Fostering Digital Competency, Building Re-employment Capacity, and Enhancing Well-being for Younger Older Adults in the Digital Economy

Background Paper

APEC Human Resources Development Working Group

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Note:
The term "National" and the names of public or private institutions used in the text are for the purposes of this report and do not imply the political status of any APEC Member Economy.

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Introduction

In 1956, the United Nations (UN) set a criterion that an economy would be defined as having entered an ageing stage or aged society if more than 7% of its population was aged 65 and above. In 1982, the UN revised this criterion to more than 10% of the population aged 60 and above. According to *World Population Prospects 2019*, by 2050, the proportion of the population over 65 years of age will reach 16%, up from 9% in 2019. Data from the World Health Organization (WHO) shows that the number of people aged 60 and above has already exceeded one billion, accounting for 13.5% of the world's total population of 7.8 billion. This number is expected to reach 2.1 billion by 2050, i.e., more than 20% of the total population then (WHO, 2020, p.2). Judged by either criterion or based on either set of data, on average the world population has entered the ageing stage.

Based on this demographic reality, the UN has been paying close attention to the living conditions of older adults, advocating for economy actions to improve their quality of life and build *a society for all ages* as proposed in the *Madrid International Plan of Action on Ageing* (United Nations Population Fund and HelpAge International, 2011). Studies have shown that education enables older adults to better themselves and become major contributors to social development. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has enjoined economies to "promote lifelong learning opportunities for all" (UNESCO, 2021). Older adult education (OAE) is the final stage of lifelong learning (Ju, 2020), and it is necessary to provide quality learning opportunities for all older adults. Therefore, the economies at various levels should include OAE in relevant policies and programmes (UN, 2019). The younger older adults are energetic and full of passion. They love a challenge, cherish learning opportunities, and are willing to contribute to social development. Education plays a constructive role in promoting the physical and mental wellness and social integration of older adults, and OAE is an effective solution to the challenges of population ageing (Liu et al., 2022). It is imperative that economies and higher education institutions widen educational access for younger older adults.

OAE is not a new topic. Many economies, including those in the Asia-Pacific Economic Cooperation (APEC), have been offering education opportunities to older adults since the 1960s. Most education programmes for older adults, however, are primarily focused on entertainment and unable to address the diverse learning needs of older adults in the 21st century, especially the younger older adults. As demographics shift, formal education is becoming more and more accessible to these older adults. In light of the diminishing working-age population, the APEC economies are trying to entice the younger older adults back into employment through formal education.

The Industrial Revolution 4.0, which is being fuelled by innovations in artificial intelligence, virtual reality, big data, cloud computing, block chain, Internet of Things (IoT), and interconnection, has significantly altered how people work and live. Today, digital and smart technologies affect almost every aspect of our lives. Compared with young people, older adults face more challenges in the digital age, especially during the Covid-19 pandemic. For example, many higher education institutions have shifted their classes online due to lockdown policies. A lack of digital literacy and skills is

one of the barriers to learning for younger older adults. It prevents them from enjoying themselves through technology and from improving their skills in preparation for getting back into the workforce.

To address these problems, under the guidance of the Department of International Cooperation and Exchange of the Ministry of Education, the Open University of China (OUC), PRC proposed the "*Fostering Digital Competency, Building Re-employment Capacity, and Enhancing Well-being for Older Adults in the Digital Economy*" project, which was approved by the APEC Secretariat on 27 October 2022. The project, numbered CN HRD 05 2022A, received USD140,531 in funding. This *Background Paper* is one of the outputs of the project. This paper is guided by the following three questions:

- Are the APEC economies all becoming ageing societies?
- What is the state of digital literacy and skills among younger older adults in APEC Economies?
- What challenges do younger older adults face in accessing re-employment?

To complete the paper, a collaborative research effort was conducted headed by OUC Vice President, Fan Xianrui. Other members from the OUC have made important contributions to the Paper, including Associate Research Fellow Hou Songyan, Professor Dr. Wang Li, Dr Yu Qijing, Dr. Jiang Yilu, Dr. Li Jing, Mr. Li Donghai, Ms. Liu Xiaoqian and Ms. Zhang Yi.

Background

The Development of the Digital Economy
The term "digital economy" was first proposed in 1995 by Don Tapscott, a Canadian business executive, author, and consultant specialising in business strategy, organisational transformation, and the role of technology in business and society. According to Tapscott, the digital economy is an economy based on digital and computing technologies, encompassing activities enabled by networking or other digital communication technologies in business, economic, social, cultural, and other spheres. Emerging technologies such as big data, cloud computing, the IoT, block chain, artificial intelligence, and 5G are the technological foundation of the digital economy (Zhao, 2022). Digital technologies create new development opportunities and fuel economic growth. Digital tech giants like Google, Microsoft, Baidu, Amazon, and Apple are among the largest corporations in the world. Digital applications are developing rapidly and have penetrated every aspect of our lives, including health, medical care, education, finance, and entertainment. New retail and new manufacturing are two pillars of the digital economy (Zhao, 2022).

The digital economy has demonstrated tremendous resilience and become an engine of global economic growth during the Covid-19 pandemic, driving traditional industries to transform digitally. The World Bank (2022) divides the world's economies into four income groups: high, upper-middle, lower-middle, and low income. Studies have shown that the value added of the global digital economy is mostly contributed by high-income, upper-middle-income, and lower-middle-income economies. Among these, upper-middle-income economies have the fastest-growing digital economies (China Academy of Information and Communications Technology,

2021). Though the digital economy is growing rapidly around the world, there is a downside to it. First, there may be a shortage of digital professionals. The construction and operation of digital platforms, which are at the core of the digital economy, involves complex processes and sophisticated technologies. It takes time to train digital professionals to construct and run such platforms. A lack of digital talent is a particular problem in remote areas. Second, people need to equip themselves with the necessary digital literacy and skills to keep pace with the digital economy. Without assistance and training, it can be difficult for people, especially older adults, to live independently in a digital society.

Most APEC Economies Have Become Ageing Societies
According to World Bank statistics, among the 21 APEC member economies, 11 are high-income economies (Australia; Brunei Darussalam; Canada; Chile; Hong Kong, China; Japan; Republic of Korea; New Zealand; Singapore; Chinese Taipei; and the United States), seven are upper-middle-income economies (People's Republic of China; Indonesia; Malaysia; Mexico; Peru; The Russian Federation; and Thailand), and three are lower-middle-income economies (Papua New Guinea; The Republic of the Philippines; and Viet Nam). There are no low-income economies in the APEC community.

APEC economies are leading the world in terms of total value added and the growth rate of the digital economy. A large number of digital professionals are needed to meet rising human resource demands. However, as of 2022, most APEC economies had become ageing societies. For example, Japan had the highest proportion of people over 65 in the world, accounting for 29.92% of the total population. This figure was 19.03% in Canada, 20.47% in Hong Kong, China, 17.13% in the United States, 16.31% in New Zealand, 17.49% in Republic of Korea, 16.9% in Australia and Chinese Taipei [1], 15.8% in The Russian Federation, 15.12% in Singapore, 15.21% in Thailand, 13.03% in Chile, and 13.72% in China [2]. The proportion of people aged 65 and above in the total population of economies that have not yet become an ageing society was also on the rise between 2020 and 2021 (World Bank, 2022). In the face of an increasingly ageing population, younger older adults have undoubtedly become an important part of the labour force of every APEC member economy in the era of digitalisation.

The Challenges of the Digital Divide
The term "digital divide" has been defined in different ways. For example, the Organization for Economic Co-operation and Development (OECD) defines the digital divide as the gap between individuals, households, businesses, and geographic areas at different socio-economic levels with regard to both their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities (OECD, 2022). This is one of the most widely adopted definitions of the term. Such gaps are often described as gaps between individuals in digital literacy and skills and categorised by the type of ICT skills required or activities people carry out online (Mossberger et al., 2003). The digital divide is a global issue and is getting worse as technology continues to advance. The digital transformation of society, population ageing, and large-scale public health

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[1] This figure of Chinese Taipei is the one in 2021, and no figures in 2022 have been found when the report was completed. https://statistics.apec.org/index.php/key_indicator/kid_result/18
[2] Statistics sourced from the World Bank: https://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS?view=map

crises are the three major external factors that lead to the emergence of the digital divide (Li & Chen, 2022). An increasing number of older adults are struggling to keep pace with the advancement of digital technologies in the age of the digital economy.

Economies facing population ageing have long been aware of this issue and have taken a variety of measures to close the digital divide affecting the older population. For example, the United States overhauled its telecommunications law in 1996. It has also increased investment in digital infrastructure and used virtual reality technology to help older adults overcome psychological barriers and integrate into society. Japan has rolled out active ageing programmes and ICT solutions and promoted age-appropriate smart home transformation. Singapore has introduced the Silver Zones and Seniors Go Digital programmes to help older adults improve their digital skills and learn to use e-government systems (Liang & Luo, 2023).

In sum, the world has entered the digital economy era, and most APEC economies are dealing with an ageing population. It therefore makes sense that younger older adults have become a critical part of the labour force. However, the grey digital divide constitutes a major challenge for older adults in the digital economy era. Aware of the fact that older adults face unique challenges when it comes to adopting digital technologies, the economies have introduced policies and measures to help them integrate into digital society. However, these policies are usually more focused on helping older adults cope with digital challenges in their daily lives rather than increasing the labour force participation of older adults. It is imperative that economies with ageing populations adopt practical measures to improve the digital literacy, skills, and competencies of older adults so they can remain competitive in the labour market.

Relevant studies

From cocoa farmers in Ghana using mobile phones to market their crops to Papua New Guinea entering the age of digital television to nurses in Sweden using telehealth to monitor their patients remotely, digital competency is considered an essential set of skills in today's world and one of the key abilities for lifelong learning (Vuorikari et al., 2022). For this reason, Target 4.4 of SDG 4 places an emphasis on "relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship." To achieve this target, the UN has called on economies to keep abreast of the digital literacy levels of young people and adults and provide relevant training.

But what exactly are digital literacy, digital skills, and digital competencies? Due to differences in political, economic, cultural, and social circumstances, different economies have proposed different answers to these questions. This is a challenge faced by international organisations such as UNESCO in helping economies achieve Target 4.4. This section will provide an overview of the studies conducted by scholars and international organisations on digital literacy and related frameworks and summarise the definitions and essential components of digital literacy, digital skills, and digital competencies.

Academic studies on digital literacy began to increase in 2000. Lenham (1995) claimed that the meaning of literacy has been expanded from the ability to read and write to include the ability to decipher complex images and sounds, emphasising the

ability to understand digital information. On the basis of Lenham's definition of literacy, Gilster defined digital literacy as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (1997, p.1). With the development of the Internet, more and more researchers have equated digital skills with Internet skills, and when talking about digital literacy and digital skills, they focus more on technical skills related to Internet use (Bruce & Peyton, 1999; Davies et al., 2002; Bunz et al., 2007; Hargittai & Hsieh, 2012). According to Van Deursen et al. (2014), computer-related skills are only a subset of digital literacy, which also include the ability to comprehend and use online content. Therefore, digital literacy can refer to comprehensive ability skills at both the conceptual and practical levels, including information, communication, content creation, safety, and problem-solving skills (Ferrari, 2012). The lack of consensus on the definition of digital literacy has caused confusion among researchers in this field.

With the development of science and technology, digital literacy and skills are becoming more and more important, and international organisations are trying to help facilitate people with digital literacy and skills, leading to the establishment of different frameworks. The European Commission was the first international organization to attach great importance to digital literacy and skills framework. In 2013, it released the first version of DigComp with the goal of improving citizens' digital competence, helping policy-makers to formulate policies and plan education and training initiatives to improve digital competence (European Commission, 2019). In 2022, after four revisions, the European Commission released DigComp 2.2 (European Commission, 2022; Vuorikari et al., 2022) to support the development of digital competences across the ever-changing social contexts of employment, education and training, and lifelong learning. Antoninis and Montoya (2018) pointed out that more than 40 digital literacy frameworks have been established around the world, and these frameworks have been developed based on the European Commission's Digital Competence Framework for Citizens (DigComp). OECD distinguishes three types of digital skills: (i) ICT generic skills that workers need to acquire in order to use ICT in their daily work, including skills to access information online or use software.; (ii) ICT specialist skills to programme and develop applications, manage networks, and engage in the production of ICT products and services such as software, web pages, e-commerce, cloud and big data; and (iii) ICT complementary skills, including skills to process complex information, communicate with co-workers and clients, solve problems, plan in advance and adjust quickly (OECD, 2016a). The International Labour Organization (ILO) identifies three types of basic digital skills including using basic hardware, basic software, and skills to operate safely in an online environment (ILO 2021b). APEC groups digital skills into four categories: basic digital literacy such as accessing email and using basic applications such as Microsoft Office; applied tech skills relating to using enterprise software and platforms to improve job efficiency and performance, such as SAP ERP and social media; software and hardware tech skills related to developing software and hardware, such as mobile app development and printed circuit board (PCB) design; and disruptive tech skills required for designing and developing new technologies, such as artificial intelligence and robotics (APEC Human Resources Development Working Group, 2020).

The above theories of digital literacy and skills are all on the theoretical level. There has been little coverage of how to improve digital literacy and skills for the labour

force, particularly for younger older adults who are a potentially huge part of the human resources needed in the digital economy. This paper, with the aim of providing a solution to this issue, examines three aspects including population development trends, the status quo of digital literacy and skills of younger older adults, and the current situation of re-employment for younger older adults in APEC economies.

Research questions

This background paper is guided by three main questions:

Question 1: What is the development trend of population ageing and the current situation of OAE in APEC economies?
Question 2: What is the current state of digital literacy and skills among younger older adults in APEC economies?
Question 3: What re-employment prospects are there for younger older adults in APEC economies?

Methodology

The methods adopted in the background research include:

Due to the Covid-19 pandemic, a field study was impossible, so desktop research was employed. Sources of information including digital libraries, the Internet, books, documents, and reports were used to gain a comprehensive understanding of the development trends of the ageing population, OAE, digital literacy and skills, and the re-employment of younger older adults in APEC economies.

An online questionnaire survey was designed to help answer questions such as what challenges do younger older adults face in the use of digital technologies, how to solve these challenges, and what kind of digital literacy and skills younger older adults need in order to return to the workforce.

Semi-structured interviews were also conducted. Twenty people, including researchers, scholars, teachers, and the younger older adults in APEC economies, were interviewed using WeChat, Tencent Meeting, emails, and Zoom.

Based on the outcomes of the desktop research, literature review, and semi-structured interviews, case studies of five APEC economies – Australia; China; Japan; Singapore and the United States – were selected. The paper introduces in detail the challenges of population ageing faced by the five economies, as well as the state of education, digital literacy, and the re-employment of older adults, especially the younger older adults, in these economies.

Findings

The Overwhelming Majority of APEC Economies Are Facing Population Ageing and Corresponding Policies Have Been Proactively Put in Place to Address This Issue
Statistics show that 17 APEC economies have already become ageing societies, and some developed economies are about to enter a moderately ageing society. Some economies that have not yet become ageing societies also have an older adult population that is very close to the standard set by the UN. It is estimated that by

2050, the older adult population in major APEC economies will continue to grow, with nearly half of the economies entering a severely ageing society and the overwhelming majority of the remaining economies entering a moderately ageing society. Overall, population ageing will be a serious social problem faced by each economy.

To actively respond to population ageing, all the APEC member economies have introduced macro policies and strategies at the economy level, coupled with specific measures and related initiatives. A variety of measures are being taken, such as encouraging older adults to participate in lifelong education, strengthening vocational training, and creating conditions and opportunities for older adults to participate in re-employment, in order to fully tap into the potential of older adults and make full use of their knowledge and experience and make them an integral part of effective human resources.

The Proportion of Women in the Older Adult Population is Slightly Higher, but They Have a lower Employment Rate Than Men
In all the APEC economies, the proportion of female older adults in the total population is slightly higher than men. As a result, caring for them is an indispensable part of coping with the ageing population. In terms of employment rate among the older adult population, the employment rate is higher for men than for women.

APEC Economies Have Implemented Various Forms of OAE, Mainly Focused on Leisure and Entertainment Activities
APEC economies have developed five main models for OAE. The first is higher education institutions and vocational colleges offering education for older adults or enrolling older adult students, aiming to provide compensatory education for them and prepare them for re-employment. The second is independent universities for older adults or universities of the third age. The third is community education institutions. The fourth is public service institutions such as libraries and museums that hold education activities for older adults. The fifth is research institutes for retired people, which conduct research on topics that interest this group. The course contents range from knowledge and experience sharing to cultural arts and life skills with the main goal of enabling older adults to enjoy life after retirement. Some economies have also focused on training in trades or digital and computer skills with the aim of preparing older adults for re-entering the job market. However, according to the research, fewer economies have put in place educational content of the latter type.

Older Adults Have the Potential for Re-employment
The overwhelming majority of APEC economies believe that younger older adults are one of the human resource groups with the most potential against the current background of population ageing. In order to fully tap their potential and stimulate their enthusiasm, each economy has introduced a variety of macro initiatives at the highest level, including pushing back the retirement age, providing training on job technology and skills, and eliminating age discrimination through legislation. Economies at all levels are working with enterprises to create a friendly and relaxed working environment for the re-employment of younger older adults. From a micro perspective, younger older adults have rich work experience and can realise their own individual value through re-employment. In some economies, older adults pursue re-employment to improve their own economic level.

Most APEC Economies Have a Strong Demand for Digital Talents
Regardless of whether it is at the economy level or based on development trends in related industries, most APEC economies predict a high demand for digital talents in their respective economies. In general, there are three levels of demand. The first is baseline digital skills, covering Microsoft Office software, enterprise resource planning, and project management software. The second is specific digital skills, such as data analysis, digital design and marketing, software and programming, computer and network support, customer relationship management, and machining and manufacturing technology. The third is cutting-edge digital skills needed for rapidly developing advanced digital technologies.

Older Adults Face a Digital Divide in Returning to the Job Market
The advancement of digital technology has created new professions while also changing existing jobs and their requirements. As one of the world's fastest-growing regions, the Asia-Pacific region has been undergoing rapid digitalisation. The Covid-19 pandemic has given further impetus to the development of industries related to digital skills and expertise. Compared to people of other age groups, older adults generally have a lower level of digital literacy and skills, with a basic grasp of digital skills focused mainly on socialising and entertainment. Due to the impact of factors such as individual interest, security, economic status, product usage experience, and social attention, older adults may not have the ability, courage or willingness to use digital technology. With the rapid development of information technologies such as big data and artificial intelligence, a lack of digital literacy and skills can make it difficult for older adults to integrate into society, which reduces their sense of happiness, fulfilment, and security, and ensures that the digital divide persists.

Implications

This paper focuses on the current state of OAE, digital literacy and skills, and the re-employment of older adults, especially the younger older adults. It adds to the body of theoretical work on population ageing and offers a theoretical basis for bridging the digital divide for older adults and keeping them in the workforce. It informs policy-making for the older adult population in APEC economies and their digital literacy levels, thereby helping APEC economies improve the well-being of older adults and address labour shortages at the practical level. The report also seeks to help younger older adults in APEC economies reap the benefits of economic development, improve digital literacy, and further contribute to the sustainable development of APEC economies.

Theoretical Implications

Increasing the Theoretical Research on Population Ageing
Theoretical research of population ageing is seriously lagging in today's society. Expanding the body of theoretical knowledge about population ageing is the premise for actively responding to population ageing. This paper examines the theoretical solutions to healthy ageing and active ageing by combining perspectives from demography, sociology, pedagogy, economics, and other fields. It also analyses the new demographic characteristics of APEC economies and the new needs arising from changes to their demographic structures. The research findings will advance the

understanding of the potential paths by which population ageing may affect economic recovery and development. The world is becoming increasingly digitalised, and its population is ageing. In this context, the paper could offer an insight into the academia regarding issues such as how to improve the well-being and boost the labour force participation rate of older adults in the digital age and updates theoretical knowledge on population ageing. It offers a future-oriented perspective on the issue of population ageing.

A Theoretical Basis for Bridging the Digital Divide for Younger Older Adults
Digital literacy and skills are the key points of this paper. The paper examines the diverse definitions and frameworks of digital literacy, digital skills, and digital competencies. Based on these theories, it shows that younger older adults in APEC economies face a digital divide, which may hold them back from returning to the labour market. However, this theoretical knowledge also demonstrates the potential contributions if younger older adults could play a positive role in the labour market and lays a foundation for bridging the digital gap for younger older adults.

A Theoretical Basis for Keeping Younger Older Adults in the Workforce
With the continuous growth of the older adult population, all APEC member economies have a large developable talent pool. In his book *The Economics of Ageing*, James H. Shulz comprehensively analysed a series of unavoidable vulnerabilities faced by older adults in their material and spiritual life, advocated for active ageing, and encouraged older adults to participate in the workforce. To address the workforce dilemma posed by population ageing, it is imperative that APEC economies tap the older talent pool. This paper reveals that some deep ageing economies have already taken measures in this regard. For example, Japan has the highest proportion of older adults in the world and has a wealth of experience in responding to the ageing society. Since the 1960s, it has recognised older adults as important contributors to its labour force and rolled out a slew of policies to keep older adults in the workforce longer. This paper emphasises the importance of boosting the labour force participation rate of older adults by helping them to improve their digital literacy and skills. It provides a new perspective and a new theory on the issue of population ageing.

Practical Implications

Essential Information About Ageing Populations in APEC Economies and Their Levels of Digital Literacy
The paper collects and summarises relevant information and provides an opportunity for APEC economies to understand and learn from each other's strengths regarding the younger older adult population and their digital literacy and skills. It also offers a comprehensive overview of how well older adults in APEC economies, especially younger older adults, are adapting to the digital society. It is a reliable source of data and information on digital transformation and the digital literacy of older adults across APEC economies.

How Policymakers in APEC Economies Can Improve the Well-Being of Older Adults and Address Labour Shortages
Raising the digital literacy and skills of younger older adults can help improve their well-being and increase the inclusivity of education. It can also help older adults to

improve their employability and contribute to economic recovery and development. The methods adopted in the paper include questionnaire surveys, desktop research, interviews, and case report research. It analyses policies and practices adopted by APEC economies to improve digital literacy and skills of older adults and encourage them to participate in social and economic life and informs policy makers of the challenges of population ageing and potential solutions to these challenges.

A Foundation for Helping Younger Older Adults in APEC Economies Benefit From Economic Development and Raise Their Level of Digital Literacy and Skills

The direct beneficiaries of this paper will be younger older adults. By studying relevant policies and practices, the actual needs of younger older adults can be understood and solutions to meet those needs can be developed, thereby contributing to social and economic development. Although some older people no longer participate in the labour market, their experience still constitutes an important part of today's human resources. In this sense, in view of their past contributions, younger older adults have a right to participate in social development after retirement. The paper points out that improving the digital literacy and skills of younger older adults is an important way to help them bridge the digital divide, increase employability, and return to the labour market.

Suggestions

Establish a More Inclusive Human Resource System

Population ageing has become a major social issue that APEC economies are either currently facing or will face. One of its direct consequences is the reduction of younger human resources. In the interest of promoting the current and future prosperity and post-pandemic economic recovery of all APEC economies, it is imperative that each economy establish a positive and friendly employment mechanism at the economy level and admit younger older adults to the labour market as an important and necessary part of effective human resources. Each economy should consider establishing its own systematic and age-inclusive human resource system based on its specific political, economic, social, cultural, and educational situation.

Enhance Re-employment Capacity Building for Female Older Adults

Younger female older adults account for a large proportion of the older adult population and should thus be a major part of an age-inclusive human resource system. For a long time, the social mission of women has been limited to some extent due to family responsibilities. Lower-aged female younger older adults are far less burdened than when they were as they have completed the task of raising their children. Therefore, it could be an effective supplement to human resources to give play to the social function of younger female older adults against the background of a dwindling workforce. To achieve this, it is necessary to establish employment skills counselling and training mechanisms for female older adults to enhance their re-employment capacity.

Provide Skills-Oriented Education for Older Adults

Strengthening education for older adults is an effective way of enhancing their employment ability. Although most APEC economies have developed OAE, most focus on providing products for leisure and entertainment, and the supply of

employment-oriented education is still insufficient. To enable older adults, especially younger older adults, to adapt to the development needs of the labour market, it is imperative to use the needs of employers and the market as a guide for OAE and design and develop corresponding educational products tailored to the characteristics of younger older adults. This will reduce employment barriers via education, keep pace with social development, and adapt to the needs of the era of digital economy.

Establish Universal Standards for Digital Literacy and Skills
Improving digital literacy and skills has become a common issue faced by all APEC economies. The paper shows that both international organisations and individual economies have developed and designed corresponding standards for improving citizens' digital literacy and skills. However, these standards vary greatly due to the different specific situations in each region and economy. This paper proposes developing a set of digital literacy and skills standards for citizens in the Asia-Pacific region with particular consideration given to their appropriateness for younger older adults in the current era of the digital economy. Providing digital literacy and skills training for older adults will not only help them adapt to the digital economy but also assist younger older adults in bridging the digital divide and prepare them to enter the digital workforce.

Put Institutionalised Re-employment Security Measures in Place
All the APEC economies have released policies and measures to encourage younger older adults to return to the labour market and continue to contribute to society through re-employment. However, these policies and measures are still incomplete. In order to tap into the employment potential of younger older adults fully and sustainably, it is necessary for the APEC economies to develop comprehensive re-employment security measures at the macro level of the economy, the intermediate level of businesses and educational institutions, and the individual micro level. A "top-down" approach will ensure sufficient human resources supply, while a "bottom-up" approach will ensure the active and highly-motivated return of younger older adults to the labour market.

Case Studies

Australia

Population Ageing
Increases in life expectancy and declines in fertility have accelerated population ageing in Australia. The following table presents the population data for all age groups, as provided by the Australian Bureau of Statistics in June 2021.

Table 1
Distribution Ratios of Populations of all Age Groups in Australia

Age Group	Population Size	Percentage of the Total Population
0-17	5,655,727	22%
18-49	11,283,064	44%
50-64	4,558,327	18%
65-79	3,138,426	12%
Above 80	1,057,723	4%
Total Population	25,693,267	100%

People aged 50 and above, totalling 8,754,476, account for 34% of the population. Of

this group, 4,558,327 are younger older aged 50-64, accounting for 18%; 3,138,426 are in the 65-79 age group, accounting for 12%; and 1,057,723 are over 80, accounting for 4%. By 2066, the older-adult population is expected to be 21-23% of the total, with the fastest growth occurring between 2009 and 2029 (Australian Bureau of Statistics, 2019). Since women tend to live longer than men, about 53% of the existing Australian population over 65, or around 2.2 million, is female, while male older adults number around 2 million (Australian Bureau of Statistics, 2020).

Older Adult Education in Australia

The Australian public recognises that older adults not only need care but also opportunities to learn after retirement. Learning empowers them to increase social participation, continue to contribute to their families, and maintain a high quality of life (Reghenzani-Kearns, 2018). There are many ways in which OAE is offered in Australia. The first is the University of Third Age (U3A), which provides learning resources for older adults. By 2022, more than 150 U3As had been founded, creating a friendly learning environment for nearly 100,000 older adults (U3A Network Queensland, 2022). The second is adult community education (ACE), a relatively independent education system offering skills training. Some large ACE institutions also provide advanced vocational qualifications. Nowadays, ACE makes significant contributions to the lifelong learning of people from all walks of life and has led to the development of community colleges (Hou, 2020). The third is public facilities that provide informal learning opportunities, such as libraries, community-service agencies, and volunteer-service teams, which are common in Australia.

Development of the Digital Economy in Australia

Australia attaches great importance to the development of the digital economy. As early as 2009, the federal government released "Australia's Digital Economy: Future Directions" (Commonwealth of Australia, 2009), clarifying the importance of the digital economy for Australia, industrial enterprises, and communities. The development of the digital economy in communities emphasises the need to enable organisations to enhance digital literacy, strengthen inclusiveness and participation, and benefit communities through access to the internet. Australia increasingly recognises that digital technology not only changes production and lives, but also offers significant opportunities for economic and social development. Therefore, in 2018, Australia released "Australia's Technology Future - Achieving a Strong, Safe and Inclusive Digital Economy", one of the goals of which is to equip Australians with the skills to adapt to a changing job market and promote the continued growth of businesses (Zhang, 2019). After the outbreak of Covid-19 in 2020, uses of digital technology have been growing throughout Australia, and released "Australia's Digital Economy Strategy 2030" (Australia, 2022), highlighting the role that digital technology can play in supporting and strengthening business operations across all sectors of the economy, improving the delivery of administration services, and making life easier for Australians. This covers everything from telemedicine and electronic prescriptions to online sales, cloud computing, and telecommuting. In this strategy, Australia has determined that one of the priorities of the digital-economy strategy is to strengthen cooperation with private enterprises, promote their input in work related to the digital economy, and enhance the use of information technology. The Covid-19 epidemic has accelerated the use of such technology in Australia.

Digital Literacy Among Older Adults in Australia
According to the Australian Bureau of Statistics, 98% of young people aged 25-34 and 83% of those aged 55-64 are able to use the internet. In contrast, only 55% of those over 65 (ABS, 2017) have this ability. In short, internet use skews drastically younger. The 2019 Australian Digital Inclusion Index (ADII) showed that those over 65 represent the youngest age group with the least digital inclusion (Thomas et. Al., 2019). The 2021 ADII listed those over 65 as the age group with the most exclusion in the economy in 2021 (COTA, 2022). Other data show why people use the internet, as well as the economic, social, and personal benefits they get from it (McCosker et. al., 2020). Many older adults have adapted poorly to digital technology, for reasons including affordability and lack of instruction. Rapid changes make it impossible for them to keep up without professional guidance. Older adults in Australia face greater barriers than other age groups in getting access to online health, welfare, and business services, as well as social connection, with Covid-19 posing an additional challenge since 2020. Both the technology they have access to and their ability to use it are at a low level. Australia sees it as a challenge to enable their full participation in every aspect of online social life and has developed a digital-literacy strategy for this purpose (McCosker et. al., 2020).

Australia's Demand for IT-literate Human Resources
IT skills are needed in vocational fields both inside and outside the ICT industry in Australia. Outside the industry, a huge demand exists for skills in Office software, enterprise resource planning, and social media. Inside the industry, software programmers, app designers, computer-network professionals, and others are required.

The Australian Bureau of Statistics defines retirement as leaving for a period of time with no plan to continue working (ABS, 2020). In 2018-2019, there were 3.9 million retirees aged 45 and above, with an average retirement age of 55.4 years. The average retirement age was 60 years for men and 52 years for women (ABS, 2020). In 2018-2019, fewer than 18% of those aged 45-64 said they were going to retire before 65, 33% of them planned to retire between 65 and 69, and 11% after 70. Another 38% said they had no idea when they would retire. The average retirement age is 66 years (66 for men and 65 for women) (ABS, 2020), and the overwhelming majority of young older adults have no desire to retire.

Challenges Faced by Older Adults in the Digital Economy
The Covid-19 pandemic resulted in a sharp drop in immigration to Australia, and a large part of the labour force was needed for infection control, leaving Australia with a shortage of labour. In August 2022, legislators proposed encouraging those over 65 return to work (The Australian, 2022), showing that this age group is welcomed for re-employment in Australia. However, the reality is that Australia proposed a strategy to maintain its global strength in the digital economy and has thus created a large number of vacancies related to digital technology. Older adults who are able to return to the labour market are not skilled in digital technology; 49% of those aged over 65 know nothing about it (China News Network, 2018), and the economy training offers only basic literacy. As a result, older adults are far from able to fulfill digital-related job descriptions. This reflects the challenges Australian older adults face in returning to the labour market in the digital age.

Promoting Re-employment among Older Adults in Australia
In Australia, neither younger older adult nor the older workforce can find suitable work, regardless of whether they retire earlier or later than the usual age. However, people over 50 have a better ability to create value for society because of their rich work experience. Scholars point out that the employment participation rate of those aged 50-69 will have increased by 5% by 2050, and the GDP will have increased by 2.4% (Chomik & Piggott, 2012). Therefore, a higher employment rate among older adults can be said to promote economic development.

In order to help this group gain re-employment, Australia invested A$43.3 million to implement the "Productive Ageing Package" in 2010 along with the Consultative Forum on Mature Age Participation in Australia. The initiatives fall into four areas: formulating relevant laws and regulations; enhancing employers and the work environment; offering healthcare; and offering training (CEPAR, 2013). Programmes to train qualified seniors to work as mentors of young people have been implemented. Not many programmes regarding digital literacy and skills have been found yet.

China

Current Status and Development Trends of China's Ageing Population
At present, China is the economy with the largest number of older adults in the world. According to the results of the seventh census, as of November 2020, the number of people in China aged 60 and above had reached 264 million, accounting for 18.7% of the total population, and the number of people aged 65 and above had reached more than 190 million, accounting for 13.5% of the total population. It is estimated that by 2025, the total number of people aged 60 and above will exceed 300 million, making up 21.6% of the total population; by around 2035, the population of people aged 60 and above will be 412 million, representing 29.8% of the total population; by 2050, the population aged 60 and above will reach 480 million, and China will become a deep ageing or even super-aged society.

Table 3
Trend of Changes in the Size and Proportion of the Older Adult Population in China (2015-2060)

Year	Population size of older adults aged 60 and above		
	Total (hundred millions)	Annual net increase (10,000)	Percentage (%)
2015	2.21	958	16.1
2020	2.54	447	18.1
2025	3.04	1172	21.6
2030	3.65	1356	26.0
2035	4.12	669	29.8
2040	4.32	286	32.0
2050	4.80	749	37.8
2060	4.64	-511	40.1

Current State of Education for Older Adults in China
All levels of government in China, as well as various enterprises, institutions, and social groups, have constantly increased their efforts to promote and be engaged in the development of education for older adults. The National Veteran Cadre

Administration System, the Ministry of Culture and Tourism, the Ministry of Veterans Affairs, the China Association for Science and Technology, and the Open University system all run universities for older adults. An increasingly open and diverse atmosphere for the establishment of universities for older adults has started to appear in China.

Governments at all levels are actively mobilising various educational institutions to jointly provide education services for older adults. The first task is to encourage traditional colleges and universities and vocational colleges to find opportunities to be engaged in education for older adults. At present, there are more than 100 colleges for older adults run by colleges and universities. The second task is to encourage primary and secondary schools to open libraries, laboratories, stadiums, and other venues to older adults on the premise of ensuring the education quality of their own students. In addition, some enterprises, individuals, and social organisations are actively extending the government's measures to benefit older adults, including participating in the establishment of universities or teaching sites for older adults, contributing funds, integrating resources, and making favourable attempts to promote inclusive education for older adults.

Current State of Digital Literacy and Skills Among Older Adults in China
With the continuous improvement of Internet infrastructure, the number of older people with basic Internet skills in China has now entered a stage of steady growth after experiencing rapid growth, and its percentage among the total population of older adults is stabilising. The factors restraining the use of the Internet among older people include physical or health factors and lack of digital proficiency and equipment. In terms of specific skills, older people use the Internet most frequently for social media and entertainment functions, while their information researching skills remain relatively weak.

This report surveyed a sample of Chinese middle-aged and older adults born before 1977 on their views on senior citizens' lives in the digital economy. Among the 2,385 valid surveys collect, 47.30% of respondents consider the difficulties caused by the digital divide to be an important issue affecting the lives and careers of older adults. 45.53% of the respondents believe that younger older adults are unable to perform jobs related to electronic devices, 55.81% believe that younger older adults lack safety awareness when using online devices, and 22.39% believe that younger older adults have difficulties in their daily lives, such as being unable to shop and pay. 75.81% of respondents believe that older people should improve their awareness of online safety, 69.39% believe that older people should improve their basic digital skills, and 30.19% believe that older people should improve their professional digital skills. 45.24% of respondents think there are sufficient learning resources in China to help older people improve their digital literacy and skills, 29.60% think there are not enough learning resources, and 25.16% are not sure if there are enough learning resources.

China's Demand for Digital Human Resources
With the rapid development of China's digital economy and ICT industry, the demand for digital talents is continuing to rise. In 2021, the number of ICT-related posts increased by 34% compared with the same period in 2020, while the number of applicants experienced a sharp decline. As the demand for ICT talents continues to grow, there is an increasingly severe lack of human resources. With the further digital

transformation of various industries, the demand for digital professional skills and abilities to solve complex problems is expected to rise, and there is a shortage of high-quality interdisciplinary talents with practical experience. According to the 2020 Future Employment Report survey, 55% of the companies surveyed believe that "insufficient employee skills" constitutes the primary challenge in utilising new technologies.

With the rapid expansion of relevant companies in tier 1 and tier 2 cities in China and the increasing convenience of transportation, many ICT companies have begun to expand their business to tier 3 and tier 4 cities, where there is a serious shortage of talent. In terms of industrial structure, the salary for digital human resources in tertiary industry in China is significantly higher than in primary and secondary industry, and there is an accelerating trend of migration from primary and secondary sectors to tertiary sector. In terms of level and structure, China lacks reserves of digital leaders and basic-level technicians. According to a survey of ICT enterprises, 55% of enterprises said that they lack digital leaders. At the same time, there is a mismatch to between basic-level technicians and the actual needs of the market.

The Re-employment Situation for Older Adults in China
The China Population Census Yearbook 2020 indicates that 5,777,863 people aged 60 or above are still employed, accounting for 9% of the total employed population and 2.19% of the population aged 60 and above. Among older adults aged 60 and above, the age group with the highest employment rate is 60-64, followed by those aged between 65-69, and the number of employed people decreases with age. Among all age groups, the employment of men is higher than that of women, with 62.4% of men aged 60 and above employed, compared to only 37.6% of women.

In China, the retirement age is usually 60 for male workers, 55 for female cadres, and 50 for female workers. There are two main reasons for "continuing working" or being "re-employed". The first is trying to achieve personal value, and the second is that there is an economic need to maintain income through working. Social discrimination and physical problems caused by age are the biggest challenges faced by older adults seeking re-employment. 41.3% of interviewed job seekers said that they been rejected when applying for a job because of age, 28% of older job seekers said they lack energy, and 16.3% are troubled by lack of professional skills.

Japan

Definition of "Older Adult" in Japan
In many economies, including Japan, the term "older adult" refers to people aged 65 or above. As medical conditions further improve along with the changes to diet and lifestyles, most older adults enjoy great physical health and are quite energetic regardless of individual differences. However, in Japan, academics propose that people aged between 65-74 are in a period of "pre-old age", while those above 75 years are in old age (Ouchi et al., 2017). According to this definition, healthy old people, especially younger older adults, should be motivated to actively participate in social activities and enhance their social value and sense of engagement.

Older Adults as a Proportion of Japan's Population
According to data from Statistics Bureau of the Ministry of Internal Affairs and

Communications of Japan, as of 21 November 2022, the total population in Japan is 124.85 million, with 60.69 million men and 64.16 million women. The number of people aged 65 and above is 36.25 million, accounting for 29.0% of the total population, an increase of 87,000 or 0.24% over November of the previous year, among which 15.73 million are men and 20.51 million are women. There are 16.79 million younger older adults aged 65-75, accounting for 13.4% of the total population and 46.3% of the population aged 65 and above (Statistics Bureau of Japan, 2022). According to the United Nations World Population Prospects 2022, Japan is suffering from severe ageing, and its ageing rate (29.8%) is second only to Monaco (36.0%), ranking second in the world (see figure 1). The Japanese government has formulated policies and strategies at both the macro and micro levels to respond to its ageing society.

Figure 1 Proportion of population ageing in Japan in 2022
(Source: United Nations Population Division data)
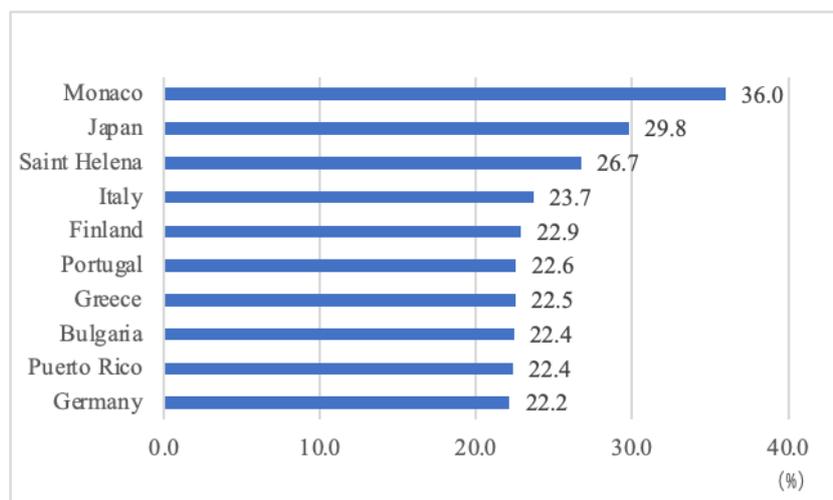
Current State of Education for Older Adults in Japan

As one of the economies with the largest number of older adults, Japan's OAE system has accumulated rich experience over the course of more than half a century of development, and has formed a model led by the government with extensive social engagement that is collaboratively governed by government welfare institutions and education administration institutions. Japan has two main forms of OAE: government-financed and self-governing. The former constitutes the main form of OAE in Japan, and the latter serves as a future direction. The parties providing OAE in Japan are diverse, including government agencies, longevity universities, senior universities, and local public groups. OAE in Japan offers a wide range of courses catering to knowledge and job-hunting needs, and the content is closely related to older adults' lives, including medical care, interpersonal communication, leisure and entertainment, life after retirement, mental health, and interpretation of hot social topics. At the same time, many group activities take place in public facilities such as libraries, museums, and theatres that further enrich the learning experiences of older adults.

Current State of Digital Literacy and Skills Among Older Adults in Japan

In 2021, the Ministry of Internal Affairs and Communications of Japan conducted a survey on the use of information and communication services. Firstly, the results revealed that in terms of the use of mobile communication terminals, people aged 60-69 boast the highest proportion of users of smart phones at 79.3%, while the 70-79

age group has the highest proportion of users of traditional mobile phones. Secondly, in terms of the use of Internet, the percentage of Internet users is 82.9%. Among these, the percentage of users over 60 years old decreases as age increases, and the percentage of women from all age groups above 60 is lower than that of men. The 60-69 age group has with the highest Internet use rate at 84.4% (86.5% for men, 82.5% for woman), followed by people aged between 70-79 at 59.4% (65.8% for men, 53.9% for women) and 27.6% for people over 80 years old (37.5% for men, 21.9% for women).

According to the survey, in terms of the purposes of using ICT, social networking services (SNS) rank highest with a proportion of 78.7%. Among users over 60 years old, the share of "communicating with acquaintances" is the highest (88.6%), followed by "looking for information they are interested in" (63.7%). In addition, compared with 2020, the percentage of users aged 60-69 has grown from 60.6% to 71.7%, and the percentage of users aged 70-79 has increased from 47.5% to 60.7%. The percentage of people over 80 has grown only slightly, from 46.7% to 47.4%. It can be concluded that the main purpose of using ICT for older adults in Japan is for communication and to meet their social needs.

With regard to individual anxiety related to the use of Internet, more than 70% of people feel a certain kind of anxiety, and 71.9% "feel upset" or "generally speaking, somehow upset". Among all age groups, the 60-69 year-old group has the highest rate of people feeling anxious about using the Internet, reaching 81%, followed by the 70-79 year-old group at 79.7%. In terms of reasons for their anxiety, 90.1% of people are concerned about "leaked personal information and network search history", followed by "getting a computer virus" at 62.7%, and lastly "becoming victim of a fraud when surfing online", representing 54.1%. It can be seen that Japanese people are cautious about the use of information technology, and most people feel anxious due to personal privacy concerns or other reasons. This may also be slowing down Japan's digital transformation.

In order to build an inclusive society where everyone, including older adults, can enjoy their lives by using digital devices and services while maintaining their own diverse values and lifestyles, in 2022, the Ministry of Internal Affairs and Communications launched a project promoting people including older adults to learn how to use digital devices and services from people they know and in an environment in which they feel relaxed. Local governments across Japan have adopted corresponding measures according to their own circumstances to improve the digital literacy and skills of older adults. For example, Tokyo's Shibuya District lent smartphones to residents aged 65 and above without smartphones for two years to encourage them to use devices and applications, optimising their quality of life. Kaga City in Ishikawa Prefecture holds meetings on how to use digital devices such as smartphones so that older adults can benefit from a data-driven society.

Japan's Demand for Digital Human Resources
According to the 2022 Information and Communication White Paper released by the Ministry of Internal Affairs and Communications of Japan, 70% of Japanese companies indicate that there is a "shortage of human resources" (Ministry of Internal Affairs and Communications, 2022b). In addition, many companies in Japan pointed to "insufficient technology knowledge and literacy", which reflects their problems in

human resources. More than 30% of Japanese companies are facing a "serious shortage" of professional talents in artificial intelligence (AI) and data analysis. In 2018, the shortage of ICT professionals in Japan totalled approximately 220,000 people, and this number will soar to 450,000 persons by 2030 according to the Ministry of Economy, Trade and Industry.

Increasing the Employment Rate of Older Adults
According to statistics from the Ministry of Internal Affairs and Communications of Japan, 9.29 million older adults aged 65 and above were employed in 2021, an increase of 70,000 compared with the previous year, and this figure has been rising for 10 consecutive years since 2012. The employment rate of the population over 65 is 25.6%, among which the male employment rate is 34.9% and the female employment rate is 18.4% (Statistics Bureau of Japan, 2021). Both the central government and local governments have adopted measures to help older adults get re-employed. For example, the retirement age has been extended to over 65 years old, and trainings have been organised for older adults to improve their knowledge and practical skills. Projects have been launched to offer more opportunities for older adults to work in communities.

Singapore

Current Status and Trends of the Older Adult Population in Singapore
Over the past decade, Singapore's ageing population grew faster than that of Japan; Korea; and China. The reasons for this can be attributed to the long-term low fertility rate and longer life expectancy due to the improvement of medical conditions. As can be seen from the latest Census of Population, Singapore is undergoing rapid ageing. The total population of people over 65 years old is 678,000 with an increase of 6.1% month-on-month, far exceeding the growth rate of other age groups. The proportion of people aged 65 and above also increased from 16% in 2021 to 16.6% in 2022. As of June 2022, the proportion of people aged 65 and above in the total population had risen from 11.1% in 2012 to 18.4%. [3]

Singapore's Policies and Documents in Response to Ageing Population
Facing a rapidly ageing population, the Singapore government has been studying strategies to vigorously improve the living conditions of older adults. A series of policies to improve the well-being and quality of life of older adults have been formulated, such as creating older adult-friendly communities, developing education for older adults, and offering preferential subsidies.

The Singapore government was alert to the potential ageing population as early as the 1980s and hence set up the Committee on the Problems of the Aged in 1982 to analyse the influence of population ageing trends and propose solutions intended to rectify society's attitude towards older adults and build a correct understanding of the problem. For the sake of the physical and mental health of older adults and to help them stay positive and healthy, the Committee called for an increase in the retirement age from 55 years to 60 years (later raised to 65 years) and gradually lifted the age for pension withdrawal. The scheme also recommended alternative work patterns such as

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[3] Source: Singapore Department of Statistics (DOS) https://www.singstat.gov.sg/

part-time work, flexible work, and working at home for older adults to help them access more job opportunities.

Striving to achieve the vision of "Successful Ageing for Singapore", Singapore incorporated the concept of the ageing population into its public policy and set up an Inter-Ministerial Committee on the Ageing Population to formulate comprehensive strategies in 1999. The Committee proposed 78 recommendations in six major fields, including social integration, healthcare, financial security, employment and vocational competency, housing and land use, and cohesion and conflicts in an ageing society[4]. Singapore's basic concept in approaching the ageing issue was to seek collaboration from all sides with the individual as the leading role and the family as the auxiliary, and the well-being of older adults would be improved through comprehensive cooperation between the community, families, and the older adults themselves.

Current Status of Digitalisation and the Definition of "Digital Literacy" in Singapore

As a competitive Asian economy, Singapore was one of the first economies in the world to propose the idea of structuring a digital government and has committed to digitalisation and informatisation in the long run. Singapore ranked second in the 2018-2019 Smart City Government Report and topped the IMD Smart City Index in 2019. Since the early 1980s, the National Computerisation Plan has been gradually promoted. In 2006, the Singapore government unveiled the Intelligent Nation 2015 (iN2015) master plan. After years of exploration and practice, the iN2025 master plan was formulated in 2014 to propel digitalisation. These efforts have prompted remarkable achievements in Singapore's digitalisation process. The Singapore government values the iN2025 master plan highly as it is a development plan and the first initiative in the world to build a smart nation. The Smart Nation and Digital Government Office (SNDGO), the leading authority of this master plan, is directly led by the Prime Minister's Office (PMO). The SNDGO is responsible for the top-level design of the iN2025 master plan and maps out specific project content and schedules for execution, promotes digital application and participation from the public and industrial sectors, and perfects the system and mechanism design for governmental supportive policies. The Government Chief Digital Technology Office (GCDTO) of the SNDGO is responsible for executing specific work. The master plan concentrates on three strategic priorities, digital economy, digital government, and digital society, and has adopted the 3C concept (Connect, Collect, and Comprehend) as its overall framework while adhering to the 3-In principle (Innovation, Integration, and Internationalization) to enshrine the basis of building a world-leading smart city. It will lay a solid foundation for future digital infrastructure, platform construction, and digital resource sharing.

The definition of digital literacy remains controversial in the academic community. The Ministry of Communications and Information, the Ministry of Education, and other agencies have drawn up different digital and information literacy frameworks for different objects and goals. For example, the Digital Readiness Blueprint published by the Ministry of Communications and Information in 2018 indicated that to cope with digital challenges, competency shall be enhanced in three aspects: the ability to acquire digital information, digital literacy, and digital engagement and

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[4] Report on the aging population,1999. Inter-ministerial committee on population ageing, Inter-Ministerial Committee.

creation. The programme bases the cause of comprehensive digital reform on four strategic thrusts: expanding and enhancing digital access for inclusivity; infusing digital literacy into the economy's consciousness; empowering community and business to drive widespread adoption of technology; and promoting digital inclusion by design.

Digital literacy is also influenced by gender, age, income, and social class. Social inequality further expands when different people possess differentiated opportunities and abilities to access new information technologies. IMDA surveyed the use of digital technology among older adults and discovered that their acceptance of digital technology was influenced by many factors, including personal, family, society, and technological factors. Firstly, older adults generally have insufficient digital literacy and knowledge due to age, educational qualifications, state of health, and other personal reasons. Secondly, a depressed economic state hinders some older adults from purchasing digital equipment and suppresses their will to bear high communication costs, impeding them from acquiring digital skills. Finally, external factors such as insufficient learning channels and barriers to operating sci-tech products have led to lagging performance among older adults and their failure to share digital dividends during the digitalisation process. They are overawed by the difficulties and drop out of this process gradually in this ever-enlarging digital divide.
The improvement of digital literacy is not only influenced by external factors but also related to internal factors such as physiological and psychological features. As they get older, physical skills such as eyesight, hearing, and memory decline to some extent. This often leads to a sense of incapability and frustration in learning new skills and knowledge, thus breeding psychological resistance and weariness and indirectly lowering the acceptance of digital technologies among older adults. It is of critical importance to improve the confidence and learning interests of older adults to settle this dilemma. Moreover, support from families and friends can bolster the learning interests of older adults as family support and intergenerational assistance can help them find out new things, guide them to learn basic digital operations, and strengthen digital inclusion and confidence. Therefore, Singapore highlights understanding, inclusiveness, and whole-of-society participation in the process of creating a digital life for all and calls for all social efforts to help older adults step out of their comfort zone, empowering them with favourable learning conditions and letting them apply digital technology confidently and skilfully to improve their quality of life.

Programmes and Initiatives to Improve Digital Literacy for Older Adults in Singapore
The Singapore government has never stopped exploring ways to bridge the digital divide and has formulated a series of digital reform measures by adopting mechanisms such as top-level planning led by the government, collaborative governance by all parties, and active engagement through stimuli to help older adults get ready for a digital life as soon as possible.

Upon reviewing Singapore's digital strategies in recent years, it is possible to make the following observations:

Firstly, government agencies are the main leaders in improving digital literacy and skills for older adult. An older adult-friendly digital society is the embodiment of a local consciousness and the construction. A digitally inclusive society and bridging

the digital divide are significant targets of digital initiatives. The government considers overall situation and collaboration when initiating measures, and short-term measures and long-term effects are considered as a whole. In this way, older adults can truly get involved in digital life, the whole society can enjoy digital dividends, a benign governance framework for healthy and sustainable digital development can be reached, and sustainable development with efficiency can be structured.

Secondly, non-governmental organisations, civil groups, and private institutions have followed the government and played an active part in responding to the ageing population. In promoting digitalisation for all, all social sectors in Singapore have been fully mobilised to seize digitalisation opportunities, bridge the intergenerational gap and the digital divide, and enhance inclusiveness and social coherence. The community, as the capillary of institutional governance, has developed flexible and detailed policies with strong operability and easy-to-promote features. Enterprises and media also put emphasis on older adult-related work from the perspectives of digital design and digital friendliness. Their tailor-made services for people with particular needs reflect a sense of social responsibility among enterprises and the media.

Lastly, the positive attitude of families and individuals towards digital literacy is of the utmost importance in this process. Alhough the state and society offer economic and policy support, the family still plays an irreplaceable role in care for older adults as it is closest to their daily lives of older adults and brings spiritual and psychological comfort, elevating their enthusiasm and internal drive for digital skills acquisition, helping them overcome their fear, and allowing them to improve their digital literacy spontaneously.

The United States

The Definition of "Older Adult" in the USA
In the United States, the term "older adult" generally refers to individuals aged 65 and above. When considering employment policies, individuals aged 50 and older are also generally considered "older Americans". However, in this paper, younger older Americans are tentatively defined as those between 50 and 70 years of age.

The Number of Older Adults in the USA's Population
The baby boom generation, born between 1946 and 1964, began turning 65 in 2011. It is projected that by 2030, more than 70 million Americans, accounting for 21% of the population, will be over the age of 65 (United States Census Bureau, 2001). According to the 2021 U.S. population evaluation, the population aged 65 and above accounts for 16.8% of the economy's total population (United States Census Bureau, 2022). The United States is classified as a "moderately aged" society according to UN criteria (United States Census Bureau, 2018). This report examines the economic and social value of younger older Americans regarding knowledge, experience, skills, health, and well-being.

Current State of OAE in the USA
OAE in the United States is rooted in both lifelong learning and employment. The former aims to enrich the lives of older adults and improving their health and well-being, while the latter aims at developing human resources for older adults. There are

a variety of organisations, including government-level and community level organisations, non-profit organisations, and enterprises. Funding comes from various sources, including government financial allocations, membership fees, and donations. Some courses are free, while some are paid. In addition, professional training for service personnel in the field of ageing is available, and certification courses can be used as continuing education credits for personnel in the field.

One organisation that provides lifelong learning opportunities for older adults is the Lifelong Learning Institute (LLI) (Harvard Division of Continuing Education, 2022). The LLI is a learning community of people over the age of 50 who learn not for career advancement but for higher quality intellectual exploration and the enjoyment of their social life. The LLI's learning content is usually at the college level. Institutes are free to join the network, but studying at the institutes is not free for learners (Lifelong Learning Institutes, 2022).

Another organisation that provides OAE in the United States is the public library network. The Institute of Museum and Library Services (IMLS) is the governing body of public libraries (Institute of Museum and Library Services, 2022). Public libraries are a social organisation providing free or low-cost Internet access and training to the public, with older people as one of the key service groups. The mission of public libraries is to provide free or low-cost services to meet the information needs of the public. Museums and libraries across the economy use their funding to develop and expand educational, recreational, and other programmes that contribute to the well-being and advancement of their communities (Bertot et al., 2006).

Professional associations in the industry, such as the American Society on Ageing, also offer courses for those who provide services related to the field of older adult services, such as librarians and nurses. These courses can be redeemed for Continuing Education Credit (American Society on Ageing, 2022).

Current State of Digital Literacy and Skills of Older Adults in the USA
The United States has a relatively small generational gap in internet penetration, with older Americans catching up to younger generations each year (Anderson, 2017). The primary motivations for older Americans to use digital technology are to stay connected, for entertainment, and to manage their daily lives (Faverio, 2022). The Covid-19 pandemic has accelerated this trend, with a significant increase in spending by older Americans on digital products and services in 2020 and 2021 (AARP & FP Analytics, 2017).

While home broadband penetration is higher among older adults aged 50-64 than those aged 65 and above, and smartphone ownership is comparatively higher among the former group (Faverio, 2022). Internet use among older Americans has also increased significantly, with 96% of those aged 50-64 and 75% of those aged 65 and above using the internet in 2021 (Kakulla, 2021). However, there are still significant differences in digital technology use within the older adult population based on factors such as age, income, and education level (Anderson, 2017).

Older Americans use digital technology primarily to maintain social connections, gain entertainment, and manage daily life. Since the Covid-19 pandemic, more older adults have relied on technology to stay socially connected, with video chatting growing in

popularity (Faverio, 2022). Entertainment consumption among older Americans has shifted from cable to streaming media, with Netflix, Amazon, and Hulu being the most popular platforms (Kakulla, 2021). Older adults are also increasingly using digital products and services for online shopping, ordering food, banking, and medical services (Faverio, 2022).

Overall, the digital literacy and skills of older Americans in the USA have improved significantly in recent years, but there are still differences in use based on various factors (Anderson, 2017). These trends are likely to continue and expand in the future.

The USA's Demand for Digital Human Resources

The USA is experiencing a rapid digital transformation, resulting in a high demand for digital talent across industries. Basic, intermediate, and advanced digital skills are required for different types of occupations, with an increasing demand for more complex roles. The pandemic has further accelerated this trend, particularly in industries such as healthcare and education. US employers reported a higher demand for advanced digital skills compared to other surveyed Asian economies. This indicates that the US remains a leader in attracting talent with skills such as AI and machine learning. (Bank, 2022; Beblavý et al., 2016; Woodward & Carrasco, 2022). By 2022, it is projected that nearly 65% of the Asia Pacific region's GDP will be digitised.

Adapting to the Digital Economy: Challenges and Opportunities for Older Americans

The US has undergone a rapid digital transformation, one that has been further accelerated by the pandemic, resulting in higher requirements for digital literacy and competency in the labour market. Thanks to the ageing population and the impact of the pandemic, older Americans are the fastest growing segment of the workforce. Basic digital literacy has become essential, and higher digital competency makes it easier to find jobs. Job satisfaction for older adults heavily relies on their skills matching with their job. Increased training can help boost employment rates, but older people need greater access to quality job search services and training. Age discrimination is a major barrier, but older workers remain a valuable resource for employers. Underemployment is a problem and requires attention from society.

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