Digital Entrepreneurship across the APEC Region

Assessing the needs of the region's digital start-ups

Prepared for the APEC Business Advisory Council Connectivity Working Group
by RMIT University Australia and RMIT University Vietnam

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FOREWORD

The RMIT University Graduate School of Business and Law (RMIT GSBL) and the RMIT Asia Graduate Centre (RAGC) are pleased to partner with the Australian APEC Study Centre (AASC) to produce this report on Digital Entrepreneurship across the APEC Region: Assessing the needs of the region's digital start-ups for the APEC Business Advisory Council (ABAC) Connectivity Working Group.

Every APEC economy is striving to support digital entrepreneurs and start-up firms that will deliver new digital businesses, products and services to create high value jobs and economic growth. This report identifies issues for policy makers to inform endeavours to grow digital entrepreneurship.

As a grouping, APEC has an interest in minimizing the digital divide between member economies. It is important that all APEC economies have affordable, reliable, safe and high-speed digital infrastructure. Equally there are benefits for regional trade and investment if all regional economies have capacity to exploit digital technologies and secure advantages in business and government.

Vietnam, the current Chair of APEC, has made impressive progress fostering its digital economy in the twenty years since it launched its first internet service. It has established a modern digital ecosystem to support an active start-up community with evident entrepreneurial drive and success. One of several foundational themes in this report is the need for the tertiary education sector to provide the pivotal knowledge and skills to nurture this and the next generation of digital entrepreneurs. Vietnam has invested significantly in science, technology, engineering and mathematics (STEM), digital and entrepreneurial education in-country and is seeing positive results.

The report on Digital Entrepreneurship across the APEC Region has been the culmination of extensive research across RMIT Campuses in Melbourne, Ho Chi Minh City and Hanoi. RMIT will continue to respond to the growing interest of our staff, students, researchers, and alumni, in entrepreneurship across the APEC region.

I thank the MBA, Executive MBA and MIB researchers selected from RMIT University's campuses in Hanoi, Ho Chi Minh City and Melbourne for their work on this report. Their findings highlight critical issues around the challenges of digital entrepreneurship across the APEC region. On their behalf, I commend this report to ABAC, and look forward to continued collaboration with the Australian APEC Study Centre and ABAC in the future.

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EXECUTIVE SUMMARY

Every APEC economy is striving to support digital entrepreneurs and start-up firms that will deliver new digital businesses, products and services, creating high value jobs and economic growth. This report identifies issues that policy makers should consider to create an nurturing environment for digital entrepreneurship.

APEC recognises that digital technology, innovation and entrepreneurship are key to securing quality economic growth and employment in the fourth industrial revolution which is upon us. APEC economies want to support home-grown digital entrepreneurs to engage in the global economy, creating new businesses and jobs, engaging with new markets, working differently and ushering in change. The scale of the digital economy and trends driving it should not be underestimated.

APEC's digital outlook points to a region that is undergoing rapid change. The outlook at regional level reveals the intensity at which digital entrepreneurship is being pursued across the Asia-Pacific. Currently, the digital economy's contribution to global GDP is 5% however the potential is enormous. Calculations of actual value delivery rather than standard economic indicators suggest that contributions could already be as high as 20%.[1] Digital technologies could be worth USD1.36 trillion to the world's ten largest economies by 2020.[2] The report identifies the top six trends in digital economy and entrepreneurship.

- **Mobile Commerce** or m-commerce, a subset of e-commerce, offers capability to buy and sell via mobile services through wireless technology. The global m-commerce market accounted for approximately 34% of global e-commerce sales in 2016 and is forecast to exceed 50% by 2021.
- **Digital freelance work** and remote working arrangements have arisen due to the changing nature of workplaces, rise of the millennials, demographic shifts, and new technologies.
- **E-services** are deeds, efforts or performances delivered digitally, primarily through the internet. The growth in B2C (business to consumer) e-commerce will be led by emerging Asian economies with the People's Republic of China (China) holding the largest B2C e-commerce market globally.
- **Crowdfunding** is a technique for raising external finance via the internet from multiple individuals. The industry has been growing since the mid-2000s, but represents a minor share of business financing. In 2015, its worth was estimated at USD34 billion, with expectation that emerging economies will significantly contribute to further growth.
- **E-Payments** are on the rise - e-wallets, credit cards, and mobile devices are fast becoming mainstream. A convenient alternative to cash-based models, the global digital payments industry is expected grow by 20% between 2016 and 2017 to reach a total value of USD3600 billion in transactions. Forecasts place emerging economies as drivers of further growth in e-payments by leap-frogging existing systems to create state-of-the-art payments systems.[3]
- **The Internet of Things (IoT)** - devices embedded with electronics, software, sensors and network connections with machine-to-machine capabilities, will be a defining feature of the future digital economy with potential to transform sectors in the Asia-Pacific.

[1] Sheehy, A. (2016) 'GDP Cannot Explain the Digital Economy', *Forbes*
[2] Accenture. (2016) *Digital Density Index: Guiding Digital Transformation*, Accenture Strategy and Oxford Economics
[3] Capgemini. (2017) *Top 10 trends in Payments 2017*, Capgemini Consulting; Strategy&. (2016) *The Future of Transaction Banking and Payments in 2020,* PwC; PwC. (2016) *Emerging Markets; Driving the Payments Transformation*, PwC

A qualitative assessment of each of the APEC regions was undertaken to understand the challenges facing digital start-ups and entrepreneurs. Interviews with government officials, start-up founders, incubator and accelerator program managers, venture capitalist funds, education providers, and trade associations supported by secondary research produced a digital readiness scorecard. The scorecard measured digital readiness across four enabling domains: ICT; Skills and Education; Institutional and Regulatory; and Access to Finance.

ICT infrastructure is key to digital inclusion, digital entrepreneurship and participation in the digital economy. The Asia-Pacific region is host to some of the fastest growing economies in the world with rapid rates of smartphone uptake and mobile broadband expansion. There is however within APEC a 'digital divide' in the region's ICT infrastructure landscape. There is no regional benchmark for minimum internet penetration or speeds despite digital connectivity being positioned as a regional policy imperative. Emerging economies are investigating leapfrog technologies however the efficacy of these technologies will be dependent on fast, and expansive network connectivity, including through roll-out of 5G, which is not slated for commercial launch until 2020.

As the Fourth Industrial revolution unfolds, APEC economies are assessing what is needed to foster digital entrepreneurship. At present, the skills to manage rapid advances - in computing power, internet access, artificial intelligence (AI), Big Data and Cloud Computing - are a scarce global currency. Competition for them is fierce. It is also estimated that 65% of people undertaking education will work in jobs that are not yet invented, further complicating workforce planning.[4]

The challenge facing APEC economies is being able to produce sufficient numbers of graduates with appropriate digital, technical and business skills in the future. Only 6.5% of interviewees and survey respondents for this study believed that graduates in their country were ideally prepared for digital careers. Most reported a common struggle to recruit workers with appropriate digital and business skills and Entrepreneurs' interactions with government are viewed as burdensome, and resource draining, with interoperability, and the establishment of one-stop-shops most welcome.

Access to finance for start-ups continues to be one of the key issues in the APEC region. Funding and investment remain the lifeblood of every start-up operation and access to finance remains a major struggle for APEC's digital entrepreneurs. Many interviewees found the difficulty to accessing bank loans as a widespread concern. This is likely to become more acute as the average age of start-up founders drops — many of these founders will be unable to provide collateral or a credit history.
Drop-off rates between seed funding and Series A is high indicating a shortage of angel and venture capital funders, particularly in markets with underdeveloped financial and regulatory institutions. This also represents a deficiency in many accelerator programs in supporting monetization of ideas and scaling up of endeavours.

Collectively more than one billion people live in rural areas across APEC but digital connectivity, education, literacy, entrepreneurship and support is skewed to urban centres within APEC.
While governments want to meet the needs of digital entrepreneurs and there has been progress on many fronts, more is needed to deliver conducive conditions for entrepreneurship across enabling domains. This report highlights areas for development of those regional digital start-ups which hold great promise for the advancement of trade and connectivity across the Asia-Pacific.

[4] Telstra. (2017) *Connecting Capabilities White Paper: Asian Digital Transformation Index*, p.12

KEY RECOMMENDATIONS

- *A regional benchmark for internet speed and minimum internet penetration be integrated into the national broadband plans of individual economies*
- *5G is essential for leapfrog technologies which offer solutions for emerging economies and should be progressed as a priority*
- *APEC Governments should provide the education and skills acquisition for the coming generation of digital entrepreneurs. Governments should prioritise digital education (STEM) in primary and secondary schools and provide opportunities to improve digital skills of teachers*
- *Policy makers should prioritise digital gender equality in education, business and government*
- *Incubator programs should be encouraged to establish comprehensive performance evaluation frameworks particularly if government funded*
- *One-stop-shops should be developed for government grants, permits, applications and certifications to assist entrepreneurs to progress their businesses*
- *APEC should build digital capability in public sector workforces*
- *Establish policy and regulation that comprehensively target financial inclusion among the poor and create an environment in which micro financing institutions (MFIs) can grow their base*
- *Pathways for venture capital and other private equity funders need to be eased and incentivized*
- *Governments could formally recognise the potential of crowdfunding and enact legislation that permits the raising of equity funding through such platforms*
- *Visa policy design should be compatible with the profile and nature of entrepreneurial activity to enhance labour mobility*
- *Data privacy and protection laws should be drafted and enacted as a priority*
- *APEC economies should review and reform bankruptcy laws to ensure that they are entrepreneur-friendly*
- *Priority should be placed on increasing awareness, digital and entrepreneurial literacy in rural and remote areas*

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INTRODUCTION

RMIT University has conducted research on digital entrepreneurship in the Asia-Pacific, to identify common challenges for digital entrepreneurs, and their most critical needs. Digital Entrepreneurship across the APEC Region is a qualitative analysis and subjective assessment of the state of and needs of the region's digital start-ups.

APEC recognises that digital technology, innovation, and entrepreneurship are key to secure quality economic growth and employment in the Fourth Industrial Revolution which is now upon us. They are looking to support home-grown digital entrepreneurs who can engage in the global digital economy, creating businesses and jobs, engaging with new markets, working differently and ushering in change.

It is also hoped that some of these digital advances bring tangible and positive impacts on the everyday lives of APEC's 2.6 billion population, including in its remote and rural communities.

The scale of the digital economy and the trends that are driving it cannot be underestimated. This report examines APEC's digital outlook, which presents a strong narrative of a region that is ready to embrace change. It reveals the intensity at which digital entrepreneurship is being pursued in every corner of the Asia-Pacific.

Chapter One examines key trends in global digital economies whilst Chapter Two presents an overview of progress in the region in digital terms. Together, these chapters provide context for the chapters that follow which examine key enablers of digital entrepreneurship, associated issues, challenges, and recommendations.

To varying degrees, each APEC economy is backing economic development with investments in:

- ICT infrastructure (hardware, network, content, ICT eco-system)
- Soft infrastructure (education and skills to allow the diffusion, uptake and integration of ICT fostering both consumer and business digital readiness)
- Policies to optimize business and innovation environments critical to digital entrepreneurship.

Drawing on secondary research, existing indicators, and opinions of digital entrepreneurs and ecosystem stakeholders surveyed across APEC, the research team produced a Digital readiness report card for all APEC economies across 13 indicators aligned with APEC's 3 pillars of connectivity: physical; institutional; and people-to-people. This should be considered in conjunction with the overviews of APEC economies in Chapter Two. Importantly, the chapter presents focus pieces on Vietnam, the current APEC Chair, and Papua New Guinea (PNG) the Chair of APEC in 2018.

The report works through major issues, challenges and enabling factors facing APEC policy makers. The Fourth Industrial Revolution characterised is characterised by the World Economic Forum as the "fusion of technologies that is blurring the lines between the physical, digital, and biological spheres". [5] Its distinguishing feature is the velocity at which digital disruption is transforming industries, and changing what people do, who they are, and how they think.

[5] Schwab, K. (2016) 'The Fourth Industrial Revolution: what it means', *The World Economic Forum*

This digital revolution has given rise to large challenges and opportunities for digital entrepreneurs. However, there are fundamental enablers, which are outside of their spheres of influence that can, and do, to an extent, determine the paths of their start-ups.

In some economies, digital entrepreneurs can draw on strong digital ecosystems, accessing support networks, and a wealth of nearby business knowledge, funds, skills, and expertise. In other economies, digital entrepreneurs must struggle for traction in an ever-growing pool of digital start-ups vying for scarce resources. This report has sought to understand what these struggles are, where, and why they exist. Chapters Three to Six examine four enabling domains: ICT infrastructure; skills and education; the government environment; and finance and funding.

Chapter Three examines issues pertaining to establishing and updating a strong ICT infrastructure. The region has progressed ICT infrastructure. However, in parts of APEC, access to affordable, reliable, high-speed broadband infrastructure is still limited, impeding the development of societal or cultural readiness to take up ICT and integrate it into life and/or business.

Chapter Four examines important considerations around education and skills acquisition for digital entrepreneurship. Expertise and knowledge underpins the capacity to undertake new ventures, to know what talent is needed and to attract it, including across borders, to manage the business and commercial opportunities. The study and associated survey developed a snapshot of the education and skills needs that CEOs require for a digitally able work force and to underpin digital entrepreneurship. The chapter identifies some encouraging gains in tertiary education across the Asia-Pacific and discusses key concerns relating to capacity of academic workforce and institutions, digital literacy, STEM and enterprise education that require further consideration if graduates with appropriate digital, technical and business skills are to be ready in the required numbers in the future. It also highlights a gender bias that should be addressed.

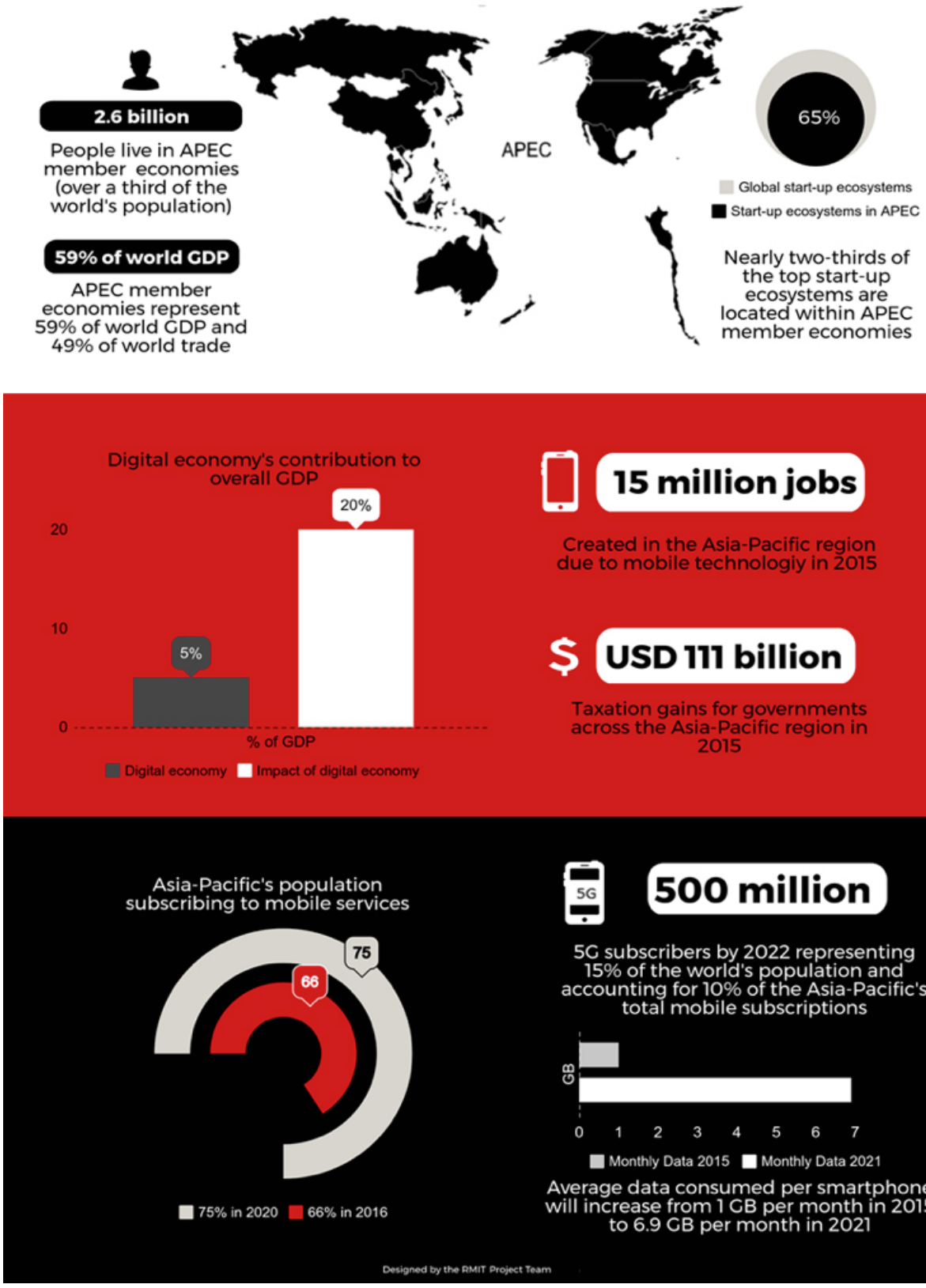
Governments are vital players in the digital entrepreneurial eco system. Chapter Five examines the questions around what is an optimal facilitative policy framework for digital entrepreneurship.

Digital start-ups develop innovative products and services. Development costs can be significant and access to funding is key to success. Chapter Six reviews the financial aspects of entrepreneurship. Digitalisation can promote gender equality and socio-economic inclusion and stimulating local and sustainable development. Chapter Seven highlights issues affecting rural inclusion in the digital age.

Research Objective and Design

The research is based on an extensive literature and media review and stakeholder engagement across business, government, academia, trade associations, professional services firms and change makers within APEC's start-up ecosystems. Each issue examined in this report relates to the pillars of the APEC Connectivity Blueprint for 2015-2025: physical; institutional; and people-to-people.

This study was segmented into two phases. In Phase One, a team led by RMIT University Vietnam conducted targeted, thematic research into current trends and issues around digital entrepreneurship in APEC. In Phase Two, a team of RMIT Australia and RMIT Vietnam researchers consulted with around 50 stakeholders in Vietnam, Australia and selected SE Asian countries. Interviews plus a workshop were held to obtain feedback about digital entrepreneurship in Vietnam.


2.6 billion
People live in APEC member economies (over a third of the world's population)
59% of world GDP
APEC member economies represent 59% of world GDP and 49% of world trade
APEC
65%
Global start-up ecosystems
Start-up ecosystems in APEC
Nearly two-thirds of the top start-up ecosystems are located within APEC member economies
Digital economy's contribution to overall GDP
20
10
0
20%
5%
% of GDP
Digital economy
Impact of digital economy
15 million jobs
Created in the Asia-Pacific region due to mobile technologiy in 2015
$
USD 111 billion
Taxation gains for governments across the Asia-Pacific region in 2015
Asia-Pacific's population subscribing to mobile services
75
66
75% in 2020
66% in 2016
5G
500 million
5G subscribers by 2022 representing 15% of the world's population and accounting for 10% of the Asia-Pacific's total mobile subscriptions
GB
0 1 2 3 4 5 6 7
Monthly Data 2015
Monthly Data 2021
Average data consumed per smartphone will increase from 1 GB per month in 2015 to 6.9 GB per month in 2021
Designed by the RMIT Project Team

The consultation process aimed to capture the views of people on the ground, who are: progressing digital start-ups; are established digital entrepreneurs; and enablers of digital entrepreneurship. The team developed interview protocols, questionnaires and survey. From these interim findings, further research was conducted to produce the APEC Digital Readiness report card in Chapter Two. It is important to recognise the subjective nature of a study that explores the needs of young companies, draws on anecdotal evidence and the lived experiences of individuals in entrepreneurial businesses.
While this study takes account of broader trends across the entire membership of APEC, the emphasis is on the region's emerging economies, particularly in Southeast Asia. This is in recognition of these economies' increasing reliance on digital and leapfrog technologies in progressing development agendas and the interest in entrepreneurship among their young adult populations. Issues and findings in this report have been validated to the largest extent possible against open-source publications and data from consulting and advisory firms and international institutions.

In affirmation of Vietnam's important role as Chair of APEC 2017 and RMIT University's presence in Vietnam, this study engaged deeply with Vietnam's start-up ecosystem. The report includes a case study on Vietnam's progress since the launch of internet nearly 20 years ago. In acknowledgement of PNG's role as Chair of APEC 2018, this report also examines the digital landscape in PNG.

CHAPTER ONE

THE DIGITAL ECONOMY

The Scale of the Digital Economy and Digital Entrepreneurship

The hopes of Asia-Pacific's digital entrepreneurs invariably ride on major developments occurring within the broader digital economy, globally and intra-regionally. A conservative estimate for the digital economy's current contributions to global GDP is 5%, however calculations based on actual value delivery rather than standard economic indicators, suggest that contributions could already be as high as 20%.[6] The potential for growth is enormous. It is predicted that digital technologies could be worth USD1.36 trillion to the world's ten largest economies by 2020.[7]

High expectations for digital economic growth in the Asia-Pacific are also evident, driven largely by the emerging and youthful economies of Southeast Asia. ASEAN has a digital economy worth USD50 billion in 2017 with 200 million digitally connected consumers, representing a surge of 50% since 2016. The majority share of growth was attributed to travel and tourism followed by e-commerce.[8]

The mobile economy, an important subset of the digital economy, has become an important driver of business opportunity, and job creation. Mobile technology created some 15 million new jobs in the Asia-Pacific in 2015, resulting in USD111 billion in taxation gains for governments across the region. By end-2015, 62% of the Asia-Pacific's population were subscribed to a mobile service, with expectation that 600 million new users will come online by 2020.[9]

Regionally, consumer appetite for larger mobile data packages, fueled by roll-out of high-speed network coverage will only grow. Average data traffic per smartphone will increase to 6.9 GB per month in 2021, up from 1 GB monthly in 2015.[10] Plans for and trialing of 5G network coverage are progressing steadily with forecasts of over half a billion global 5G subscribers by end-2022, covering 15% of the world's population[11] and accounting for 10% of the Asia-Pacific's mobile subscriptions.[12]

The evolution of the digital economy, and predictions for its future impacts directly on the state of digital entrepreneurship. Strategic policy development in all economies will necessarily rely on an understanding of future technology and the business environment.

This chapter and Chapter Two examines key trends affecting the global and regional digital economies. This forms important context for the following chapters which examine key enablers of digital entrepreneurship, and associated issues, challenges, and recommendations.

Digital Entrepreneurship in an International Context

Entrepreneurs are those persons who seek to generate value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes, or markets. This is distinct from a small business that provides subsistence to the owner usually self-employed, with or without employees.[13] Digital entrepreneurship refers to creation of a new Internet enabled or delivered business,

[6] Sheehy, A. (2016) 'GDP Cannot Explain the Digital Economy', *Forbes*
[7] Accenture. (2016) *Digital Density Index: Guiding Digital Transformation*, Accenture & Oxford Economics
[8] Lamy, S. Hoppe, F. (2017) *Digital Acceleration in Southeast Asia: Navigating Tectonic Shifts*, Bain & Company
[9] GSMA. (2016) *The Mobile Economy Asia Pacific*, GSMA Intelligence, pp.8-20
[10] Ibid.
[11] Heuveldop, N. (2017) Ericsson *Mobility Report*, Ericsson, p.17
[12] Ibid, pp.7-9
[13] ___. (2014) *The promise of digital entrepreneurs*, Accenture; Bogdanowicz, M. (2015) *Digital Entrepreneurship Barriers and Driver – The need for a specific measurement framework*, European Commission

product or service either through a start-up — bringing a new digital product or service to market—or by digital transformation of existing activity inside a firm or the public sector.[14]

Digital enterprises are characterised by a high intensity of utilisation of novel digital technologies to improve operations, invent new business models, and engage with customers and stakeholders. Novel digital technologies are generally described as social media, mobile computing, big data, and cloud (SMAC). Emerging in the past five years, these technologies are now reaching a critical mass and have the potential to create new business value, owing to new or higher revenue, faster go-to-market, enhanced services, reduced costs, increased productivity and competitiveness.[15]

Digital start-ups cover all sectors of the economy including ICT, health, financial services, and manufacturing. In Australia, three out of every four technology start-ups are targeting the Information and Media Communications sector but opportunities exist across the economy.

Start-up Ecosystems

A 2017 study into global start-up ecosystems, which analysed information from 25 economies, 55 ecosystems, and 1000 participants found that within the top 20 ecosystems, 45% are in North America, 25% in Europe, 25% in Asia, and 5% in Australia. Of these, 85% are in advanced economies, with 15% in the emerging economies of India and PRC. New trends indicate that the proportion of the US is declining, and the Asia-Pacific's share is increasing, although the dominance of advanced economies is expected to continue for the medium term.

The technology sector, particularly digital ICT, is growing at twice the rate of the global economy, with much of this growth in start-ups. However, not all regions are capturing the benefits. Most new business creation is concentrated in US metropolitan areas. A small 20% of start-up ecosystems in the research has constantly represented 78% of the global ecosystem value in the past decade.

Nearly two-thirds of the top start-up ecosystems are located within five APEC member economies — the US, Canada, China, Singapore, and Australia. For other APEC economies, the research posits that it can take 20 years for a vibrant entrepreneurial ecosystem to materialise in a city or region.[16]

Digital Entrepreneurs and Start-ups: Job Creation

For economies with high youth unemployment, the rise of digital entrepreneurship comes as a welcome trend. Recent research has indicated that digital entrepreneurship has the power to create 10 million youth jobs in G20 economies if barriers, such as access to funding and skills, were lifted.[17] Young entrepreneurs have already become the driving force behind job creation in G20 economies, in particular where ecosystems have been shaped by large companies and other 'bridge makers' that help entrepreneurs translate ideas to marketable products and services.[18] The importance of a strong support ecosystem for fledgling entrepreneurs will be examined in the forthcoming chapters.

[14] Van Welsum, D. (2016) Enabling Digital Entrepreneurs, the World Bank
[15] ___ (n.d.) Fuelling digital entrepreneurship, European Commission; ___. (2014) WP3 Framework conditions for success of EU digital entrepreneurship, Ernst & Young
[16] ___. (2017) Global Start-up Ecosystem Report 2017, Start-up Genome
[17] ___. (2014) The promise of digital entrepreneurs, Accenture
[18] Ibid.

Digital Economy and Entrepreneurship: Top Six Trends

Mobile Commerce: m-commerce, a subset of e-commerce, offers capability to buy and sell via mobile services through wireless technology. The global m-commerce market accounted for approximately 34% of total global e-commerce sales in 2016, and is forecast to exceed 50% by 2021. In the Asia-Pacific region, the frequency of mobile purchases is significantly higher than any other region, with Japan, Republic of Korea, and Australia holding leading positions in m-commerce share proportionate to total e-commerce transactions. Noting the ubiquity of smartphones, on average, 75% of mobile internet users have purchased a product or service via a mobile or tablet device in the past six months, with convenience, time and price savings the most commonly cited draw cards. As m-commerce reaches parity with desktop transactions, applications will continue to drive business results as an important transaction channel, however issues of trust, security, and privacy will continue to be central concerns among consumers for the foreseeable future.

The Rise of Freelancers: The changing nature of workplaces, rise of the millennials, demographic shifts, and new technologies have resulted in new forms of work from freelancing, and part-time work, to remote working arrangements. In 2016, some 55 million people were engaged in freelance work in the US alone. Recent years has seen the emergence of digital nomads, often described as creative professionals and entrepreneurs, seeking to redefine themselves through a combination of work and travel. The largest proportion of digital nomads are millennials on career breaks from traditional work, and ageing baby boomers with a high level of financial independence and flexibility. They are borderless, self-employed people who are said to interact with cities in a manner different to tourists, and long-term expatriates. The growth of free Wi-Fi services worldwide, co-working spaces, inexpensive air travel, and portable laptops, tablets and notebooks, are fuelling the rise of digital nomads. While there are no hard figures on the number of digital nomads, the consensus view is that this will be a growing and likely long-term trend, a position supported by the proliferation of global digital nomad support networks, both offline and online.[19]

E-services are deeds, efforts or performances delivered digitally, primarily through the internet. According to UNCTAD, major types of e-commerce include: B2B; B2C; C2C (for example, online auction platforms such as eBay); and B2G (for example, public procurement). While the primary e-service remains e-commerce in merchandise, e-government also serves as a major contributor to the total e-services economy. The Asian Development Bank indicates that while the bulk of transactions occur in advanced economies, the growth in B2C e-commerce will be led by emerging economies in Asia, with China now holding the largest B2C e-commerce market globally. The combined share of global e-commerce of Asia and Oceania will increase to 47% in 2018, from 23% in 2013. Trade in online services beyond merchandise, such as financial and legal advisory, ICT, environmental and engineering services is coming into focus, with negotiations underway for a trade in services only agreement between 23 members of the World Trade Organisation, including 10 APEC economies.[20]

[19] ILO. (2016) *The Future of Work*, international Labour Organisation; Mohn, T. (2017) 'The Digital Nomad Life: Combining Work and Travel', *The New York Times*

[20] UNCTAD. (2015) *information Economy Report: Unlocking the Potential of E-Commerce in developing countries*, United National Conference on Trade and Development, UN Publishing; DBS. (2016) *E-Commerce in Asia: Bracing for Digital Disruption*, Development Bank of Singapore

Crowdfunding: Crowdfunding is a technique for raising external finance via the internet from multiple individuals. This source of capital emerged for early-stage enterprises to raise funds after the global financial crisis including donations, pre-selling or pre-ordering, with lending, and equity, being primary forms for start-ups. It has opened new doors for start-ups while also offering opportunities for amateur investors to enter new markets. Often mediated by online intermediaries, such as the Australian Small-Scale Offerings Board, peer-to-peer or social investment, has been made considerably easier, aided by recent legislation in several APEC economies. The industry has been growing since the mid-2000s, but represents a minor share of business financing. In 2015, its worth was estimated at USD34 billion, with expectation that emerging economies will significantly contribute to further growth. The World Bank estimates that the potential crowdfunding market in emerging economies alone will reach USD95 billion, with the greatest potential surfacing in China.[21]

E-Payments: E-payments are on the rise - e-wallets, credit cards, and mobile devices are fast becoming mainstream. A convenient alternative to cash-based models, the global digital payments industry is expected grow by 20% between 2016 and 2017 to reach a total value of USD3600 billion in transactions. The growth in e-payments has produced customer service cost savings for banks by up to 70%. Key drivers of e-payments include: changing consumer demand for greater personalisation and convenience; e-commerce growth; accessible technology advancements; and regulatory reforms that clarify formerly ambiguous aspects of the e-commerce and e-payments ecosystem. Forecasts place emerging economies as drivers of further growth in e-payments by leap-frogging existing systems to create state-of-the-art payments systems.[22]

The Internet of Things: The growth of Internet of Things (IoT); devices embedded with electronics, software, sensors and network connections with machine-to-machine capabilities, will be a defining feature of the future digital economy. Devices span from smart phones, watches, smart televisions, and personalised whitegoods, to advanced industrial, energy, and agricultural capabilities with potential to transform sectors in the Asia-Pacific. Still at the stage of early adoption, IoT will pervade APEC economies within the decade. The forecasts for IoT market value ranges between USD2700 billion to USD6200 billion by 2025, in healthcare, infrastructure and public-sector services. It is projected that at least 50 billion devices will be connected to the internet, fostering IoT start-ups and tackling development issues such as access to healthcare, water treatment, energy conservation, natural resource management and agricultural productivity have already proven effective in some of APEC's emerging economies, particularly in Southeast Asia. However, the fast and fruitful adoption of IoT in these economies will be heavily reliant on coordinated regulation across all sectors, with ICT and telecommunications regulators working closely with their counterparts to further data protection and competition policies. Challenges for entrepreneurs range from organisational-level obstacles such as culture, cost, expertise and big data, and analytics capability to economy-wide issues of policy, standards and regulation. The role of IoT in alleviating development challenges in emerging economies has garnered region-wide debate, and optimism.[23]

[21] OECD. (2015) *New Approaches to SME and Entrepreneurship Financing: Broadening the Range of Instruments,* OECD; InfoDev. (2013) *Crowdfunding's Potential for the Developing World*, The World Bank

[22] Capgemini. (2017) *Top 10 trends in Payments*, Capgemini Consulting; Strategy&. (2016) *The Future of Transaction Banking and Payments in 2020*, PwC; PwC. (2016) *Emerging Markets; Driving Payments Transformation,* PwC

[23] Heppelman, J, & Porter, M. (2015) 'How Smart Connected Products are Transforming Companies', *Harvard Business Review*, October 2015, pp.97-124; OECD. (2015) *OECD Digital Economy Outlook*, OECD Publishing, Paris; ICU. (2016) *Harnessing the Internet of Things for Global Development*, International Communications Union; McKinsey and Co. (2013) *Disruptive Technologies: Advances that will Transform Life, Business, and the Global Economy*, McKinsey and Company

CHAPTER TWO

APEC'S DIGITAL OUTLOOK

INTRODUCTION

APEC boasts a diverse range of markets, with varying levels of digital economy maturity and technology adoption. The following review of the current state of the digital economy, relating to e-commerce and entrepreneurship, will inform efforts to achieve parity across APEC. APEC is home to some 2.6 billion people and many of the world's largest youth bulges. APEC policy makers and key fora are increasing their attention on digital entrepreneurship and policies for improving physical, institutional and people-to-people connectivity, digital inclusion, and literacy.

This report assesses the state of the region's digital start-ups. It drew on secondary research and opinions of digital entrepreneurs and ecosystem stakeholders to produce the Digital Readiness Report Card based on APEC's pillars of connectivity: physical; institutional; people-to-people.

The Indicators used are defined below:

- Skilled visa policy environment: entrepreneur/ start-up/ skilled migration visas to attract talent
- Expertise and mentorship: assistance and guidance for entrepreneurs through university-facilitated industry mentorship, incubator, and accelerator programs
- Skills availability: ICT skills in primary, secondary and tertiary education and adult literacy
- Mathematics and science education (primary and secondary): availability of mathematics and science education in primary and secondary and performance of students in these arenas
- Internet access and usage (% population): Penetration rate proportionate to population
- Internet speeds and reliability: speed (mbps) and reliability of internet connection
- Rural inclusion: scope/success of initiatives to expand ICT infrastructure in rural/remote regions
- Mobile network coverage (% population): percentage of total population with network signal
- Regulatory and political environment: extent that domestic legal and regulatory frameworks allow for internet penetration and the advancement of business activities
- E-government readiness: national digitalisation agendas, conversion of paper to digital, consolidation of business functions into coordinating agencies and online one-stop-shops
- Laws relating to ICT: considers the level of development in laws relating to ICT, including but not limited to protection of IP, data privacy, and electronic commerce legislation
- Flexible bank loans for start-ups and new companies: availability of, and ease of access to flexible loans during early-financing stage of ventures
- Availability of venture capital: view of venture capital funders and digital entrepreneurs.

Red Weak; poor quality; limited in scope; insufficient legislative or regulatory frameworks — lagging

Yellow in progress but needs development

Green Strong; high quality; implemented; enacted — regional leader

Digital Readiness Report Card for APEC Economies

	People, Skills and Education				Infrastructure and ICT				Institutional and Regulatory			Financial	
Regional Leader / Requires Development / Lagging	A Conducive Skilled Visa Policy Environment for Entrepreneurs	Availability of Expertise and Mentorship	Current Skills Availability	Math and Science Education (Primary and Secondary)	Internet Access and Usage	Internet Speeds and Reliability	Rural Inclusion	Mobile Network Coverage	Regulatory and Political Environment	E-Government Readiness	Laws Relating to ICT including Protection of IP and Data Privacy	Flexible Bank Loans for Start-ups and New Companies	Availability of Venture Capital
Australia													
Brunei Darussalam													
Canada													
Chile													
China													
Hong Kong, China													
Indonesia													
Japan													
Republic of Korea													
Malaysia													
Mexico													
NZ													
PNG													
Peru													
Phillipines													
Russia													
Singapore													
Chinese Taipei													
Thailand													
US													
Vietnam													

North America (the US and Canada)

The United States (US) and Canada continue to trail blaze in many aspects of the digital economy and entrepreneurship, including their relative digital connectivity rankings to fellow APEC members, and the maturity of their start-up ecosystems and support networks.

The digital economy in the US has seen large contributions to growth and employment outcomes, with the export of USD400 billion in digitally-deliverable services in 2015, accounting for over half of the economy's total service exports.[24] Sale of merchandise through e-commerce giant Amazon, which currently represents 37% of all online sales in the US is set to grow by 50%, and will account for half of all online sales by 2021 *(Figure 2.1)*. Consequently, this will place pressure on traditional bricks and mortar retailers which will see annual growth rates fall short of online retailers.[25]

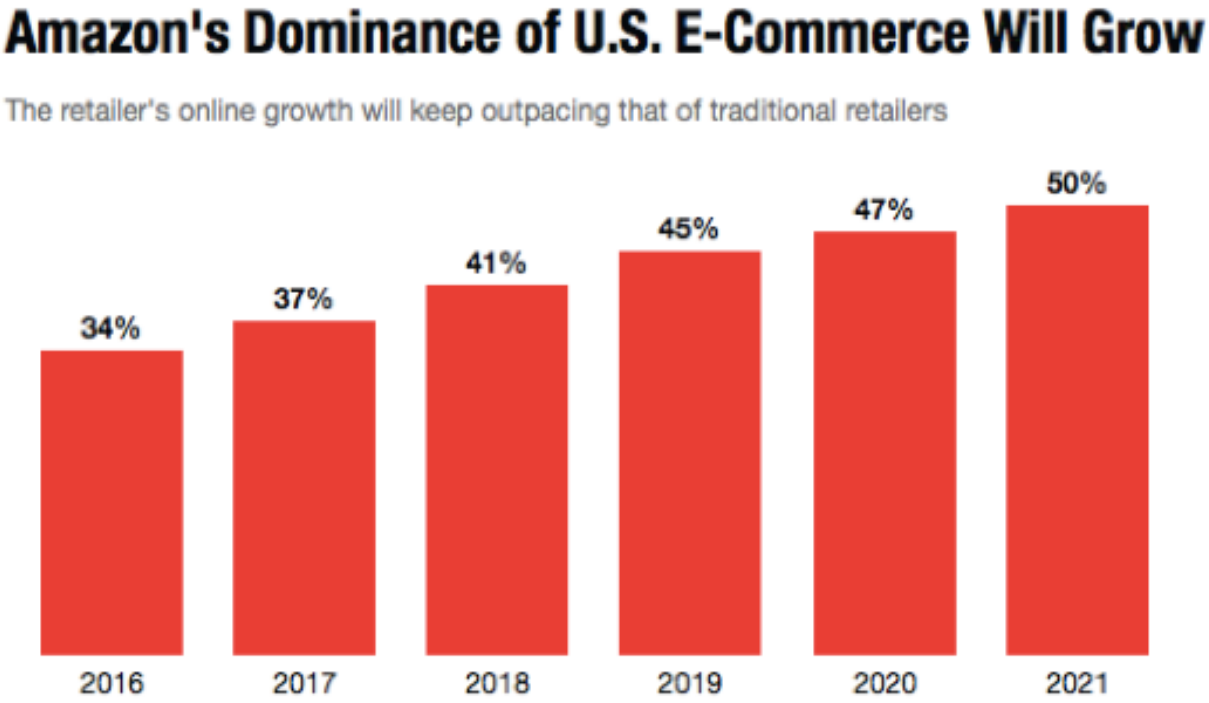


Figure 2.1: Amazon's growth projections, Source: Needham & Co

With a growing appetite for e-commerce and a smartphone user base expected to grow to 270 million users by 2022, the US Commerce Department has a *Digital Economy Agenda* which prioritises technology and internet policy to facilitate information and services flows across borders, roll-out of high-speed broadband, and the research and development of innovative technologies. Additionally, the Commerce Department's 2017 Internet of Things (IoT) Green Paper, acknowledges the transformational impact that IoT will have on the daily lives of citizens, workers and consumers.

[24] Davidon, A.B. (2015) 'The Commerce Department's Digital Economy Agenda', *U.S. Commerce.gov*
[25] *Wahba, P.* (2017) '*Amazon will make up 50% of All U.S. E-Commerce by 2021*', Forbes

On the digital entrepreneurship front, Silicon Valley with proximity to top institutions including Stanford University and U.C. Berkeley has attracted top graduates from technology and business fields. Although venture capitalists continue to target companies in the Bay Area, New York, Los Angeles and Boston, new hubs in non-coastal, and sun-belt states are emerging as locations for business start-ups with hopes of innovation and employment opportunities.

In Canada, where the expanding mobile economy has resulted from early technology adoption, nearly three-quarters of its population will become smartphone users by 2018. Canadians have also embraced e-commerce, from a CAD22.3 billion spend in 2014 to an expected CAD39 billion spend by 2019, accounting for 9.5% of all retail transactions in Canada. While encouraging, there is still scope for greater gains, particularly for Canadian small businesses, 40% of which do not have a website to promote or sell their goods and services, highlighting a need for widespread web education.[26]

The Canadian Government has also established initiatives to promote growth of its digital economy including Digital Canada 150 initiated in 2014 to provide all Canadians with skills and tools to capitalise on the digital economy. Its Connecting Canadians program targets rural inclusion providing 300,000 homes in Canada's remote regions with high-speed broadband internet access by 2019.[27]

The start-up scene in Canada is gathering pace particularly in Vancouver, Toronto and Waterloo. The Government's 2017 'Innovation' Budget highlighted policies to accelerate growth of the start-up scene and job creation in major centres, forecasting 182,000 new technology jobs by 2019.[28] The Budget allocated CAD50 million to early stage research and development and late-stage prototyping for innovators and entrepreneurs; expedited visa processing times for skilled workers; assigned CAD30 million to digital skills development for K-12 students, CAD400 million for a new Venture Capitalist Catalyst Initiative, and CAD950 million to 2022 to create new innovation corridors.[29]

[26] Cira. (2016) *The States of e-Commerce in Canada*, p.2
[27] Government of Canada. (2017) 'Digital Canada 150 FAQs'
[28] Egusa, C. (2017) 'Canada is North America's up-and-coming start-up centre', *Tech Crunch*
[29] Forrest, C. (2017) '6 Ways the 2017 Federal 'Innovation' Budget Will impact Canada's Entrepreneurs, *Startup Canada*

East Asia (People's Republic of China, Hong Kong, Chinese Taipei, Japan and Republic of Korea)

The East Asian APEC economies include the People's Republic of China (China), Chinese Taipei, Japan, Republic of Korea, and Hong Kong, all of which maintain strong positions across e-commerce, and technology development and adoption. The progress of China has garnered global attention over the past decade. Internet giants in China such as Alibaba, Baidu and Tencent, continue to be a leading digital force in the region, in e-commerce, internet penetration, and the development of advanced technologies. China has grown from 1% of global transactions in 2007, to 40% in 2017. Their mobile payments system has also made great bounds, rising from 25% in 2013 to 68% penetration in 2016, and is worth an estimated USD790 billion, eleven times that of the US.[30] The Chinese e-commerce market is predicted to grow by 15% to reach USD1.4 trillion by 2020.[31]

China's internet user base of 731 million, combined with a large domestic talent pool, have allowed for the proliferation of new cloud, big data and IoT solutions to ensure the reliability of platforms and e-payments systems that support China's booming digital economy. Mass entrepreneurship and innovation remain high on the government agenda. Although the benefits of innovation go without saying, observers suggest that ongoing intellectual property challenges, and the Chinese Government's mass entrepreneurship initiative, which saw 15,000 new businesses registered daily in 2016, may create a frenzied environment where large-scale business failure, and financial losses would be realised. For example, in the Chinese city of Suzhou, 300 incubators serving an expected 30,000 new start-ups are planned for establishment by 2020.[32] Large resource allocations to such projects, while encouraging at face value, have not achieved expected economic or employment outcomes, and have led to caution among investors in China. This is expected to feature as a key concern in China's start-up ecosystem for the foreseeable future. Despite this, Chinese digital start-ups have performed well in recent years, and the economy is now home to the world's largest number of unicorns; start-ups with valuations of over USD1 billion.

Further east, Japan's digital economy has facilitated recent gains after an extended period of economic stagnation.[33] Japan ranks highly on the World Bank's ease of doing business tables. Japan has been able to drive economic and social development by leveraging some of the highest broadband penetration rates and fastest speeds in the world, and capitalising on the momentum that is building within its cloud, big data and IoT markets.

E-commerce, which includes a growing mobile commerce segment, will become Japan's largest retail channel by 2022. Japanese online food retailers, which are pursuing strategies to attract senior citizens to purchase groceries online, will reap the benefits of high connectivity, and are forecast to grow by 8.5% between 2015 and 2020 to reach an annual value of USD10.5 billion.[34] E-payment readiness is also high relative to other APEC economies, with 66% of shoppers opting for debit or credit cards as their preferred payment method, with an increasing share of purchases executed through mobile or tablet devices.[35]

[30] Woetzel Et al. (2017) *China's Digital Economy – A Leading Global Force*, pp.1-1
[31] Feifei, F. (2017) 'E-commerce set to grow 15% by 2020', *China Daily*
[32] Schuman, M. (2016) 'Venture Communism: How China is building a start-up boom' *The New York Times*
[33] ____. (2017) 'E-commerce in Japan: 20% of retail by 2022', *Retail Asia*
[34] ____. (2015) 'An Overview of E-Commerce Trends in Japan', *Agriculture and Agri-Food Canada*
[35] Frederick, J. (2016) '2016 Japan Ecommerce Market', *PFS*

In Korea where 90% of residents own a smartphone, mobile purchases account for approximately one third of retail sales, with mobile users reporting weekly purchases across a vast array of new internet businesses. Online food retailers will also experience approximately 10% growth by 2020.[36]

Chinese Taipei and Hong Kong have lead positions in digital entrepreneurship. Hong Kong is home to 50 incubator programs, underpinning approximately 25% year-on-year growth of new businesses, with nearly 2,000 start-ups employing over 5,000 staff.[37] Chinese Taipei is tipped to become another leading start-up hub. In addition to recent government investment of USD310 million for an 'Asian Silicon Valley', the National Development Council has initiated the 'Head Start Taiwan' project and accelerator with hopes of building closer relations with Silicon Valley in the US as a means to support fledgling entrepreneurs and regional collaboration.[38] Chinese Taipei has also seen several high-value acquisitions of local technology start-ups in 2016, which has led to widespread optimism for the future of entrepreneurship in this economy.

In focus

DHgate

DHgate is an online platform that connects MSMEs with global markets. Founded in 2004, it is one of the oldest and largest B2B e-commerce platforms in China. Platforms such as DHgate offer various services that significantly ease the ability to buy and sell across borders especially for entrepreneurs and SMEs. DHgate offers international logistics, cross-border payments, internet financing and distribution warehouses to easily allow entrepreneurs to reach new markets and scale their businesses. Although DHgate is smaller than rivals such as Amazon, Alibaba and Flipkart in terms of revenue and funding received it has been growing rapidly over the past few years.[39] It now has approximately 10 million global buyers and 1.2 million global sellers offering 33 million listed products.[40] DHgate also offers drop shipping services, which allows a retail store to buy products individually from a wholesaler who then ships the order directly to customers. This has helped thousands of new e-commerce businesses reduce costs and scale more easily, eliminating the need to buy merchandise in bulk and pay for storage or inventory management.

[36] Frederick, J. (2016) '2016 South Korea Ecommerce Market', PFS
[37] ___. (2017). 'Hong Kong's Start-up Ecosystem', startmeup.hk
[38] Lim, T. (2016) 'How Taiwan will become a major Asian start-up hub', Tech In Asia
[39] ___. (2017) 'DHgate Competitive Analysis', DGgate
[40] DHGate Introduction Brochure 2017

Southeast Asia (Singapore, Vietnam, Malaysia, Thailand, Brunei Darussalam, Indonesia, and Philippines)

Southeast Asia holds great promise for the digital economy and entrepreneurship over the next decade, owing to a raft of factors that are converging to produce favourable operating conditions. Consequently, technology giants, investors and aspiring entrepreneurs are closely monitoring digital developments, government innovation and internet policies, with the view to capitalising on Southeast Asia's large and youthful markets.

Although most of Southeast Asia remains cash-dependent, with cash-on-delivery models expected to continue as the dominant payment method, the future of e-commerce, and the broader digital economy is bright following Alibaba's recent acquisition of its Southeast Asian counterpart Lazada for USD1 billion. Given the nascence of the market, little data exists on projections for its future valuation, however approximate estimates by Google and Temasek, size the current digital economy at USD50 billion with growth to USD200 billion by 2025. Leading industries within SE Asia's digital economy will be: online media and gaming; ride hailing applications; flights and hotels; and e-commerce for apparel, electronics, food and groceries.[41]

Growth projections for the digital economy, and an explosion in smartphone adoption has led to a slew of new entrants to digital entrepreneurship, and local start-ups are beginning to take form in all of APEC's ASEAN members. Indonesia, Singapore, and Vietnam account for the majority of start-ups, primarily focused on e-commerce. Just four ASEAN start-ups have valuations of USD1 billion (Garena, Lazada, Grab Taxi, and Razer), while 53% achieve seed-funding with large drop-off rates at subsequent stages of funding.[42] This is indicative of the funding challenges facing start-ups in ASEAN, and is examined later in this report.

Despite failing to make Southeast Asia's top three start-up locations in recent years, Malaysia's ecosystem is building momentum with an optimal location in the region, a mix of nationalities which support business model testing, and lower operating costs relative to neighbouring Singapore. Efforts to diversify Malaysia's economy are based on a newfound entrepreneurial spirit epitomized by the eminent accelerator program MaGIC, Malaysian which assists start-ups region-wide including in Thailand and nearby Brunei Darussalam. Malaysia is currently home to between 350 to 650 technology start-ups, a high proportion of which were founded by women. The government has also actively pursued the innovation cause, and is expected to apply a 10-year tax exemption to attract foreign technology companies to Malaysia.[43]

In focus

A World First: Malaysia's Digital Free Trade Zone

Responding to the rise of the digital economy, in a world first, Malaysia has launched a Digital Free Trade Zone (DFTZ) to capitalise on the vitality of its USD1 billion e-commerce market and to provide seamless support for MSMEs and innovative enterprises engaging in cross-border trade. The joint initiative between Prime Minister Najib Razak, and Alibaba Group aims to accelerate e-commerce growth rates from 10.8% to 20.8% by 2020, and achieve a USD8 billion e-commerce valuation by 2025, leading to the creation 60,000 new jobs. The zone focuses on building the capability and reach of Malaysia's MSMEs, which account for a disproportionately low 37% GDP contribution despite

[41] Ho, Sheji. (2017) 'Why Everyone is Wrong About Southeast Asia's Ecommerce Potential', *ecommerce IQ.*
[42] *Ibid.*
[43] Start-up Genome. (2017) *Global Start-up Ecosystem Report*, p.117

representing 97% of all businesses.[44] The DFTZ will be rolled out in stages commencing in late-2017 and finalization is expected by 2019.

Despite the potential and optimism, Southeast Asian economies face challenges, larger in magnitude and scope than those of any other APEC area across its innovation and start-up ecosystems. Talent acquisition, access to funding, e-payment readiness, immaturity of ICT infrastructure, logistics inefficiency, and lack of consumer trust rank high as barriers to further growth of the digital economy and digital entrepreneurship, and will be examined during later chapters of this report.

Internet in Vietnam: 20 Years On

In November 1997, Vietnam officially connected to the Internet. On 1 December, the first .vn domain name was registered, marking an explosion in ccTLD[45] registrations, which reached an average annual growth rate of 127%. Vietnamese appetite for the internet lifted Vietnam into prime ASEAN position in the number of ccTLD registrations.[46]

By 2001, service expectations among internet users were high and public criticism about poor internet speeds and outages were common.[47] The Government responded with a suite of internet policy, control and infrastructural initiatives through the Ministry of Information and Communication (MIC), to underpin the development of high-speed service, national network connectivity, and the creation of a competitive online environment.[48] ICT was seen as a 'pivotal technical-economic sector…contributing to the social-economic development'.[49] Prioritisation of ICT and internet saw Vietnam leading within ASEAN in digital terms with Singapore and Malaysia.[50]

More recently, emphasis has been placed on significant investment in leapfrog technologies, namely mobile broadband and cloud computing. Between 2010 and 2016, Vietnam led its Southeast Asian neighbours in the largest growth in expenditure on cloud computing, with annual spend increasing by 64.4%.[51] Maturity of cloud-based platforms will likely be the catalyst for expansion in big data and IoT applications, which will also be strengthened in a future 5G network environment.

Vietnam has achieved impressive internet penetration rates, reaching 53% in 2017, up from 34% in 2012. Mobile subscriptions hit 124.7 million in 2017 in a nation with a population of 94 million. Social media use drives the uptake amongst Vietnam's large youth population. Currently, 40.10% of Vietnam's population are active social media users, representing an increase of 12 million people since 2016.[52] E-commerce is also booming in Vietnam. Currently, 62% of Vietnam's internet users participate in online shopping, with the Vietnam E-Commerce and Information Technology Agency (Vecita) estimating the local market to worth USD10 billion by 2020.[53] Most Vietnam's start-ups are operating in this market, which grew

[44] (2017) 'What exactly is the Malaysian Digital Free Trade Zone and its impacts?' *ecommerce IQ*
[45] ccLTD refers to country code top-level domain, which is an internet domain used or reserved for a country or sovereign state.
[46] VNNIC. (2012) *Report on Vietnamese Internet Resource,* p.3; Vaughn, R.B., and Dandass, Y.S. (2007) *Internet Development in Vietnam: A General Perspective*, p.16
[47] Ibid., p.17
[48] Ibid.
[49] MIC. (2009) 'Vietnam Information and Technology Whitebook 2009', *MIC Publishing House*, p.5
[50] (2013) 'Vietnam amongst the internet development leaders in Southeast Asia', *Case Asia*
[51] Real spending (in dollar terms) was led by Singapore, Malaysia and Thailand.
[52] Hootsuite. (2017) *2017 Digital Yearbook* p.240
[53] (2016) 'ASEAN Announces ICT Master Plan 2020', *Vietnam Telecom 2017*

by 35% between 2015 and 2016, and holds significant growth potential.[54] These predictions paint a promising future for digital entrepreneurs in online retail, logistics and payments locally and beyond Vietnam's borders; the latter two of which are considered to be the greatest challenges associated with the impending e-commerce boom.

The limited data available estimates 1,500 active start-ups, mainly in Hanoi, Danang or Ho Chi Minh City. Many operate with limited government support and small-scale seed funding up to USD10,000.[55] The research team conducted interviews with ecosystem players in these cities and the select Vietnam-specific results are compiled in the forthcoming pages. *Figure 2.2* shows expected digital economy growth in the three cities with Ho Chi Minh City in prime position.

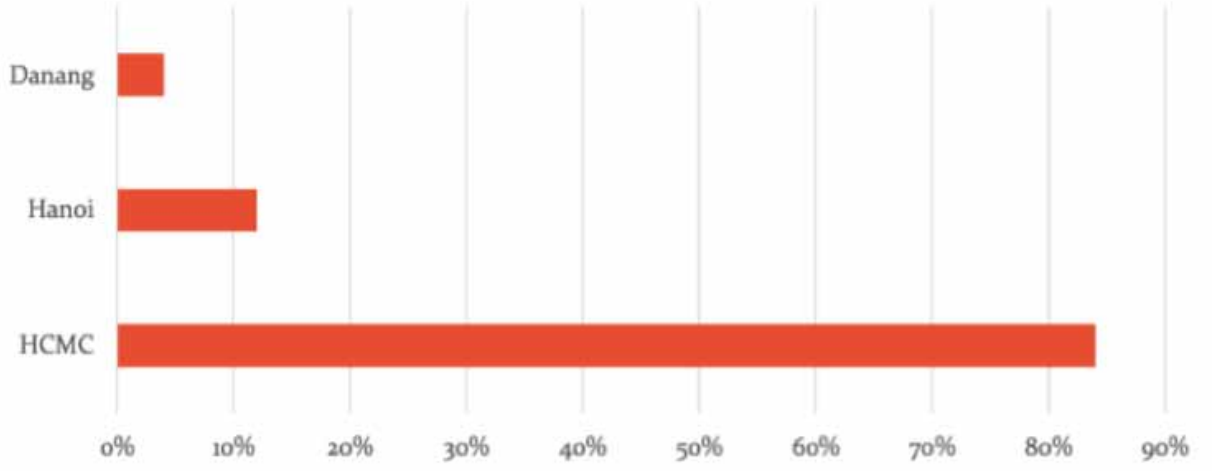


Figure 2.2: Potential to become the centre of Vietnam's future digital economy

The Vietnam Silicon Valley in Ho Chi Minh City was launched in 2013 with backing from the Ministry of Science and Technology, as part of a national ecosystem of innovation and technology commercialisation boasts the largest cluster of start-ups. It draws on overseas best practice in mentoring, accelerators, investment, and funding and aims to support a further 2,600 start-ups over the next ten years.[56] Vietnam has an estimated 90% failure rate in start-ups, often due to inadequate financial support.[57] Interviews conducted in Ho Chi Minh City highlighted the risks of limited government support being spread too thinly in an environment with limited alternate sources of funding such as angels, venture capitalists or banks.

Vietnam boasts several high-value start-ups from Ho Chi Minh City's collective start-up community. One high-profile example is *Flappy Bird,* a gaming application which shot to fame in 2013, reportedly pocketing its founder USD50,000 per day[58] *DesignBold*, a rival to Photoshop, Digipencil MVV and *Gioahangnhanh*, an online delivery service, are three further success stories.

[54] Nguyen, M. (2016) 'Vietnam's Young Tech Talent Pulls Foreign Funds to Booming Start-up Scene', *Rueters*
[55] Nguyen, M. (2016) 'Vietnam's Young Tech Talent Pulls Foreign Funds to Booming Start-up Scene', *Rueters*
[56] VSC (2017) 'Mission', *Vietnam Silicon Valle*, Hoekstra, A. (2017) 'Tech start-ups are funding fertile ground in Vietnam's 'Silicon Valley', *Deutsche Welle*
[57] Phuong, H. (2017) 'The next Silicon Valley? Where to place Vietnam on the global start-up map? *VNExpress*
[58] Kushner, D. (2014) 'The Flight of the Birdman: Flappy Bird Creator Dong Nguyen Speaks Out', *Rolling Stone*

In focus

Digipencil MVV

Digipencil MVV is a home-grown digital start-up founded by a digital veteran in 2014, to develop business solutions in marketing, operations, and distribution. In just three years, its revenues have risen sharply by 500%, and now serve international enterprises, on top of an already-strong local customer base. The company, founded by a digital veteran, attributes its success to early funding, raised through venture capital, and an intensive program of coaching for their digital workforce, which has strengthened, and transformed the company's internal capability.

DigiPencil MVV aims to educate the market, and acquire local talent through digital thought-leadership programs such as the dCommerce initiative within the Ministry of Trade and Commerce, Digitised Online Marketing programs, and Content Marketing programs. These thought-leadership platforms are its main source of revenue, and act as a talent pipeline for DigiPencil. In an emerging market such as Vietnam, the success of DigiPencil MVV demonstrates that the rapid growth of a digital business must be done in parallel with educating the market, and building public awareness about the power of digital.

Home grown high profile successes fuel the evident optimism among interviewees and survey respondents about the future and as depicted in *Figure 2.3* two thirds of all respondents believed that Vietnam had the capacity to produce a billion-dollar unicorn start-up, rivalling the likes of Airbnb and Uber. However, in spite of overall optimism for the future of Vietnam's digital economy, individual entrepreneurial confidence among Vietnamese has historically been low. Previous studies have indicated that 57% of Vietnamese adults feared failure, and lacked confidence in their ability to pursue entrepreneurial ventures.[59]

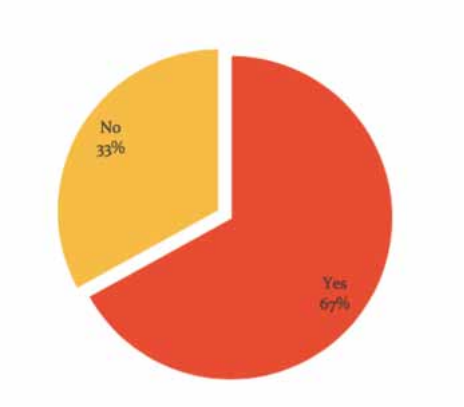


Figure 2.3: Can the next billion-dollar unicorn start-up originate from Vietnam?

Interviewees and survey respondents rated the competitiveness of Vietnam's current digital economy in enabling digital entrepreneurship. The average score was 2.8, on a scale from 1 being not competitive and 5 being very competitive, shown in *Figure 2.4*. Although there was confidence in the future of Vietnam's digital economy with technology giants having entered the market, especially in recent years since 2010, apprehension about Vietnam maintaining its competitive low-cost business environment was evident.

[59] World Bank. (2017) *Vietnam 2035: Towards Prosperity, Creativity, Equity, and Democracy* p.129

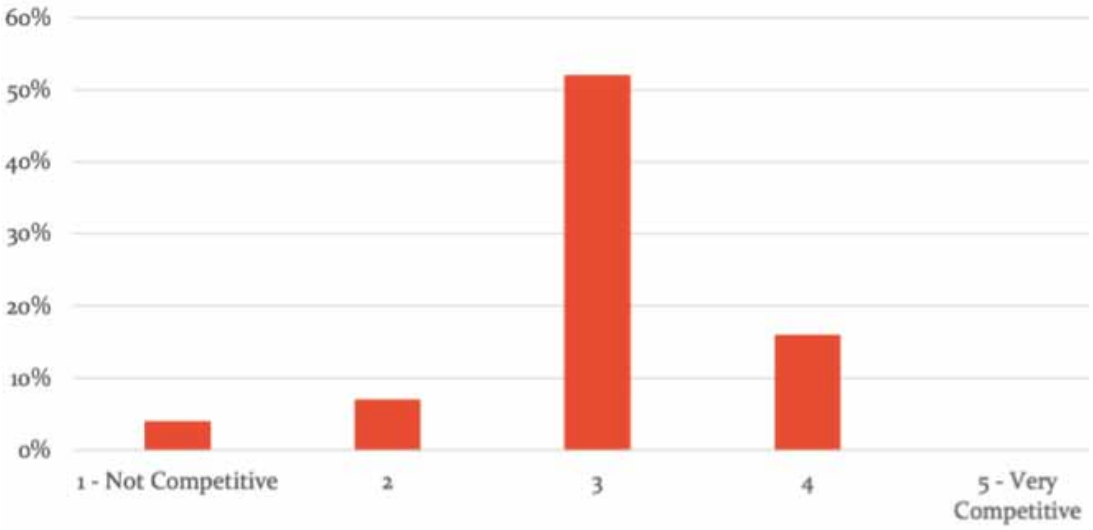


Figure 2.4: Competitiveness of Vietnam's Digital Economy

Interviewees flagged the importance of having sufficient suitable technology talent to drive high-growth start-ups in Vietnam. Vietnam hosts a large pool of IT professionals, and is world-renowned for software outsourcing. However, the aptitude of technology-savvy workers to draw on user-centric design and critical thinking to create new, innovative digital enterprises is less proven. There is comfort in the strength of Vietnam's human capital pipeline with students exceling in mathematics and science – foundational knowledge and expertise - ranking strongly against leading economies.[60] There was a view that traditional primary and secondary education models did not adequately prepare students for digital careers, and a high importance was placed by interviewees and survey respondents on the tertiary education sector filling these gaps, as shown in *Figure 2.5*.

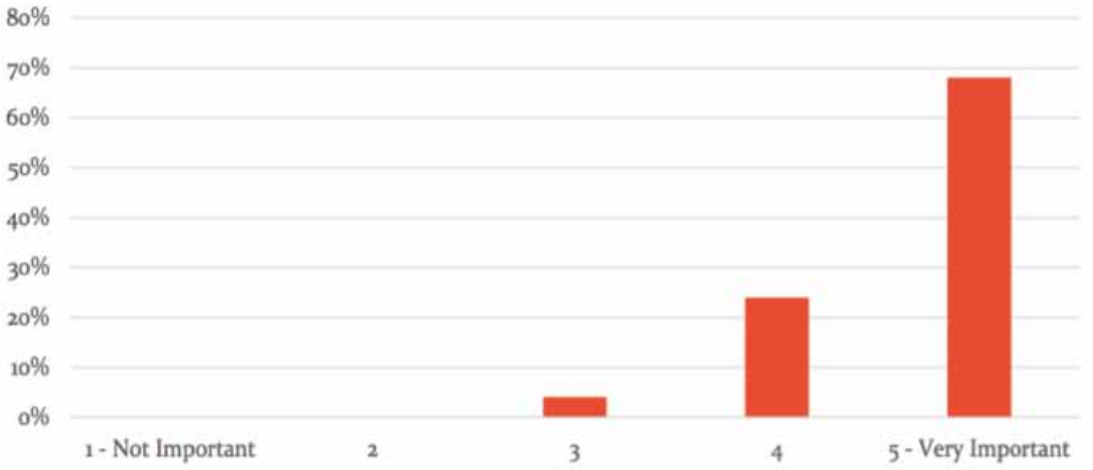


Figure 2.5: Importance of the tertiary education sector in ensuring a bright technology future in Vietnam

All respondents highlighted the value of Vietnam hosting more foreign universities to secure more knowledge about 'smart ways of working' and the newest technology trends.

Enabling ICT infrastructure was confirmed as fundamental requirements with wireless and internet technologies being as just as important as physical infrastructure projects such as transportation, roads and ports, as shown in *Figure 2.6*.

[60] Ibid

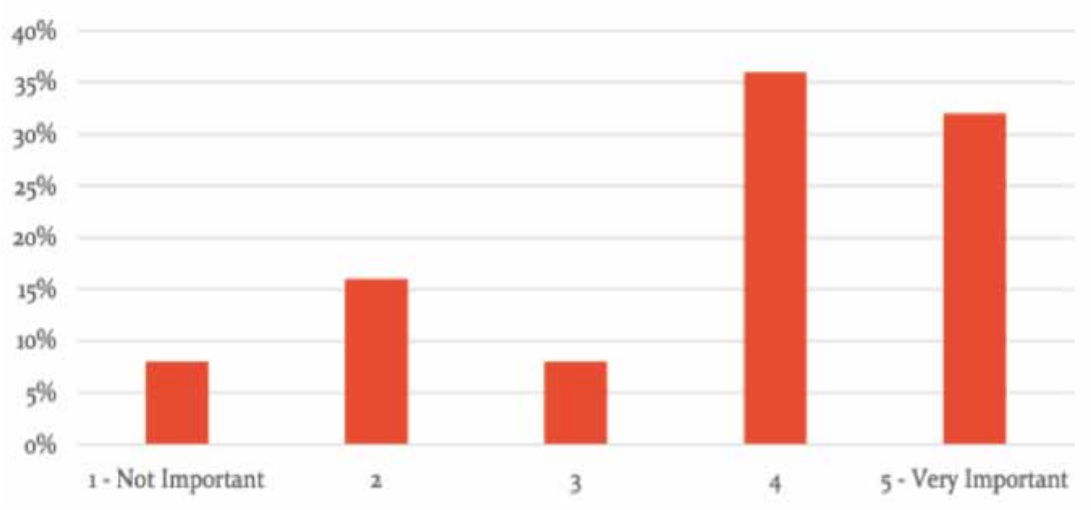


Figure 2.6: Importance of wireless and internet technologies

Discussion on enablers to further ecosystem growth indicated that awareness of support was low and would be improved by strong public awareness and information campaigns in the digital space. There was a strong desire (68% of all respondents) to see streamlining and consolidation of digital economy and small business support functions into a single government body.

Oceania (Australia, New Zealand and Papua New Guinea)

Australia maintains a position as a global top ten e-commerce market, valued at AUD32.56 billion. This is supported by a national digital buyer penetration rate of 62.58%, which is predicted to grow to 69% by 2020.[61] *Figure 2.7* shows that Australia has also performed strongly on the ICT services front, with total trade flows increasing by 12% to reach AUD5.7 billion in 2016, attributed primarily to strong hardware and software consultancy services.[62] Recognising the economic potential of high-margin ICT service exports, the Australian Government is tailoring policy responses accordingly, with new initiatives geared towards advancing ICT R&D.[63]

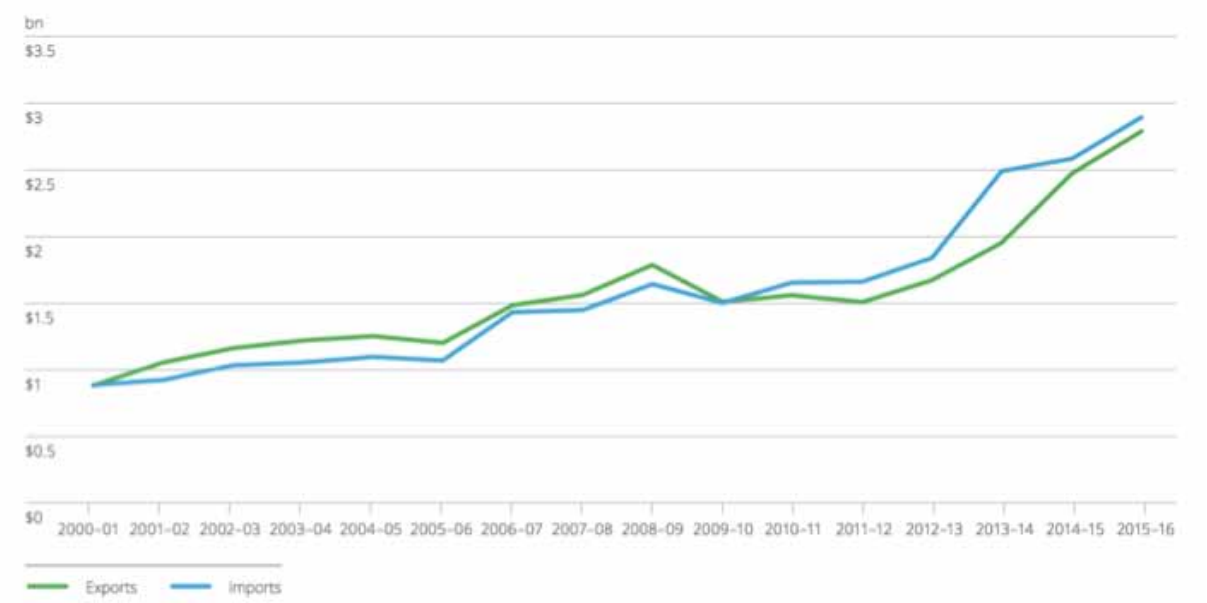


Figure 2.7: Australia's Trade in ICT Services, Source: ABS

Despite early technology adoption, world-class research institutions, a strong economy and ICT educated workforce, Australia had significant challenges in fostering the digital start-up stage.

However, positive developments in Australia's start-up ecosystem are emerging, drawing strength from bipartisan political support for innovation and entrepreneurship. Large milestones have been achieved since 2016 from public listings to international expansion of home-grown start-ups, to ever-larger capital inflows from angel investors and venture capital funds.[64] These developments, combined with state and federal government investments targeted at innovation-intensive start-ups, have renewed hopes for Australian industry, and what has become a re-energised start-up ecosystem to watch closely. Australia's start-up ecosystem is shown in *Figure 2.8*.

[61] Webalive (2017) 'Australia's Growing Ecommerce Industry and How It is Changing Retail Trends', *WebAlive*
[62] Deloitte Access Economics. (2017) 'Australia's Digital Pulse', *Australian Computer Society 2017*, p.12
[63] Ibid.
[64] Startup Aus. (2017) *Crossroads: an action plan to develop a vibrant tech startup ecosystem in Australia*, p.28

Figure 2.8: Australia' Start-up Ecosystem, Source: Startup Aus

Across the Tasman, NZ's e-commerce market has come of age. Since 2012, growth has jumped 28% with 2 million New Zealanders purchasing 20.6 million items online annually.[65] Thee NZ market has strongly taken up mobile commerce, with year-on-year increases in online shopping via smartphones topping 127%.[66]

Coinciding with these upward trends is the NZ Government's digital and innovation drive, which has pledged NZD410.5 million to its Innovative NZ Package – the single largest science and innovation investment in NZ's history.[67] Placing a laser focus on igniting the start-up ecosystem, the government has enacted legislation to enable crowdsourcing of up to NZD2 million pa in equity funding and announced an Entrepreneur Visa to attract foreign talent to establish high-growth start-ups in NZ.[68]

[65] H Boyte, T. (2016) 'New Zealanders Open Their Laptop Lids Instead of their Wallets', *Nielsen*
[66] SP eCommerce (2015) '10 NZ eCommerce Facts', *Singapore Post eCommerce* p.1
[67] Ministry of Business, Innovation & Employment. (2016) 'Budget 2016 science & and innovation funding', *NZ*
[68] Startup Aus. (2017) *Crossroads: an action plan to develop a vibrant tech startup ecosystem in Australia*, p.78

PNG's Digital Landscape

In 2018 PNG will chair APEC. The spotlight will be on this emerging Pacific economy, its ambitions and the challenges it faces. Like APEC counterparts, PNG leaders, policy makers and business aspire to a digital future. PNG faces latent factors in relation to building an enabling environment which will require attention to a range of critical issues (adequate infrastructure, internet access, human capacity building, and appropriate policies) to advance digital entrepreneurship in PNG.
PNG has 7.9 million citizens, speaking over 820[69] languages mostly in rural communities across 600 islands with terrain that inhibits rollout of fixed line telecommunications and energy infrastructure. STEM and entrepreneurial education is limited and financial exclusion is high in PNG's largely cash economy. 80% of people are not connected to the national grid.

In the twenty years since PNG Post and Telikom launched the first internet service, PNG's digital environment has expanded, stimulating digital appetite particularly amongst young mobile phone subscribers for social connection and leisure. Internet penetration has reached 12%, and there are 3.44 million mobile subscriptions, representing 44% of the population, up from 1.6% in 2006. Social media use is at 8% of the population, with 7% accessing social media platforms via mobile devices. *Figure 2.9* shows internet access and penetration in PNG is growing.[70]

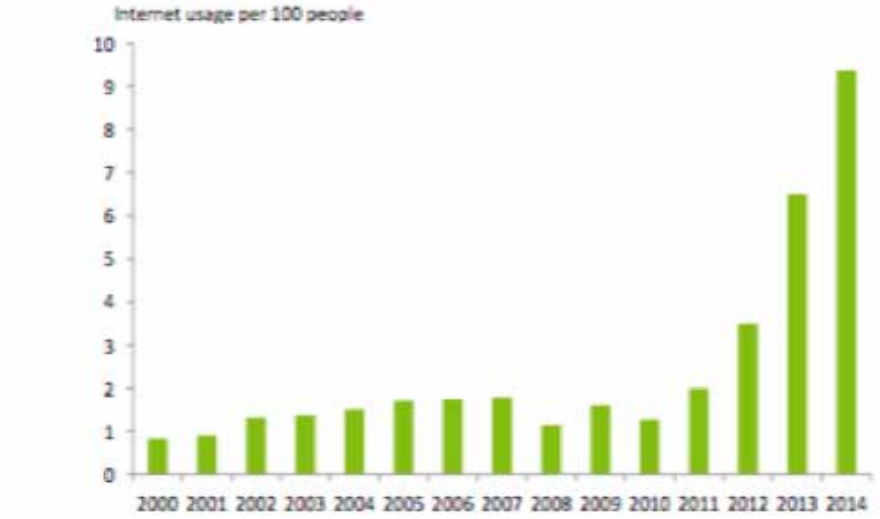


Figure 2.9: Internet usage per 100 people Source: ITU (2015)

Over the past decade, the PNG Government has introduced significant policies, regulation, and market reform to develop their digital environment through infrastructure investment, competition and equity issues.[71] The National Information and Communication Technology Act of 2009 and the establishment of National Information and Communications Technology Authority (NICTA) in 2010 led to a National Broadband Policy in 2013 and the National Transmission Network project from 2014. Liberalisation and deregulation in this period ended the monopoly of state-owned telecommunications provider Telikom (now Citifon) over fixed and mobile telecommunications services, allowed new entrants including the present retail telecommunications providers Digicel and bmobile-vodafone, and saw expansions in mobile services and coverage and sharp decreases in end user costs[72] driving the increase in subscribers in *Figure 1* notable from 2011.

[69] _____. (nd) 'The country with the highest level of language diversity: PNG, *pangeanic*
[70] Hootsuite. (2017) *2017 Digital Yearbook*, p.172
[71] Kwasam, N. (n.d) 'The Internet and effects on PNG', *University of PNG*
[72] Deloitte Touche Tohmatsu. (2016) *Why are internet prices high in PNG?* pp.3,28

Nevertheless, tele-density and fixed-internet penetration remains very low in relative terms, particularly outside major cities and prices are still high. In 2013, broadband costs in PNG as a percentage of GNI per capita were 38 times higher than Indonesia and 665 times higher than in Singapore.[73] PNG ranked 163rd out of 169 countries in 2013 for internet service costs relative to gross national income (GNI) per capita. Basic fixed line broadband cost 266% of the average person's GNI per capita.[74] Recent developments including the 2017 installation of a Neutral Internet Exchange Point (IXP) facility will contain local internet traffic within the country and further reduce costs.

Internet infrastructure has expanded but there are signs it is stretched to capacity.[75] The National Transmission Network project, illustrated in *Figure 2.10* overseen by state-owned enterprise DataCo is in its final stages. The USD313 million project[76] will become the wholesale internet provider for PNG's telecommunications companies, supplying high-speed and more affordable broadband to internet and mobile phone users in PNG - a 'transformative leap'.[77] The PNG government has entered into partnership with Huawei Marine to support development of a national submarine cable network, servicing 14 major domestic cities.[78]

Gains have been significant in providing affordable and widely available broadband services that are essential to the future social and economic development. Digicel has invested USD800 million in PNG internet, transiting PNG from slow dial-up internet to high-speed broadband and aiming for 3G coverage for 80% plus of PNG's population by 2020, with 60% mobile penetration to accessible customers.[79] Presently, 3G – and even some limited 4G in 2017– networks are available in major population centres although large rural populations remain on 2G network coverage.[80] However, PNG's digital future requires further work to increase coverage and penetration rates.

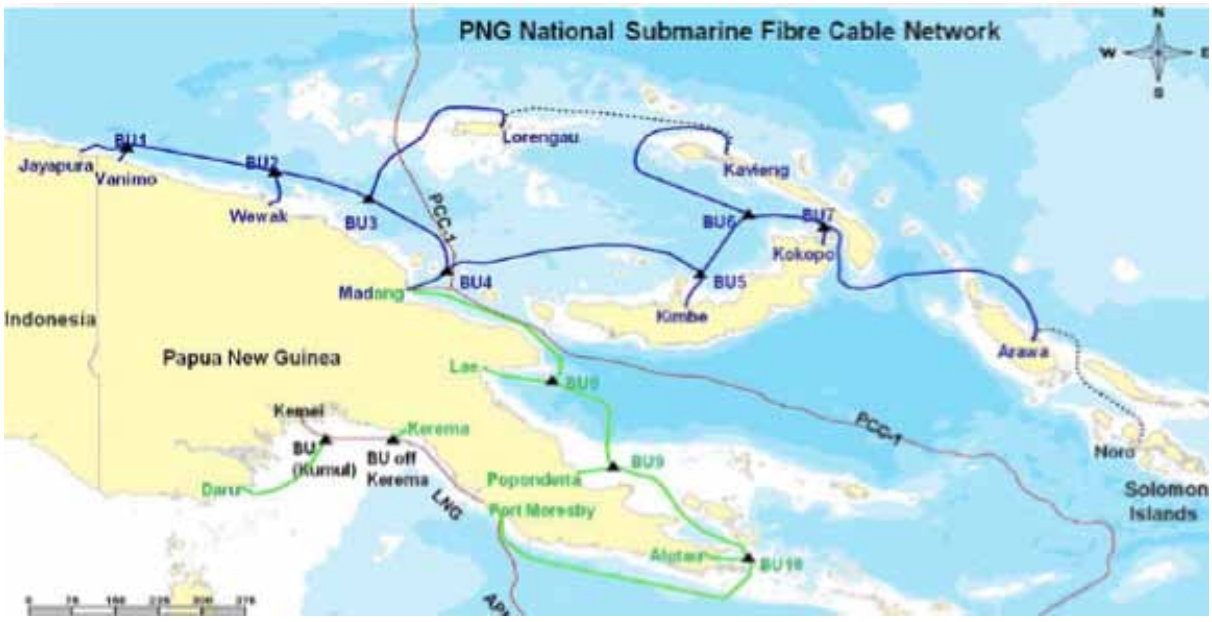


Figure 2.10: National Submarine Cable Network, National Transmission Network Source: Huawei

[73] International Telecommunication Union (ITU): ITU (2015)
[74] Deloitte Touche Tohmatsu. (2016) *Why are internet prices high in PNG?* p.13
[75] Deloitte Touche Tohmatsu. (2016) *Why are internet prices high in PNG?* p.24
[76] McQuillan, K. (2016) 'Papua New Guinea's broadband network 'on track', but there will be challenges, says analyst', *The Business Advantage PNG*
[77] Garrett, J. (2013) 'PNG's transformative internet warmly welcomes', *ABC News*
[78] ____. (2016) 'Huawei Marine Helps PNG Build a National Broadband Transmission Network', *Huawai News*
[79] ____. (2016) 'Papua New Guinea's internet is gaining speed', *Oxford Business Group*
[80] Wansink, K. (2017) PNG – *Telecoms, Mobile and Broadband – Statistics and Analyses, Executive Summary*

Photo credit: Villagehuts.com

The costs of network infrastructure are high. Impervious terrain inhibits transmission of internet signals[81] placing emphasis on mobile and submarine and satellite[82] for roll out to some regions.
Business digitalization, ecommerce and digital entrepreneurship remain fledgling in PNG. Beyond geographic and infrastructure challenges lie other socio-economic challenges. PNG is a cash dominated economy with financial and banking services only relatively recently being extended to remoter regional areas. The World Bank rates PNG as having a high level of financial exclusion, particularly in rural areas.[83] Cash and debit card usage is low with a consequential impact on ecommerce and electronic payment readiness indices.[84]

Initiatives to tackle financial illiteracy include *Vision 2050* with provisions for grants, credits and funding and roll-out of financial literacy programs.[85] The introduction of mobile wallet technology could improve access to banking services and the expansion of microfinance in PNG is offering more accessible loan and credit options. The microfinance industry is estimated to now have over 500,000 individual loans as small as USD62 with an emphasis on women.[86] Women in rural areas of PNG have generally been excluded from education and are disadvantaged by low levels of financial literacy.[87]

In urban areas, there is only limited capacity to make online payments to local merchants - most are not on line. There is a need to raise awareness amongst SMEs of the utility of the internet and websites for commercial opportunity and to introduce foundational ICT and digital education within schools and in the business community to foster low-cost e-commerce and website development to increase PNG's capacity to realise its digital aspirations. There is also a need to increase confidence in the community through regulation and legislation. Parliament passed the Cybercrime Code Act in 2016, covering hacking, forgery, infringement of intellectual property rights and identity theft.[88] Laws on privacy and data protection would improve community confidence in digitilisation.[89]

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[81] Deloitte Touche Tohmatsu. (2016) *Why are internet prices high in Papua New Guinea?* pp.30-32
[82] McQuillan, K. (2016) 'Papua New Guinea's broadband network 'on track', but there will be challenges, says analyst', *The Business Advantage PNG*

[83] Sibley, J. (2015) *Financial Inclusion in Papua New Guinea Status Report,* The World Bank p.13
[84] USC Marshall. (2015) *Driving Economic Growth through Cross-Border E-Commerce in APEC: Empowering MSMEs and Eliminating Barriers,* p.138
[85] Sibley, J. (2015) *Financial Inclusion in Papua New Guinea Status Report*, The World Bank p.16
[86] ___. (2014) 'Microfinance sector in Papua New Guinea expanding services', *The Business Advantage*
[87] Administrator. (2017) 'The central bank of PNG is partnering Australia for developing blockchain solutions to bring financial inclusion for the country's 85% unbanked population', *Skerah, PNG*
[88] Dawidi, Z. (2016) 'What you need to know about PNG's new Cybercrime Act', *The Business Advantage*
[89] _____. (2016) 'Thinking beyond borders: Papua New Guinea', *KPMG*

In focus

Tourism e-commerce

PNG offers some examples of effective tourism e-commerce for other emerging economies to consider. In 2016, the National Geographic Traveler Magazine named PNG as a top 21 must-see global destination, reflecting growing numbers of adventure tourists to PNG.[90] Air Nuigini has online booking and credit card payments, supplemented since 2015 by an innovative a 'pay later' scheme allowing online bookings with follow-up cash payments within 48 hours in office.[91] In 2016, Villagehuts.com was created to provide a promotional platform and secure booking channel for village and community guesthouses and home-stay lodgings, 95% of which did not have a website.[92]

PNG e-commerce will grow following the completion of the National Broadband Transmission[93] and reform of its financial institutions. In 2015 the PNG government joined the Better than Cash Alliance, which brings together governments, international organisations and companies in PNG, Indonesia, Peru, Philippines, Mexico, and Vietnam to expedite the movement from cash to digital payment platforms.[94] PNG is digitising all government payments, from salaries to social security payments.[95]

In focus

Leapfrogging with blockchain

Leapfrogging with blockchain: The PNG Government is partnering with the Australian Government to examine the feasibility of using advanced financial technologies such as blockchain to leapfrog traditional financial infrastructure into the future digital economy. The Central Bank of PNG's research into the application of blockchain, a digital technology that tracks transactions, and verifies identity.[96] Following trials this year, PNG's Central Bank announced the establishment of a PNG Digital Commerce Cryptocurrency Association to aid closer ties with the Global Blockchain Forum, championed by the US Chamber of Digital Commerce.[97] A number of APEC economies are trialing blockchain, including Japan, Australia and the US. PNG is at the forefront in this area for emerging APEC economies and could secure significant dividends for digital advances and financial inclusion.[98]

[90] _____. (2016) PNG named in National Geographic's top 21 travel destinations', ABC News Pacific Beat
[91] Corporate Affairs. (2015) 'Pay later method of payment', *Air Nuigini*
[92] Villagehuts.com. (2017) 'About us', *villagehuts.com*
[93] Wilkins, A. (2017) 'The new PNG cyberspace' e-commerce set to take off in PNG', *the Business Advantage*
[94] Sibley, J. (2015) *Financial Inclusion in Papua New Guinea Status Report*, The World Bank p.13
[95] _____. (2015) 'PNG commits to digitising all government payments', *Media Release, Better than Cash Alliance*
[96] Administrator. (2017) 'The central bank of PNG is partnering Australia for developing blockchain solutions to bring financial inclusion for the country's 85% unbanked population', *Skerah, Papua New Guinea*
[97] Willms, J. (2017) 'Central Bank of PNG Adopts Blockchain Technology', *Nasdaq*
[98] Ibid.

Photo credit: Villagehuts.com

There are few statistics on the number of start-ups in PNG. A survey by Australian Lowy Institute found aspiring entrepreneurs, mostly under 35, cited access to finance, reaching customers online, and securing contracts were major obstacles.[99] Entrepreneurship could offer a solution to reducing the high rates of youth unemployment in PNG. In PNG - in Port Moresby, 40,000 youth are unemployed, many without secondary education, with limited skills for entry-level positions.[100]

There is considerable opportunity for PNG in digital entrepreneurship and foundational capacity building work would contribute to realising digital opportunities. One program introduced to empower and enable budding entrepreneurs and SMEs was the 2014 PNG's National Development Bank's Youth in Business Scheme (YES) with two-years mentoring and seed funding up to USD30,000 for start-ups. In the same year, the EU sponsored a PNG ICT Cluster Pilot Initiative with the PNG Business Council and PNG Chamber of Commerce and Industry with workshops on incubator development and lessons from Silicon Valley, and starting the Port Moresby Google Software Development Club and young technology entrepreneur network.[101]

This year, the Kumul Game Changers program commenced, selecting up to 40 entrepreneurs with an innovative idea in agriculture; fishery; financial inclusion; renewable energy; healthcare; water, and sanitation; and education.[101] One participant is developing an app to provide women with digital information and diagnostic tests for cervical cancer, the leading female cancer in rural PNG.[103]

Start-up support initiatives such as these help to inspire and empower the next generation of digital entrepreneurs and provides a foundation to build on. APEC can help provide capacity building support in collaboration with the government, educational institutions and the private sector in bedding down the transformative processes that IT and digitisation will contribute to PNG's development. PNG might find it useful to review its regulation affecting equity funding and foreign investment in sectors which would benefit from digital innovation.

[99] Pryke, J. (2016) 'Creating jobs in PNG: The role of young entrepreneurs', *The Interpreter, Lowy Institute*
[100] ___. (2016) 'Papua New Guinea: Giving Urban Youth a Second Chance', *The World Bank*
[101] Ibid., p.6
[102] ___. (2017) 'About us, Sectors', *Kumul GameChangers*
[103] McQuillan, K. (2016) Entrepreneur: Roberta Morlin, women's health app developer', *Business Advantage*

Europe (Russia)

Russia has embarked on an ambitious campaign to boost its digital economy with a government announcement to invest USD3.4 billion into IT infrastructure in 2017, citing it as the foundation of Russia's long-term position on the world stage, and "a matter of national security…".[104]

Russia's e-commerce market has grown steadily in recent years with the number of online shoppers increasing with a strong preference for merchandise from Chinese and other foreign online retailers.[105] This coincides with a large increase in internet penetration, reaching 73% in 2017,[106] and a steady uptake of smartphone and tablet devices.[107] Russia's e-commerce market will likely be sheltered by expanding internet connectivity, fast adoption of online payment methods, and development of rural infrastructure, which will expand business' reach into once-isolated territories. This is expected to drive positive results in a market forecast to be worth between USD40 billion to USD50 billion in 2020, and in excess of USD100 billion by 2025.[108]

Russia's Ministry of Economic Development has recently launched a renewed focus on innovation policy under the *Innovation Development Strategy of the Russian Federation to 2020*.[109] The Strategy's wide-ranging measures are intended to ignite innovation and modernisation across Russia's economy, including promising IT and high technology industries.[110] Priorisation of the innovation agenda is expected to engage a new breed of entrepreneurs operating in e-commerce, online advertising, and advanced technologies. For this reason, start-up ecosystem ranking systems have flagged Moscow has a future technology hub to watch over the outlook period.

[104] Huaxia. (2017) Russia to invest 3.4 bln USD in digital economy this year: Putin', *New China*
[105] BI Intelligence. (2016) 'Russia's e-comerce market slowed drastically in 2015', *Business Insider*
[106] Hootsuite. (2017) *2017 Digital Yearbook*, p.183
[107] Ecommerce Foundation. (2017) *Russia B2C Ecommerce Report*, p.21
[108] Ecommerce Worldwide. (2015) *E-Retail in Russia*, p.27
[109] OECD. (2013) Russia: Modernising the Economy', *Better Policies Series*, pp.27-28
[110] Remarks of Dmitry Medvedev's Progress report on Russia's Innovative Development Strategy at the Presidential Council for Modernisation and Innovative Development, December 2014

Latin America (Mexico, Chile, and Peru)

Across the Pacific, Latin America (LATAM) is also emerging as another set of APEC economies with notable economic and digital potential. LATAM has made significant strides in boosting a young, yet dynamic start-up ecosystem, despite experiencing a sustained period of underdevelopment of and poor investment in science, technology, and innovation systems.[111] Peru, Chile and Mexico, LATAM's members of APEC have emerged as popular destinations for would-be digital entrepreneurs and bootstrappers seeking to capitalise on large and relatively youthful markets.

While there is significant progress to be made in encouraging regional cooperation among Latin American economies in the areas of entrepreneurship and innovation policy, multilateral consensus on the entrepreneurship agenda has begun to take form in recent years. Convening for its inaugural meeting in 2013, the *Innovation and Entrepreneurship Forum of the Pacific Alliance*, otherwise known as LAB4+, attended by the four member-states of the Pacific Alliance trading bloc (Mexico, Peru, Chile and Columbia), has become the region's leading forum for championing the start-up cause in the area. Owing to the Pacific Alliance's high technology exports, there is widespread optimism throughout LATAM for a bright start-up and technology future, and subsequent growth in business investment across many of the continent's emerging economies.

Mexico currently accounts for 12.3% of Latin America's total e-commerce market, a figure which is expected to rise to 15.6% by 2019. Mexico's online retail market illustrated in *Figure 2.11* is expected to be worth USD11.5 billion by 2018, aided by retail giant Amazon's large investment in Mexico.[112] Mexico's internet penetration rate remains at 59%, significantly lower than APEC's frontrunners, although mobile subscriptions have risen to 83% of the total population.[113] Falling prices in smartphones, and recent telecommunications regulatory reform may slingshot mobile commerce start-ups into favourable positions to capitalise on Mexico's large market of 129 million people[114] which is forecast to grow to 148 million by 2030.[115]

Mexico City is becoming a hotbed for digital start-ups in LATAM. Several factors have influenced this including recently returned university graduates who have studied in the US and a strengthening relationship with Silicon Valley funders following high-value acquisitions of Mexican Venture Capital firms in 2012. The government is also positioning technology and innovation as a pillar of the Mexican economy, poised to become a global powerhouse by 2050. In 2014, the National Institute of Entrepreneurship allocated USD658 million to over 600,000 entrepreneurs in 2014, which has since led to the creation of 6,000 new start-ups and 73,000 new employment opportunities.[116]

[111] OECD (2016) 'Start-up Latin America 2016: Building an Innovative Future' *OECD Development Centre*
[112] BI Intelligence cited in Smith, C. (2016) *The Latin America E-Commerce Report*
[113] Hootsuite. (2017) *2017 Digital Yearbook*, p.143
[114] Hootsuite. (2017) *2017 Digital Yearbook*, p.143
[115] Euromonitor. (2015) 'Mexico in 2030: The Future Demographic
[116] Egusa, C. (2015) 'Beyond the Maquiladora: A Look at Mexico's Start-up Scene', *Tech Crunch*

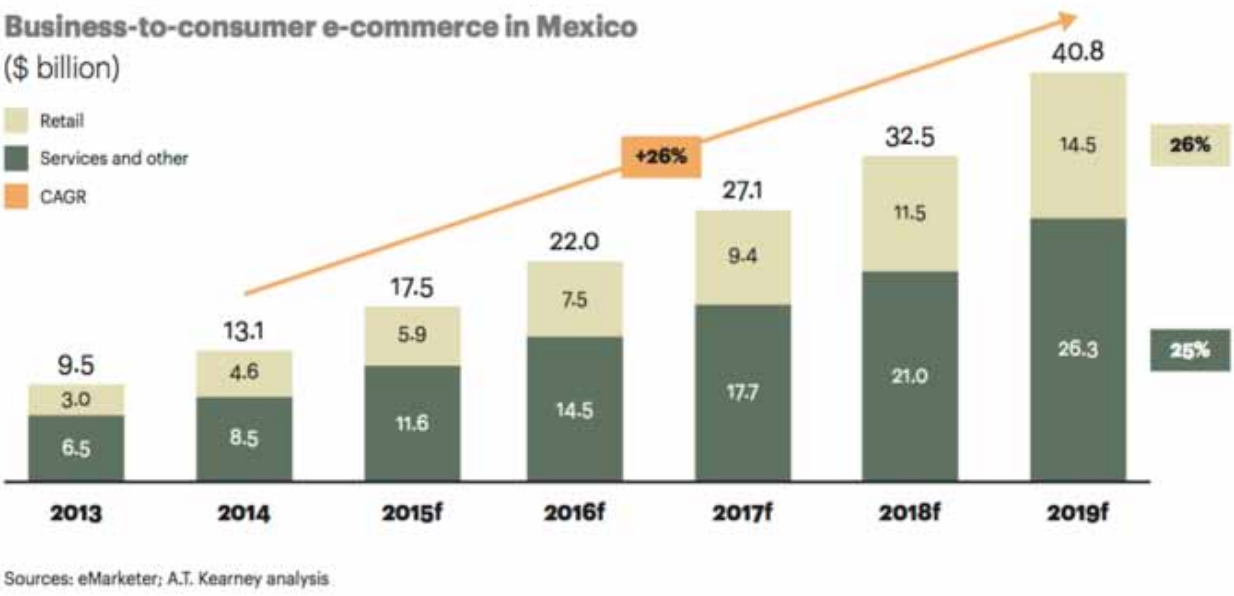


Figure 2.11: Growth in Mexico's Online Retail Market, Source: eMarketer, A.T. Kearney

Chile and Peru have achieved higher internet penetration rates than Mexico at 77% and 63%, and even higher mobile subscriptions of 142%, and 111% respectively. Forecasts for the Chilean e-commerce market is positive but conservative relative to growth predictions for Mexico. For Peru, large disparities in internet connection rates between inhabitants of Lima and other urban and rural areas is the largest barrier for expansion of e-commerce although growth is expected as more offline business opt for omni-channel strategies.

Chile is home to LATAM's first seed accelerator, eclipsing larger economies Brazil, Mexico, and Argentina in pioneering ecosystem development. Its government-funded program Start-up Chile has graduated over 12,000 start-ups since 2010, many of which have been enticed to stay through a follow-up fund known as SCALE. The fund, which awards USD100,000 to start-ups in exchange for their commitment to retain operations in Chile, has supported Chile's rise to the top of the charts in total cash investment in LATAM — more than double the investment in Mexican start-ups in 2016.

[117] Hootsuite. (2017) *2017 Digital Yearbook*, pp.74,149
[118] GSMA Intelligence. (2016) *The Mobile Economy: Latin America and the Caribbean,* p.36
[119] Gust. (2016) *LATAM Accelerator Report 2016*, p.2

CHAPTER THREE

ENABLING DIGITAL ENTREPRENURSHIP WITH STRONG ICT INFRASTRUCTURE

KEY FINDINGS

- *There is no regional benchmark for minimum internet penetration or speeds despite digital connectivity being positioned as a regional policy imperative*
- *Individual national pursuit of internet roll-out has led to large disparities in connectivity within APEC affecting digital business and engagement in an increasingly digitalised global market*
- *The number of national broadband plans in place is growing but many fall short of current or future requirements*
- *The cost of smartphones and mobile services has decreased but is still prohibitive in some economies and some rural and remote areas*
- *Leisure and entertainment are the dominant reasons for internet use with low awareness of the power of the internet to drive business in emerging economies of APEC*
- *Public-Private Partnerships could be used as an alternative form of funding for large-scale ICT infrastructure projects*
- *Emerging economies are investigating leapfrog technologies however the efficacy of these technologies will be dependent on fast, and expansive network connectivity, including through the roll-out of 5G, which is not slated for commercial launch until 2020*

INTRODUCTION

ICT infrastructure is key to digital inclusion, digital entrepreneurship and participation in the digital economy. The Asia-Pacific region is host to some of the fastest growing economies in the world with rapid rates of smartphone uptake and mobile broadband expansion. There is however within APEC a 'digital divide' in the region's ICT landscape. This chapter examines the current issues and state of ICT infrastructure in the region. Bridging the divide between the digital haves and have nots is complex and costly challenge but a necessity for attention given the potential rewards for individuals, enterprise and government and should be prioritised as an issue of high national and regional importance.

Comparing APEC Economies' Level of Connectivity

The Global Connectivity Index (GCI) (reviewed annually) illuminates relative rankings of connectivity and implementation of key technologies across the APEC membership. *Figure 3.1* depicts GCI's mapping of 50 countries (17 APEC) along a technology S-curve, classifying them into starter, adopter, and frontrunner. Each cluster is characterised by similar levels of GDP Per Capita and maturity across five enabling technologies: broadband; data-centre; cloud; big-data; and Internet of Things (IoT).

Figure 3.1: Global Connectivity Index S-curve mapping
Figure 3.2: Enabling technologies for digital transformation
Source: Huawei GCI Report 2017

'Starter' countries, including Vietnam, Indonesia, and Philippines need to enable high-speed broadband as the critical first step and "first line of defence against the inequality gap" whilst recognising broadband is one element in the full-suite of enabling technologies illustrated in *Figure 3.2* essential to achieve broader digital transformation.[120]

The Index identifies three fast climbers within APEC. Malaysia, an adopter, which has embarked on ambitious 4G roll-out and cloud expansion climbed five ranking spots on its 2016 position. Chile, also an adopter, and a strong technology performer in LATAM, is leveraging cloud computing as a leapfrog technology to position itself as an attractive base for regional start-ups. NZ, a front-runner, is harnessing mobile broadband, cloud and big data to grow its digital economy.

ICT Infrastructure More Important than Roads and Ports

Today, digital and internet infrastructure is as important as traditional infrastructure projects. Connectivity is an important pillar of APEC's Connectivity Blueprint 2015-2025 (the Blueprint) and encompasses investment in infrastructure for ICT and broadband connectivity, noting the large disparity that exists in access to and quality of ICT infrastructure across the region. The consultations conducted during this study revealed a strong appreciation of the benefits to be realised through connectivity and *Figure 3.3* shows preference for prioritising mobile internet infrastructure over roads, ports and transportation projects in both advanced and emerging economies of APEC. 45% of interviewees and survey respondents thought that internet infrastructure was as important as traditional infrastructure projects while 50% believed it was more important.

[120] Huawei (2017) GCI Report; *Harnessing the Power of Connectivity: Mapping your transformation into digital economy with GCI 2017*

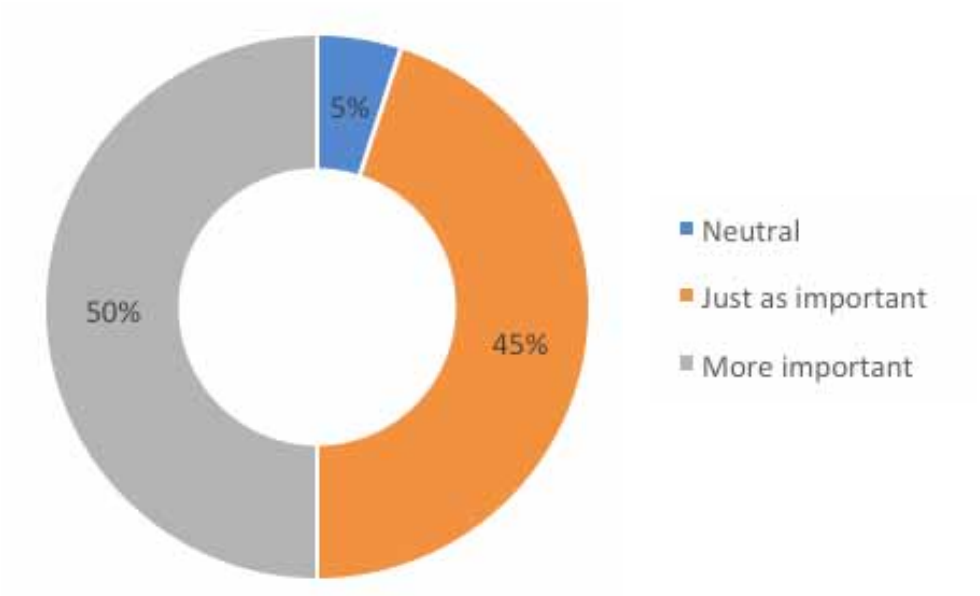


Figure 3.3: Do you think that mobile internet technologies are as important as traditional infrastructure projects such as roads and ports?

Fixed Line Broadband Vital for Development in APEC's Emerging Economies

Fixed line broadband is internet connection via a phone line or a provider's network of cables. Historically, fixed line broadband has offered lower latency and higher download limits than mobile broadband though this is changing. Fixed line broadband has underpinned internet delivery in much of Asia, and its contributions to social and economic inclusion cannot be overstated, however many now argue that governments must look beyond fixed broadband to reap economic gains.

Globally there were an estimated 884 million fixed broadband subscriptions in 2016, an increase of 8% on 2015.[121] The Asia-Pacific accounts for more than half of the world's fixed broadband subscriptions but there are disparities for example between advanced economies of East and North Asia and emerging economies of Southeast Asia.[122] Despite steady increases, internet penetration is still low compared to other regions of the world, posing barriers for e-commerce and digital entrepreneurship. There is a high correlation between fixed broadband connections and business-to-business (B2B) online trade, which has been greater than that of mobile broadband and B2B sales.[123]

The requirement to expand fixed broadband for APEC economies in Southeast Asia and LATAM is most acute. *Figure 3.4* depicts variations in fixed broadband subscriptions across a selection of Southeast Asian economies. For every 100 inhabitants, there are 26.5 fixed broadband subscriptions in Singapore, 9.2 in Thailand, 9.0 in Malaysia, 8.0 in Vietnam and Brunei Darussalam, 3.4 in Philippines and 1.1 in Indonesia.[124] A disparity is visible elsewhere in APEC with 40.2 subscriptions per 100 inhabitants in the Republic of Korea, and 15.2, 11.6, and 6.4 in Mexico, Chile and Peru respectively. PNG recorded the lowest score with just 0.2 per 100 inhabitants connected to the internet via fixed broadband.[125] This poses a challenge to the potential reach of digital business, and digital entrepreneurs who are exploring cross-border and intraregional trade.

[121] Broadband Commission. (2016) *State of Broadband: broadband catalysing sustainable development*, p.26
[122] United National ESCAP. (2016) 'State of ICT in Asia and the Pacific: Uncovering the Widening Broadband Divide' *United National Economic and Social Commission for Asia and the Pacific*, p.8
[123] Ibid.
[124] Ibid.
[125] World Bank (2015) 'Fixed Broadband Subscriptions (per 100 people)' *World Bank Data*

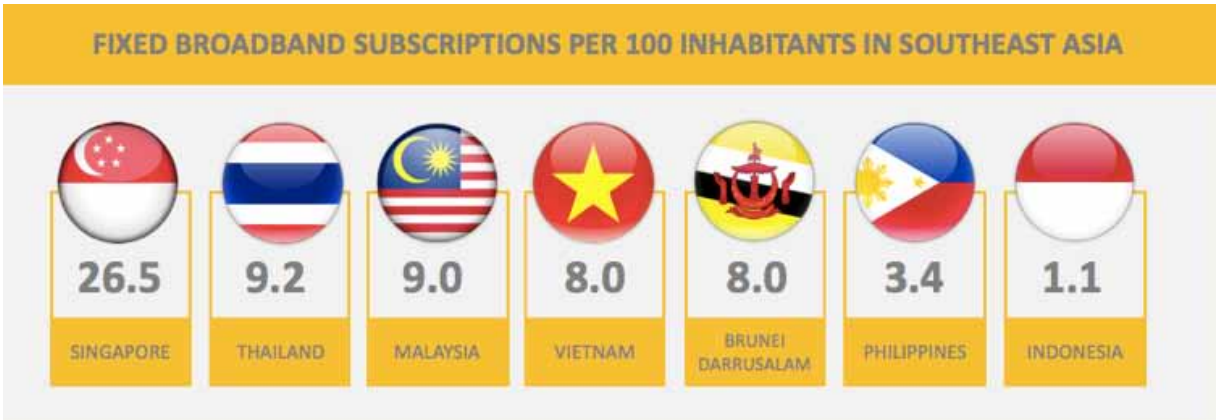


Figure 3.4: Fixed broadband subscriptions per 100 inhabitants in Southeast Asia

When prompted to discuss issues of relevance to ICT infrastructure, slow internet speed and reliability rated as a top concern among interviewees and survey respondents located in the emerging economies of APEC. Respondents were asked to rate internet speed and reliability in their respective countries. *Figure 3.5* highlights disappointing results across a large proportion of the respondent base.

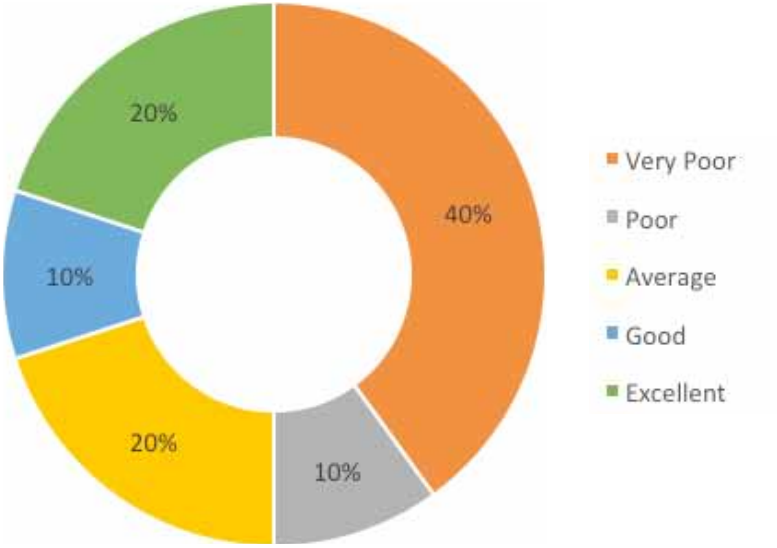


Figure 3.5: Respondent ratings on internet speed and reliability

In Philippines, many respondents rated internet speed, and reliability as 'very poor'. No respondents provided a rating of 'excellent'. Singapore accounted for the majority of 'excellent' ratings, and recorded zero 'very poor' or 'poor' ratings. The consultations and literature stress the inconsistency in average internet speed across APEC's membership. *Figure 3.6* shows average internet speeds from around APEC,[126] measured in Megabits Per Second (mbps).

[126] Fastmetrics (2017) 'Average Internet Speeds Per Country'

Figure 3.6: Internet speeds (mbps) across a sample of APEC's membership

Economically, the argument for widespread internet penetration and fast speed is sound. Noting that every market has its own unique characteristics and will be influenced by a raft of factors, research has shown that in emerging markets, for every 10 percentage points of broadband penetration, 1.2% of per capital GDP growth is added.[127]

The implications of varied internet speeds combined with low fixed broadband subscriptions for digital business are significant. In recent years, the link between internet and business productivity has been evident, and APEC economies' independent pursuit of broadband development has left large disparities between high performing ICT economies and Southeast Asia's emerging markets. Normalising broadband connectivity in the interests of expanding regional trade, and opening opportunities to entrepreneurs must be a regional policy imperative. This would call for the establishment of a regional standard and benchmark for internet speed on the APEC agenda.

[127] Qiang, C. and C. Rossotto with K. Kimura, "Economic Impacts of Broadband" in Information and Communications for Development 2009: Extending Reach and Increasing Impact. *World Bank*

Smartphone Adoption and Mobile Internet Subscriptions

Smartphones and mobile broadband subscriptions have exploded in the Asia-Pacific, raising prospects of gains through leapfrog technologies in the region's emerging markets. Asia-Pacific has the largest share in mobile user growth in the world. Singapore, Australia, the Republic of Korea have recorded the highest smartphone penetration rates in APEC. Mobile broadband became the region's dominant internet technology in 2016 as 4G connections overtook 3G.[128]

Mobile data usage varies greatly around APEC. On average, 1 gigabyte (Gb) of mobile data is used monthly on the average smartphone in the Asia-Pacific. In Singapore and Japan, an average smartphone uses 2Gb of mobile data per month compared to 300 Mb in Philippines and China, reflecting infrastructure differences and varying cost. Costs have come down in recent years across APEC, but some economies still see access requiring 18% of monthly average gross national income, well beyond the 5% target devised by UNESCO's Broadband Commission.[129] Reducing phone and subscription costs or introducing flexible purchasing arrangements would improve digital inclusion.

There are also variances in current patterns of usage. In the region's most advanced economies, mobile internet is commonly used for financial services, navigation purposes and digital commerce, whereas users in emerging markets use mobile internet for entertainment (music and games), and social media. There is a lower use of the internet to drive business opportunities. Of note, consultations found few interviewees and survey respondents (non-entrepreneurs) in the emerging markets of APEC could provide a single example of local digital start-ups.

Transitioning to Fifth Generation (5G) internet

Slow internet was a core complaint in almost all of the consultations. Large rural populations remain on 2G network connection obstructing digital inclusion in PNG and Indonesia. Progress has been made with 4G penetration with Australia, the Republic of Korea and Japan leading. By 2018, China will have 1 billion 4G connections. Southeast Asian economies, Philippines and Malaysia, have introduced regulatory reforms enabling greater competition and network investment.[130] Peru, Chile, and Mexico have also received boosts to expand 4G coverage. Mexico has 4G coverage in 32 cities, reaching 75 million people.[131]

Hype about the roll-out of 5G with potential opportunities for connectivity, business activity and digital entrepreneurs is permeating the region. *Figure 3.7* sets out some of the benefits that 5G could deliver. By 2035, the 5G value chain will generate USD3.5 trillion in output and support 22 million jobs.[132] There is active trialing of 5G technology in the region but 2020 has been flagged as the commercial roll-out date by most providers.

[128] GSMA. (2017) *The Mobile Economy Asia Pacific 2017*
[129] United National ESCAP. (2016) 'State of ICT in Asia and the Pacific: Uncovering the Widening Broadband Divide' *United National Economic and Social Commission for Asia and the Pacific*, p.25
[130] Care Ratings. (2017) *Industry Research: The Mobile Economy: Asia Pacific 2017*, p.2
[131] (2016) 'AT&T Mexico 4G roll-out gathers pace: 32 cities now covered' *Telegeography*
[132] ___. (2017) 'The 5G economy: How 5G technology will contribute to the global economy', *HIS Markit*

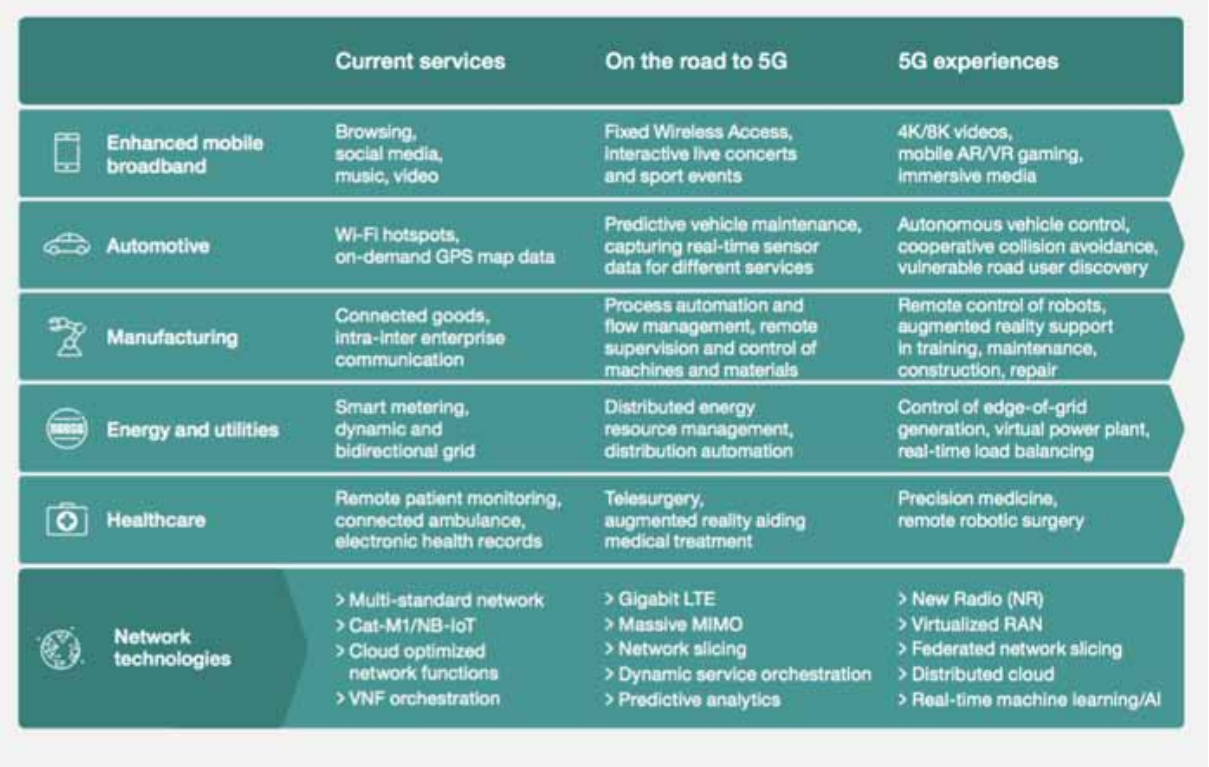


Figure 3.7: Benefits of 5G Network Coverage Source: Ericsson Mobility Report 2017

National Broadband Plans

Research has shown that countries with comprehensive government agendas on ICT infrastructure experience higher fixed and mobile broadband penetration rates of 2.5% and 7.4% respectively.[133] Progress has been made over the past decade in the establishment of government ICT agendas. *Figure 3.8* demonstrates that globally, the number of countries with national broadband plans has risen markedly, from 31 in 2006, to 151 in 2016.[134] Singapore, Malaysia, Brunei Darussalam, Vietnam, Philippines, Thailand, and Indonesia have a national broadband plan.

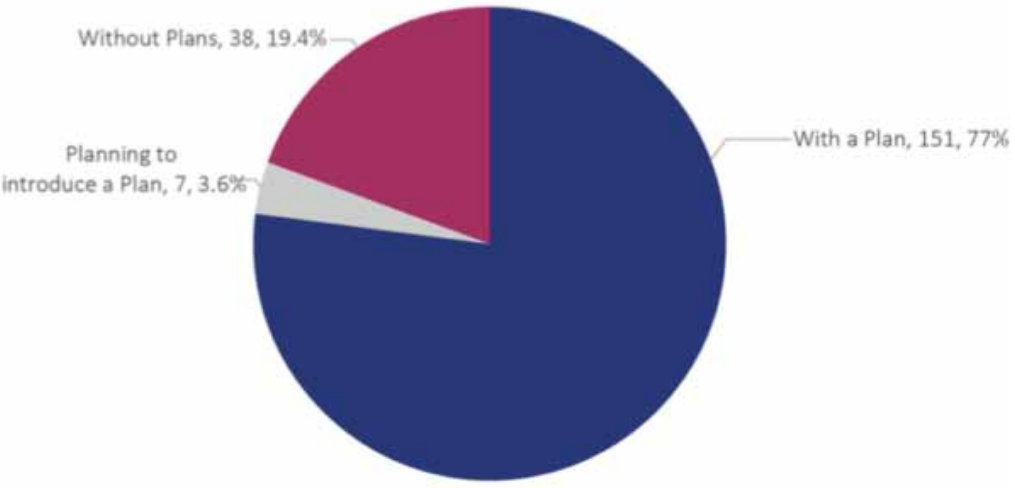


Figure 3.8: Number of countries that have either adopted a plan or strategy, are planning to adopt or are without national broadband plans (as at 2016) Source: Broadband Commission, 2016

[133] The Economist (2014) *The future of broadband in South-East Asia*, Economist Intelligence Unit, p.8
[134] Broadband Commission. (2016) *State of Broadband: broadband catalysing sustainable development*, p.32

In focus

Connecting Canadians through Digital Infrastructure

Connecting Canadians is a project run by the Government of Canada to extend high-speed internet access to Canadian households mainly in rural and remote areas. Recognising the importance of high-speed internet access in today's digital economy, the project aims to defray the up-front costs of telecommunications infrastructure in remote areas with lower population densities. Such infrastructure is vital to ensuring that all citizens have internet access suitable for essential activities such as commerce, employment and distant education amongst others.

Prior to rolling out this program, a scoping study was conducted to determine which areas lacked access to internet at speeds of at least 5 megabits per second (Mbps) in most rural areas, and at least 3 Mbps the particularly remote northern areas of Nunavut, and Nunavik. This mapping exercise received data from provincial and territorial governments, internet service providers, and Canadians to identify the geographical areas most in need of internet infrastructure.

Connecting Canadians then provided funding to internet service providers to undertake selected projects that expanded coverage to underserved areas as identified in the mapping exercise. For most rural areas 50% of eligible costs such as labor, material, equipment satellite capacity, and travel could be covered with this funding. For projects serving Aboriginal communities or very remote areas, up to 75% of eligible costs could be covered.

To date, the approved projects announced under this scheme cover of 300,000 underserved households across most Canadian Province and Territories. Over CAD200 million has been dispersed to these projects.[135]

[135] ___. (2017) 'Announced Connecting Canadian Projects', *Digital Canada 150, Government of Canada*

In focus

Philippines' National Broadband Plan

Philippines is emerging as a bright spot in the Asia-Pacific's start-up ecosystem. With an English-speaking population and large, youthful market, the potential for digital entrepreneurship is great. However digital infrastructure has remained an inhibitor, and long-held source of discontent among its population — an issue which has now been acknowledged by government. The newly established Department of Information and Communications Technology (DICT) unveiled its National Broadband Plan (NBP) and vision for widespread broadband access in Philippines through extensive roll-out of fibre-optic and wireless technologies to speed up lagging internet speeds — an issue cited by interviewees and survey respondents in Philippines. Its bold vision highlights the open, inclusive, pervasive, affordable, and trusted nature of broadband across the country, including in the most marginalised communities. The NBP acknowledges that despite progress, the country has long been outperformed by other regional economies, placing last for internet speed (Mbps) out of its ASEAN-5 peers (Singapore, Malaysia, Indonesia and Thailand).

The rationale for establishing the NBP extends beyond speed – the economic and social imperatives are outlined explicitly. Noting Philippines' desire to integrate fully into the regional and global economies, the NBP calls out the equalizing role of internet for MSMEs reaching global markets, the 'realization of potential in the digital economy', the 'unlimited potential for the development and acquisition of new skills', and 'improved administration and service delivery' for citizens engaging in government services, each of which are critical to the growth of the digital start-up ecosystem.

Social connectivity is an important characteristic of Filipino culture, and changes under the NBP will improves the everyday lives of millions of the country's residents. According to the plan, 46% of residents in Philippines use the internet daily, and there are 48 million active social media users, 41 million of which access social media platforms on mobile devices. Primarily used for entertainment, messaging and mobile banking, e-commerce is emerging as an important activity undertaken on the internet, with 31% of the population visiting online retailers, and 39% researching goods and services online.

The benefits of implementation are immeasurable, however, the road to realisation is long and the challenges should not be understated. Amending longstanding legislation, policies and regulatory frameworks related to broadband, and harmonising broadband permits and services at national and local levels are slated as priority actions, planned immediately for 2017-2020. Investment (with a focus on rural areas) from the private sector through Public-Private Partnerships will also be necessary as will the development of attractive incentives for new market players to ensure that connectivity either via fixed or mobile broadband service is afforded to the currently underserved.[136]

These issues and priorities are largely representative of the challenges that are facing many of APEC's emerging economies, and reflect the growing impetus to invite the private sector into infrastructure projects of high national importance.

[136] DICT (2017) *National Broadband Plan: Building Infostructures for a Digital Nation*

Planning versus Implementation

Implementation issues can hinder the best-laid plans therefore a plan alone cannot not bridge the digital divide being experienced at both domestic and regional levels. Further, plans can often lack currency with the modern requirements of business and society, as highlighted by interviewees and survey respondents of the study. For example, in Australia, where internet speeds lag behind the world's best, and which hosts one of the largest populations of mobile data users, respondents questioned whether the National Broadband Network (NBN) would live up to its promises to deliver on economic growth and jobs. Major concerns stemmed from slower-than-expected roll-out and the decision to use copper over fibre for the NBN. Participants noted that copper-based services will be largely obsolete within one to two decades, require expensive maintenance and place limitations on internet speeds. Policy makers should understand emerging technologies that offer fit-for-purpose and sustainable internet solutions prior to large-scale investment and extensive roll-out. APEC can capitalise on technical talent in the region to create a shared Community of Practice to agree sustainable materials for ICT development to reduce costs and ensure parity of digital connection in the longer term.

Public Private Partnerships for Infrastructure Development

Discussion groups attended by government officials that centred on the issue of Public Partnership Partnerships (PPPs) in ICT infrastructure projects were facilitated by the study team in Vietnam. The results from these discussions, and broader stakeholder engagements revealed a strong and consistent message: governments have big plans for the digital economy but they cannot execute them alone. Although slowly being adopted, the need to accelerate the uptake of PPPs is most acute in economies, which experience low internet penetration. This is combined with the imperative for regulatory reform in conditional sectors for foreign direct investment, which typically include telecommunications and internet sectors.

Research conducted around the region reveals the widespread usage of PPPs, although the extent to which they are leveraged for ICT infrastructure projects varies greatly from country to country. ICT infrastructure is expensive to procure, develop, and maintain, therefore various methods have been deployed across the Asia-Pacific to fund these large-scale and long-term projects. PPPs for infrastructure development have taken the form of joint-ventures where risk and reward is shared equally, to seed capital whereby governments outlay initial development costs with the expectation that the private sector will enhance and expand development as demand for ICT grows, such as in the case of Malaysia's Multimedia Super Corridor (MSC).[137] The MSC was introduced in 1996 to "leapfrog Malaysia into the Information Age", supporting the government's ambition for the country to reach 'developed' status by 2020, and has been hailed as an exemplary case of collaboration between the two sectors.

Elsewhere, there have been recent success stories of PPPs in the areas of mobile internet and payments infrastructure. Peru, which has typically recorded lower levels of ICT investment than other LATAM nations, has entered a series of PPPs to improve national connectivity. The most notable and outstanding example is found in Modelo Peru, a mobile financial initiative for digitising payments for underserved and disconnected rural inhabitants.[138]

[137] Pillay. H. and Hearn, G (2010) Digital Review of Asia-Pacific 2009-2010 PPP in ICT for education, p.79
[138] Camara, N. and Tuesta,D. (20150 'Peru Model for Financial Inclusion: E-Money Potential Adopters', *BBVA Research, Financial Inclusion Economic Watch*

Plans in PNG for partnership between the government and Huawei Marine have also been announced on the Broadband Submarine Cable Network, which will see broadband transmission in 14 major cities, and international connectivity via a link to Jayapura in Indonesia.[139] A project of this magnitude will have the power to bring social and economic change to a country that has to date, rated poorly across many indices on digital connectivity, and should act as an exemplar to other countries in similar stages of economic and digital development.

While PPPs enable speedier development of infrastructure and higher efficiency of service provision, the effectiveness of this method can be challenging and will remain dependent on the complexity of procurement processes, which in many APEC economies are costly and lengthy, and the legal and regulatory frameworks which govern many of the sectors that are in most need of development. Moreover, a lack of practical experience in negotiating and managing PPPs as identified by interviewees and survey respondents in Vietnam, will also prevent fast adoption, and ultimately stifle digital entrepreneurship growth potential. Respondents in Southeast Asia felt that governments should adopt a more open approach to partnerships by ensuring that tender processes enable participation from start-ups rather than prioritising large enterprises.

Further, global awareness about the role of the private sector in the provision of services that have typically been delivered by government will need to be carefully managed to avoid negative public perception of privatisation and the weakening of state control. These are often compounded by sensational news coverage heightening the need for regular and transparent public awareness campaigns to increase public acceptance of and trust in new arrangements.

Leapfrogging with SMAC Technologies

Digital disruption is offering unprecedented opportunity for entrepreneurs across APEC. However, emerging APEC economies are uniquely positioned to leapfrog into the digital revolution, expediting the adoption of cutting edge technologies to provide powerful launchpads for local entrepreneurs. Many large enterprises in advanced economies must deal with troublesome legacy systems, cumbersome processes and entrenched workforce cultures before they can introduce the agile and innovative elements that underpins leading edge digital businesses.

The Asia-Pacific is one of the fastest growing technology hubs in the world, where the prevalence of start-ups based on SMAC (social, mobile, analytics, and cloud) technologies has accelerated innovation, and provided strong competitive advantages to those who have effectively integrated all four technologies into their business models. Recent trends in SMAC technologies in Mexico offer a promising future for digital entrepreneurs, and a standout case within APEC.

Mexico has seen a rapid uptake in social media usage, with Facebook and Twitter leading as preferred platforms. Today, Mexican internet users show a clear preference for mobile access and social media, with 80.5% of social media users in the 18+ age bracket browsing daily.[140] With 2.5 quintillion bytes of data being created globally each day in 2014, big data and analytics have also been accompanied by powerful cloud technologies which has seen 84% of Mexican companies adopt cloud-based storage services, achieving sizeable reductions in capital expenditure.[141] This has opened the doors to large

[139] Sahoo, S. (2016) 'Huawei Marine to help Papua New Guinea, *Voice and Data*
[140] eMarketer. (2016) I*nternet Users in Mexico Prefer Mobile Access and Social Media*
[141] Herrmann, N. (2016) 'Social Media in Mexico', *Quintly blog*

enterprises and entrepreneurs to draw on the power of advanced analytics tools to better understand their customers, target advertisements and grow their customer bases both domestically, and internationally.

These encouraging developments in the economy have been in part spurred by government measures to deconstruct long-standing monopolies and expand free Wi-Fi access to over 150,000 public spaces.[142] Further, the growth underpinning Mexico's technology market can be apportioned to private educational institutions offering short programs in 3D modelling, computer graphics and digital marketing in a move away from Mexico's traditional education models of state-run universities.[143] Short-term courses have allowed hordes of digital entrepreneurs to bypass traditional four-year university degrees which have exhibited consistently poor alignment to industry requirements. Instead, they are entering vocational training for rapid skills and knowledge acquisition in application development, and are now serving an expanding fintech sector.[144]

Given that there is widespread acceptance that SMAC technologies are critical to the growth of entrepreneurship region-wide, they became a central feature of the study's consultations. In Vietnam for example, the research team found unanimous support for the notion that the future of enterprise and economy lies in the capacity to infuse digital and SMAC into all industries and functions of business, yet very few sectors were achieving prolific success in doing so, or even showing visible signs of responding quickly to this imperative. Two CEOs of digital start-ups noted the strong cultural barrier which prevented consumers from understanding and taking advantage of cutting edge technology. Both agreed that digital had long been viewed as a foreign concept; a belief that was likely attributable to old school educational models. Although the digital scene in Vietnam is increasingly vibrant and leading to optimism at home and abroad, the great divide between the mindsets of pioneering, often foreign educated entrepreneurs, and their target customers, has led to slow growth prospects for digital entrepreneurs and 'nervousness' among venture capitalists contemplating investment in innovative technology start-ups originating out of Vietnam.

On the contrary, interviews conducted with Singaporean technology start-ups revealed the large and fast strides being made in digital transformation, owing to forward thinking government policy, a highly skilled and educated workforce, and the strength of its IoT sector. According to interviewees and survey respondents, Singapore is transforming in all industries, affording large-scale and lucrative opportunity to home-grown and expatriate digital entrepreneurs. IoT has inspired a new start-up niche in Singapore and the rise of Smart City initiatives in dense urban centres across Asia has led to an explosion in demand which can only be met by support for and expansion of the technology start-up ecosystem.

From energy consumption monitoring and management in Singapore, and more efficient manufacturing in China, to remote healthcare access in Philippines, and intelligent farming in Indonesia, respondents agreed that the future of IoT rests with digital entrepreneurs, and increasingly caters to those whose missions favour social impact. However, the utility of IoT, which consists of a network of connected sensors, software and electronics, remains heavily dependent on strong internet infrastructure and fast speeds, achieved through 5G. Therefore, governments and telecommunications providers will need to ensure that ICT plans and associated decision-making on roll-out, and regulation considers the emerging and increasing pivotal IoT sector, to support digital entrepreneurs to capitalise on tomorrow's opportunities.

[142] Escalona, C.J. (2016) 'Mexico Contectado baja velocidad for recorte presupestal', Eleconomista
[143] Wilson, T. (2017) 'Making the Most of Mexico's Digital Opportunity', Mexicoit, pp.15-16
[144] Ibid.

RECOMMENDATIONS

- *A regional benchmark for internet speed and minimum internet penetration be integrated into the national broadband plans of individual economies*
- *Governments, smartphone manufacturers and telecommunications providers need to partner to reduce handset and subscription costs*
- *Initiatives to expand free Wi-Fi access at all public venues should be encouraged*
- *APEC should draw on regional technical expertise and establish a Community of Practice to work towards regional parity to research and develop appropriate and sustainable broadband infrastructure and connectivity projects*
- *National ICT strategies should include provisions for emerging leapfrog technologies including IoT, and artificial intelligence, as these are likely to take centre stage in the short to medium term*
- *5G is essential for leapfrog technologies which offer solutions for emerging economies and should be progressed as a priority*

CHAPTER FOUR

EDUCATION AND SKILLS FOR DIGITAL ENTREPRENEURSHIP

KEY RECOMMENDATIONS

- *There have been many encouraging gains in tertiary education across the Asia-Pacific but there remain a number of critical areas for attention to produce sufficient numbers of graduates with appropriate digital, technical and business skills in the future*

- *Only 6.5% of interviewees and survey respondents for this study believed that graduates in their economy were ideally prepared for digital careers. Most reported a common struggle to recruit workers with appropriate digital and business skills*

- *The development of requisite digital skills must begin in young learners and continue through secondary schooling to prepare students for higher level education in relevant fields*

- *There is a current shortfall in digital literacy initiatives, skilled teachers, and integration of technology in classrooms*

- *Academic workforce and institutions struggle to meet the demand for quality education relevant to digital entrepreneurship, including in STEM and enterprise education*

- *Women are being left behind in the digital revolution with lower participation rates in STEM education and careers in the new digital world*

- *There is a pressing need for better opportunities for digital entrepreneurs to access opportunities to develop business and professional skills. Incubators are often unable to provide vital business mentoring and lack appropriate KPIs to measure success*

INTRODUCTION

Foundational skills, education and ongoing skills acquisition are important pillars of many forms of human endeavour and are key to reducing economic, social and digital disparities in the APEC region. As the Fourth Industrial revolution unfolds, APEC economies are assessing what is needed to create a future-ready workforce and foster digital entrepreneurship.

At present, the skills to manage rapid advances - in computing power, internet access, artificial intelligence, Big Data and Cloud Computing - are a scarce global currency and competition for them is fierce. It is also estimated that around 65% of people currently undertaking education will eventually work in jobs that are not yet invented, further complicating workforce planning.[145]

Each economy must foster a talent base with high level digital, technical and professional skills to secure a digital ready workforce and fuel digital entrepreneurship. APEC will need unprecedented numbers of digitally literate professionals and workers with deep technical specialisations and critical thinking skills for new jobs in traditional industries. Many workers will need digital and entrepreneurial skills to manage a career marked by change, mobility, free-lancing, and self-employment. Others will need digital and entrepreneurial skills to create new enterprises to capitalise on opportunities arising from technological advances.

[145] Telstra. (2017) *Connecting Capabilities White Paper: Asian Digital Transformation Index*, p.12

This chapter draws on primary and secondary research to consider the ongoing education and skills acquisition needed to create a digital ready workforce and drive digital entrepreneurship. The study and associated survey developed a snapshot of the education and skills needs that CEOs require for a digitally able work force and to underpin digital entrepreneurship. The scale, scope, and complexity of requirements varies and this chapter does not claim to be exhaustive. The focus has been to identify some key high-level trends and to highlight important factors influencing individual, workforce, and national digital readiness.

Progress Made in Asia-Pacific Education Yet Gaps still Exist

The past two decades have seen great progress in providing opportunities for tertiary education to university-age students across the region. Asia accounts for the largest growth in global higher education institutions and participation, recording the greatest share of the world's tertiary enrolments in recent years.[146] This trend is strongly evident in Southeast Asia. LATAM's educational gains have also been visible across primary, secondary and tertiary education sectors.

Institutions, governments and international education advocacy groups are under ongoing pressure to meet the increased demand for high quality institutions and teachers within budget constraints. Various strategies have already been deployed to alleviate these pressures and increase government revenues, including through more conducive regulatory environments which allow for investment by foreign education providers. Innovative and evidence-based policy development will be required on an ongoing basis at all levels of government.

Increased demand has driven establishment of additional local tertiary institutions in many economies along with massification of higher education programs. International student numbers continue to rise. Local branches of international universities or international branches campuses (IBCs) have also grown in number, especially in Asia which has recently displaced the Gulf region as the centre of IBCs. In 2016, China, Singapore and Malaysia were the largest hosts of IBCs, with 32, 12, and 12 ICBs respectively. In the past decade, China has experienced the highest growth in IBCs (from 11 to 32).

The majority of the growth in tertiary education can be apportioned to undergraduate enrolments but post graduate enrolments have also increased. The study evidenced growth in postgraduate enrolments in Philippines and Vietnam over the past decade. Middle-income Malaysia and China have also seen large spikes in engineering master's and doctoral program enrolments, reflecting growing demands for such expertise in their economies.[147]

Retention and graduation rates are variable. Whilst LATAM's youth are more educated than previous generations and post-secondary enrolments have increased over the last ten years, there is a concerning incidence of incomplete secondary and post-secondary education certifications. With the exception of Chile, APEC's high performer in LATAM in tertiary education enrolment and attainment, tertiary graduation rates remain low. In 2016, 41% of the LATAM's population[148] aged 16-64 had begun tertiary education, with just 14% completing their certifications.[149] This highlights the need for APEC leaders to ensure appropriate policies targeting retention and graduation rates.

[146] UNESCO Institute of Statistics (2014) *Higher education in Asia: expanding out, expanding up, UNESCO*, pp.16
[147] Ibid
[148] This study includes Caribbean States
[149] OECD/ECLAC/CAF (2016), Latin American Economic Outlook 2017: Youth, Skills and Entrepreneurship, OECD Publishing, Paris, pp.150-152

Many economies have shortages of academic instructors with Masters or Doctorate qualifications to teach both under- and post-graduate courses. In China and Vietnam just 16% and 14% of academic staff hold doctorate qualifications respectively.[150] Increased post-graduate enrolments will help to create additional academic instructors as well as graduates for industry in APEC economies.

The US, Australia and Russia are APEC's top home countries for ICBs, a trend that is not expected to change and which also includes new developments in the Republic of Korea.[151] Demand for and recognition of the value of IBCs to unleash entrepreneurial potential in the economies examined by the research team is widespread. Noting a focus on emerging economies of the region, 79% of interviewees and survey respondents thought that their country's digital economy would benefit from more foreign universities *(Figure 4.1).* This was especially striking in Vietnam, with 100% of respondents believing that Vietnam required more foreign universities.

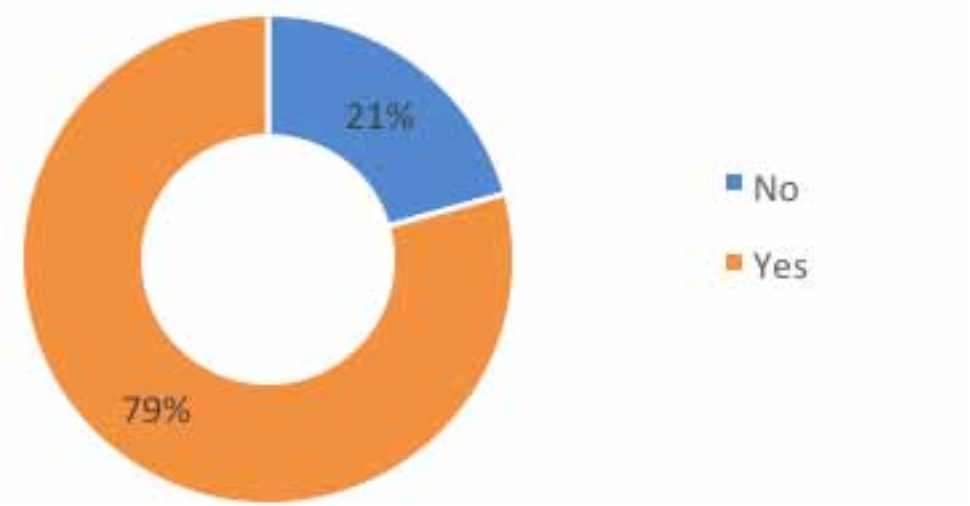


Figure 4.1: Do you believe that your country can benefit from more international universities?

Demographic, and technological aspects of a large proportion of APEC's membership, notably Southeast Asia, place many economies in a favourable position to capitalise on the fourth industrial revolution. Our exploration suggests there are gaps that need to be addressed to provide the required skillset – digital, STEM and entrepreneurial - to take advantage of new realities.

Science, Technology, Engineering and Mathematics (STEM)

Despite strong production of STEM graduates in some countries, it is projected that the demand for STEM graduates will outstrip supply in many APEC economies.[152] The OECD place China, Russia, the US, Indonesia, Mexico, Japan, Republic of Korea, and Canada within the top 20 countries with the largest share of the world's STEM graduates by 2030.[153] Leading global STEM rankings, China recorded 4.7 million STEM graduates in 2016. The US and Russia recorded the second and third most STEM graduates in APEC with 568,000 and 561,000 graduates respectively.[154] Despite its position, it is expected in 2022, the US will face a shortfall of 1 million

[150] Ibid
[151] Garrett. R, Kinser. K, and Merole. R, (2016) 'International Branch Campuses: Trends and Developments', *The Observatory on Borderless Higher Education*
[152] OCED (2015) Educational Indicators in Focus No. 31, p.4
[153] OCED (2015) Educational Indicators in Focus No. 31, p.4
[154] World Economic Forum (2016) The Human Capital Report 2016, p.32

STEM professionals to meet the nation's labour market requirements. The Southeast Asian economies that are pushing to move up global value chains from 'low cost, low value' economies are dealing with a critical shortfall in STEM enrolments. Large student populations in Vietnam, and Thailand continue to opt for social sciences, law, and business *en masse*, while engineering and natural sciences enrolments lag.[155]

Governments across APEC are including provisions and special initiatives for STEM in their national education agendas. This warrants further investigation and sharing of lessons learned.

In focus

US. Government Office of STEM

The US Government has instituted a suite of education reforms and programs, establishing an Office of STEM within the Federal Department of Education, which has spawned "unprecedented levels of public-private collaborations".[156] A notable example is the 2016 initiative by the US State Department, a STEAM (STEM+Arts and Design) Camp, inviting 100 girls from Mexico, Chile, Peru and the US to seminars and hands on experience in application development led by Google and Intel.[157]

In focus

Malaysia's 60/40 Science/Technology: Arts Policy

STEM has been a preoccupation of the Malaysian Government and education officials for five decades. First conceived in 1967, the 60:40 Science/Technical: Arts Policy was designed to have 60% of Malaysia's students directed towards a STEM pathway, while 40% would remain in the arts stream. Fifty years after its conception, this target has not been met due to a range of factors which have seen the appeal of STEM diminish. These include: a poor national awareness of STEM and associated careers; a bias towards content and theory learning over practical aspects which simulate real-life application; and inadequate infrastructure which has found 20% of schools have either damaged or inoperable science labs.[158]

The Malaysian Government has set out provisions in its Education Blueprint 2013-2025 to address these shortfalls. Notable among them are the observation and assessment of the pedagogical skills of teachers in STEM subjects; introduction of blended learning approaches through technology-enabled instruction; national awareness campaigns via print, television and social media platforms; and incentivising post-secondary enrolment in STEM programs, for instance, through the provision of tax relief and scholarships.[159]

Despite these wide-ranging initiatives, the gap between supply and demand for STEM graduates persists. According to Malaysia's National Council for Scientific Research and Development, there will be a shortfall of 236,000 scientists and engineers in Malaysia by 2020.[160] This has significant implications not just for the state of digital entrepreneurship but for the nation's overall prosperity given the Government's ambitious target for Malaysia to be classified as an advanced high-income economy by 2020.

[155] World Economic Forum (2016) Human Capital Outlook ASEAN, p.5
[156] U.S. Department of Education (2016) 'Fact Sheet: Spurring African-American STEM Degree Completion'
[157] Ibid.
[158] Ministry of Education Malaysia (2013) Malaysia's Education Blueprint 2013-2015, p.4-7
[159] Ibid.
[160] Ibid.

Digital Education and Skills

Most interviewees and survey respondents from both emerging and advanced APEC economies considered students to be ill-prepared for the onset of the digital revolution. In connection to both primary and secondary education, just 6.5% of respondents described students as 'ideally prepared' for digital work. Many attributed this to risk-averse attitudes, fear of failure and traditional educational models which do not allow for the development of critical thinking and problem-solving skills in students.

Similarly, US studies found that fundamental technology skills are not taught in the majority of K-12 schools. Approximately 85% of parents and 75% of teachers believe that educating children and adolescents in computer science is just as important as traditional school subjects. Yet, just one in four principals in the US report computer science course offerings within their schools.[161]

The development of requisite skills for digital work begins in young learners creating preparedness for higher level education in relevant fields, professional development and workplace skills / business based skills acquisition to pursue digital entrepreneurship. However, recent literature and this consultation in the emerging economies of APEC point to a shortage of teachers who are trained to deliver computer science subjects as a key barrier and a focus for education policy-makers.

Despite high profile 'hole-in-the-wall' projects in India where impoverished children used an unattended computer with internet to teach themselves to operate the mouse, execute web searches and download music, games and videos, access to hardware alone does not build digital skillsets in young learners. Peru's USD200 million One Laptop per Child (OLPC) program in 2008 delivered 900,000 low-cost internet-capable computers to public school students. An evaluation study one year after implementation reported issues including rampant software bugs, intermittent electricity and internet access and digital illiteracy among some teachers.[162]

The right skills need to be taught, starting in primary school and building year on year throughout high school. Early exposure to digital literacy initiatives, STEM disciplines and enterprise and entrepreneurial skills is essential. APEC governments must prioritise and fund appropriate programs to foster skills from primary school, building year on year throughout high school. These programs must blend teachers' professional development and integration of technology into the classroom to allow modelling of technical proficiency and encourage self-directed digital learning through experience and immersion with peers. Programs must be designed to foster the foundation awareness, understanding and skills needed to build a feeder group of digitally competent high school students able to graduate to further tertiary or vocational training.

Gender Factors: Women in STEM and ICT

APEC policy makers need to consider issues relating to the awareness, participation, and involvement of women in STEM and digital education. Less women than men consider education and careers in STEM and ICT or digital fields in APEC economies, and a high and rapid drop-out rates by female STEM students has been noted in several APEC economies.[163] This study has considered factors that impede women in these areas,

[161] Busteed, B (2016) "Americans agree computer science is important – but only one quarter of U.S. schools teach it", *Gallup Education*
[162] Inter-American Development Bank (2015) *What worked (and didn't): Lessons on Development 2012-2015*
[163] Association of Academies and Societies of Sciences in Asia (2015). Women in Science and Technology in Asia. Seongnam-shin: Panmun Education Co., Ltd

reducing the size of the feeder group of suitably qualified worker with knowledge and expertise in demand. Governments should consider the long-term contributions of digital economy workers to national GDP growth.

Factors that may deter female enrolment and degree completion in STEM include: limited exposure to STEM in early and primary education programs, a perception of STEM qualifications being difficult, lack of awareness of career opportunities for women in STEM and the underrepresentation of senior female faculty in STEM, limiting female mentorship for young women in STEM.[164]

Women opt for qualifications in life sciences over computer science and engineering. The Association of Academies and Societies of Science in Asia compared enrolment in life sciences and other STEM qualifications and found that female attainment of bachelor degrees in life sciences was over 50% compared to 17.9% in computer science and 19.3% in engineering degrees.

Careers in STEM offer higher salaries which can further economic empowerment of women. Many women who pursue careers in STEM across APEC opt for lesser paid roles in academia and government, rather than industry and entrepreneurship.[165]

Initiatives such as the APEC Women in STEM Framework can narrow the gender divide by outlining strong action plans across its key pillars which include: the enabling environment; education; employment; and entrepreneurship. However, a surge in female interest in STEM will not occur overnight. It will take the commitment of resources and will of individual governments (federal and state), working in tandem with the education and private sector for outcomes to be achieved.

Early exposure of girls to STEM-subjects during K-12 education (including experiential and hands on learning), raising awareness about STEM and STEM career opportunities should continue to be a priority for government and education stakeholders across the region. Studies of awareness of and exposure to STEM disciplines and related careers among girls, found that just one hour of code can greatly enhance interest in computer science. A 2016 study examining a sample group of female high school students with no prior exposure to computer science found 20% more students agreed with the statement "I like computer science" after one hour of coding.[166] Similar programs in primary and secondary curricula may improve the capacity of students especially girls for digital careers.

Tertiary education institutions should incentivisie female application for STEM faculty positions and support women in senior leadership positions. In a similar vein, high-profile female leaders within the technology industry can promote impactful STEM careers in industry and entrepreneurship.

Women in Southeast Asia have predominately been employed in service, manufacturing or agricultural sectors that require little or no ICT skills. This has been exacerbated by a dominant regional culture and gender biases, often incited by female teachers, whereby young girls have been actively discouraged from pursuing ICT education, and careers, in favour of low-skilled jobs, carer or domestic duties. These female workers face future risks of being replaced through automation or becoming redundant because they lack both basic and applied digital literacy skills. Predications are that over 80% of all future work will require such skills, provoking mass job losses.[167] In Indonesia, 20% of women are at higher risk of losing their

[164] US Agency for International Development (2016) APEC Women in STEM: a Framework for Dialogue, Learning and Action
[165] Ibid.
[166] Phillips, R.S. and Brookes B. PC (2017) 'The hour of code: impact on attitudes towards and self-efficacy with computer science', *Code.org*
[167] The Sasakawa Peace Foundation and Dalberg Global Development Development. (2017) Advancing Women's Empowerment: ICT Skills for Girls and Women in Southeast Asia

jobs than men, while in Vietnam and Philippines, women are more than two times as likely to lose their jobs to automation.[168] Equipping Southeast Asia's women with fundamental digital skills would provide opportunity to millions of women and expand economic growth by over USD2 trillion.[169]

ICT and technology jobs commonly feature a disparity in pay between men and women, discouraging female participation. In both the advanced and emerging economies of Southeast Asia, women earn lower salaries and gain fewer promotions than their male counterparts. In Indonesia, Singapore and Malaysia, women occupy just 10-20% of mid-senior level positions, and even fewer CEO posts.[170] These trends, echoed by technology start-ups surveyed by the research team, highlight issues in Southeast Asia that will restrict female participation in the digital economy, and cause a large and potentially damaging gender imbalance in the future workforce.

Programs in Southeast Asia are underway to promote women. One such example is the Telecentre Foundation's Digital Literacy Initiative, which has provided 1 million women with digital skills (internet, email and social media use), including 10,000 women in Philippines through effective in-person education and train-the-trainer models.[171]

Despite the progress that has been made to mitigate barriers to digital literacy among women, there are still few initiatives in Southeast Asia that directly address the barriers to workforce entry. It is critical that Southeast Asian private sector organisations provide equal opportunity for women to gain exposure to industry and technology insights. This can be achieved by stronger collaboration between the private sector and ICT education providers, including university programs which can provide a direct talent pipeline for women interested in pursuing technology careers. APEC policymakers should encourage firms to adopt fair hiring practices, in addition to flexible and remote working arrangements that increase female employee retention rates.

Digital Literacy

There are factors that influence the development of digital literacy beyond the realms of formal education. Digital literacy refers to the range of skills *(Figure 4.2)* from basic abilities to use computers and the internet through to the ability to create, navigate and utilise digital content across multiple mobile devices vital to digital entrepreneurship.

Figure 4.2: Stages of Digital Literacy Source: GSMA Intelligence, Digital Inclusivity Report 2014

[168] Ibid.
[169] Ibid.
[170] Ibid.
[171] Ibid.

There has been a strong connection between illiteracy in the traditional sense, and digital illiteracy. Worldwide, there are approximately 800 million illiterate adults.[172] The Asia-Pacific is home to the largest share of this figure. UNESCO estimates an illiterate adult population of over half a billion.[173]

The uptake of mobile technology in the region's emerging economies has been largely restricted to voice call and SMS functions for large cohorts. Across Asia, inexpensive feature phones offering more than standard mobile phones but less than smartphones predominate. Feature phone users undertake several steps to conduct a basic web search, inhibiting internet use.[174] Steps to reduce the complexity of feature phones or support transition to smartphones would enhance digital literacy.

Free Wi-Fi supports digital skills development and reduces the number of digital 'have nots'. It is ubiquitous in most Southeast Asian economies, often tied to Social Wi-Fi, or hotspots that allow internet access through social media accounts and create digital inclusion. In Thailand, Philippines, and Vietnam, free Wi-Fi is now widespread through bars, cafes and restaurants. Extensive roll-out of hotspots is slated under national ICT and 'free Wi-Fi' plans. This has, with the large uptake of smartphones, created a "self-education revolution" as one respondent put it. In the US, the District of Columbia Council is contemplating the Wi-Fi Task Force Act 2017, to create free Wi-Fi noting that "free public Wi-Fi is a matter of economic equality and would help to erase the digital divide that prevents so many less fortunate residents from bettering their lives".[175]

English language literacy is a major barrier for digital literacy. Just 5% of the world's population are native speakers of English, yet over 50% of the world's internet content is published in English. This retards digital participation particularly in the Asia-Pacific, which represents over 3200 languages.[176] Existing language translation apps cannot substitute for proficiency in English language. Indeed, the desire to participate in e-commerce is a cited driver of growing demand by adolescents and young adults for English language education across the region. A survey by the research team of private English education institutions in Vietnam, a country which has seen exponential growth in demand for English education over the past decade, confirmed this.

A lack of online content created or hosted domestically or made available in the native language hampers accessibility and participation. In China, there are over 1.3 billion native speakers of Chinese, with just 3% of internet content published in Chinese.[177] In Philippines, where English is quite commonly spoken, 60% of internet users would prefer to access content in Filipino.[178] Bringing the next billion subscribers online will require strong content collaboration between government, mobile providers, and entrepreneurs who can tailor content to local populations and markets.

[172] IGSMA (2014) Digital Inclusion Report
[173] UNESCO (2012) *Asia-Pacific End of Decade Notes for Education for all – youth and adult literacy* p.8
[174] GSMA (2015) *Mobile Internet Usage challenges in Asia – awareness, literacy and local content*, p.18
[175] Coulter, T. (2017) '2 Bills would Help Bring Free Internet and Digital Skills Training to All D.C. Residents.
[176] Includes Asia-Pacific countries outside of APEC membership, and indigenous languages
[177] GSMA (2014) *Digital Inclusion Report*
[178] GSMA (2015) *Mobile Internet Usage challenges in Asia – awareness, literacy and local content*, p.15

Critical Skills for Digital Entrepreneurs

When asked to discuss challenges in starting an online business in their country, interviewees and survey respondents also selected skills and expertise as the biggest hurdle as depicted in *Figure 4.3.*

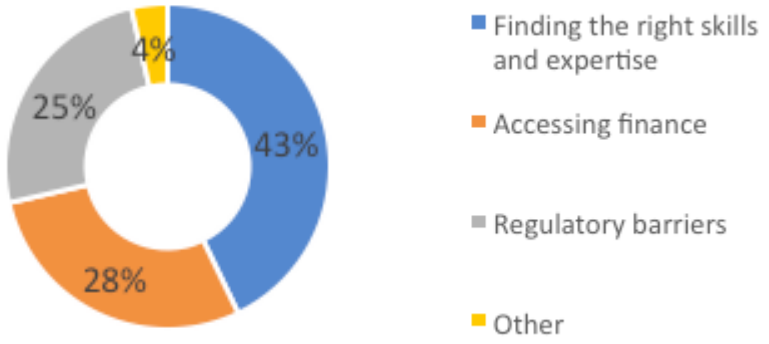


Figure 4.3: What do you think is the biggest challenge for starting an online business in your country?

During this study, start-up founders, business executives, government officials, accelerators and incubators, venture capitalists, and education providers were asked to nominate skills and attributes that they viewed as most critical to digital entrepreneurship, which were then segmented into required and nice to have skills in *Figure 4.4.*

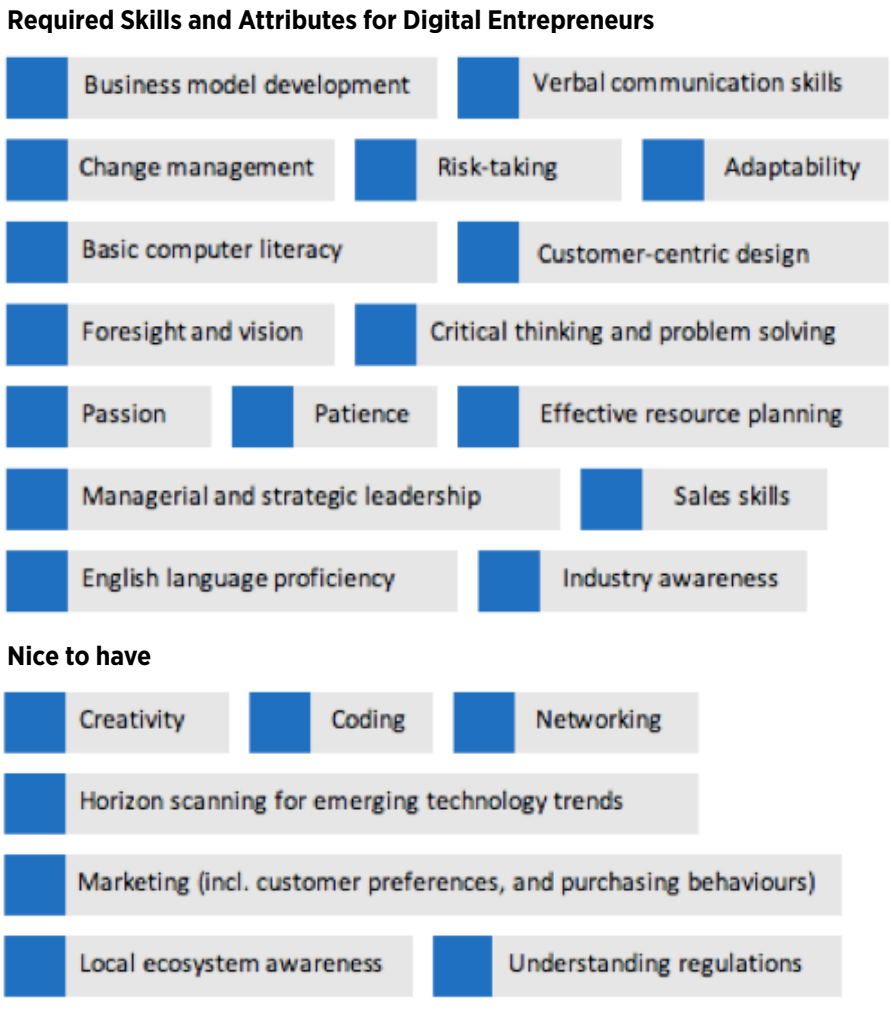


Figure 4.4: Required and desirable skills and attributes for entrepreneurs

Asked whether they believed the people in their country possessed the skills that they had nominated, 55% of interviewees and survey respondents responded no with most from Philippines, Vietnam, Thailand, and Indonesia. The most yes responses were from Singapore, and Australia.

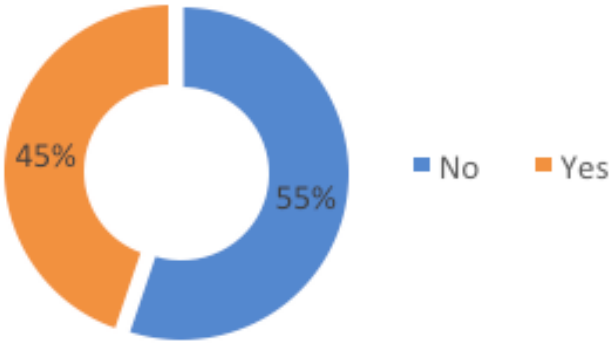


Figure 4.5: Do you believe people in your country have required skills for digital entrepreneurship?

Building capacity to support skills acquisition in students and young professionals for digital work, involves a multi-pronged approach from government, education providers and companies.

Participants in the study highlighted business model development as a critical skill, noting examples of how ill-conceived business models causes failures of start-ups, and loss of the life savings of founders. Instruction on business modelling, planning, problem solving, and lean start-up methodologies helps to build foundational business acumen, particularly for fledgling entrepreneurs.

Education providers in APEC economies where start-up ecosystems have been unable to produce desired start-up and scale up results must consider how their course offerings can deliver accessible and affordable routes to entrepreneurial skills development. Degree qualifications are by no means a silver bullet for high incidence of start-up failure but tertiary institutions can offer formal pathways for skills acquisition with well-designed entrepreneurship programs. Tailored course content, co-curricular events and access to mentoring can be instrumental to students' personal and professional development. Entrepreneurship degree units are increasingly in vogue within APEC. In China, more than 80% of all universities and colleges offer either mandatory or elective courses in entrepreneurship and innovation.[179]

Investment in the professional development of employees, and the advancement of emerging career disciplines such as change management and business transformation will help to create a talent pool suited to pursuing entrepreneurial endeavour.

[179] Ministry of Education cited in China Daily. (2015) '80% of Chinese universities open entrepreneurship and innovation courses', *China Daily Business and Economy*, 29 October 2015

In focus

REA Group Building a Digital Workforce of the Future

REA Group is a digital media company, specialising in property, founded in 1995 in Melbourne. REA has grown into a multinational company in 10 countries with revenues over AUD600 million. In 2016 REA was recognised by Forbes in the top 100 innovative growth companies in the world.

Figure 6: REA Group's Global Footprint (Source: REA Group)

The company's competitiveness, commercial success and relevance in a constantly changing digital world can be attributed to a policy of supporting learning and application of digital skills in their workforce, processes to support ongoing innovation to ensure customer satisfaction, and a culture of creative problem-solving and originality.

The company has institutionalised small multidisciplinary teams blending ICT, sales, and marketing disciplines to deliver core functions for REA's residential and commercial property, developer, media and international groups. Each quarter, REA holds a hack day for the whole international network, melding 1500 global employees into teams to brainstorm solutions to improve customer experience.

REA's online and digital mobile services are leading edge including innovative tools, simple and seamless mobile applications and new customer-centric property search and service features. Recently they have adopted customer focused Virtual and Augmented Reality (VR/AR) technology. PropertyAR is an augmented reality application, developed in collaboration with News Corp Australia and Ray White Real Estate to provide an immersive experience using VR/AR devices. These innovations are pivotal to the company's vision to change the way the world experiences property.

In the rapidly advancing digital economy with new technologies becoming mainstream, REA Group's culture of and investment in workplace innovation position the company to compete against big players such as Google, Facebook and Amazon, as they continue to disrupt the industry.

INCUBATORS AND ACCELERATORS IN DEVELOPING ENTREPRENEURIAL SKILLSETS

The business incubator has become a staple of start-up ecosystems worldwide, featuring in government entrepreneurship policy, scattered predominantly in major urban centres as independent private ventures, or within Universities and in major corporations. There are an estimated 5000-7000 business incubators globally, offering services to fledgling start-ups, from inexpensive rent, telephony and internet services, to business guidance and access to funding. China and the US are home to 2400 and 1500 incubator programs respectively.[180] Proponents of incubator programs cite notable successes, such as IBM's Emerging Business Opportunities organisation which has produced USD15 billion in additional annual revenues for the company.[181] Best in class incubators like this provide intensive coaching and mentoring to selected candidate companies and report impressive results in terms of scaling up and securing funding for start-ups.

However, not all incubators boast these success rates. Seasoned entrepreneurs suggest that "too many companies, too little mentorship" may be inhibiting growth prospects of companies emerging from incubator programs. Incubators, which regularly use levels of external funding as a key measure of success, can overlook the important provision of business services which allow for the robust testing of business ideas. A priority of incubators should be helping entrepreneurs decipher what ideas are fundable and non-fundable, instead of applying a broad-brush approach of encouraging inexperienced entrepreneurs down the early financing path. The absence of this type of advice can see products go to market prematurely, and result in rapid business decline. High incidence of this suggests a resourcing gap in incubator programs but also a short supply of readily-available expertise to support entrepreneurs through their formative years. It also underscores the importance of developing a range of performance metrics for incubator effectiveness beyond funding as these may be more effective in ensuring the longevity of young companies.

Acknowledging that there is scant empirical research on survival rates of incubated companies, studies conducted to date provide little evidence to support the assumption that success rates of incubated businesses exceed those of unincubated businesses. This raises questions about the level and type of guidance businesses receive during their incubation period, and has been identified as an area for in-depth future research.[182]

In contrast, the Asia-Pacific has seen comparative success arising from accelerator programs, as distinct from incubators. Accelerators, which are usually time-bound, and require co-location with select cohorts of start-ups, known as batches, follow intensive programs of mentoring, with the view to securing investment or acquisition. One notable example is Y Combinator, heralded as the pioneer of seed funding and lauded by the international start-up community as the most powerful seed accelerator globally with a portfolio valuation expected to surpass USD100 billion in 2017.[183]

Silicon Valley in the US is no longer the only home to major seed accelerators. Today, focus shifts to Asia including the high-growth, large and youthful markets of Southeast Asia. The rise in fintech start-ups beyond the traditional finance and banking hubs of Singapore and HK has seen accelerators crop up across Southeast Asia. In 2015 alone, nine new accelerator programs were established to match the demand. This growth is capturing the attention of major corporations, which have typically overlooked early seed funding in favour

[180] Sharma, D. (2017) 'India ranks third globally in number of incubators and accelerators: Report', *VCCircle*
[181] Wunker, S. (2012) "Seven Signs of a Successful Incubator" *Forbes*
[182] Amezcua, S.J. (2012) 'Boon or Boondongle? Business Incubators as Entrepreneurship Policy: A Report from the National Census of Business Incubators and their Tenants'
[183] Balakrishan, A. (2017) "Warning for young tech firms from Silicon Valley's top start-up factory", *CNBC Tech*

of investments beyond Series A or B stages. This is all changing. Technology giant, Cisco, for example, which has already been an active contributor to and investor in Japanese and South Korean accelerators, recognises the high potential of Southeast Asian accelerators. Increasingly, technology behemoths are prioritising the long-game and supporting Southeast Asian seed accelerators due to the potential they hold in producing successful companies that can later become future partners. This emphasises the strong performance of select accelerators in offering not just capital but tailored guidance and mentorship in producing high-value companies. The financial aspects of accelerators will be examined further in Chapter Six.

In focus

Vietnam's Incubators

Consultations conducted with incubators in Vietnam's three largest cities of Ho Chi Minh City, Hanoi, and Danang reported similar challenges. Vietnam's Ministry of Industry and Trade is expecting business registration to reach 1 million by 2020, up from the current 500,000 in 2017. Concurrently, interest in digital entrepreneurship has spiked in the tech-savvy nation, in which 50% of the population is aged under-35. Eminent incubator programs and observers in all three cities outlined resource constraints, untested business models, and insufficient mentorship as the biggest obstacles to Vietnam producing its first billion-dollar start-up. These views were also echoed by Vietnamese Venture Capital funds interviewed during this study.

In focus

Canberra Innovation Network

Canberra, Australia's 'Bush Capital', the seat of government and federal public service is an unlikely candidate for a digital start-up hub. In 2014 the government of the Australian Capital Territory, set up the *Canberra Innovation Network* (CBRIN) to accelerate innovation and diversify the local economy. CBRIN boasts a portfolio of programs, grants and initiatives including an incubator, three-month accelerator, co-working space, regular networking events and seminars on lean start-up methodologies. CBRIN is located close to Australia's leading universities and leverages world class research and expertise. The network boasts a number of success stories, including global companies. CBRIN has educated and upskilled former public servants in business, supporting new entrepreneurs in their transition out of the public sector. Its monthly networking event *First Wednesday Connect*, attended by members of the research team epitomises the entrepreneurial energy and purpose in the Capital. Business ideas are pitched to established entrepreneurs, angel investors, venture capitalists, students, local business owners, academics and public servants. CBRIN exemplifies the power of strong Public-Private Partnerships in diversifying regional economies, and promoting inclusivity and participation outside of the major cities.

Hackathons

Once only conducted within the confines of technology heavyweights such as Facebook, Google, and Amazon, hackathons have evolved into public events attended by hundreds of thousands of people globally each year. Hackathons are sprint-like and competition-style events running over short periods as short as 24-48 hours, which bring together computer programmers, designers, project managers and other relevant experts to collaborate on a project or solve a problem.

Often sponsored by technology companies, the benefits of hackathons are self-evident. Aspiring

entrepreneurs are able to build networks, find prospective colleagues, and learn new skills through cross-disciplinary project teams. Established companies have also begun to recognise hackathon events as a source of talent, scouring project teams for future employees.

The majority of hackathons take place in the US but are beginning to find favour elsewhere in the region. Accompanying the growing number of accelerators in Asia, Hackathons, which are regularly hosted by local branches of large multinationals, are gaining traction among Southeast Asia's millennials eager to drive change in their respective societies.

In focus

Hackathons Australia
Founded in 2015, Hackathons Australia is a community group based in Sydney, Australia that promotes Hackathon events around Australia. Its mission is to bring skills, talent, event organisers, industry partners, government and education providers together into a hub for entrepreneurs and technologists. The organisation provides a public directory to search and join hackathon events around Australia. Its founder explains that public participation in and visibility of hackathons promotes inclusive and connected communities, proving that location, age and level of experience are no barriers to building entrepreneurial acumen and pursuing high-impact start-ups.

Hackathons need not be purely commercial-centric with events tackling hot button issues including: healthcare; smart cities; transportation; female participation in sport; disability services; and humanitarian challenges. As the innovation and entrepreneurship agenda gains prominence in Australian political, corporate and education circles, Hackathons Australia has observed a marked increase in companies and government organisations requesting access to or offering sponsorship for events.

For all of the positive impact that hackathons can have on the skills development and networks of entrepreneurs, there are also challenges associated with duration and execution of ideas beyond prototyping. Chief among them is the low rate of follow-up after the events, often owing to funding constraints, with many run on the efforts of volunteers. Those who remain unconvinced of the value of hackathons argue that their sprint-like nature does not simulate the organic innovation process which necessarily calls for time, discipline and an iterative approach - unlikely to be realised during events which operate in a vacuum. This can mean that flaws in product design can go unrecognised in the frenetic pace of an event, producing ideas which can ultimately fall flat.

RECOMMENDATIONS

- *APEC Governments should provide the education and skills acquisition for the coming generation of digital entrepreneurs. Governments should prioritise digital education (STEM) in primary and secondary schools and provide opportunities to improve digital skills of teachers*
- *APEC needs to share information and raise awareness about digital entrepreneurship which is rich in opportunity and raise awareness about the skills people will need to navigate and thrive in digital economies*
- *Incubator programs should be encouraged to establish comprehensive performance evaluation frameworks particularly if government funded*
- *Policy makers should prioritise digital gender equality, in education, business, and government*

CHAPTER FIVE

A FACILITATIVE GOVERNMENT ENVIRONMENT

KEY FINDINGS

- *Transition to e-government is a priority across APEC. Digital transformation in public sector organisations is being pursued, but public-sector workforces often lack important skills to drive digital strategies*

- *Entrepreneurs' interactions with government are viewed as burdensome, and resource draining, with interoperability, and the establishment of one-stop-shops most welcome*

- *Dedicated digital agencies are opening new opportunities to digital start-ups by simplifying, and streamlining costly and drawn-out processes for start-ups, including more open, and transparent tender processes for government contracts*

- *Start-up grants are widely available but awareness of them requires improvement. Further, government grants can be overlooked by entrepreneurs because of the time, energy, and cost of navigating application processes*

- *Start-up and entrepreneurship visa programs are coming into vogue but some fail to acknowledge the nature of entrepreneurial activity in their design*

- *A link between bankruptcy laws and start-up launch rates has been established with evidence that entrepreneurs will shop around for the most entrepreneur-friendly bankruptcy regimes*

- *Digital entrepreneurs are particularly vulnerable to data breaches due to the constant changes in their business models. Poor or non-existent data privacy frameworks was a common concern among entrepreneurs engaged in the study*

INTRODUCTION

All interviewees and survey respondents discussed the important enabling role of government to create a conducive regulatory environment for business and provide financial or non-monetary forms of assistance with a noted void in some areas of support architecture.

This chapter examines the characteristics of government workforces and their role in spearheading E-government for more efficient, seamless interactions between entrepreneurs and government services. It also considers the availability and accessibility of government grants schemes for entrepreneurs, and considers how people and business mobility programs can be leveraged to mitigate the impacts of skilled labour market shortages. APEC's response to data privacy and cross-border information flows is also explored in connection to digital entrepreneurs who are directly and significantly affected by an environment of weak data governance.

E-Government: Can Public Sector Workforces Serve Digital Entrepreneurs?

As individuals adapt and companies reorganise to respond to digital disruptions, governments themselves are facing similar imperatives. Shifting from analogue models of governance and service delivery to e-government in often large and complex bureaucracies takes time, and agencies will continue to be limited by legislative, budgetary and human capital constraints. Levels of digital maturity in government as depicted in *Figure 5.1* vary greatly around APEC, from Singapore, where some of the highest rates of citizen involvement in e-government service design are experienced, to North America where some of the lowest levels of co-creation are reported.

Figure 5.1: Organisational Digital Maturity Source: Deloitte

Research conducted into the characteristics of digital organisations has found that the majority of agencies and departments place responsibility for digital strategy in the hands of a single person, as illustrated in *Figure 5.2.*

In many instances, hierarchical structures are more pronounced in public sector organisations,[184] and the willingness to transform to digital models varies among group or divisional leaders, many of whom abide by old-school and traditional modes of business. These leadership profiles can become detrimental to the effective planning and execution of digital transformation strategies. Survey respondents, particularly those in the younger age brackets identified a generational gap between technology-savvy populations working in or towards digital careers, and the government leadership charged with facilitating an environment that enables success, which will increasingly be realised through technology. Awareness of this generational gap was also highly evident through consultations with government officials who often referenced youth in relation to digital entrepreneurship, and requisite skills and education in the context of digital economy trends.

[184] Eggars, W., and Bellman, J. (2016) *The Journey to Government's Digital Transformation*, p.6

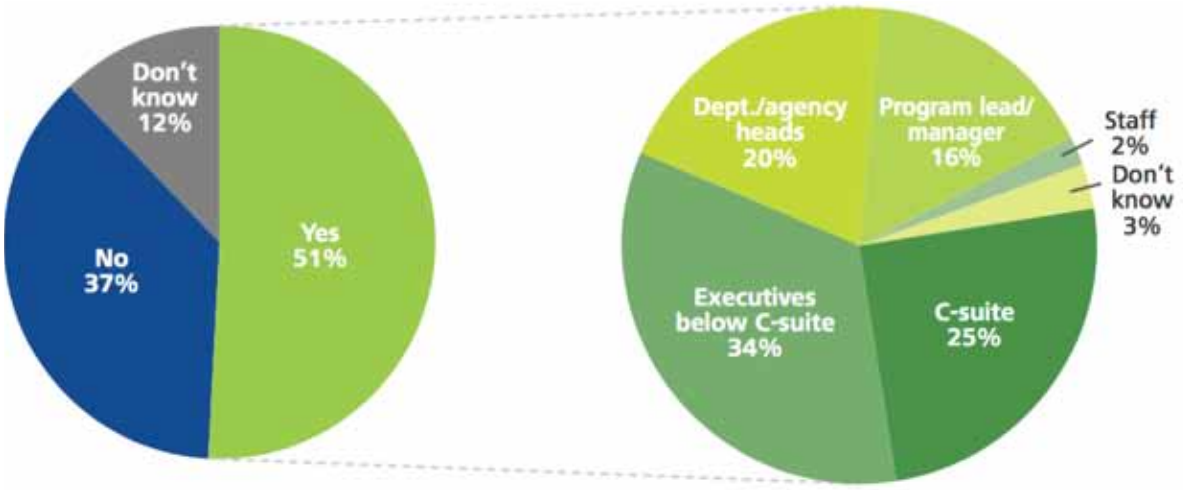


Figure 5.2: Does any one person or group have responsibility to oversee/manage your organisation's digital strategy? Source: Deloitte

Workforce culture, skills and capability are identified as major impediments to digital transformation in government, even when a strong willingness to convert to smarter and technology-enabled service delivery is present. Improvement of citizen experience is often the primary motivation behind conversion to service provision via digital channels, but very seldom at the centre of service design. The necessary skillsets to enable user-centric design of government services, including technological literacy, agility and collaboration are reportedly absent among many government workforces.[185] This sentiment was confirmed during this study, including in APEC's advanced economies, where government officials were asked to identify constraints to effective e-government service design. Often cited reasons were the siloed nature of organisational design, and the misplaced emphasis on procuring technology, instead of business and citizen experience, as the definition of digital transformation.

Regularly identified as inhibitors to achieving a digitally-prepared and versatile public-sector workforce are restrictive recruitment policies with outdated selection criteria, an absence of opportunity for secondment to other sectors for skills development, and unfavorable remuneration for skills that can command large compensation packages in industry. For example, in many Australian government agencies, employees in IT roles do not receive specialist pay conditions, unlike legal and public affairs specialists. This has led to IT positions in government being overlooked in favour of contractor roles which offer highly attractive hourly pay rates. This has seen large government overspend in supplier budgets, and highlights the need to reform recruitment and compensation policies for IT professionals seeking impactful careers in the public sector.

For start-ups, time is also money, and the burdensome nature of their interactions with government, from inquiries to approvals of permits and certifications, can become an impost on minimal company resources, as widely experienced by interviewees during this study. Efforts to equip government workforces with the suitable skills to accelerate transition to omni-channel platforms and reduce the headache of paper-based applications for citizens and businesses engaging with government, is an important form of indirect support for entrepreneurs, and is change that can be effected in the short-term.

In spite of these challenges, APEC is home to world exemplars for citizen engagement in e-government

[185] Ibid., p.15

service design, and should be showcased as models that other economies can seek to emulate. Notable among them is Singapore, which has been a leader in digital transformation in government and e-participation, and continues to pave the way for seamless interactions between citizens, business and government. Since launching its 2011-2015 e-Government Masterplan, the Singapore government has lived by the 'government with you' mantra,[186] co-creating more than 110 mobile applications with its citizens, enabling fast access to over 1600 online services.[187]

New Dedicated Digital Agencies Opening Doors for Start-ups

Digital entrepreneurs can draw confidence from encouraging progress in the establishment of dedicated digital agencies, offices and services across APEC. Noteworthy examples include Singapore's Government Technology Agency, and the US Digital Service, a start-up housed within the White House to move the most cumbersome processes online, including through the modernisation of certification through the Small Business Administration. The consolidation of digital transformation functions into single coordinating agencies significantly reduces the administrative burden on digital entrepreneurs who will inevitably have numerous touch points with government over the life of their business.

In Australia, more than 810 million transactions with government occur every year (federal, state, and territory), 40% of which are executed via traditional methods. Reduction of this figure by 20% would realise AUD17.9 billion in productivity and efficiency benefits for government, as well as nearly AUD9 billion in savings for citizens engaging government services.[188] To this end, the Digital Transformation Agency (formally DTO) was established in 2016 to make transactions with government simpler, clearer, and faster, through the application of a new digital standard, with design-thinking at its core.

Although its broad portfolio of projects has experienced mixed progress, the streamlining of government ICT procurement processes has been met with praise, and become a strong enabler of start-up growth. Reducing the complexity of costly, and drawn-out ICT procurement processes, has enabled small vendors including MSMEs and start-ups to compete against large, and established companies which have long-held an advantage due their availability of resources to participate in tender processes. This would highlight the need for all APEC economies to establish centralised digital agencies, and to simplify and open procurement processes for ICT services so that technology start-ups are given equal opportunity to compete in tender processes.

The One-Stop-Shop

Digital entrepreneurs will have a range of interactions with various government bodies during their start-up and scale-up phases. During consultations, references to Singapore, one-stop-shop and single window initiatives were commonly encountered. Where government permissions were concerned, interoperability was viewed as one of the most important enablers of fast and simple business start-up, and very welcome among entrepreneurs. Despite an overwhelming preference for this, very few APEC economies have consolidated all services into one portal, and this has ultimately deterred business-minded individuals from pursuing their start-ups.

[186] BCG. (2016) 'Building a digital government in Singapore', Centre for Public Impact
[187] Eggars, W., and Bellman, J. (2016) The Journey to Government's Digital Transformation, p.23
[188] Deloitte. (2015) Digital Government Transformation: Commissioned by Adobe, p.1

According to the OECD, this was a large inhibitor in Mexico where many entrepreneurs "simply gave up and abandoned their business projects" after having to provide information to federal, state, and municipal governments, sometimes submitting the same documentation up to 18 times.[189] The Mexican government responded to this with the establishment of tuempresa.gob.mx in 2009, a one-stop-shop for start-ups, which continues to be a powerful example of how regulatory reform and red-tape reduction in business registration can have tangible impacts on national start-up ecosystems, and cost of doing business rankings.

In focus

Mexico's one-stop-shop

Tuempresa.gob.mx, established in 2009, is an initiative managed by the Coordination of the President's Office and the Digital Government Unit of the Secretariat of Public Service. Its aim is to significantly reduce time and expense shouldered by entrepreneurs by integrating and modernising government services into a single portal. Until its establishment, citizens were confronted with over 5000 government websites, searching for hidden information on outdated, and non-user-friendly platforms.[190] Prior to tuempresa.gob.mx, the OECD had calculated that the time and resources needed to meet government requirements "was equivalent to 16% of the country's per capita GDP", factoring in time spent queuing in government offices, filling in paperwork, and visiting banks. The introduction of the one-stop-shop was conservatively estimated to have reduced administrative costs by a 65%.[191] By 2018, the government aims to reduce the economic cost of procedures further, to as little as 3.1% of GDP. The benefits of government service integration go two ways in Mexico. For start-ups, two thirds of which did not complete business registration prior to tuempresa.gob.mx, barriers to entry have been reduced, discouraging participation in the informal economy. For government, the centralization of databases has enhanced data collection on Mexico's economic activity, strengthening government's monitoring and evaluation capability. This will enable greater policy and regulatory responsiveness in future, enabling further expansion of Mexico's economy.[192]

Across APEC, movement towards one-stop-shops arrangements is evident, from the Philippines Business Registry to Australia's my.gov platform however implementation is not widespread, and this can have negative ramifications for economic growth, particularly in those economies which are positioning entrepreneurship as an important economic lever.

In those economies where one-stop-shop arrangements for businesses do not exist, entrepreneurs who are less willing to discontinue their projects but are unable to carry the financial and administrative burden arising from complex bureaucracy, often turn to the informal sector. However, in doing so, they effectively cut off further life support from government, which can lead to serious downstream implications, for their businesses, for government taxation revenues and broader economic policy and planning.

Similarly, for start-ups that have scaled to international markets, single window initiatives will be important for customs clearance and release, one of the largest inhibiters to cross-border trade between many APEC economies. According to a 2015 study by the University of Southern California on cross-border commerce,

[189] OECD. (2015) *The one-stop-shop for quick and easy business start-ups in Mexico*, p.3
[190] gob.mx. (2017) 'What is gob.mx?' English version
[191] OECD. (2015) *The one-stop-shop for quick and easy business start-ups in Mexico*, p.7; OECD. (2011) *Cutting Red Tape: Administrative Simplification* in Vietnam, p.58
[192] OECD. (2015) *The one-stop-shop for quick and easy business start-ups in Mexico*, p.9

slow progression of customs and trade simplification will continue to fuel work-arounds including incorrect declaration of goods valuation and smuggling, causing losses in duties collection.[193]

Whilst ASEAN members have significantly bought into a regional single window initiative in principle the rate of implementation varies, reflecting differences in cost, capacity, and the complexity of government.[194] Elsewhere in APEC, progress remains slow. In Australia, there are ongoing feasibility studies and efforts to get single window off the ground have been hampered by regulatory barriers, inconsistent data formats and poor system-to-system linkages. It is costly to create one-stop-shops for start-ups but the cost of doing nothing is far greater. In conducting cost-benefit analyses, APEC economies must consider the harmful impacts to their economic and development goals of deprioritisation of one-stop-shop and single window projects. Drawing on lessons learnt from effective implementation of such platforms across the region will minimise time and expense through the fast adoption of tried and tested methods for portal development.

Government Funding and Grants Programs for Start-Ups

Government's role in supporting start-ups extends beyond e-government, and producing a conducive regulatory environment for doing business. Spanning the entire APEC region, government schemes and grants programs for young companies are becoming available, some of which rival that of early stage venture capital funds. Singapore's 1,600-2,400 technology start-ups enjoy some of the most generous government subsidies in the world.[195] Cash grants from SGD5,000, up to SGD25 million can be sought, along with tax incentives of up 400% in tax deductions, and SGD300,000 tax exemptions.[196] In China, Shanghai's 1,800-2,700 start-ups can now access low interest, and collateral-free loans of up to USD30,000 provided the founder has Shanghai citizenship.[197]

Across the Pacific in Santiago, up to 300 foreign entrepreneurs are being supported annually with year-long work visas and up to USD45,000 in equity-free funding.[198] In Australia, Sydney's start-up ecosystem is being boosted with government-backed and multi-million dollars incubator and accelerator programs.[199] In Vietnam, the government's push to build a start-up nation has spawned new funds in key agencies from the National Technology Innovation Fund, to the National Agency for Technology, Entrepreneurship and Commercialisation Development. Rural business can access an Australian Government and Asian Development Bank fund (the Mekong Business Initiative) for business development, financing, incubation and acceleration in the Greater Mekong area.[200]

Although some grants in some economies fall short of required capital needed for scale-up activities, the largest challenge associated with government support for start-ups is awareness and up-take. Interviewees and survey respondents were asked about their level of awareness for government grants and initiatives for entrepreneurs, with just 6.5% highly aware of their existence. *Figure 5.3* shows that awareness for government support could be improved markedly.

[193] USC Marshall. (2015) *Driving Economic Growth Through Cross-Border Commerce in APEC: Empowering MSMEs and Eliminating Barriers*, pp.56-58
[194] KGH Border Services (2016) 'International Single Window Study', *The Department of Immigration and Border Protection*, p.42
[195] Start-up Genome. (2017) '2017 Global Start-up Ecosystem Report', p.62
[196] Dzulkifli, E. (2017) 'Infographic: A Start-up's Guide to Government Grants, Funding and Incentives in Singapore', Asia Finance
[197] Start-up Genome. (2017) '2017 Global Start-up Ecosystem Report', p.55
[198] Ibid., p.93
[199] Ibid., p.62
[200] Shona. (2016) 'Vietnamese Government Support for the Start-up Ecosystem', *Demystify Asia: Asian Business Advisory*

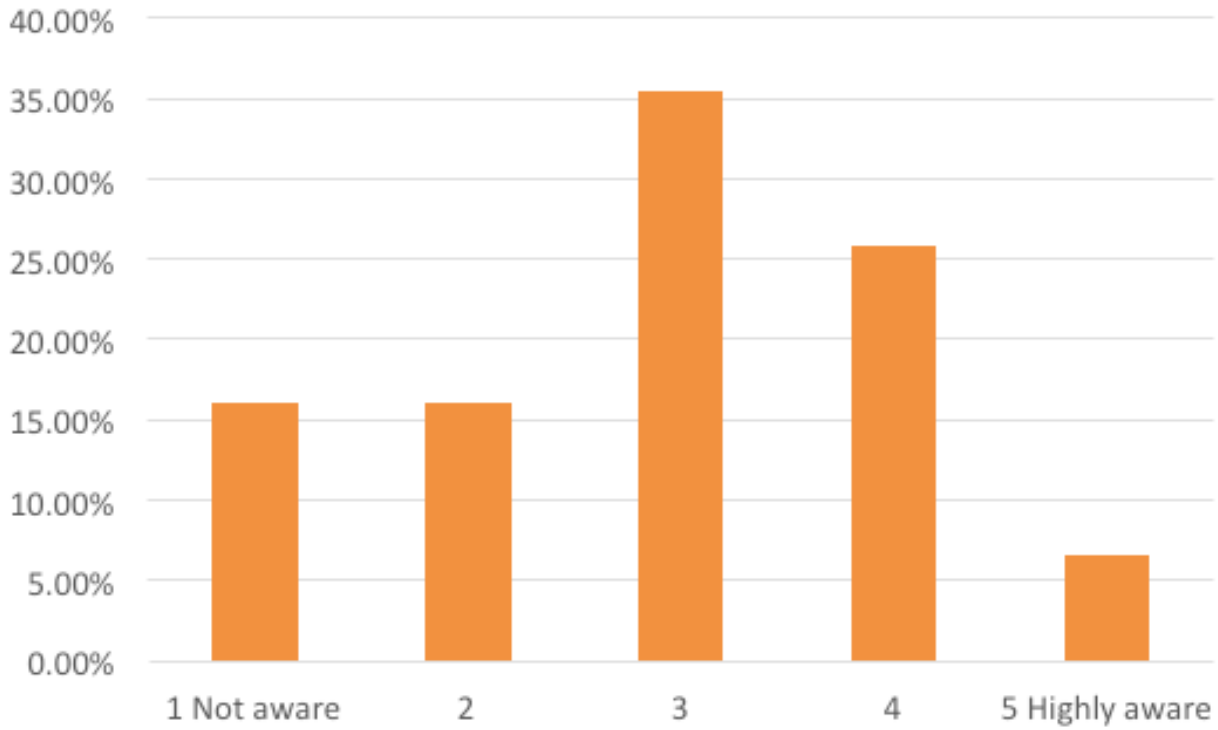


Figure 5.3: How aware are you of government grants and initiatives to support start-ups in your country?

Further, take-up of government grants has been low in specific APEC economies owing to a lack of awareness, but also the complexity and cost of their associated application processes. In Canada, a concerning proportion of technology start-ups opt against government funding, with studies suggesting that up to 50% will overlook government support, instead turning to the private sector and independent investors for early funding. Although government funds do not carry equal conditions to that of venture capital or other forms of equity funding, the time, cost and energy required to build contacts in government agencies that administer these funds, and for application lodgment, prompt entrepreneurs to pursue more efficient channels for sourcing funds.[201]

Evidently, governments APEC-wide are working hard to ensure support is available to entrepreneurs, but poor promotion, and time and expense associated with application preparation see grants go begging. This underscores the need for government agencies administering start-up funds to reduce application complexity and nurture close relationships with incubators, accelerators, and other institutions, which are in-place to guide entrepreneurs towards early-funding. This also extends to tertiary education institutions which offer entrepreneurship and start-up activator programs.

Promotion of government support may be facilitated through the establishment of an APEC network of dedicated 'start-up support ambassadors' in relevant government authorities, who can also serve as valuable points of contact for entrepreneurs during business research exercises. This would complement the APEC Accelerator Network for Early-Stage Investment, and add another important feature to APEC's innovation mapping initiative, currently underway to identify incubators and accelerators dispersed around the region.

[201] PwC. (2015) *A nation of innovators: 2015 Canadian emerging companies*' survey, p.13

People and Business Mobility

People-to-people connectivity is a major pillar of the APEC Connectivity Blueprint 2015-2025, and imperative to the health of any business. During the formative years of their start-ups, entrepreneurs will connect with a myriad of players within their local ecosystem, but will often require overseas connections and talent to support scale-up and international expansion. Having the right people on board is considered as the key, and often missing ingredient to start-up growth.

Global talent pools have become more mobile than ever, and international travel highly accessible with the advent of low-cost carriers in an already competitive aviation industry. However, start-ups still report being bound by significant people-to-people connectivity constraints. Administrative burden associated with visa applications, and difficulty in accessing skilled labour are experienced, and can, and do inhibit attempts to scale. These can be overcome. The impacts on start-ups can be minimised by improvement to, and concessions under already existing regional initiatives, including the APEC Business Travel Card (ABTC) scheme, and should be used in conjunction with smart, and responsive migration policies such as dedicated start-up and entrepreneurship visa programs.

APEC Business Travel Card: Inefficiencies to be Addressed

Formation of large economic blocs such as ASEAN, and the Pacific Alliance, have made travel easier for citizens of their member states but there are still barriers to wider travel throughout the APEC region. While bilateral, plurilateral, multilateral, and regional trade agreements include people mobility and visa provisions, large cohorts who possess low-risk travel profiles still do not reap the benefits of what is now described as a borderless society.

In support of the region's collective business agenda, the ABTC has enabled over 160,000 business travelers the convenience of fast immigration clearance[202] without the requirement to apply for a separate visa however not all people can access the benefits. Inefficiencies in processing, and inconsistent eligibility requirements among participating economies inhibit further take-up of this flagship initiative. With wait times up to several months, application charges of hundreds of dollars, and strict secondary eligibility requirements imposed at the economy-level, many start-up operations are locked out of the initiative. Given that the ABTC reduces transaction costs by 27.8% for cardholders[203] this would be of considerable value to entrepreneurs who report financial difficulties, yet still require international people-to-people connectivity for the growth of their businesses. This highlights the need for standardisation of eligibility and administrative procedure for more seamless, and inclusive people-to-people connectivity.

It is important to note the current ABTC transitional member-status of Canada and the US, home to some of the largest start-up clusters in APEC. Difficulty in accessing these markets for entrepreneurs originating from elsewhere in the region is also potentially limiting for growth prospects. This would call for governments of Canada and the US to review current arrangements with the view to transitioning to full membership of the ABTC scheme.

[202] APEC. (2017) '*Achievements and Benefits', Asia-Pacific Economic Cooperation*
[203] Ibid.

Start-up and Entrepreneurship Visa Programs

Skilled migration programs, as seen in Australia, Canada and NZ, allow people to live and work for an extended period if they qualify under specific skill categories. However, with the rapid pace of technological change, these categories become redundant relatively quickly. More recently, some economies have started offering 'start-up' visas to encourage entrepreneurs with a broader remit of skills, and appetite for risk, to re-locate and help foster a culture of innovation.

These 'entrepreneur' or 'start-up' visas are expected to bring substantial benefits to local economies. One study in the US estimated that a proposed start-up visa program could lead to the creation of 900,000 to 1.6 million new jobs over the next ten years. In addition, such visa programs act to reduce barriers to starting a new business by allowing individuals to more easily cross-borders. They also signal to global entrepreneurs that the local environment is supportive of innovation and thereby helps to attract talent.

In the APEC region, various types of start-up visas are currently on offer. *Table 5.1* provides a snapshot of differences in terms of funding, assessment, time period and other requirements. Australia, Canada and Singapore have similar programs. They all require applicants to have support from venture capital firms or angel investors. In addition, Australia requires nomination by a State or Territory government while Singapore makes applicants pass an approval process of their business plan and entrepreneurial background. Canada stands out for offering entrepreneurs permanent residency visas regardless of the success of their enterprise. Australia grants a visa for 4 years but requires intermediate milestones to be met, for example 10% of funds must be received within the first 12 months.

Chile, and more recently NZ have taken a different approach by offering visas tied to their respective accelerator or support programs. Once accepted into these programs, applicants are eligible for a visa even without venture capital backing. In Chile they may receive up to USD45,000 if they are successful in competitive rounds of the Start-Up Chile Accelerator program. In NZ applicants need only demonstrate sufficient funds to cover living expenses, and basic operations of their enterprise for the first stage of the Edmond Hillary Fellowship. Both programs offer wide-ranging support services to help entrepreneurs initiate and scale their businesses.

Country	Fund Source	Minimum Funding	Assessment	Time Granted	Other
Australia	Govt Agency: Australian venture capital	AUD200,000	Nomination by State or Territory government	4 yrs 3 months	Renewal requires 10% of funding in first 12 months
Canada	Venture capital	CAD200,00	Letter of support	Permanent	Option for permanent residency regardless of success of enterprise
	Angel investor	CAD75,000			
Chile	Govt provides up to USD45,000 without taking equity	N/A	Acceptance into Start-up Chile Accelerator program	1-year subject to renewal	
NZ	N/A	N/A	Acceptance into Edmund Hillary Fellowship	Eligible for permanent residency after 30 months	Fellowship is not funded. Applicant must have access to NZD36,000 for maintenance expenses
Singapore	Anyone	SGD50,000	Approval of business plan and entrepreneurial background	Eligible for permanent residency after 2 years	Company must be less than 6 months old. At least 30% ownership in enterprise must be maintained by applicant
	Angel investor	SGD100,000			

Table 5.1: Comparison of Start-up Visas

[204] Stangler, D., and Konczal, J. (2013), 'Give Me Your Entrepreneurs, Your Innovators: Estimating Employment Impact of a Start-up Visa' *Ewing Marion Kauffman Foundation*

While there are many benefits from easing restrictions on entrepreneurs, there can also be drawbacks depending on the approach used. In some cases, visa programs do not reflect the nature of entrepreneurial activity. Start-ups are an inherently risky endeavour with the vast majority often failing. Successful entrepreneurs often go through a string of failed attempts from which they learn valuable lessons. Therefore, start-up visas that require milestones to be met in a specific time period or visas that expire if an enterprise fails, can add to the psychological costs of would-be entrepreneurs, only compounded by the serious implications of stringent bankruptcy laws. Canada's approach of offering permanent residency to eligible candidates regardless of the success of their enterprise is one way to address this problem.

Start-up visas on their own may not be sufficient to spur entrepreneurial activity as this often requires broader changes in the innovation ecosystem. For example, entrepreneurs often require a wider pool of talent in order to grow successfully. This may require broader changes in immigration laws to help facilitate easy access to skilled migrants. Visa Tech Chile is one program through which start-ups can hire professional and technical expertise from overseas through a streamlined process that takes a maximum of 15 days. It is therefore important for APEC governments to tailor their start-up visa programs to meet the needs, and match the profiles of entrepreneurs to help foster an innovative environment.

Cross-Border Information Flows and Data Privacy Frameworks

In this digital age, data has become an asset. As more individuals, and businesses come online, data will continue be created at break-neck speed. The current rate of global data output is 2.5 quintillion bytes per day, with 90% of the world's data created over the past two years.[205] *Figure 5.4* derived from an annual Data Never Sleeps report, is a snapshot of data generated every minute in 2017.

Figure 5.4: Data generation per minute in 2017 Data sourced from Domo

The sheer volume of and pace at which data is being generated has brought issues of data governance, ownership, storage and privacy into sharp focus. Government, and businesses face a continuous balancing act between data privacy and protection and the promotion of cross-border information flows. In response to this, the UN adopted a resolution in 2016 on the right to privacy in the digital age, affirming privacy as a human right, and expressing concern over sale of personal data without individual consent.[206]

In the era of cloud computing, location of data centres, where information is organised, housed and processed, becomes key to the privacy debate as domestic legislation, which varies dramatically across all APEC countries, can determine the utility of and access rights to data, even of that belonging to a different jurisdiction from which it is being stored. The already complex issue of data residency becomes even more of a grey area with the constant movement of information from data centre to data centre, from country to country; a strategy often used by companies for cost minimisation. Legal provisions for data residency also differ markedly, from Australia and Canada, which have both enacted legislation restricting companies from storing consumer data outside of their physical land borders,[207] to Thailand, and PNG, where legislative frameworks are limited.

[205] Domo. (2017) 'Domo Releases Annual 'Data Never Sleeps' Infographic', *Nasdaq GlobeNewswire*
[206] Brown, D. (2016) 'New UN resolution n the right to privacy in the digital age: crucial and timely', *Internet Policy Review*
[207] Vaultive. (2015) Storing Data in the Cloud and Data Residency Laws: Irreconcilable Differences

In focus

Cloak

Singapore-based start-up, Cloak was established with a vision to make data encryption easier for companies. Its founders saw an opportunity to provide data security to new, and fast-growing companies by leveraging disruptive technologies such as Deep Machine Learning, IoT, Bring-Your-Own-Device, and Software-as-a-Service. Cloak was able to develop its core intellectual property (patented) through start-up grants from the Singapore SPRINT TECS grant, NUS FLO grant, and the T-UP grant, worth a total of more than USD600,000.

Located in the very cosmopolitan Singapore, Cloak has attracted global IT talent to build its business solutions. During the product development stage, Cloak won the Red Herring Asia Top 100 companies award, T-UP Excellence Award and was awarded multiple other accolades, which further raised its profile among enterprise customers. This gave Cloak a much-needed boost to successfully acquire its first customers in its revenue growth stage. Cloak's cloud service, Cloak Apps has been downloaded by more than 50,000 users worldwide, making it one of the most popular file encryption products on the market. Cloak's flagship product is its revolutionary all-in-one box that brings easy-to-use, secure and affordable enterprise IT services to MSMEs. Cloak's success demonstrates the power of government grants and funding in unleashing start-up potential, and cements government's enabling role in creating an environment that is conducive to innovation.

Data Privacy of Great Importance to Digital Entrepreneurs

In the context of digital entrepreneurship, a lack of consumer trust in providing personal information to merchants, and its damaging consequences for technology start-ups, were common features of interviews conducted by the research team. Data is a hot issue for digital entrepreneurs, particularly those operating in economies with insufficient data governance and privacy legislation. In Vietnam, interviewees were highly vocal about this, where laws on data privacy are still in flux, violations occur frequently with limited penalties, and from where a high proportion of the world's cybercrime originates.

Data protection and privacy should be front and centre in the minds of digital entrepreneurs as the future of digital economy becomes ever-more reliant on them. Moreover, start-ups are particularly vulnerable to committing inadvertent data privacy breaches due to their regular testing, and revision of business models, which can lead to them using data in ways without coverage and permission.[208]

Start-ups should perform data privacy assessments at the outset, however this may not be enough. When privacy legislation is unclear and inconsistent, compliance becomes difficult, and the consequences of unintentional breaches including bad publicity, and even litigation can cause major disruptions to the business. The reputational damage to young companies, which are in less of a position to manage fall-out, was evident in study consultations with Bangkok-based entrepreneurs. The research team sought views on the level of concern about data privacy among consumers in Thailand, where associated laws are deemed inadequate. The practice of 'naming and shaming' e-commerce start-ups on online review websites was a commonly adopted method for notifying fellow citizens of privacy breaches, and was viewed among interviewees as an adequate interim response to poor privacy frameworks, both for consumer protection and keeping companies in-check.

[208] van Otterloo, S. (2015) 'New data privacy law and the consequences for start-ups', *Start-up* Juncture

APEC'S Data Privacy Framework

From a regional perspective, data privacy has been in the spotlight since 2004, when the APEC Privacy Framework was first endorsed. Further regional initiatives including the Data Privacy Pathfinder (2007), and the APEC Cross-border Privacy Enforcement Arrangement (CPEA) have since been developed. The CPEA, which commenced in 2010 to promote cross-border cooperation between authorities, is now complemented by the Cross-Border Privacy Rules (CBPR) System. While the CBPR system is a necessary measure to help align domestic privacy laws with the APEC Privacy Framework, there are just five participating economies (the US, Mexico, Canada, Japan, and the Republic of Korea). The benefits of widespread CBRP system-certification to international trade, and consumer trust are clear, but for these to be realised, participation has to reach a critical mass. The onus will be on businesses operating within each member economy to strengthen their internal data policies in ways that are compatible with the APEC Privacy Framework, and this will only occur through strong political and public-sector leadership, which clearly articulates the benefits of CBRP certification, and the trade-offs of opting out, including bottom-line implications.

Bankruptcy Laws and Entrepreneurship

It is not uncommon for digital entrepreneurs to fail several times before hitting their stride. Often, entrepreneurs become so engrossed in ensuring the financial health of their companies, that they stop paying attention to their own personal finances until it becomes too late, for themselves, and their ventures. Therefore, the declaration of both personal, and company bankruptcy for founders, and their start-ups is not outside the realm of possibility, and in some instances, is the least painful route to reinvention, and renewal. While there are longer term impacts of bankruptcy, such as the inability to access loans, and financing, and the years-long black mark on credit reports, the prospect of a "fresh start", and immediate respite from creditors has become appealing to start-ups.

Bankruptcy laws vary across APEC, with some regimes more entrepreneur-friendly than others. The factors influencing the friendliness of an economy's bankruptcy regime include: the length of time taken to move through the entire procedure; the cost, and fees associated with the procedure; and the level of debt relief that is afforded upon declaration.[209] Research into the field has established a connection between bankruptcy laws and rates of new business launch. It has found that entrepreneurship-friendly bankruptcy laws which carry lower costs, shorter procedures, and larger debt relief encourage start-ups to take risks, and plan for expansion. It also suggests that entrepreneurs may shop around for the most lenient regimes, and target these jurisdictions if the company finds itself in rough waters.[210] Therefore, APEC economies that are positioning start-ups as the keys to their future, must understand this connection, and if required, reform their bankruptcy regimes to ensure that they are compatible with their entrepreneurship agendas.

This report has examined select regulatory issues based on the most immediate challenges facing digital entrepreneurs. Although the need for a comprehensive suite of regulatory reforms was not directly identified by digital entrepreneurs surveyed by the research team, the negative consequences of a regulatory regime that has not kept in lock step with modern requirements, will become apparent over the coming years. This highlights an area for future research so that a more wide-ranging review of regulation of digital technologies can be undertaken. This should be conducted in concert with an assessment of current trade rules, and their compatibility with the emergent trade patterns arising from the fourth industrial revolution.

[209] Lee, S.H. (2011) 'The Impact of Bankruptcy Laws on Start-ups', Strategy+Business
[210] Ibid.

RECOMMENDATIONS

- *Grants for start-ups should be simplified and integrated into the regional initiative to map incubators and accelerators. This could include the establishment of a dedicated network of 'start-up support ambassadors' in relevant government authorities to complement the APEC Accelerator Network for Early-Stage Investment*

- *Visa policy design should be compatible with the profile and nature of entrepreneurial activity to enhance labour mobility*

- *One-stop-shops should be developed for government permits, applications and certifications to assist entrepreneurs to progress their businesses. This can include open and transparent tender processes for government contracts to ensure digital start-ups are not locked out of lucrative government contracts.*

- *APEC should prioritise building digital capability in public sector workforces.*

- *Data privacy and protection laws should be drafted and enacted as a priority*

- *APEC economies should review and reform bankruptcy laws to ensure that they are entrepreneur-friendly. This may include increasing the level of debt relief afforded to entrepreneurs on declaration, and reevaluating its associated administrative costs*

CHAPTER SIX

FINANCIAL ASPECTS OF DIGITAL ENTREPRENEURSHIP

KEY FINDINGS

- *Difficulty accessing finance is a widespread concern. This is likely to become more acute as the average age of start-up founders drops — many of these founders will be unable to provide collateral or a credit history*

- *Drop-off rates between seed funding and Series A remains high. This indicates a shortage of angel, and venture capital funders in some markets, particularly those with underdeveloped financial and regulatory institutions. This also represents a deficiency in many accelerator programs in supporting monetization of ideas*

- *There is great disparity among APEC economies in terms of the number of transactions protected through encryption technology, and secure servers. Most businesses report traditional password verification despite common preference for multi-step verification processes*

- *There is large potential in crowdfunding as an alternative source of equity funding and financing*

- *Microfinance institutions are facing severe resource constraints, and are turning to mobile wallet technologies to reach a large unbanked population, and reduce operational expenditure*

- *Fintech has been identified as a key growth area for start-ups, and will play an important role in increasing access to crucial financial services among APEC's large, unbanked population*

- *E-payment readiness and credit card penetration rates still vary greatly across APEC, and inhibit start-up growth*

- *Consumers, and entrepreneurs in both advanced and emerging economies rate credit card fraud and security as a top concern with few protected by secure servers and encryption technology*

INTRODUCTION

Funding and investment remain the lifeblood of every start-up operation and access to finance remains a major struggle for APEC's digital entrepreneurs. This chapter examines the most prevalent financial issues pertaining to digital entrepreneurship, identified by digital entrepreneurs and ecosystem stakeholders during consultations, and substantiated by secondary research. These issues will be principally explored through the lens of emerging Southeast Asian economies, where start-ups have consistently reported difficulty in accessing bank loans, equity funding and other forms of monetary assistance, and where rates of job informality, and unbanked citizens remain high. Finally, this chapter will also place due focus on issues arising from the expansion of online payments.

Access to Finance Critical Issue for APEC's Digital Entrepreneurs

At the outset, the research team requested all participants to nominate the most pressing challenge to digital start-up growth, and the most important enabler to business success. *Figure 6.1* and *Figure 6.2* depict these results, highlighting access to finance as the second-most cited concern after talent acquisition, with access to funding and investment the second-most important business enabler.

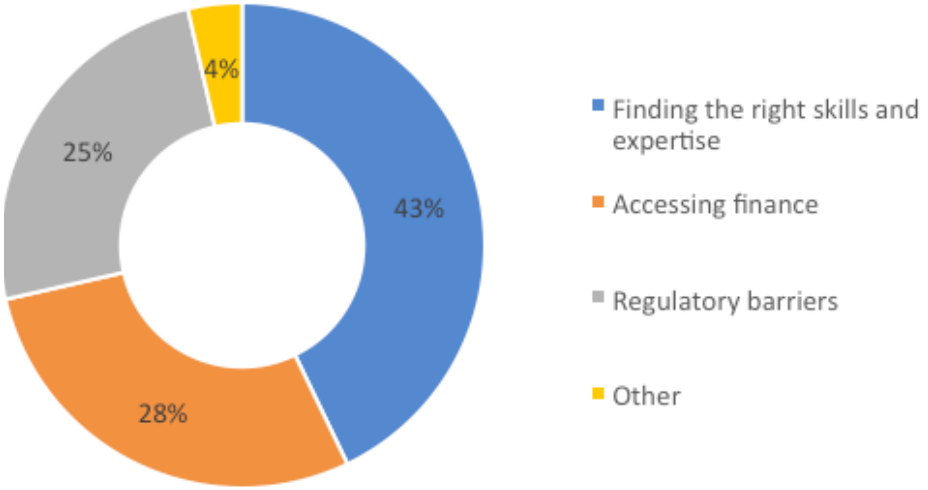


Figure 6.1: Largest challenges encountered that inhibit start-up growth

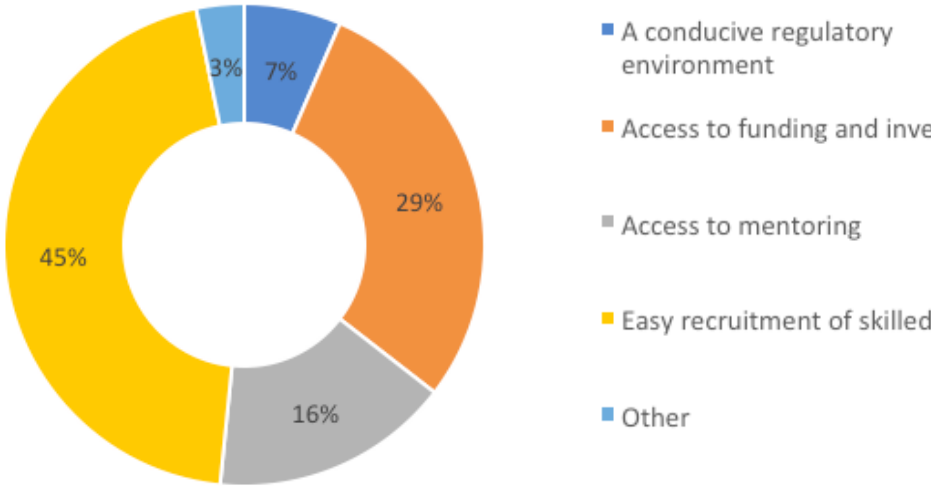


Figure 6.2: Most important enablers to scale-up and growth

The reluctance of banks to offer loans to digital entrepreneurs was a common feature across all finance-relevant consultations. Bankers who were engaged for comment during this study, also conceded that start-ups will continue to encounter difficulty in receiving formal bank loans, particularly those that are unsecured. Banks' uncertainty on their ability to recover loans, in an environment of high start-up failure is a high-risk activity. For this reason, the practice of asset-based lending is widespread, but poses a direct challenge to new entrepreneurs, many of whom are young and possess few assets, or credit history.

In the US, a study exploring why banks refuse loans for American entrepreneurs found poor comprehension about creditworthiness. 45% of those surveyed were unaware that they had a business credit score and 82% and admitted they were unable to interpret their scores. One quarter of participants avoided

hiring and expanding their business after several unsuccessful applications for finance.[211] Education about creditworthiness is needed and banks should ensure that customers have such information during application stages. Anticipated growth rates for start-ups quadrupled among entrepreneurs who had awareness of their credit scores compared to those that did not.[212]

Informal Entrepreneurship not a Peripheral Feature of the Regional Economy

The informal economy in the Asia-Pacific accounts for 60% of the total workforce, with the majority share apportioned to the region's emerging markets.[213] At the economy-level, these percentages can be much higher. As a sample, in PNG, more than 80% of the population are engaged in the informal economy.[214] In Peru, this figure is approximately 74%, a trend predicted to extend to 2050[215] and in Indonesia, stands at more than 60%.[216] 'Unofficial' entrepreneurs should not be locked out of financial support but are even less likely to secure support from banks. There is a need for a diversified mix of financing possibilities perhaps requiring a softening of relevant regulation to support such entrepreneurship, particularly in rural and remote APEC.

Microfinance institutions (MFIs), are an important source of small, flexible and unsecured loan arrangements for informal entrepreneurs in poor and low-income communities. The growing demand for micro-credit has pushed the industry's value up to USD100 billion with a current customer base of 200 million people.[217] However, MFIs themselves are grappling with resourcing constraints, and face an imperative to reduce operational expenditure through digital business models, or risk scaling back their reach. Mobile technologies, such as e-wallet, will further ensure MFI sustainability, reducing operational costs and facilitating further financial connectivity. This highlights three immediate areas for development: accelerated expansion of reliable internet infrastructure in rural and low-income communities; the establishment, and promotion of a digital channel strategy within every MFI that is accessible to all prospective customers; and the government's constructive role through regulatory frameworks that specifically, and comprehensively target financial inclusion for the poor. Each of these should be enacted simultaneously, and as priority measures.

Early-Stage Seed Accelerators

Accelerators are fixed-term, cohort-based programs that exist to support seed and early-stage start-ups. Accelerators confront entrepreneurs with a realistic picture of the growth potential of their business models and their likelihood of securing funding in a highly competitive seed funding market. A decade ago, average investment for a start-up ranged between USD500,000 to USD1 million. In 2017, as little as USD15,000-50,000 in seed capital can hatch a billion-dollar idea.[218] As a consequence, a larger appetite for business experimentation has been observed, resulting in Asia-Pacific accelerators rejecting

[211] ___. (2015) *Small Business American Dream Gap Report*, Nav
[212] ibid.
[213] ILO. (2017) 'Informal Economy in Asia and the Pacific', *International Labour Organisation*
[214] ____. (2015) 'Papua New Guinea's Government Faces the Informal Economy', *The East Asia Forum*
[215] Colin. (2016) 'Peru's informal economy to persist for decades: report', *Peru Reports*
[216] ILO. (2017) 'Informal economy in Indonesia, and Timor-Lese', *International Labour Organisation*
[217] Cull. R. (2015) 'Does Microfinance Still Hold Promise for Reaching the Poor', *The World Bank*
[218] Fehder, D.C. and Hochberg, Y.V. (2014) *Accelerators and the Regional Supply of Venture Capital Investment, pp.1-40*

thousands of applicants each batch.
On average, accelerators supply entrepreneurs with a stipend or seed worth USD22,000, up to USD150,000. This seed is typically exchanged for 5-7% equity in the firm.[219] Entrepreneurs benefit from an accelerator's one-stop-shop function, with access to office space, mentors, networks, potential investment, and business advisory services.[220] Further, accelerators also serve as a screening and sorting function for venture capital investors, who no longer have to travel extensively for prospective opportunities, but are instead offered with an assortment of pre-screened, and co-located start-up operations, usually in highly accessible urban centres.[221]

Early-stage funding was identified by stakeholders as the most arduous phase of start-up journeys. Consultations revealed that determining and agreeing a business model and strategy to attract seed capital was challenging in all economies surveyed during this study. Accelerators help and some of the Asia-Pacific's most prolific accelerators have produced graduates that have become household names. However, other accelerators have lesser records of successful exits (acquisitions or IPOs) or venture capital investment.

High Drop-off Rates between Seed Funding and Series A

Despite accelerators' efforts to prepare their charges for a series of funding rounds or to achieve exit, steep drop-off rates between seed capital and Series A persist. *Figure 6.3* illustrates the growth in seed-stage deals in Southeast Asia which outnumber all other stages. While the number of Series B deals

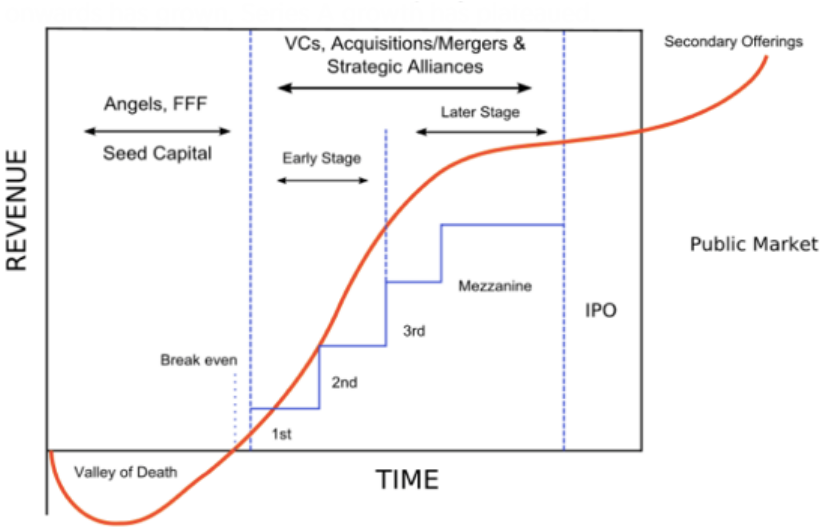


Figure 6.3: The start-up financing cycle Source: Start-up Explore

Series A funding, the first significant round of venture capital financing, is perhaps one of the most pivotal and 'make or break' stages in the entire funding process, when entrepreneurs are expected to model how their ideas will be monetized. Series A funding, normally provided to the tune of between USD2-15 million,[222] and exchanged for a 10 to 30% stake in the company is dependent on an entrepreneur's ability to demonstrate a high company valuation.[223] For many, this is a difficult ask, and represents a quantum leap from seed funding, which rides on a simple idea.

219 Ibid.
219 Ibid.
219 Ibid.
219 Morrill, D. (2014) 'For Y Combinator Start-ups, the Average Series A Round in 2014 is 5X Larger Than in 2008' *mattermark*
219 Lackland, B. (2016) '3 Reason You Shouldn't Give Up Equity in Your Company', *Fortune*

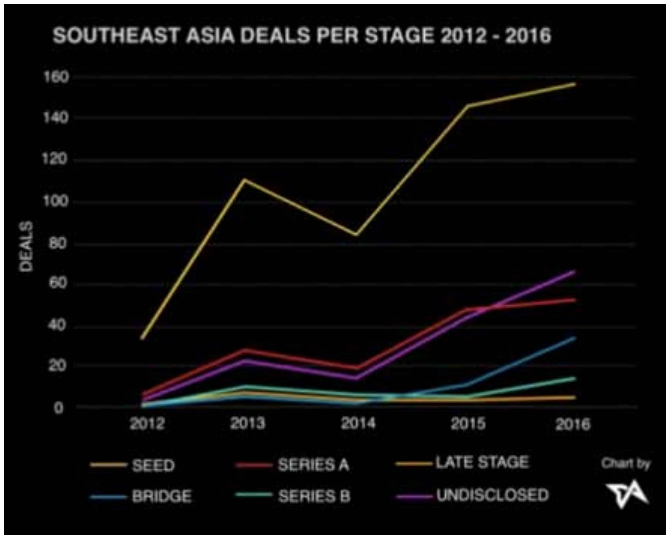


Figure 6.4: Southeast Asian deals per stage of funding Source: Tech in Asia

As shown above in *Figure 6.4* the number of start-ups seeking to matriculate from seed capital to Series A has exploded and venture capital funds are choosy. Inexperienced founders struggle to effective go-to-market strategies, financial and management plans. In consultations, stakeholders recounted examples of poor allocation, utilization and management of seed capital which raises flags for potential investors.

Securing Series A funding is more difficult in some APEC economies. Even with strong business acumen, moving beyond the conceptual stage in Southeast Asia can be difficult with a weak M&A market, and large companies opting to establish ventures from scratch rather than acquiring start-ups.[224] Historically there has been poor availability of venture capital and angel funding in particular, in part due to the disincentive effect of undeveloped legal and financial frameworks in some Southeast Asian economies. This signals a need for private equity pathways to be eased through regulatory and institutional reform, and introduction of suitable tax incentives for investors.

The view that return on investment for digital start-ups takes longer to achieve than non-technology dependent businesses was another factor for a shortfall in angel and venture capital. Low return on investment in earlier years discourages some venture capitalists away from digital entrepreneurs. Inability to access private equity funding forces entrepreneurs to self-fund, which has limited attempts to scale in start-ups participating in the study. Constrained access to loans and equity funding for entrepreneurs means a high level rely on self-funding with many conceding that their start-up operations depended on the support of their families. Entrepreneurs see funding from the bank of mum and dad as a stop-gap and unsustainable measure, and would welcome other options.

There has been a surge in large-scale venture capital deals in Asia since 2015. Venture capital investments topped USD55.3 billion in 2015, up from USD20.7 billion in 2014, with China claiming the majority share of investments. Malaysia and Philippines are recording the fastest growth rates in venture capital investment in the region. E-commerce has been the most funded vertical in Asia, followed by logistics, lifestyle, finance and healthcare. Big data, payments, and cloud computing are predicted to make up ground over the short to medium term.[225] This is a positive sign for Vietnamese start-ups in particular, which are making strides in these industries.

[224] ___. (2016)' e-Conomy SEA: Unlocking the $200 billion digital opportunity in Southeast Asia', Google, and *Temasek*
[225] Lee, T. (2016) 'The state of venture capital in Asia', *Tech in Asia*

In focus

Grab

Grab, founded in Malaysia as GrabTaxi in 2012, and headquartered in Singapore, is now available in all of APEC's Southeast Asian membership. The company's fortunes have been closely linked to its positioning in the industry. It is easily accessible, considerably lower priced, and offers a broader range of transport options, from motorbikes to seven-seat passenger cars. In Vietnam, where its popularity has soared, Grab Bike's characteristic green helmet is now up and down the length of the country. Viewed as a cheaper and safer option to Vietnam's alternative transport methods, notably, the traditional Xe Om (motorbike taxis), Grab offers higher-than-average wages to young Vietnamese and has 710,000 drivers. In 2017, the company announced the opening of an R&D centre in Ho Chi Minh City, to capitalise on the economy's strong engineering sector.

Grab concluded another successful funding round in mid-2017 raising USD2 billion funding boost for the acclaimed ride-hailing application. Grab, Southeast Asia's answer to Uber, has had an impressive fundraising track record since Series A in 2013, where it first raised USD5.28 million. Funding amounts, which have been growing progressively, are summarised in *Figure 6.5.*

Jul, 2017	$2B / Series G
Jun, 2017	undisclosed amount / Undisclosed
Dec, 2016	undisclosed amount / Private Equity
Sep, 2016	$750M / Series F
Aug, 2015	$350M / Series E
Dec, 2014	$250M / Series D
Oct, 2014	$65M / Series C
May, 2014	$15M / Series B
Sep, 2013	$5.28M / Series A

Figure 6.5: Grab's funding track record Source: Modified from Crunchbase

Grab's four-year plan for Indonesia, Grab 4 Indonesia 2020, commits USD700 million in investment to the market through R&D setups, social impact investment funds, and technical assistance to start-ups. Its commitment to Indonesia is visible in its recent acquisition of Kudo, an e-commerce platform for unbanked citizens to shop online through third-party agents. Kudo will be integrated into Grab's payments ecosystem, GrabPay to compete with Go-Jek, its direct competitor in Indonesia.[226]

Grab's proven strategic planning track record is not the only draw card for investors, with deals also having been sweetened through more creative means. For example, Toyota can now access driving patterns of Toyota cars within the Grab fleet, and Honda has been promoted by the company as the preferred brand for its large motorbike fleet. Toyota, Didi, and Softbank's 2017 investment in the company brings its valuation to USD6 billion, doubling it worth since 2016.[227]

[226] Maulani, A.M. (2017) 'Grab inks Kudo acquisition, appoints new head of cashless payments solution'
[227] Meyer, D. (2017) 'Toyota is Investing in Major Uber Rival Grab', *Fortune Auto*

Crowdfunding: an Innovative Funding Model

For entrepreneurs without the three Fs of support: Family; Friends; and Fools, crowdfunding offers a new alternative for funding, and has become a highly disruptive innovation since its conception in 2008 with the launch of Indiegogo. It is a technique for raising external finance via the internet from multiple individuals, and can take many forms, as identified in *Figure 6.6*. Loans, and seed equity are the primary forms received by start-ups, and while investments through crowdfunding are dwarfed by venture and angel funds, the number of online platforms facilitating this new method is growing.

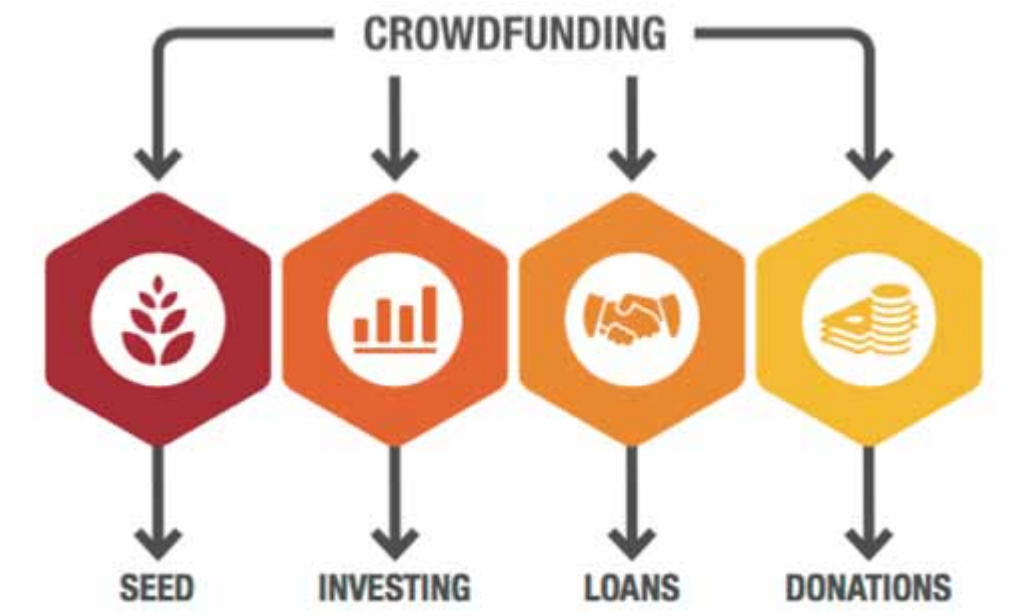


Figure 6.6: Forms of crowdfunding, Source: PwC

It is proving an effective platform for supporting women in business and entrepreneurship. Recent studies found that while more men undertake crowdfunding campaigns, women are more successful in reaching their targets, using more inclusive language during crowdfunding campaigns, which are targeted at every-day, non-corporate micro-investors. In all regions, women lead men in crowdfunding success across multiple sectors and cultures.[228]

Women are turning to crowdfunding to overcome the biases that they encounter in venture capital funding processes. In the top 100 global venture capital firms, just 7% of partners are females, and decision-making is dominated by males. Studies have found venture capitalists preference male entrepreneurs over females even with similar business pitches.[229] There is a perception among lenders that females possess higher risk profiles than men.[230]

Awareness of crowdsourcing and associated platforms is low. Education providers have a responsibility to highlight this method in business and entrepreneurship programs. At a national level, governments must formally recognise crowdfunding as a legitimate financing technique, and ensure women-led entrepreneurial ventures are given sufficient airtime and support.

[228] The Crowdfunding Centre. (2017) *Women unbound: unleashing female entrepreneurial potential, PwC*, p.11
[229] Brooks, A.W., Huang, L., Kearney, S.W., and Murray, F.E. (2014) 'Investors prefer entrepreneurial ventures pitched by attractive men', *Harvard Business School*, pp.1-5
[230] The Crowdfunding Centre. (2017) *Women unbound: unleashing female entrepreneurial potential, PwC*, p.12

The Payments Ecosystem

This chapter has examined the core financing and funding issues facing entrepreneurs. However, the other side of the equation, their customers, and their propensity to participate in online payments will also play a role in furthering the interests of APEC's digital start-ups.

The way that consumers pay for goods and services has changed dramatically since the first diners credit card was issued in 1950. Today, consumers are purchasing goods and services at the click of the mouse or tap of a card through well-oiled machines linked to the global payments ecosystem. These transactions may seem simple to consumers, yet the payments ecosystem, illustrated in *Figure 6.7* comprises a complex network of players, each of which must communicate sensitive financial information to one other in a timely and secure fashion.

Figure 6.7: The global payments ecosystem Source: BI Intelligence

The growth in online payments has given rise to fintech, a global industry that is disrupting traditional financial and banking services, including mobile payments, loans and money transfers. As banks grapple with regulatory changes that have led to large resourcing pressures, nimble, and innovative fintech start-ups are proliferating to respond to the digital transformation imperative facing financial institutions worldwide.

Fintech is big business, with global investment in the industry reaching USD12 billion in 2015, up from USD980 million in 2008.[231] It is an opportunity that technology-savvy populations in APEC's emerging economies of Vietnam, Thailand, and Indonesia are well-positioned to seize, provided that financial services and banking institutions are willing to partner with them.

[231] Marr. B. (2017) 'The Complete Beginners Guide to Fintech in 2017, *Forbes*

E-Payment Readiness Varies Among APEC Economies

Substituting cash for online payments is becoming more common in APEC, however e-payment readiness varies greatly among its economies. This inevitably impacts consumer capacity to engage digital start-ups, particularly in e-commerce, which is driving the majority of payment ecosystem innovations and growth. Examination of e-payment readiness across APEC reveals a divide between the economies, with implications for the growth prospects of their respective start-up ecosystems, and efforts to reduce regional economic disparities.

APEC economies account for 49% of world trade, and 59% of global GDP, therefore the vitality of the regional economy rests on a strong payments ecosystem.[232] APEC, in consultation with RMIT University, and Chinese technology research firm TRPC, has developed an e-payment readiness index (the index) comprised of four pillars: regulatory and policy; infrastructure; demand; and innovative services, and 39 associated indicators. The conceptual framework of the Index is found in *Figure 6.8.*

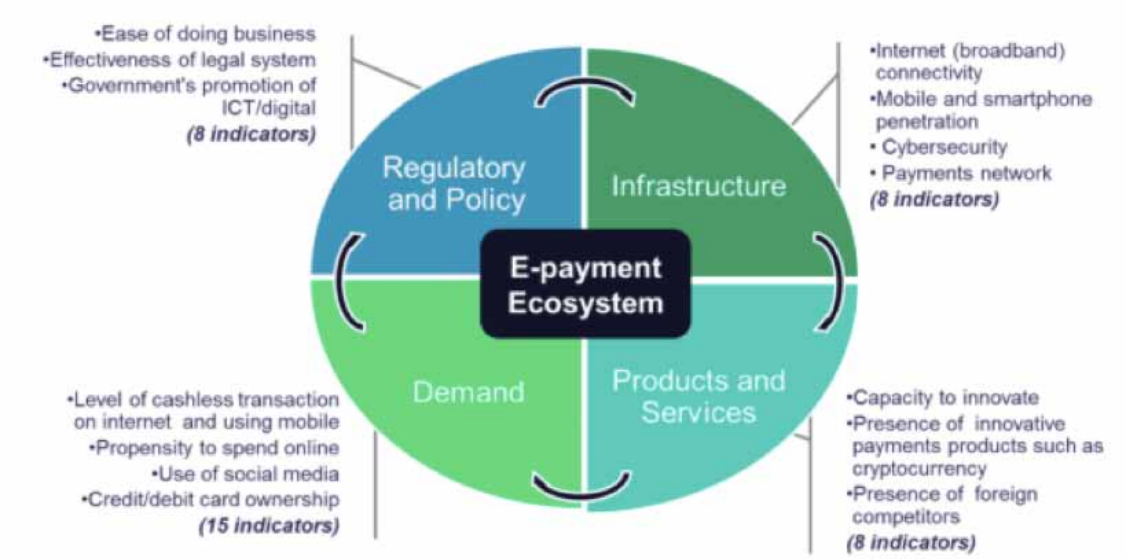


Figure 6.8: APEC's E-Payment Readiness Index Source: TRPC

Overall e-payment readiness rankings are provided in *Figure 6.9.*

Rank	Economy	Score
1	United States of America	65.5
2	Singapore	59.6
3	New Zealand	58.3
4	Australia	57.2
5	Canada	56.9
6	Hong Kong SAR, China	56.6
7	Korea, Rep.	55.2
8	Japan	53.1
9	Taiwan	50.6
10	Malaysia	44.5
11	Brunei Darussalam	37.2

Rank	Economy	Score
12	Chile	35.9
13	China	35.9[6]
14	Russian Federation	32.3
15	Thailand	29.7
16	Indonesia	28.8
17	Philippines	26.4
18	Mexico	24.7
19	Peru	23.4
20	Vietnam	22.9
21	Papua New Guinea	19.1

Figure 6.9: E-payment readiness rankings, Source: TRP

[232] RMIT University, and TRPC. (2015) *APEC E-payment Readiness Index: Ecosystem Assessment and Status Report*, Asia-Pacific Economic Cooperation, p.1

Economies have been grouped into three clusters in *Figure 6.10*, based on their e-payment rankings across each of the indicators. It is important to note that the top 14 positions on the table, and across clusters one, and two, are high-income or middle-income economies based on World Bank data. The relationship between e-payment readiness and GDP per capita is depicted in *Figure 6.11*.

Cluster 1: Economies with advanced e-payment ecosystems — US, Singapore, NZ, Australia, and Canada

Cluster 2: Economies with transitioning e-payment ecosystems — Hong Kong SAR, Republic of Korea, Japan, Chinese Taipei, Malaysia, Brunei Darussalam

Cluster 3: Economies with nascent e-payment ecosystems — Chile, China, Russian Federation, Thailand, Indonesia, Philippines, Mexico, Peru, Vietnam, Papua New Guinea

Figure 6.10: E-payment readiness clusters, Source: TRPC

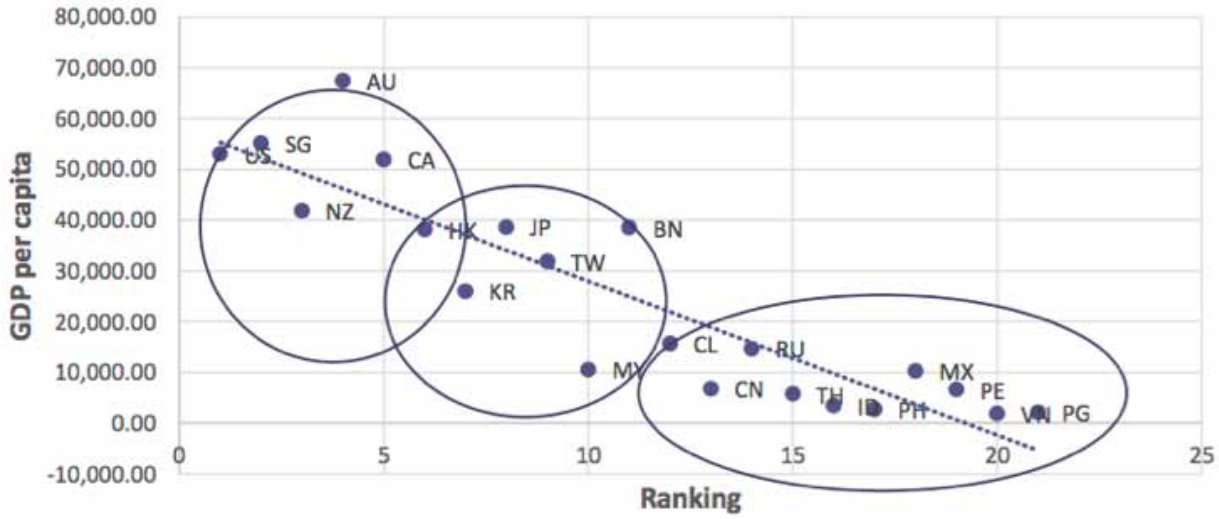


Figure 6.11: E-payment readiness and GDP per capita relationship, Source: TRPC

Of all four pillars of e-payment readiness, the largest gap between advanced and emerging economies is observed in infrastructure. Secure servers and encrypted technology are important factors in this domain, given the distrust in online transactions reported through consultations. In Indonesia, just six people in every million are protected by secure servers and encryption technology in their online transactions, compared to 2,177 per million in the Republic of Korea.[233] This has serious implications for the financial security of individuals, and businesses, and broader reputational consequences for whole economies.

Intuitively, it would be expected that high-income, and middle-income economies would be better placed to migrate aged systems to newer digital platforms, and further enhance e-payment readiness, however the capacity of cluster three economies to leapfrog using mobile payment technologies should not be discounted.

[233] Ibid., p.16

Mobile Payments Rising in Southeast Asia

Although cash-on-delivery (COD) models still dominate in emerging APEC economies, credit card penetration is low, and distrust in online payment facilities is high, the Asia-Pacific is now the world leader in mobile payments, with over half the regional population using their mobile devices to pay for goods and services at point of sale via applications. Although Japan, the Republic of Korea, and Australia are leaders in mobile payments, emerging economies in Southeast Asia are making up ground. A lack of credit card holders, and legacy financial structures has forced emerging economies to look for fast and affordable methods to plug into the digital economy. Mobile payments are prevalent and mobile payment start-ups are emerging everywhere.

In Indonesia mobile payments take-up has increased to 14% in 2016, up from 9% in 2014.[234] In Malaysia, faith in the security of mobile payments is strengthening, with seven in ten Malaysians now ready to adopt mobile wallets. Visa reports double-digit monthly growth in contactless payments in Malaysia and tips it as a mobile payments market to watch.[235]

In the context of digital entrepreneurship, the move towards mobile wallets will have positive bottom line implications. Payments made from mobile wallets are fast with lower transaction fees than traditional payment methods. Automated monitoring and tracking of transactions produces administrative efficiencies for start-ups with limited resources.

Fintech start-ups have a bright future. KPMG posits they could unlock up to USD52 billion in economic gains by 2030 by reaching Southeast Asia's 438 million unbanked individuals through agent networks, mobile wallets, and digital currencies such as bitcoin, and in the process, increase financial connectivity, and raise living standards for nearly half a billion of APEC's population.[236]

Figure 6.12 confirms concerns about credit card fraud and data privacy when purchasing online.

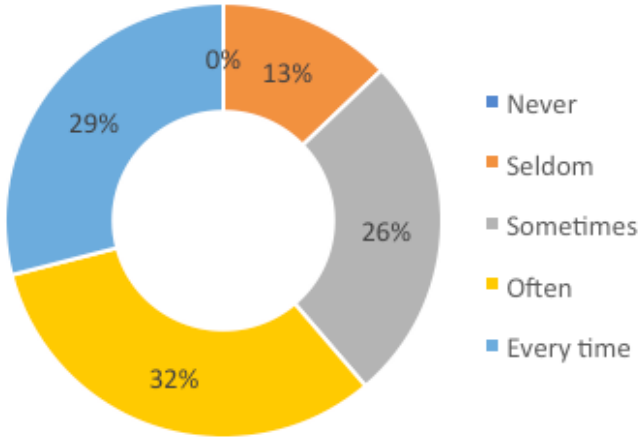


Figure 6.12: Level of distrust in online payment facilities

According to results from a Nielsen survey *(Figure 6.13)* although COD accounts for just 36% of global transactions, the figure is more than double in Philippines at 73%, closely followed by Russia at 70%, and 56% in Thailand. A high distrust in providing credit card information online is also experienced across this sample of APEC economies.[237]

[234] Leopold, A. (n.d.) 'Asia Pacific leads the world in mobile payments in study by Kantar TNS', Kantar TNS
[235] Anderson, S. (2017) 'Visa Says Malaysia Is the Next Big Mobile Payments Market', payment week
[236] Reinmueller, J. (2016) 'Fintech: opening the door to unbanked and underbanked in Southeast Asia', KPMG
[237] ___. (2016) 'Global connected commerce', Nielsen

Figure 6.13: COD popularity where credit card penetration, and trust are low, Source: Nielsen

In focus

Alibaba

E-commerce giant Alibaba has a global vision. It has transformed from a small company operating out of an apartment in Hangzhou, to a large online ecosystem, comprising key divisions spanning e-commerce, leisure, entertainment, and payment and financial services. The Chinese behemoth has seen its share price skyrocket from USD94 in January 2017, to USD171 in September 2017 alone, and is on a mission to become the global e-commerce leader. In China, its e-commerce platform Tmall dominates 60% of the market, and has helped to bring hundreds of millions of consumers online in recent years. The company has changed the mindset of consumers around e-commerce, seeing it as not just a market, but also a venue for entertainment and leisure. Leveraging big data analytics, it has effectively targeted consumers through the tailoring and promotion of deals to cross-sell products across its expansive ecosystem. Alibaba is ticking all of the boxes for consumers, including through its secure e-payment systems.

Alibaba's growth can be attributed to its strong payments and financial services division, Alipay, which is operated under affiliate company Ant Financial. Its services range from cross-border online transactions, and in-store payments, to Chinese customs declarations. Alipay has made great strides in gaining trust from consumers against high levels of fraud, which have been responsible for China's low credit and debit card penetration rates — some of the lowest in the region. Following its success in China, Alipay is extending its presence to other economies including Singapore, Malaysia, Indonesia, Philippines, Canada, and the US, and has also begun investing in fintech firms in South Korea, and Thailand in support of the global fintech revolution.

[238] ___. (2017) Alibaba Group Holding Ltd. ADR, *Market Watch*

[239] Long. D. (2017) 'Alibaba affiliate Ant Financial expands global footprint with South Korea investment', *The Drum*

RECOMMENDATIONS

- *Governments should establish policy and regulation that comprehensively target financial inclusion among the poor and create an environment in which MFIs can grow their base*

- *Pathways for venture capital and other private equity funders should be eased and incentivized including through the provision of tax incentives for funders of start-ups*

- *APEC Governments need to formally recognise the potential of crowdfunding and enact legislation that permits the raising equity funding through such platform*

- *The efficacy of mobile payment technologies in emerging economies is undermined if expansion of mobile broadband infrastructure is weak in remote and rural communities. Governments and the telecommunications sector must partner to ensure the extensive roll-out of mobile internet infrastructure, acknowledging that financial inclusion policy outcomes are dependent on it*

- *Establish policy and regulation that comprehensively target financial inclusion among the poor and create an environment in which micro financing institutions (MFIs) can grow their base*

CHAPTER SEVEN

RURAL DIGITAL ENTREPRENEURSHIP IN APEC

KEY FINDINGS

- *Digital connectivity, literacy, entrepreneurship and support is skewed to urban centres within APEC opening up a marked digital divide for most rural and remote communities*
- *Education, training and skills acquisition is a fundamental enabler for rural entrepreneurship*
- *Innovation and knowledge hubs are critical to sharing knowledge and bridging gaps in the rural environment*

INTRODUCTION

Collectively there are more than one billion people living in rural areas across APEC. In the past thirty years, the rural population has declined by an estimated 20% moving to urban centres to seek opportunities for work and access to essential services including health and education *(Figure 7.1)*.[240] During this period, scientific, engineering and technological advances have lifted rural productivity, decreasing labour demand in rural areas.[241]

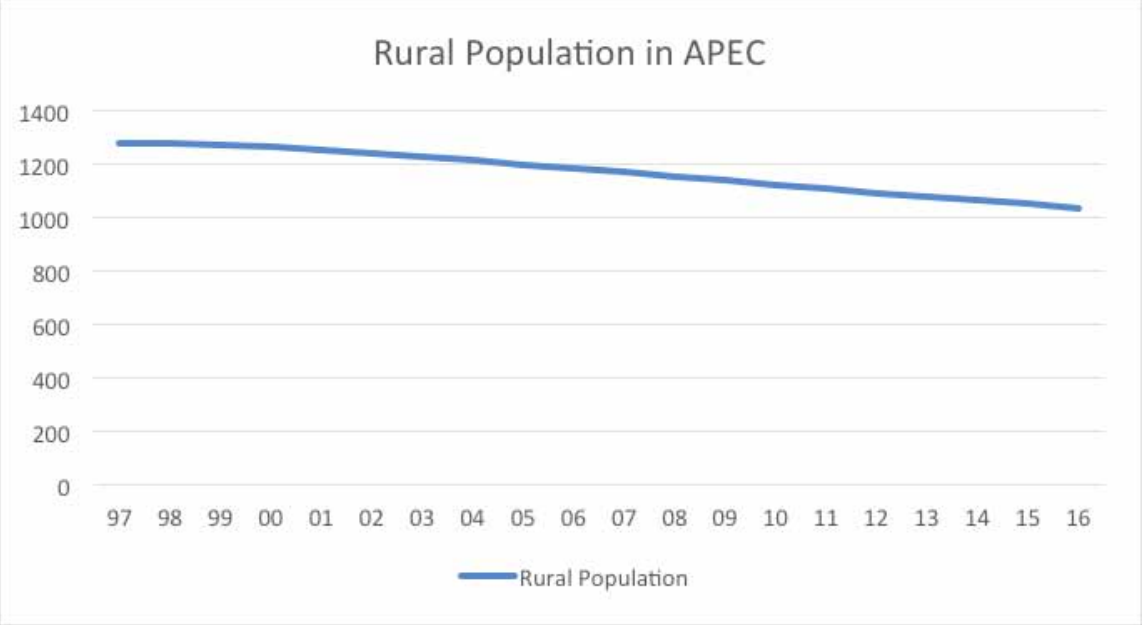
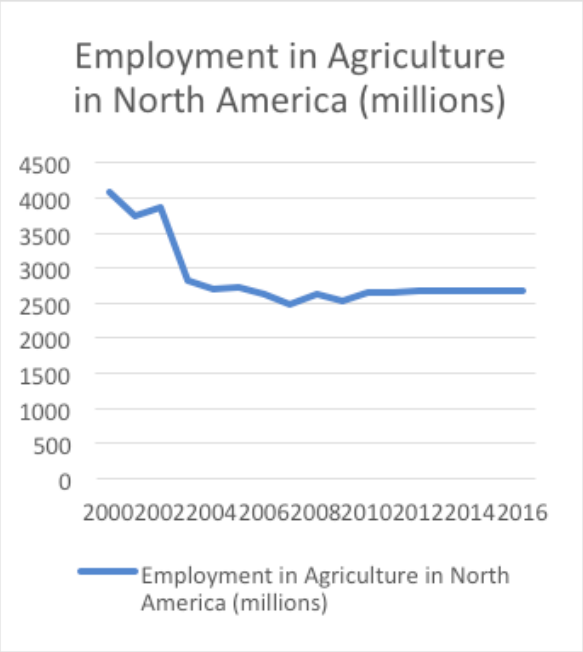


Figure 7.1. APEC countries' rural population

Figure 7.2 shows the shared trend of declining agricultural employment by 40% in both North America and Eastern Asia.[242] The International Labour Organisation (ILO) defines three rural employment categories: agriculture workers (farmers and farming related employees); industry (resources, mining, and manufacturing); services (service providers for the people from the inside and outside of the regions, including tourism).[243]

[240] World Bank Group Data, downloaded 02 SEP 2017. See Appedix 1 for rural definition and population of rural areas in each countries of APEC
[240] Max Roser (2015), *'Employment in Agriculture'*, https://ourworldindata.org/employment-in-agriculture viewed on 05 SEP 2017
[240] Downloaded from ILOSTAT. Last update on 05 SEP 2017
[240] International Labour Organisation (2016), *'Employment by sector -- ILO modelled estimates*, Nov. 2016'



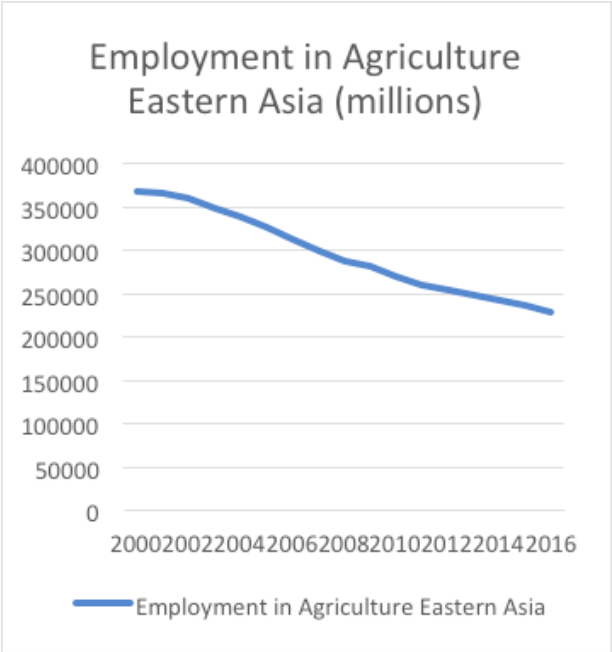


Figure 7.2 – Employment in Agriculture in Rural Regions of North America and Eastern Asia

Globally and within APEC the services sector has absorbed unemployed agricultural workers in the past decade.[244] There has been some diversification in rural area into areas including tourism to exploit the natural and cultural assets in prime agricultural regions. Digital technology is key to helping such diversification, as a tool for new businesses to enter new non-farming related markets.

Digital Innovation and the Rural Economy

The digital start-up scene is markedly skewed away from the rural economy, towards urban areas. Better access to funding, infrastructures and markets are critical factors underpinning this trend.[245] This is a global phenomenon. A study of Thomson Reuters data showed the concentration of US venture capital funds showed that the bigger the investment was, the more likely it would be placed in a highly densely populated urban zone.[246]

As awareness of digital technology improves, more entrepreneurs will emerge in rural and remote areas, with innovative solutions to social and economic exclusion. Rural technology entrepreneurs are receiving support from governments (notably US, China, Australia, Canada). In Vietnam, some rural communities are beginning to take advantage of mobile broadband coverage and mobile penetration and using Financial Technology (FinTech) options to access banking and financial services in remote areas, becoming more digitally included.[247] There are over 20 Fintech start-ups leveraging 4G to deliver services in their industries.

[244] Data derived from ILOSTAT, see Appendix 2 for full dataset. Last update on 05 SEP 2017
[245] Joo H. (2011), *'Comparative Analysis of Rural and Urban Start-Up Entrepreneurs',* Agricultural Economics, University of Kentucky
[246] Florida R. (2016), *'Start-ups and Venture Capital Are Going Urban'*, https://www.citylab.com/life/2016/06/startups-and-venture-capital-are-going-urban/485978/ 10 SEP 2017
[247] ASEAN Up (2016), *'FinTech startups in Vietnam'*, https://aseanup.com/fintech-startups-vietnam/

Agritech is receiving strong positive attention. In Vietnam agtech is taking advantage of 3G coverage in remote locations, with activity most notably in Can Tho city – home of the Vietnam Mekong delta.[248] The support for the ecosystem of AgriTech businesses come from both the public and the private sector. The government of Vietnam offers VND180 billion fund in low to no interest loans for eligible AgriTech start-ups.[249] The Government is working conjunction with the Australian and Israeli embassies to facilitate better knowledge transfer and encourage the local start-up ecosystem. Given the vibrancy of Agritech in the US, there are lessons to be learnt and shared within APEC. AgFunder, reported USD4.6 billion in funding for Agtech firms in 2015 alone.[250] Although half the recorded investments happened in the US, it is still a positive sign for the industry.

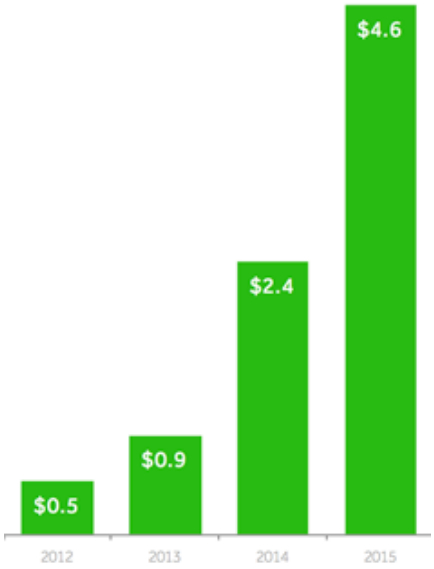


Figure 7.3 - Agriculture Technology Funding

Interviews with businesses in US rural areas by the TechCrunch Network[251] reported that infrastructure had reached most rural regions and now need support for access for rural entrepreneurs to transport, spacious working conditions and funding.

The Digital Divide

Digital inclusion is the first step toward digital entrepreneurship. There has been considerable activity and investment to expand the connectedness of rural and remote communities across APEC using both mobile telephones and cable. There have been many improvements of internet coverage across APEC.[252] However digital inclusion involves more than access to the internet/mobile broadband services. It also means having the skills to utilise digital means to meet day to day requirements.[253] Digital inclusion as well as future employability, according to the International Labour Organisation, involves connectivity, knowledge sharing, and e-commerce across borders introducing cutting edge and future technologies, such as Cloud Computing, Internet of Things, and 5G and ensuring ongoing improvement of awareness in rural communities.

[248] DTECHINASIA (2015), *'Vietnam's start-up economy is poised for success'*, https://www.techinasia.com/talk/vietnams-looming-perfect-startup-storm
[249] Vietnamnet (2017), *'Vietnam to facilitate SMEs growth through funds, incentives'*, http://english.vietnamnet.vn/fms/business/178795/vietnam-to-facilitate-smes-growth-through-funds--incentives.html viewed on 10 SEP 2017
[250] AgFunder (2016), *'AgTech investing report – Year in review 2015'*
[251] Techcrunch Network, *'Rural tech start-ups see success across the US'*, https://techcrunch.com/2016/08/01/rural-tech-startups-see-success-across-us/
[252] APEC Statistics Data, downloaded and viewed on 05 SEP 2017.
[253] Mariën, I. & Prodnik, J.A., 2014. *'Digital inclusion and user (dis)empowerment: A critical perspective'*, Vol.16(6)

Education: Fundamental Enabler for Rural Digital Entrepreneurship

The future of work is an initiative launched by the ILO in response to the rapid technological changes since the beginning of the 21st century. The work aims to gain a better understanding of the movements in society and industries in order for business and government leaders to respond to changes. The investigation has strong focus on the rural economy, on agriculture, manufacturing, and resources. The ILO suggested that shifts might take away a significant number of manual labour jobs, but they do not necessarily reduce the overall demand for the overall workforce.[254]

		Ease of automation	
		High (Routine tasks)	**Low (Non-routine tasks)**
Ease of complementarity	**Low (Manual-intensive skills)**	**A** Cashiers Typists Machine operators	**B** Landscapers Home health aides Security personnel
	High (Cognitive-intensive skills)	**C** Bookkeepers Proofreaders Clerks	**D** Doctors Lawyers Managers

Figure 7.4 - ILO categorisation of employment about automation[255]

In the age of technological changes, a set of skills consisting of problem-solving, intuition, persuasion, and creativity needed for future industries.[256] These combined with risk taking attitudes and proactiveness are also aligned with the skills needed for entrepreneurs to thrive.[257] To create a dynamic ecosystem of entrepreneurs, it is critical that governments and training providers meet these skill needs in the rural workforce. Digital literacy of workers and businesses is essential in the rural areas and requires attention to rural education and training to build the practical technological awareness and the required cognitive skills.

Technology Skillsets

The consultations reported that many SMEs in rural and remote areas do not have the skills required to take up and utilise available infrastructure. More needs to be done to ensure SMEs are skilled enough to make use of this infrastructure. A web or social media presence is a must-have for most start-ups in any field of work or industry, and particularly so in remote areas. There are still some SMEs who avoid social media either because they lack the knowledge of how best to exploit it or they are fearful of negative publicity.

[254] Autor D., Dorn D. (2013) *'Technology Anxiety Past and Present'*, Bureau for Employers' Activities, International Labour Office
[255] Chang J., Huynh P. (2016) 'The Future of Jobs At Risk of Automation', Bureau for Employers' Activities, Working Paper No 9, International Labour Office
[256] Autor D., Dorn D. (2013) *'Technology Anxiety Past and Present'*, Bureau for Employers' Activities, International Labour Office
[257] Valerio, Alexandria, author, Parton, Brent, Robb, Alicia, & EBSCOhost. (2014). *Entrepreneurship education and training programs around the World: Dimensions for success.* Washington, DC: The World Bank, p150

Entrepreneurship Education

A World Bank Study shows it is critical to incorporate entrepreneurship into the education system to build the skills, awareness, and attitude to create employments for the rural economies and developed an Entrepreneurship Education and Training (EET) framework.[258]

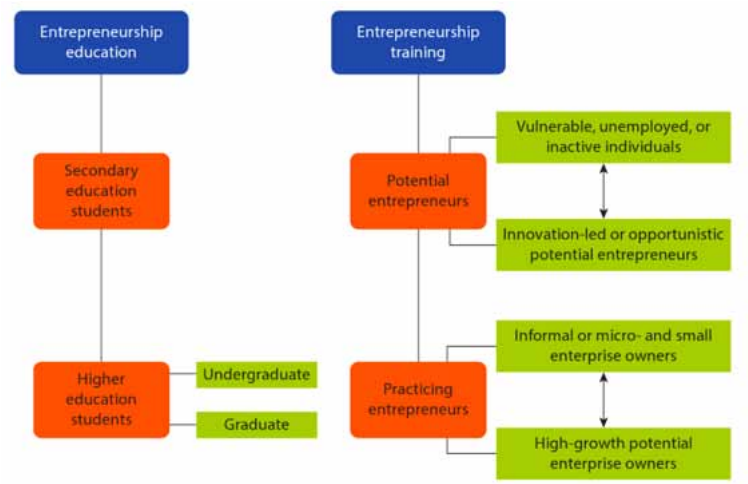


Figure 7.5 Entrepreneurship Education and Training framework

Training in entrepreneurship equips students to bring technological applications into their work, and add value to business. The Malaysian National Information Technology Council champions technology and entrepreneurship with programs, courses, and competitions for tertiary students.[259]

There is tremendous capacity through ICT to provide innovative education in connected rural and remote areas. The cost and availability of internet have been increasingly favourable to the remote population in the past decade, which has enabled the economy of scale for delivering education. The US and Australia are leaders in Digital Adoption Index, using digital technology to enable future entrepreneurs and spread the awareness to the remote regions.

Figure 7.6 Digital Adoption Index Map, World Bank 2016

[258] Valerio, Alexandria, author, Parton, Brent, Robb, Alicia, & EBSCOhost. (2014). *Entrepreneurship education and training programs around the world : Dimensions for success.* Washington, DC: The World Bank, p3, p21

[259] UNESCO (2013), *'ICT in Education Policy, Infrastructure, and ODA Statuses in Selected ASEAN countries'*, Published by UNESCO Bangkok

Opportunities for a Future Entrepreneur Ecosystem

A study focused on rural and regional Australia by the Australian Centre for Rural Entrepreneurship (ACRE), and AlphaBeta Business Advisory identified automation, globalization and collaboration as the key trends in the future workplace.[260] Respondents agreed with this study and pointed out they already hire fewer employees than their parents did because of technological advances.

Costs and risks of starting a rural business can potentially be much lower if online sales channels and customers are involved. A global study of over 12,000 people aged between 18 - 30 found that 68% believed in the possibility of starting their own businesses. However, in rural areas, shortfalls in digital and other relevent skills sets can mean that rural SMEs are missing opportunities to leverage digital technology.[261]

Electronic-Health (e-health) can be particularly important in rural and remote areas by enabling innovative models of care delivery, such as by telemedicine and mobile health in APEC economies where significant numbers still live in rural areas with poor healthcare and medical facilities. Advances in cloud computing and online service solution have potential to bridge the divide between rural and urban healthcare services.[262] Rural doctors can be equipped with health IT including electronic health record (EHR) systems to hold individual patient information to better achieve rural chronic disease management programs.[263] The EHR system has improved the care provision for village doctors significantly lifting the monitoring capacity of doctors. Raising digital awareness, introducing skills, and bringing cloud computing, analytics and big data into practice in rural regions is still a complex and time consuming endeavour and thre are costs involved software licensing, analyst contractors, and infrastructure.[264]

Internet of Things and Automation

The IoT has enhanced operational efficiency of existing businesses and created new business and economic opportunities, and improved access to services such as healthcare, education and food security.[265] It has had positive effects on agriculture, reducing reduce costs and information gaps. An important application of the IoT is 'intelligent' agriculture using automation, sensors, electronic measurement algorithms, smart and remote wireless control of the whole production procedure.[266]

China has integrated IoT technologies in agriculture and manufacturing.[267] In northern Thailand small-scale farmers lack essential IT capabilities to use information in agribusiness.[268] Some areas have limited internet connection or none at all. Small-scale farmers who do not have an Internet-ready smartphone do not access market information.

[260] http://www.acre.org.au/wp-content/uploads/2015/07/Acre-fya-future-of-work-report-final-lr.pdf
[261] Assante. et al., 2016
[262] Miah. et al., 2016
[263] An EHR system based on a cloud-computing architecture was developed and deployed in Xilingol county of Inner Mongolia using various computing resources (hard- ware and software) to deliver services over the health network using Internet when available. The system supports the work at all levels of the healthcare system, including the work of ViDs in rural areas. An analysis done on 291,087 EHRs created from November 2008 to June 2011 evaluated the impact the EHR system has on preventive medicine and chronic disease management programs in rural China.
[264] X. Sun, B. Gao, Y. Zhang, W. An, H. Cao, C. Guo, W. Sun (2011). *'Towards Delivering Analytical Solutions in Cloud: Business Models and Technical Challenges'*, 2011 IEEE 8th International Conference on e-Business Engineering, Beijing, pp. 347-351.
[265] Kshetri N. (2017), *'The evolution of the internet of things industry and market in China: An interplay of institutions, demands and supply'*, Telecommunications Policy, Volume 41, Issue 1, 2017, Pages 49-67
[266] E-agriculture in action, 2017
[267] Voraphaan Raungpaka, Phannaphatr Savetpanuvong (2017), *'Information orientation of small-scale farmers'*, community enterprises in Northern Thailand, Kasetsart Journal of Social Sciences
[268] Ibid.

Figure 7.7 Impact of IoT on various aspects of life[269]

Collaboration among Government Agencies and Industry

In rural communities in emerging economies, farmers could benefit from support to help them access and use digital technology (in their language) to identify potential new customers, identify internal business opportunities, and keep abreast of trends for production innovation and segment marketing. Small-scale farmers in general need to 'develop their agribusiness acumen; to detect and identify relevant information; dynamically seek and respond to the changes in their competitive environment; and effectively manage their information over the life cycle of information use'.[270] An APEC rural information service could usefully integrate information for farmers on promising digital technology and foster its dispersal and uptake.[271]

Artificial intelligence (AI) is defined as the study of how to make computers do things which at the moment, people do better.[272] Rural applications are numerous delivering benefits in various domains including food production, health, safety, renewable energy management, environmental awareness and sustainable developments.[273] The Chinese Taipei government has enacted the "Rural Regeneration Act " to direct sustainable development in rural areas. Using several AI (Artificial Intelligence) methods they have set up simulation models using Artificial Neural Network to model environmental management and village development in the Lun.[274]

[269] Bughin, J., Chui M., & Manyika, J. (2015). *'An executive's guide to the Internet of Things'*. Retrieved from http://www.mckinsey.com/Insights/Business_Technology/An_executives_guide_to_the_Internet_of_Things?cid=digital-eml-alt-mip-mck-oth-1508

[270] Ibid.

[271] Voraphaan Raungpaka, Phannaphatr Savetpanuvong (2017), *'Information orientation of small-scale farmers'*, community enterprises in Northern Thailand, Kasetsart Journal of Social Sciences

[272] S. Madan, K.E. Bollinger (1997), *'Applications of artificial intelligence in power systems, In Electric Power Systems Research'*, Volume 41, Issue 2, 1997, Pages 117-131

[273] Sunil Kr. Jha, Jasmin Bilalovic, Anju Jha, Nilesh Patel, Han Zhang (2017) *'Renewable energy: Present research and future scope of Artificial Intelligence, In Renewable and Sustainable Energy Reviews'*, Volume 77, 2017, Pages 297-317; Turban E, Frenzel LE. 'Expert systems and applied artificial intelligence'. New Jersey: Prentice Hall.

[274] 'Lun' is a sort of landscape arranged on coastal plain in western-side of Taiwan, which was formed over time by natural waterway and wind power Lee, Shwu-Ting & Hsieh, Ya-Han & Wu, Paokuan. (2012). *'The application of artificial intelligence methods in sustainable rural planning'* https://www.researchgate.net/publication/282731396_The_application_of_artificial_intelligence_methods_in_sustainable_rural_planning

Collaboration between different individuals and organisations on digital education, training and infrastructure has great potential to underpin new insights and approaches for rural development. Three critical factors for collaborative knowledge creation are: distributed 'leaders' with shared values and intrinsic motivations, a knowledge-creating 'process' and social ecosystem and ties, and shared physical and mental 'foundations'.[275] Digital technology can also bolster collaboration to create practical bottom-up knowledge for economic and social development in rural area, breaking down isolation and creating new connections between stakeholders. [276] There is a need to increase the bottom-up flow of communication by well-designed collaborative processes, innovation/knowledge hubs and rural partnerships to bring diverse public and private resources together to strengthen communities and improve life in rural settings.[277]

Innovation and Knowledge Hubs

In the past, the trading efficiency of products and services was facilitated by the close physical agglomeration of businesses and suppliers, and it was critical for most of the economy. In recent years, digital technologies can provide the similar benefits, and people of the same locality practices can get together through co-working hubs. It is reflecting the rise of the digital economy.[278]

The hubs act as the interactive space for people of similar interests and expertise to get together and share ideas on the notion of rural development. The hubs aim to bridge gaps and the values of these hubs are twofold. Firstly, it solves the social inclusion issues of the countryside by bringing people with energy and drive together in the same space. Secondly, this cross-pollination of knowledge and ideas facilitate a cooperative environment between workers and entrepreneurs of different backgrounds and industries.[279] This is particularly crucial as it fosters the collaborative and 'hustling' qualities of the modern tech entrepreneurs that many rural business owners lack.

Such an environment is relevant in small communities, which may take some time to become aware of the professional backgrounds and skills of people who move there, especially the new residents who move from some larger metropolitan areas. Implementation of such innovations could drive agritech innovation and support new entrepreneurs to find sustainable development paths for new agricultural ventures.

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[273] Hirose, A. (2011). *A knowledge-creating city: The case of Mitaka City*. Hitotsubashi University, Tokyo
[273] Ibid.
[273] Erdiaw-Kwasiw. M.O. & Alam. K. (2016). '*Towards understanding digital divide in rural partnerships and development: A framework and evidence from rural Australia'*. Journal of Rural Studies, 43, pp. 214-224
[273] Adamsone L. et al (2013), *'Overview on the Smart Work Centres in Europe'*, Institute of National and Regional Economy, Riga, 2013.
[273] Gryszkiewicz N., Friederici N. (2014) *'Learning From Innovation Hubs: Fluidity, Serendipity, and Community Combined'*, http://www.innovationmanagement.se/2014/12/15/learning-from-innovation-hubs-fluidity-serendipity-and-community-combined/

In focus

Songhan Incubator

The Songhan Incubator team consists of experienced entrepreneurs and former policy makers who are passionate about nurturing the start-ups that could make a difference to a central region which is 80% rural. Songhan incubator promotes the value of digital entrepreneurship and the skills required to be a successful rural digital entrepreneur.

As a medium sized city surrounded by many rural provinces, Songhan has put a strong focus on helping rural start-ups in the areas of Agriculture, Tourism, and Healthcare offering entrepreneurship skills sessions and expert knowledge sharing.

Songhan has run six conferences in Binh Dinh province, two start-ups competitions, and four conferences in Soc Trang province. The team has at one event every month to bring together farmers, doctors, traders, professors, and policy makers to share their ideas and knowledge. Every year, Songhan incubates up to 6 start-ups, changing the lives of many entrepreneurs and provide employment for over 120 people in the rural areas.

RECOMMENDATIONS

- *Priority should be placed on increasing awareness of digital and entrepreneurial literacy in both formal and non-formal primary and secondary education in rural and remote areas across APEC.*
- *Investments should be made in digital education infrastructure*
- *APEC should explore opportunities for cross border cooperation between economies for successful implementation of rural education projects, creating platform or forums for experts and businesses to share knowledge without the limitation of distances and remote location*
- *APEC should investigate opportunities to encourage corporate regional ICT investment such as a program which provides matching government capital to corporations establishing innovation funds with a focus on discrete regional areas should be considered*

CHAPTER EIGHT

CONCLUSION

This report has provided a compelling argument for why governments need to support digital entrepreneurs and their innovative start-ups as the Fourth Industrial Revolution takes hold. There is undeniable evidence that entrepreneurship has become an important driver of economic growth, and job creation during an era characterised by alarming rates of youth unemployment across the APEC membership. This research has also highlighted the role that digital technologies play in expanding connectivity to all levels of society, and solving the age-old dilemma of how to enable financial inclusion, and access for the region's large unbanked, rural and remote populations. Finally, this report provides some key recommendations for APEC economies to consider.

Interest in technology, and innovative start-ups has spiked, and support mechanisms are becoming stretched to capacity in some ecosystems. As a consequence, the challenges facing digital entrepreneurs will become more apparent, and inaction will only serve to increase the divide between the digital haves and have nots.

Among other things, this report has told a story of poor student preparedness for digital careers, an insatiable hunger for ever-faster internet speeds, a common frustration in navigating burdensome red tape, and a lack of early-stage funding and financing — all of which are inhibiting the growth, and expansion of digital start-ups, as reported by ecosystem players throughout consultations. During this study, entrepreneurs in the region's nascent ecosystems have told of an absence of mentorship, and guidance in business development, and the monetisation of ideas. They have been even more vocal about their inability to find the rights skills and expertise to grow their businesses, and attract early-stage funding, both of which have severely hampered their efforts to succeed.

While progress has been made in recent years on many fronts, and governments have become more in-tune to the needs of digital entrepreneurs, there is a long road ahead to ensure that conditions are ripe for entrepreneurship across the various enabling domains. This report has sought to highlight areas for development and produced a set of findings and recommendations associated with each key issue. The following recommendations have been selected as the Key Recommendations for this report.

- *A regional benchmark for internet speed and minimum internet penetration be integrated into the national broadband plans of individual economies*

- *5G is essential for leapfrog technologies which offer solutions for emerging economies and should be progressed as a priority*

- *APEC Governments should provide the education and skills acquisition for the coming generation of digital entrepreneurs. Governments should prioritise digital education (STEM) in primary and secondary schools and provide opportunities to improve digital skills of teachers*

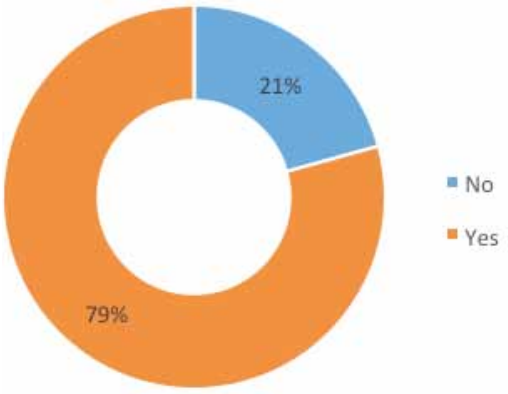
- *Policy makers should prioritise digital gender equality in education, business and government*
- *Incubator programs should be encouraged to establish comprehensive performance evaluation frameworks particularly if government funded*

- *One-stop-shops should be developed for government grants, permits, applications and certifications to assist entrepreneurs to progress their businesses*

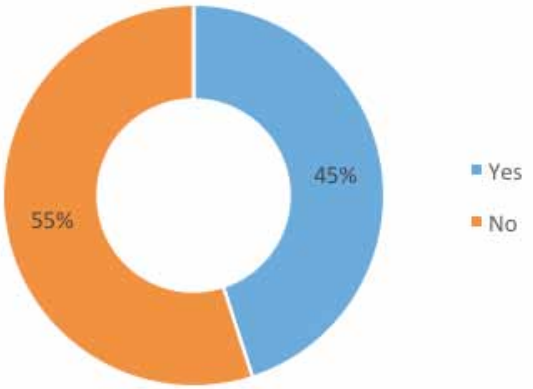
- *APEC should build digital capability in public sector workforces*

- *Establish policy and regulation that comprehensively target financial inclusion among the poor and create an environment in which micro financing institutions (MFIs) can grow their base*
- *Pathways for venture capital and other private equity funders need to be eased and incentivized*
- *Governments could formally recognise the potential of crowdfunding and enact legislation that permits the raising equity funding through such platforms*
- *Visa policy design should be compatible with the profile and nature of entrepreneurial activity to enhance labour mobility*
- *Data privacy and protection laws should be drafted and enacted as a priority*
- *APEC economies should review and reform bankruptcy laws to ensure that they are entrepreneur-friendly*
- *Priority should be placed on increasing awareness, digital and entrepreneurial literacy in rural and remote areas*

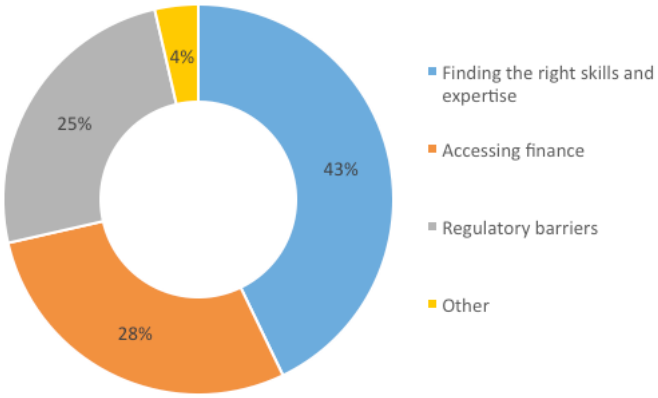
APPENDIX A – Survey results region-wide (select)



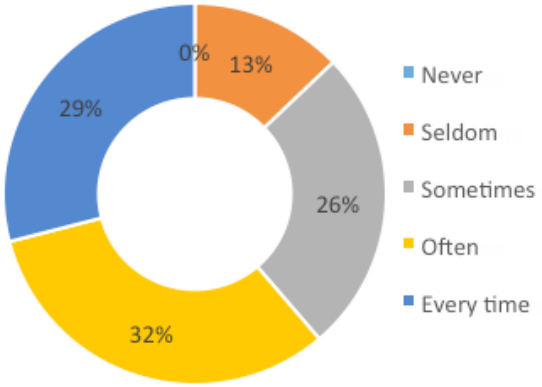
Do you believe that your country could benefit from more foreign universities?



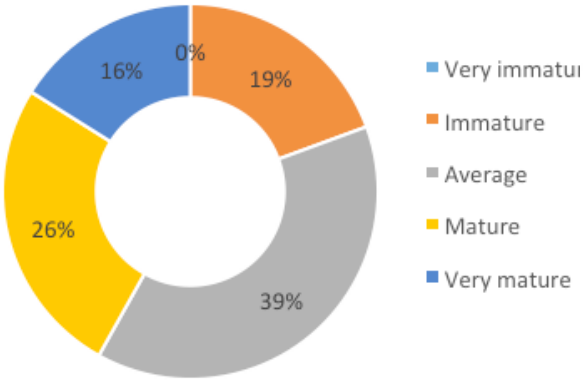
Broadly, do you believe that people in your country posses the required skills for successful digital entrepreneurship?



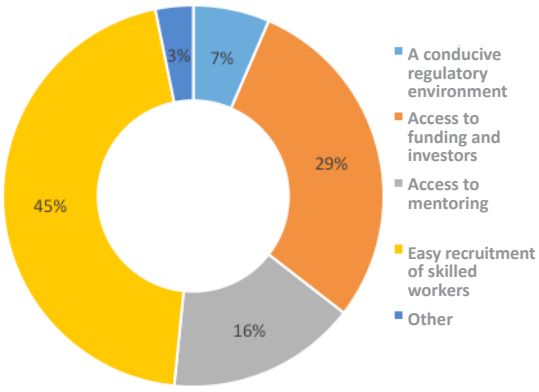
What do you think is the biggest challenge for starting an online business in your country?



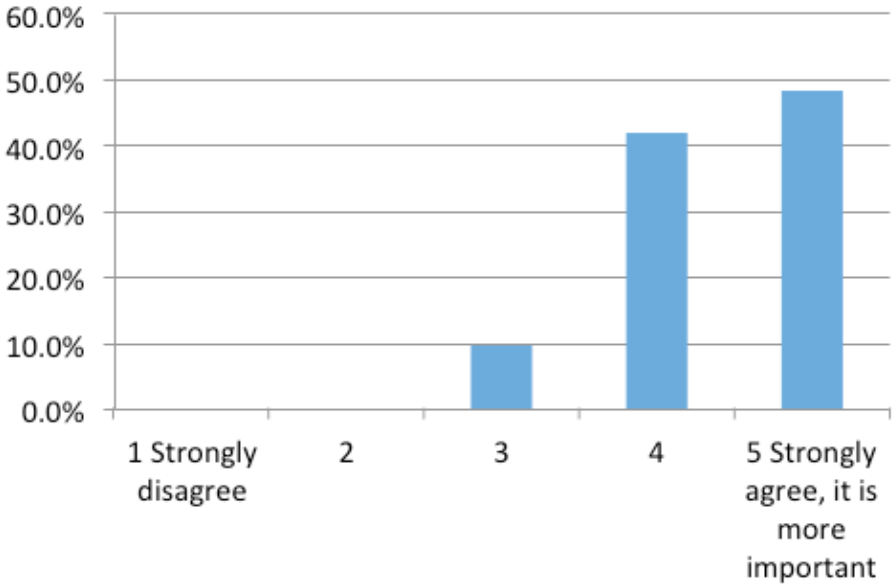
When making online purchases, how often do you worry about credit card fraud, and data privacy?



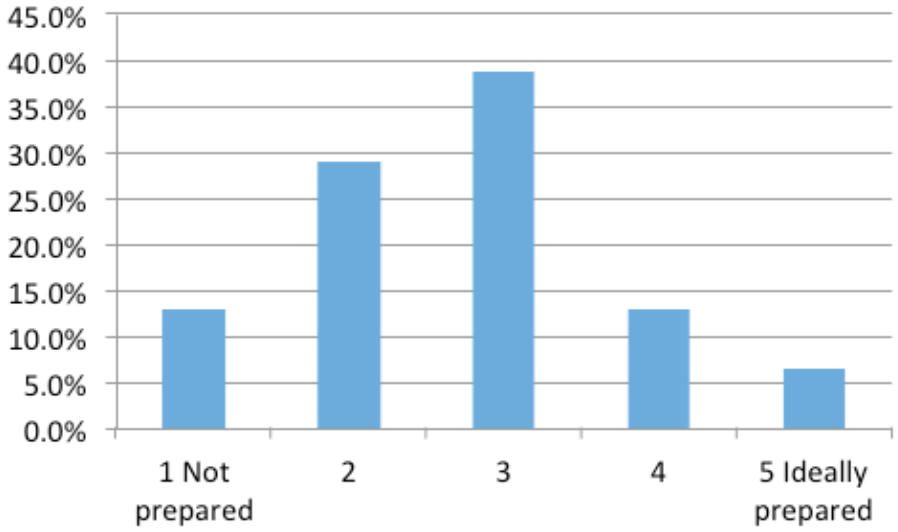
How would you rate the maturity of your country's digital economy?



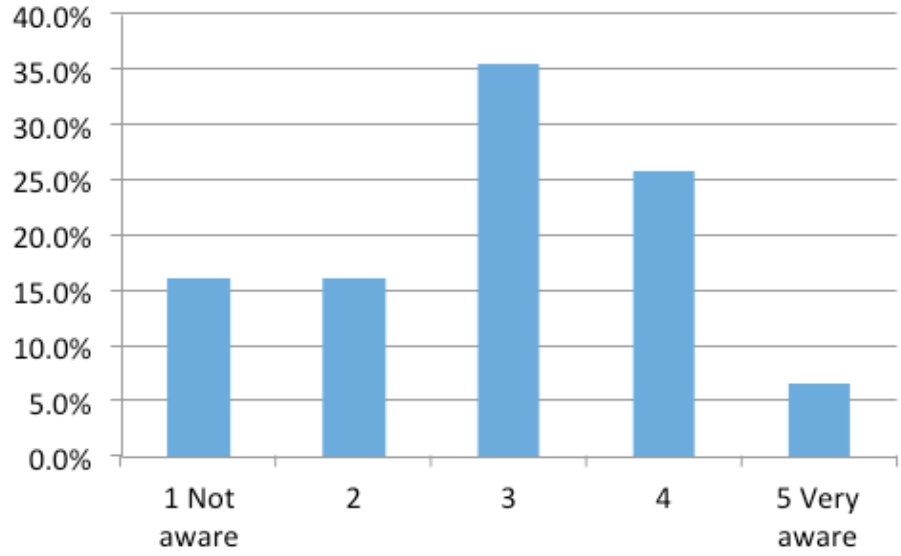
do you think is the most important enabler to your success?



Do you agree that internet, and mobile broadband technologies are as important as physical infrastructure projects such as roads, and ports?

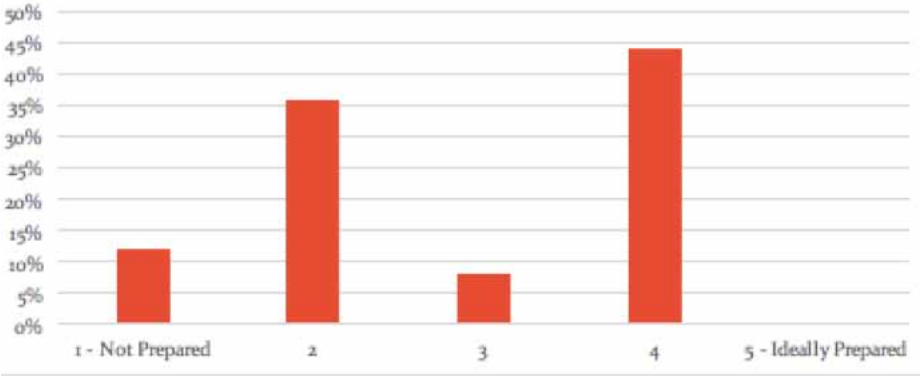


To what extent are students (primary, and secondary) in your country prepared for digital careers and entrepreneurship?

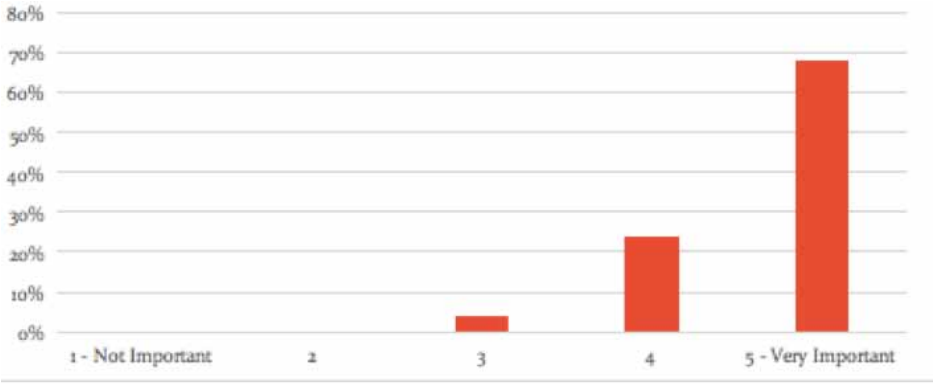


How aware are you of government grants, funding schemes, and support initiatives for start-ups in your country?

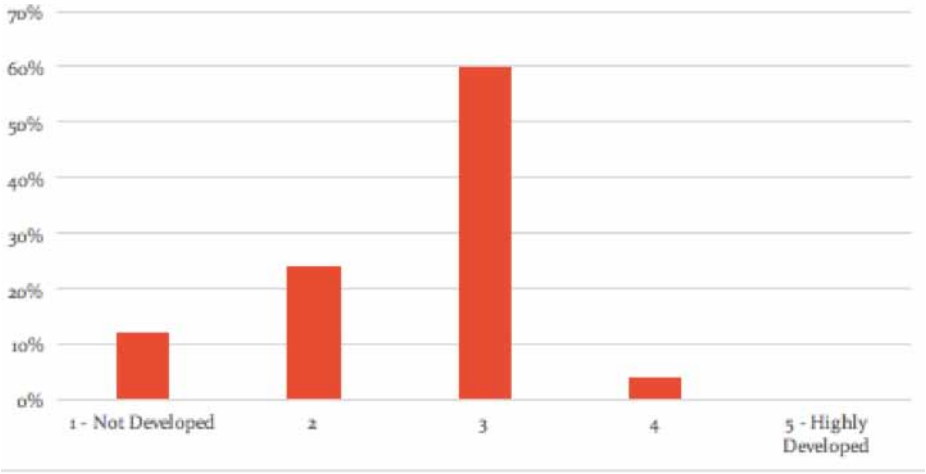
APPENDIX B – Survey results Vietnam-specific (select)



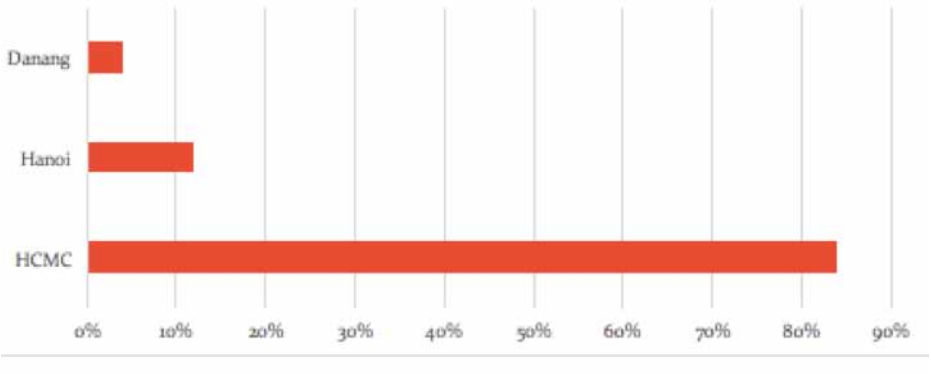
To what extent are students (primary and secondary) in Vietnam prepared for digital careers, and entrepreneurship?



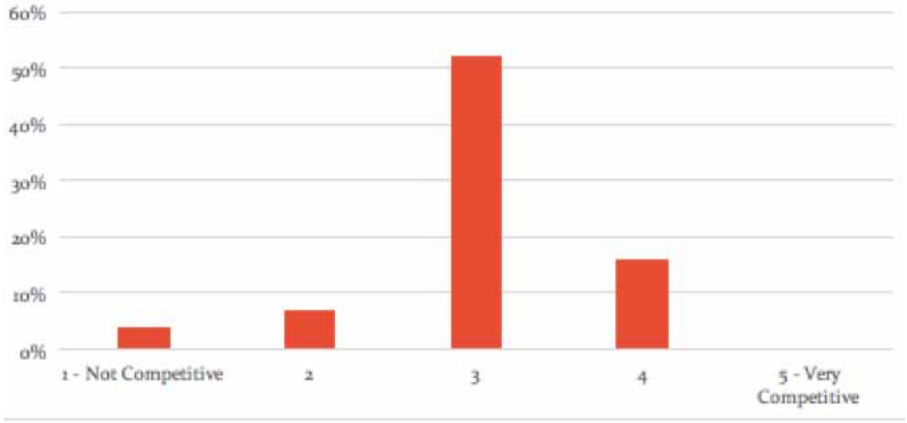
How would you rate the importance of the tertiary education sector in ensuring a bright technology future in Vietnam?



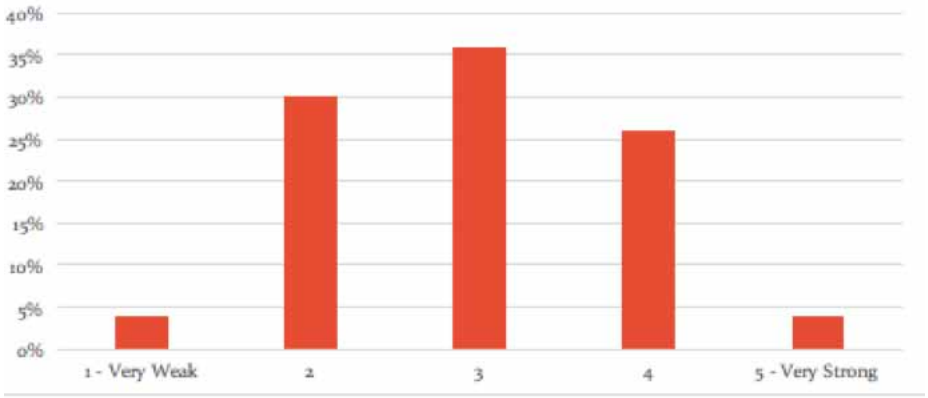
In your opinion, how developed is the Vietnam Silicon Valley initiative?



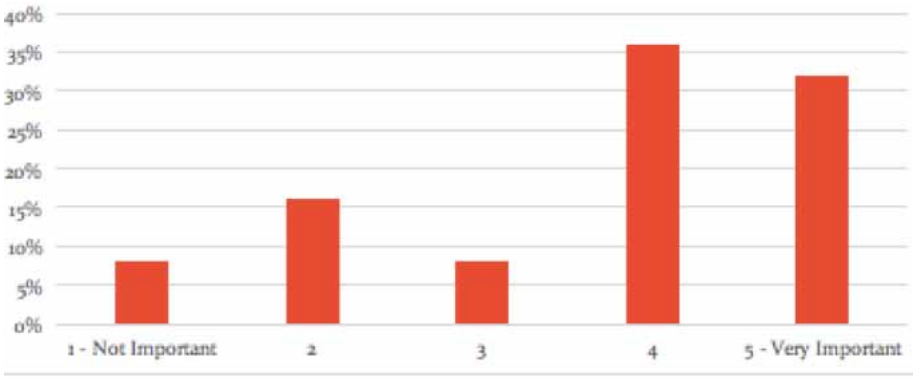
Which Vietnamese city has the greatest potential to become the centre of the



In your opinion, how competitive is Vietnam's digital economy?



How would you characterise the strength of Vietnam's software industry?



How important are internet and mobile broadband technologies to you?

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