APEC E-payment Readiness Index: Ecosystem Assessment and Status Report

Supported by PayPal

THE AUSTRALIAN APEC STUDY CENTRE Asia-Pacific Economic Cooperation
RMIT UNIVERSITY
TRPC

Table of Contents

Preface **1**

Executive Summary **2**

1. Introduction **5**

2. APEC E-payment Index **8**

Key Findings by Pillar 14

Pillar 1: Regulatory and Policy Environment 14

Pillar 2: Infrastructure 16

Pillar 3: Demand 17

Pillar 4: Innovation 19

Conclusion 20

3. Case Studies: In-Depth Look at Selected Economies **22**

Australia 22

Hong Kong 25

Indonesia 27

The Philippines 29

4. Conclusion and Recommendations: Looking Ahead **32**

Appendix 1. Econometric Methodology and Results **34**

Appendix 2. APEC E-payment Index – Methodology **36**

Preface

The **APEC E-Payment Readiness Index: Ecosystem Assessment and Status Report** is a joint study by the Australian APEC Study Centre at RMIT University and TRPC, a specialist technology research consultancy, based out of Singapore, with offices in Hong Kong, Beijing and Sydney. PayPal generously supported development of the report.

The study assesses the level of readiness and future potential of the 21 APEC economies to engage in, adopt and reap the broad range of economic and societal benefits that e-payments hold. The report was undertaken with a view to testing the assumption that there is a strong and growing link between e-payment penetration and economic growth. And that, any such link was worth identifying and beginning to measure, along with a canvassing of the barriers to e-payment adoption across the various APEC economies.

APEC economies constitute an important regional economic bloc, representing over 40% of world trade and 50% of global GDP. As the study attests, these economies are undergoing a profound transition towards cashless societies, driven by the spread of mobile devices, increasing access to the Internet, and the emergence of digital payments. The study provides a timely snapshot of e-payment adoption, and serves as an early guide on accelerating digitization of payments in line with APEC's founding objectives of trade facilitation, regional integration and economic prosperity for all.

While e-payments have long been discussed within a few specific fora of the APEC system, their wide-ranging benefits are only beginning to be appreciated outside the technology sector. Not surprisingly therefore, a cross-sectoral approach within the APEC to systematically measure the economic impact of the transition towards e-payments has been lacking. The study provides an initial reference point for such cross-cutting collaboration and discussion.

To estimate the macro-economic impact of open access to electronic payments on APEC economies, the report begins with a proof-of-concept econometric modelling using sample data from five APEC economies. The heart of the report is the APEC E-payment Readiness Index, comprising 39 indicators across four pillars making up the e-payment ecosystem. The index assesses and ranks the 21 economies according to the attractiveness of their physical and regulatory environments, and current and future capacity to innovate in and adopt e-payments. As the findings from the index show, smartphones and e-commerce are set to drive e-payment adoption in the future and in this context, the role of governments in developing economies are critical if they are to forge ahead. First, governments need to ensure their regulatory and business environments are conducive for innovation and seamless transactional flows with the region. The report also argues that the governments need to show leadership, especially in emerging economies, by promoting a shift to digital within public finances, and to work with stakeholders from the private sector and the international development community.

This report illustrates key considerations and potential pathways for expanding e-payment adoption across APEC economies. The authors hope that the APEC E-payment Readiness Index will contribute to the development of seamless electronic payments, expanding the overall market, and increasing the shared prosperity of all APEC economies.

Executive Summary

E-payments hold a broad range of promises for individuals, communities and economies at large. Adaptation to digital transactions is already having a transformative impact on societies through a lowering of transaction costs, particularly for SMEs, and thereby adding to productivity, economic growth and social benefits. Constraining transaction flows, through restrictions on access to e-payments – whether intended or not – can be shown to dampen economic growth, social equity and equality, and innovation. However, this study finds that Asia Pacific Economic Cooperation (APEC[1]) economies' level of advancement and experience in the development of an e-payment ecosystem varies widely. Realising the full potential of e-payments will require more flexible regulatory and business climates along with coordinated and sustained efforts from governments, the private sector and the international development community to foster adoption.

This study set out to illustrate the linkages between e-payment penetration and economic growth, canvassing where barriers exists for each APEC economy. To estimate the macro-economic impact of open access to electronic payments on APEC economies, a proof-of-concept exercise was conducted out at the outset of the study. Using sample data from five APEC economies, the study found that **a 1% change in online retail sales is associated with at least a 0.1 % growth in GDP per capita among these five APEC economies**. This is a substantive finding and calls for a follow up and more substantive and empirically based survey of e-payments access and opportunities across APEC economies.

Next, **an APEC E-payment Index**, comprising four pillars and 39 indicators, was constructed to gauge the readiness and capacity of each of the 21 APEC economies to engage in e-payment (including both e-payment and m-payment services), and to further develop their overall e-payment ecosystem. Building from this Index the study also uses a series of case studies of selected economies – Australia, Indonesia, Hong Kong and the Philippines – to illustrate key contributing factors to the prospects for e-payment adoption and development.

Key trends and insights that emerge from the Index and case studies are as follows:

- While economies can *generally* be seen to rank in accordance with their income bracket (GDP per capita), **the level of economic growth is not the sole determinant of e-payment readiness or adoption** in a given economy. Indeed, some middle-income economies, such as Malaysia, with a favourable business climate and solid infrastructure, are punching above their weight, while some high-income economies, such as the Republic of Korea and Japan, fall below where they would otherwise be expected, due to a restrictive regulatory environment and a lack of certain consumer demand. *This suggests that, by focusing on e-payments, an economy can boost economic growth and effectively 'leapfrog' in its development trajectory.*

- Further developing this issue, the E-payment Index shows that **APEC economies are largely divided into <u>three clusters</u> according to readiness and capacity for e-payment usage and adoption**. The clusters can be summarised as follows:

[1] The 21 APEC economies are: Australia, Brunei Darussalam, Canada, Chile, China, Hong Kong, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Taiwan, Thailand, United States of America and Vietnam.

- **Cluster 1: Economies with advanced e-payment ecosystems** ("Advanced") – United States of America, Singapore, New Zealand, Australia, Canada
- **Cluster 2: Economies with transitioning e-payment ecosystems** ("Transitioning") – Hong Kong SAR, Republic of Korea, Japan, Taiwan, Malaysia, Brunei Darussalam
- **Cluster 3: Economies with nascent e-payment ecosystems** ("Nascent") – Chile, China, Russian Federation, Thailand, Indonesia, Philippines, Mexico, Peru, Vietnam, Papua New Guinea

- Notably, no single APEC economy trumps in all pillars of the Index. Of the four pillars that comprise the Index, Singapore comes first in Regulatory & Policy, Korea tops the list in Infrastructure, Canada scores highest in Demand, while the US excels in Innovative Products & Services. This means that every economy has aspects it can improve in order to reap the benefits that e-payments can bring. Even more significantly, no single economy trumps in more than one pillar. This also implies that while sequencing of structural shifts that takes place may be important, there is no single pathway or a roadmap for those in the lower clusters to climb up the ranking. **Every economy will have a unique combination of focus areas to strategically and successfully shift to e-payments**.

- The results also show that while access to formal financial systems, such as banking including credit and debit card usage, is important today, **future growth will come disproportionately from emerging economies using affordable smartphones and other mobile devices**. Economies such as Indonesia and the Philippines, while still cash dependent, are showing not only a remarkably high propensity to go online, engage in social media and shop via their smartphones, but a large proportion are entering the formal financial market because of these devices, and potentially bypassing traditional platforms such as credit cards. **Rapidly expanding e-commerce sectors in these economies will often lead and further drive the development and usage of e-payments in coming years.**

- No matter the stage of development of the e-payment ecosystem, **facilitating an attractive market (including business) climate, and investments into innovative e-money solutions is important**. Some economies from the emerging block, such as Indonesia and the Philippines, are forging ahead in the innovations such as fintech and cryptocurrencies to capitalise on their growing middle class' propensity to spend and transact via mobile devices.

- Government, as a huge provider and consumer of payments, has an important role to play in accelerating the digital transition, especially in economies across the lower clusters. **Government efforts and initiatives to transition to electronic payments creates demand and new opportunities, including new needs for payment infrastructure and a change in consumers' cash dependence**. As governments cease to accumulate, and produce, cash and increasingly move to electronically disbursing citizen funds – to bank branches, ATMs, or other cash-out points – recipients will be incentivized to participate.

In terms of specific areas of the APEC E-payment Index, the findings are as follows:

Regulatory and Policy Environment: Many economies need to focus on fostering a favourable regulatory and policy environment to enhance the confidence of businesses and consumers.

Therefore, government's vision and efforts to make use of e-payments to improve transparency, efficiency and accountability in its own finances can kick-start a virtuous cycle of adoption.

Infrastructure: The gap or divide between high-income, upper-middle-income and lower-middle-income economies is most obvious in the infrastructure pillar and bridging the digital divide will be essential to fully leveraging the opportunities in e-payments. This includes increasing smartphone penetration, and broadband access and affordability. Focusing on availability and affordability of basic financial services is key in driving e-payments.

Demand: Demand for e-payment to date is more prominent in advanced economies where a majority of population likely have bank accounts – but that trend is likely to change soon. Rapid uptake of mobile phones, social media and e-commerce in developing economies will facilitate market growth for e-payment and m-payment.

Innovation: Innovations especially in mobile and virtual currencies in overcoming infrastructure challenges are contributing to higher uptake of e-payment and m-payment services, and are acting as gateways into the financial system for unbanked – or under-banked – consumer segments. As the number of non-bank players in the e-payment system increases, particularly in developing m-payment solutions, there is a need for collaboration among banks and non-banks in order to accelerate innovation.

1. Introduction

Electronic payments, or e-payments, have been making ever-increasing inroads into transactions since the 1950s beginning with the advent of general-purpose payment cards. Technology developments, particularly the increasing pervasiveness of the Internet and mobile phones, have paved the way for the current proliferation of e-payment methods. E-payments now range from standard bank transfers and card payments, to Internet-based consumption and transactions, to mobile wallets, and on to virtual currency exchanges such as cryptocurrencies and other blockchain technologies.

With such variety e-payments hold a broad range of promises for individuals, communities and economies at large. Mobile money, for example, can extend financial access to the previously unbanked, enabling them to transfer funds conveniently and safely; online and mobile payments enable small and medium-sized enterprises (SMEs) to expand market reach and engage in cross border trade by offering fast, secure and predictable flows of funds. For governments, digitized payments enable far more effective disbursements of funds such as pensions, salaries and social welfare payments, increasing reach and transparency, reducing corruption, and ensuring accountability.

While evidence of the positive impact of e-payments continues to grow, the pace of adoption still lags in many parts of the world. As a result, there are still more than two billion people globally without access to formal financial services, and for many of the emerging economies across the Asia Pacific region cash remains the preferred medium of payment. Moreover, differing regulatory frameworks across the region along with different definitions of what constitutes payments – or what is a payments *business* – constrain cross-border e-payments.

This paper is premised around a simple hypothesis: that by increasing open access to payments (i.e. removing constraints on payments access) there will be a corresponding growth in economic development (GDP).

The purpose of this study therefore is to look into the trends and differences, to examine the status of e-payment penetration across the Asia-Pacific Economic Cooperation (APEC) economies, and the level of advancement of each economy's e-payment ecosystem for supporting future development and adoption. In so doing, the study provides a roadmap of potential pathways and key considerations for expanding e-payment adoption across APEC economies, and thus being able to realise the socioeconomic benefits that adoption can bring.

The study is divided into two distinct components:

1. **The APEC E-payment Index**, gauging the readiness and capacity of each of the 21 economies that comprise APEC[2] to engage in e-payment, to use both e-payment and m-payment services, and to further develop their overall e-payment ecosystem.

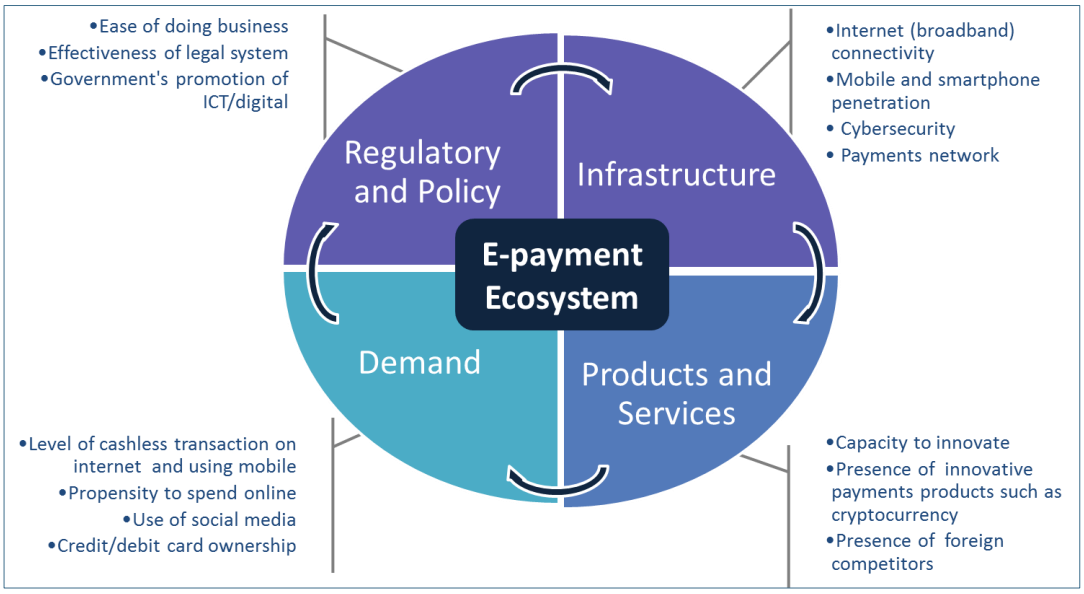
2. **Case studies** of selected economies – including both advanced and emerging economies – to illustrate key contributing factors, and the prospects of e-payment adoption and development.

[2] The 21 APEC economies are: Australia, Brunei Darussalam, Canada, Chile, China, Hong Kong, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Taiwan, Thailand, United States of America and Vietnam.

Conceptual Framework

In order to gauge e-payment readiness this study has developed an Index aggregating and then ranking a variety of factors contributing to a healthy e-payment ecosystem. The APEC E-payment Index is based on four 'pillars' of this ecosystem: i)the regulatory and policy environment, ii) infrastructure, iii) demand and use, and iv)innovative products and services (or the supply-side of the e-payment ecosystem) (see figure 1). Using these four pillars, the Index examines the readiness of APEC economies to adopt and utilise e-payments, as well as their future development potential (see Appendix 2 for the methodology used in developing the Index).

Figure 1. Conceptual framework of the e-payment ecosystem



The first pillar focuses on the regulatory and policy environment for both the information and communication technology (ICT) and business sectors. For the ICT sector, regulations and policies need to be in place to build the ICT infrastructure, and provide affordable and secure e-payment services. For the business sector, regulations and policies can foster or hinder market entry, and thus, affect the development and uptake of e-payment solutions. This pillar therefore reflects on the presence of ICT-related regulations and policies (e.g., electronic commerce, digital signatures, consumer protection), and the extent to which government is using technology to enhance competitiveness. It also examines the time and costs required to start a business, the efficiency of the legal framework in settling disputes and challenging regulations, and the range of financial products and services available to businesses.

The second pillar focuses on e-payment infrastructure. Investments in building a reliable and secure physical network to deliver e-payments nationwide, particularly to rural areas, is essential to the expansion of e-payment services. This pillar looks at the level of penetration of the Internet, wireless broadband, mobile phones and smartphones, as well as the number of ATMs and commercial bank branches in each economy. It also examines national capabilities in cybersecurity.

The third pillar focuses on the level of latent and actual demand for e-payments from businesses and consumers, as their acceptance and usage of e-payment services are key to a thriving e-payment ecosystem. The pillar gauges the economies' use of the various channels for e-payment, including credit and debit cards, online and mobile options, and through social media sites.

The fourth pillar focuses on the supply-side of e-payment and the economies' readiness to develop innovative e-payment solutions and business models by looking at the level of competitiveness, venture capital availability, and presence of international players such as Alibaba, Alipay, Amazon, Bitcoin, eBay, PayPal, Taobao and Tenpay.

The central premise of this study is that an increase in access to and usage of e-payments will lead, fairly directly, to an increase in economic growth. A corollary position is that the greater financial depth created by a transition to e-payments has a positive impact on socioeconomic development. There is already ample evidence establishing a concrete correlation between e-payments and economic benefit to support this argument. Moody's Analytics, for example, conducted a study looking at electronic card usage in 56 countries. The study found that electronic card usage added USD983 billion to GDP from 2008 to 2012 – equivalent to creating 1.9 million jobs.[3] Similarly, Imperial College London estimates that digital money adoption could enable as many as 220 million individuals or USD1 trillion to move to the formal financial sector from the informal economy.[4]

Taking this a step further, Deloitte used econometric modelling to estimate the effects of an increase in online retailing on GDP across Europe and found that the total contribution of online retail enabled by online payments, between 2009 and 2012, to be at least 1% of GDP.[5] While it is beyond the scope of this study to build a separate econometric model to quantify the economic impact of online payments across all 21 APEC economies, the Deloitte regression model can be used as a proof-of-concept exercise to test the correlation. Thus, using sample data from five APEC economies (including a mix of advanced and emerging economies: see appendix 1), **the results suggest that a 1% change in online retail sales is associated with 0.1 % change in GDP per capita among these five APEC economies**. When combined with the conclusions emerging from the E-payment Index, we believe that **this result merits further study utilizing panel data across all APEC economies and over a sustained period of time to better understand the economic impact of e-payment adoption.**

[3] Moody's Analytics (2013) The Impact of Electronic Payments on Economic Growth, http://usa.visa.com/download/corporate/_media/moodys-economy-white-paper-feb-2013.pdf

[4] Imperial College London (2014) Getting Ready for Digital Money: A Roadmap, http://icg.citi.com/icg/sa/digital_symposium/docs/DigitalMoneyIndex30012014.pdf

[5] The economic growth literature that Deloitte and this study drew the methodological approach from includes Barro (1992), Mankiw, Romer and Weil (1992) and Caselli, Esquivel and Lefort (1998).

2. APEC E-payment Index

This section details the development of the APEC E-payment Index and summarises the key trends and insights that emerge from an analysis of the Index.

Table 1. The APEC E-payment Index – overall rank and scores

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
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

APEC economies' level of advancement and experience in the development of an e-payment ecosystem varies widely.

While intuitive, it is worth recognizing upfront: APEC economies' readiness to adopt and utilise e-payments varies widely. Overall, the United States comes out as best positioned to benefit from the ongoing development of e-payments, with a high score of 65.5 (out of a possible 100 – see below for details), while at the other end of the table Papua New Guinea scores 19.1. The level of economic development of an economy is, of course, one key factor driving such a wide range. Indeed, when the economies' e-payment readiness is overlaid against GDP per capita, there is a generally linear relationship (Figure 2). And, using this approach, APEC economies can be clustered into three groups as follows:

- **Cluster 1: Economies with advanced e-payment ecosystems** – United States of America, Singapore, New Zealand, Australia, Canada
- **Cluster 2: Economies with transitioning e-payment ecosystems** – Hong Kong SAR, Republic of Korea, Japan, Taiwan, Malaysia, Brunei Darussalam
- **Cluster 3: Economies with nascent e-payment ecosystems** – Chile, China, Russian Federation, Thailand, Indonesia, Philippines, Mexico, Peru, Vietnam, Papua New Guinea

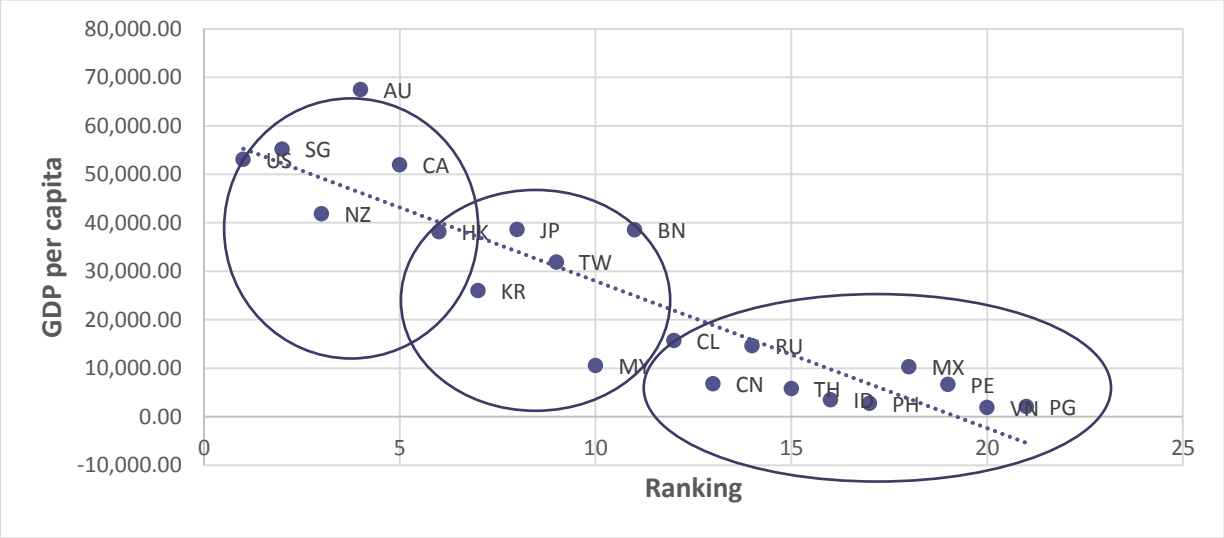
The readiness and capacity of an economy to engage in e-payment is strongly influenced by its stage of development.

When compared with the World Bank's income classification, Clusters 1 and 2 are comprised mainly of high-income economies, with the exception of Malaysia (an upper-middle income economy). Malaysia, which has achieved high e-payment readiness relative to its level of economic

[6] The overall score has been rounded to 1 decimal place. Chile's score is 35.93 and China's score is 35.86 at 2 decimal places.

development. A further notable comparator here is between Malaysia and Mexico, two economies with roughly similar levels of GDP per capita and yet starkly different levels of e-payments readiness.

Figure 2. Relationship between APEC E-payment Index rankings and income level



Source: World Bank, Data: GDP per capita, 2013, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD, and for Taiwan, https://www.google.com/search?q=taiwan+gdp+per+capita&ie=utf-8&oe=utf-8.

Cluster 3 comprises mostly upper-middle and lower-middle income economies. The exceptions are Chile and the Russian Federation, two high-income economies. For these two economies, their e-payment readiness and adoption are low relative to their level of economic development (Table 2), suggesting economies in transition not at all primed well to make the leap to broader digital enablement.

Table 2. Clusters of the APEC E-payment Index

Clusters	APEC E-payment Index		World Bank Income Classification
Cluster 1	1. United States of America 2. Singapore 3. New Zealand 4. Australia *5.* Canada		All **high-income economies**[7] except Malaysia (upper-middle income economy)
Cluster 2	6. Hong Kong SAR 7. Republic of Korea 8. Japan 9. Taiwan 10. Malaysia *11.* Brunei Darussalam		
Cluster 3	12. Chile 13. China 14. Russian Federation 15. Thailand **16.** Indonesia	17. Philippines 18. Mexico 19. Peru 20. Vietnam 21. Papua New Guinea	All **upper-middle and lower-middle income economies** except Chile and Russian Federation (high- income economies)

[7] The World Bank Income Classification according to the GDP per capita is as follows: 1) high income economies = GDP per capita of USD 12,746 or more 2) upper-middle income economies have GDP per capita of USD 4,126 to USD 12,745, 3) and lower-middle income economies have GDP per capita of USD 1,046 to USD 4,125.

High-income economies are more likely to have a thriving ecosystem for e-payments.

Based on the strong linkage between GDP per capita and e-payment readiness, high-income economies are likely to have made significant progress in the four pillars that make up the e-payment ecosystem. Economies in Cluster 1, for instance, have more advanced banking and payment systems, with well-established regulations and infrastructure for e-payments in place. A larger percentage of its population has bank accounts, and are familiar with credit cards and debit cards, and online shopping.

Cluster 1 Economies

Overall, the **United States** ranks highest based on its strengths in innovation (1st), infrastructure (2nd) and demand (2nd). From the ranking by pillar (Table 3), the United States takes the lead in the innovation pillar. US-founded companies such as Amazon, Google, and PayPal as well as major credit card companies like American Express, MasterCard and Visa are internationally-recognised innovators in e-payment. The intensity of competition and the availability of venture capital in the US are leading to the development of innovative e-payment products and services. This capacity to innovate is linked with an advanced ICT infrastructure as well as online and social technologies, which are in turn sparking demand for new services and functionalities that increase the convenience and reliability of making payments.

Singapore's runner-up status in the Index is fuelled by its top ranking in the regulatory and policy pillar. The Government of Singapore takes a top-down approach in developing its ICT environment with a clear-eyed digital strategy and focus on business start-ups. The development of a favourable policy and regulatory environment cannot be stressed enough and is shown by the Index results to be fundamental in building an overall e-payment ecosystem, particularly in terms of attracting investment, driving innovation, and stimulating the necessary emergence of demand for e-payment products and services.

New Zealand and Australia rank third and fourth, respectively because they have scored relatively well in three of the four pillars. For **New Zealand**, it scores relatively high in regulatory and policy (4th), infrastructure (5th) and demand (4th). New Zealand has the most favourable regulatory environment for starting up a business, and the use of e-payment is already quite high with over 90% of its population using debit cards, and over 70% of its population using the Internet to pay bills or make purchases.[8] For both of these indicators, New Zealand ranks highest among all APEC economies.

In **Australia**, the high Internet and smartphone penetration, and high usage of e-payment methods allow it to score relatively well in infrastructure (3rd) and demand (3rd), with figures similar to New Zealand. For instance, 82% of Australians use debit cards (compared with 92% of New Zealanders), and 68% of Australians use the Internet to pay bills or buy things (compared with 72% of New Zealanders). In the G20 E-trade Readiness Index,[9] Australia topped the rankings, and one of the reasons was due to the economy's high use of e-payment methods. Another reason was related to its relatively well-developed ICT infrastructure – although this is one area about which there has been domestic consternation in recent years with a lack of consensus in political will, a development undoubtedly reflected in Australia's 4th place ranking in the E-payments Index, behind neighbours New Zealand.

[8] World Bank (2014) Global Findex.
[9] The Economist Intelligence Unit (2014) The G20 e-Trade Readiness Index.

Canada, ranking fifth overall, scores highest – perhaps surprisingly for some – in the demand pillar (1st) with high usage of a variety of e-payment methods. Supporting this result, a MasterCard study shows that non-cash payments account for 90% of the total value of consumer payments in Canada.[10] The economy's policy and regulatory environment (5th) and infrastructure (4th) for e-payments are also relatively strong. It is worth noting that Canada also has a significantly higher percentage of credit card ownership and usage, at 77% and 73% respectively, than other APEC economies. (Japan is next among APEC economies with 66% credit card ownership and 52% credit card use – a sizeable difference. The gap is even greater when compared with economies in Clusters 2 and 3: in Malaysia, only 20% of the population owns a credit card, and in Indonesia, 2%.)

According to WorldPay, credit cards constitute the greatest proportion of non-cash transactions conducted globally (57%),[11] which reinforces the point that populations in high-income economies are more able to perform e-payment transactions. *However, as the variety of e-payment options grows and access to e-payment increases it is precisely this focus on credit/debit cards and bank accounts as indicators we see giving way as the transactions base continues to transform, and that well-positioned economies in Clusters 2 and 3 will be able to make the leap by best enabling their populations.*

No economy dominates the Index by topping more than one pillar in the e-payment ecosystem.

From Table 3 and from the preceding discussion on Cluster 1 economies, it can be seen that none of the economies top more than one of the pillars in the e-payment ecosystem. Moreover, ***no single economy ranked in the top five in all four pillars, meaning that <u>all</u> economies have the potential to improve in one or more aspects of their e-payment ecosystem.***

For instance, the United States leads in the development of innovative products and services but ranks 6th in the provision of a regulatory and policy environment for e-payments. Singapore is the front runner in offering a favourable regulatory and policy environment for e-payments but ranks only 6th in demand and usage. One interesting indicator in this regard: only 28% of Singaporeans use the Internet to pay bills or buy things.[12] Canada leads in the demand pillar but its 9th rank in innovative products and services (the supply side of the equation) pulls down its overall ranking. The Republic of Korea, one of the world's most digitally connected societies, not surprisingly scores highest for infrastructure, but ranks only 13th in the regulatory and policy environment pillar. One of the reasons for this is that, while the laws relating to ICTs are well developed in Korea, laws relating to the banking and financial services sectors have not adjusted quickly to innovations appearing in ICT, leaving new innovative areas such as fintech, rather less competitive than might otherwise be expected. There is thus room for improvement in the efficiency of the legal frameworks for financial services, in particular where it overlaps with ICT. This need for cross-sectoral understanding, awareness and responsiveness in e-payments is a theme that comes through time and again in looking at the rankings across the APEC E-payments Index.

[10] MasterCard (2013) The Global Journey from Cash to Cashless.
[11] WorldPay, 2014 cited in United Nations Conference on Trade and Development (2015) *Information Economy Report 2015: Unlocking the Potential of E-commerce for Developing Countries* (Geneva).
[12] World Bank (2014) Global Findex.

Table 3. The APEC E-payment Index rankings and scores, by pillar

Overall Ranking	Economy	P1. Regulatory & Policy Environment		P2. Infrastructure		P3. Demand		P4. Innovative Products & Services	
		Rank	Score	Rank	Score	Rank	Score	Rank	Score
1	United States of America	6	64.8	2	72.1	2	46.7	1	84.6
2	Singapore	1	93.9	7	59.7	6	37.9	4	57.4
3	New Zealand	4	77.3	5	63.0	4	45.7	8	51.2
4	Australia	9	55.5	3	71.5	3	46.1	6	54.4
5	Canada	5	68.0	4	64.5	1	47.4	9	48.7
6	Hong Kong SAR, China	2	82.3	8	58.6	9	34.5	3	61.0
7	Korea	13	43.4	1	80.8	5	38.4	7	53.9
8	Japan	7	61.9	6	62.5	10	28.4	2	67.5
9	Taiwan	8	59.4	9	55.4	8	37.1	5	55.1
10	Malaysia	3	80.7	13	41.6	11	27.4	11	38.2
11	Brunei Darussalam	11	46.6	11	42.4	7	37.4	17	19.6
12	Chile	10	53.8	12	42.3	12	24.7	14	25.5
13	China	12	44.2	14	37.7	16	22.1	10	45.3
14	Russian Federation	20	22.5	10	50.1	13	24.2	13	27.4
15	Thailand	16	33.1	15	37.5	14	23.8	15	23.5
16	Indonesia	14	43.4	19	29.2	21	17.8	12	29.9
17	Philippines	17	32.8	17	31.4	18	20.5	16	21.2
18	Mexico	19	26.2	18	30.0	15	23.8	18	16.8
19	Peru	21	20.4	16	34.9	17	20.5	20	13.6
20	Vietnam	18	28.0	20	28.3	19	20.0	19	14.0
21	Papua New Guinea	15	35.5	21	11.9	20	19.5	21	12.9

Other notable strengths and weaknesses are worth calling out. These include the remarkably rapid pace of development in the Chinese market, internationally known for widely adopted e-payment solutions such as Alipay, Taobao and Tenpay, but still needing to overcome regulatory and infrastructure challenges in order to fully leverage the opportunities. In Japan the capacity to innovate is high (ranks 2nd), while demand for e-payment is surprisingly low (ranks 10th). Among APEC economies, the Japanese spend the least amount of time on the Internet and on social media, *and only 8% of its population use mobile banking*, despite the ubiquity of mobile usage elsewhere in other aspects of Japanese life. The lack of prevalent international e-payment solutions in Japan, and the lack of success of Japanese e-payments solutions in foreign markets could explain Japan's low uptake of mobile banking.

As the results show, ***there is no single pathway to promoting and developing e-payment.*** This means that for policymakers e-payment is an area that needs to be developed holistically by

considering the ways in which each of the pillars in the e-payment ecosystem affect each other within the context of each individual economy. And this means that policymakers need to have a broad appreciation of how these factors work if they are to create an effective framework.

Moreover, ***while growth and innovation in e-payment can come from all income levels and from all manner of social groups, the types of innovation finding traction in an economy differ as different needs are addressed and different social groups serviced.***

Cluster 1 economies generally have a longer history of the development and use of e-payment services. These economies have a large percentage of their population already using credit and debit cards, and are familiar with ATMs and, increasingly, with online banking. Here e-payment innovations aim to increase convenience, flexibility and security for consumers; while for businesses they enhance sales and reduce payment processing costs.

For economies in Clusters 2 and 3, the emphasis is often on increasing access to basic financial services, on the one hand, and empowering the SME e-commerce opportunity, on the other. In these economies people are less likely to have bank accounts and the ownership of credit cards is lower, but those with smartphones are increasingly using them to make payments of one sort or another. For SMEs this can mean access to funds for setting up and expanding their businesses; it can mean access to new markets, whether on the supply side or demand side, and unlocking the potential for e-commerce; and it can mean being able to execute on payroll or finance without having to physically visit a bank and carry large sums of cash. *Greater access to e-payments draws more enterprises into the formal sector, raising tax revenues and making workers eligible for better protection and benefits.*[13] *For consumers, access to payment can mean access to services such as health and education, and enhanced productivity by reducing the time it takes to pay for services and products.*

APEC is rapidly becoming 'mobile first' and significant growth will be driven from economies with high smartphone adoption and where the proportion of services offered through smartphones are increasing. These economies are not necessarily high-income economies. For instance, the economy with the highest percentage of smartphone users who have made purchases via their phone is China (69%), with some 930 million people – or three times the total population of the United States – already having done so. This is followed by Vietnam (60%), Indonesia (57%), Republic of Korea (56%) and Thailand (51%). However, in Canada it is 27%, New Zealand 33% and Australia 41%.[14] Figure 3 shows the weak correlation between GDP per capita and the percentage of smartphone users who have purchased via phone. *This is an area requiring significant further research.*

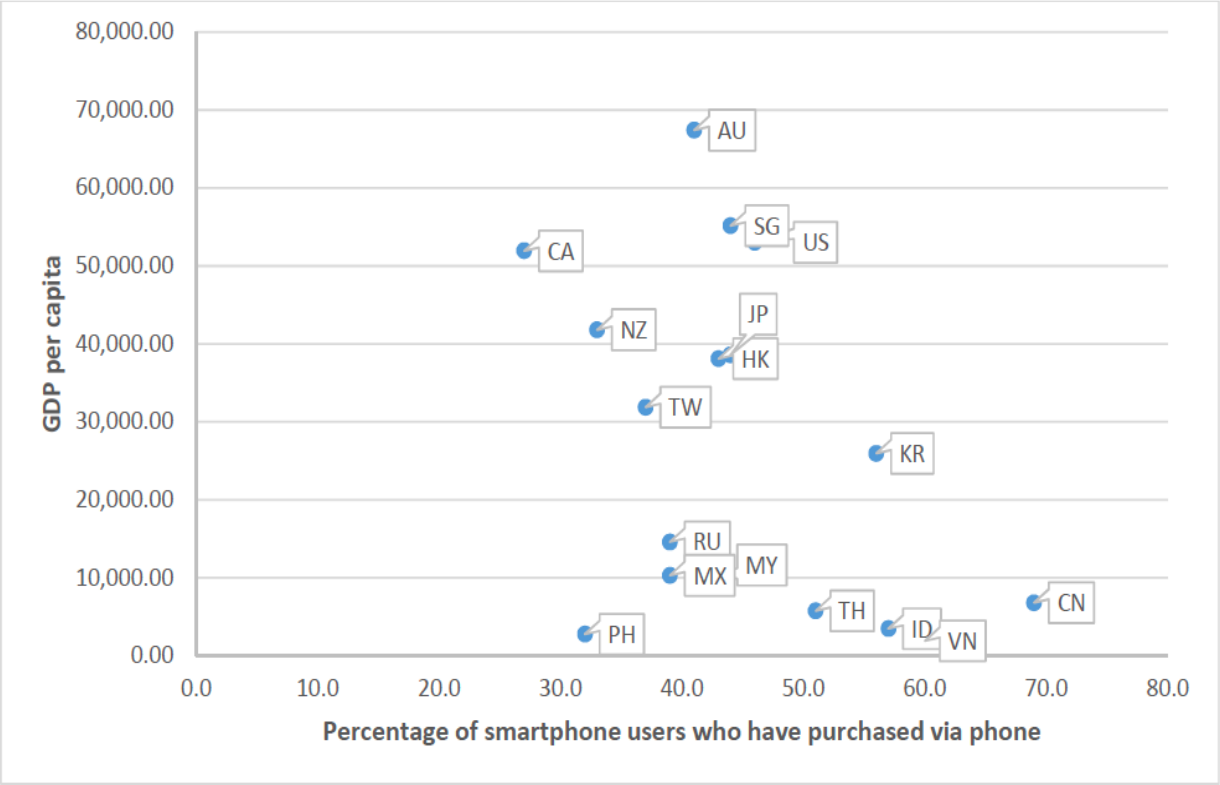
As more people become connected, particularly in the lower-middle and upper-middle income economies of Cluster 3, through the rapid uptake of mobile phones and social media, the market for e-payment and m-payment will grow exponentially. Furthermore, the variety of innovative products and services is likely to increase to meet demand, including alternative e-payment systems for the unbanked consumer segments.

Such conclusions are supported by emerging studies such as the United Nations Conference on Trade and Development's latest Information Economy Report,[15] which finds that most retail e-commerce payments are still made via credit card, but by 2017 alternate payments will make up the

[13] Standard Chartered, Financial Inclusion: Reaching the unbanked, 4 September 2014.
[14] Our Mobile Planet, Google, http://think.withgoogle.com/mobileplanet/en/downloads
[15] United Nations Conference on Trade and Development (2015) *Information Economy Report 2015: Unlocking the Potential of E-commerce for Developing Countries* (Geneva).

majority of all e-commerce payments, with e-wallets alone set to represent more than 40% of the total. According to the World Payments Report 2014,[16] mobile payments are rapidly increasing with non-banks slowly increasing their share of transactions. In the period 2011-2015, mobile payments were estimated to have grown by some 60.8% to 47 billion transactions, with non-banks increasing their share of transactions from 1.1 billion in 2012 to 7 billion in 2015. The report also points out that non-banks are pursuing digital innovations and capturing more of the payments market, *but they are not being reported*.

Figure 3. Relationship between income level and the percentage of smartphone users who have purchased via phone



Sources: World Development Indicator (2014) http://data.worldbank.org/indicator/NY.GDP.PCAP.CD; for Taiwan, https://www.google.com/search?q=taiwan+gdp+per+capita&ie=utf-8&oe=utf-8; and Our Mobile Planet, Google (2014)

Key Findings by Pillar

Pillar 1: Regulatory and Policy Environment

A majority of APEC economies need to focus on creating, or improving, a favourable regulatory and policy environment for ICT infrastructure development, cybersecurity, business innovation and demand for e-payments as illustrated by the E-payments Index. With the exception of Malaysia, all lower-middle and upper-middle income economies need to focus on this aspect of their ecosystem to be able to attract investment and further participation. This is of course one area where the government can have an outsized influence and where lower income economies can make substantial headway. It is also an area of significant contention and confusion with many aspects of e-payments now cutting across multiple regulatory jurisdictions. Thus, some high-income economies

[16] Capgemini and RBS, World Payments Report 2014.

such as Australia and the Republic of Korea, suffer from comparatively low scores in this pillar (ranking 9th and 13th, respectively)

Table 4. Regulatory and Policy Environment

Ranking	Economy	Scores
1	Singapore	93.9
2	Hong Kong SAR, China	82.3
3	Malaysia	80.7
4	New Zealand	77.3
5	Canada	68.0
6	United States of America	64.8
7	Japan	61.9
8	Taiwan	59.4
9	Australia	55.5
10	Chile	53.8
11	Brunei Darussalam	46.6
12	China	44.2
13	Korea	43.4
14	Indonesia	43.4
15	Papua New Guinea	35.5
16	Thailand	33.1
17	Philippines	32.8
18	Vietnam	28.0
19	Mexico	26.2
20	Russian Federation	22.5
21	Peru	20.4

Brunei Darussalam, another high-income economy, needs to significantly simplify and shorten the process for business start-ups in particular. According to a World Bank study on economies' ease of doing business, Brunei Darussalam is ranked lowest among APEC economies, requiring 15 procedures, 101 days and 10% of income per capita to start a business.[17]

In Latin America, Chile is most advanced in e-payment (ranking 12th), while Mexico and Peru rank 18th and 19th, respectively. Overall, it is relatively easy to start a business in these three economies—with a score for this indicator of over 85 out of 100, but they all need to improve the efficiency of their legal frameworks for settling disputes and challenging government actions and regulations. In Mexico and Peru, ICT continues to lie low on the government's agenda, which is reflected in the development of the e-payment ecosystem as e-payment becomes increasingly ICT-driven.

The results resonate with the G20 E-trade Readiness Index which noted that "regulators in many countries are still struggling with the question of how to regulate the payments industry."[18] The creation of new and innovative payment systems only accentuates the need for reviewing existing payments regulations, and reviewing them on a broader cross-sectoral basis.

Canada, for example, has become one of the first countries to pass a national law regulating virtual currencies such as bitcoin and XRP.[19] In Australia, the Australian Payments Council was established to better coordinate the country's payment systems with a view to fostering innovation, rather than merely regulating conservatively. This is perhaps the central challenge for all economies: successfully encouraging e-payment operators requires cross-sectoral government coordination, such as a whole-of-government approach or a coordinating government agency. ***For APEC, e-payments regulatory alignment will accelerate e-payments adoption and usage, and this in turn will drive cross-border transactions and thus regional economic growth.***

[17] World Bank (2014) *Doing Business 2015: Going Beyond Efficiency* (Washington D.C.).
[18] The Economist Intelligence Unit (2014) The G20 e-Trade Readiness Index.
[19] Capgemini and RBS, World Payments Report 2014.

Pillar 2: Infrastructure

The gap or divide between high-income, upper-middle-income and lower-middle-income economies is most obvious in the infrastructure pillar.

Table 5. Infrastructure

Ranking	Economy	Scores
1	Korea	80.8
2	United States of America	72.1
3	Australia	71.5
4	Canada	64.5
5	New Zealand	63.0
6	Japan	62.5
7	Singapore	59.7
8	Hong Kong	58.6
9	Taiwan	55.4
10	Russian Federation	50.1
11	Brunei Darussalam	42.4
12	Chile	42.3
13	Malaysia	41.6
14	China	37.7
15	Thailand	37.5
16	Peru	34.9
17	Philippines	31.4
18	Mexico	30.0
19	Indonesia	29.2
20	Vietnam	28.3
21	Papua New Guinea	11.9

For example, the number of secure servers using encryption technology in Internet transactions ranges from six per one million people in Indonesia to 2,177 per one million people in the Republic of Korea. Internet penetration rates range from 6.5% in Papua New Guinea to 86.3% in Japan. Wireless broadband subscription rates range from 2.98% in Peru to 136.6% in Singapore. Even mobile subscription rates exhibit a wide range, from 40.98% in Papua New Guinea to 237.4% in Hong Kong.

According to the World Economic Forum, "ICTs are neither as ubiquitous nor spreading as fast as many believe. Some 90% of the population in low-income countries, and over 60% globally, are not online yet." It goes on to suggest that "as developing countries leapfrog to 4G technology, thus enabling owners of smartphones to access the Internet, Internet diffusion may accelerate in coming years. Prices of 4G smartphones remain high, but—thanks to innovation and competition—prices are expected to keep falling. Already one-sixth of smartphones sold in 2013 cost less than US$100."[20]

Among all APEC economies, only Papua New Guinea has achieved less than 80% mobile penetration, while 15 of 21 APEC economies have mobile penetration rates over 100%, including 140% in Thailand, 131% in Vietnam and 125% in Indonesia. As more people get connected, particularly in Cluster 3 economies, the market for mobile payments will only grow, and grow strongly. Bridging the digital divide is therefore essential for fully leveraging the opportunities in e- and m-payment. This includes increasing smartphone penetration, and broadband access and affordability. But this requires significant up-front investments. To offset the required investment burdens it also means opening the market to broad-based investment and participation.

Innovations in overcoming infrastructure challenges are contributing to higher uptake of e-payment and m-payment services, and are acting as gateways into the banking system for the unbanked, or underbanked, consumer segments.

[20] World Economic Forum (2015) *Global Information Technology Report 2015* (Geneva).

For example, the high cost of traditional brick-and-mortar bank branches has historically concentrated financial access points in urban areas where higher population density makes them profitable. However, innovations such as mobile financial services and agent banking, and the modernisation of post offices provide the opportunities for rural and low-income individuals to access financial services, including e-payments.

The World Payments Report 2014[21] notes that the Russian Federation's non-cash transactions grew by 26% during 2012, driven by improved payment infrastructure. The number of point-of-sale terminals, for example, grew 23% annually since 2011, leading to increased card acceptance. The Russian Federation ranks 10th in infrastructure – significantly higher than its ranking in other pillars.

Pillar 3: Demand

As discussed above, ***populations in Cluster 3 economies are less likely to have bank accounts and the ownership of credit cards is low, but those with smartphones have readily used them to make payments.***

Table 6. Demand

Ranking	Economy	Scores
1	Canada	56.3
2	New Zealand	56.0
3	Australia	55.8
4	United States of America	54.2
5	Korea	48.8
6	Singapore	48.1
7	Brunei Darussalam	46.4
8	Taiwan	46.2
9	Hong Kong SAR, China	44.2
10	Japan	41.8
11	Malaysia	33.9
12	Russian Federation	30.5
13	China	28.6
14	Chile	28.2
15	Mexico	27.1
16	Thailand	26.9
17	Peru	22.9
18	Vietnam	20.1
19	Philippines	19.9
20	Papua New Guinea	19.4
21	Indonesia	18.2

Note however, that the ownership of smartphones in Cluster 3 economies is still relatively low, and mobile payments are generally low in these economies. Nevertheless, ***mobile payments are poised for rapid expansion across emerging economies.*** According to WeAreSocial.sg,[22] almost 42% of the world's population had access to the Internet as of January 2015—a majority of them increasingly doing so from a mobile device. At least one-third of all web pages are now served to mobile phones. *In Papua New Guinea, 89% of all web pages are served to mobile phones.* Figure 4, a comparison on the use of different e-payment methods in Canada and China, provides an illustration of why this increasing mobile access and changing usage patterns is poised to have such a dramatic and transformational impact.

Economies with populations that spend an average of over five hours a day on the Internet include Indonesia, Malaysia, Mexico, Philippines, Thailand and Vietnam. In other words, there is significant latent demand for m-payment and e-payment services in these economies. It is also worth noting that 6% of Mexicans receive government transfers through a mobile phone and 3% receive wages through a mobile—the highest among all APEC economies.

[21] Capgemini and RBS, World Payments Report 2014.
[22] WeAreSocial.sg (2015) Digital, Social and Mobile Worldwide in 2015, http://wearesocial.net/blog/2015/01/digital-social-mobile-worldwide-2015/

According to MasterCard's Mobile Payments Readiness Index,[23] consumers are typically drawn to mobile payments either for access to e-payments (mainly in the emerging economies) or the convenience of mobile phone payments (in the high-income economies).

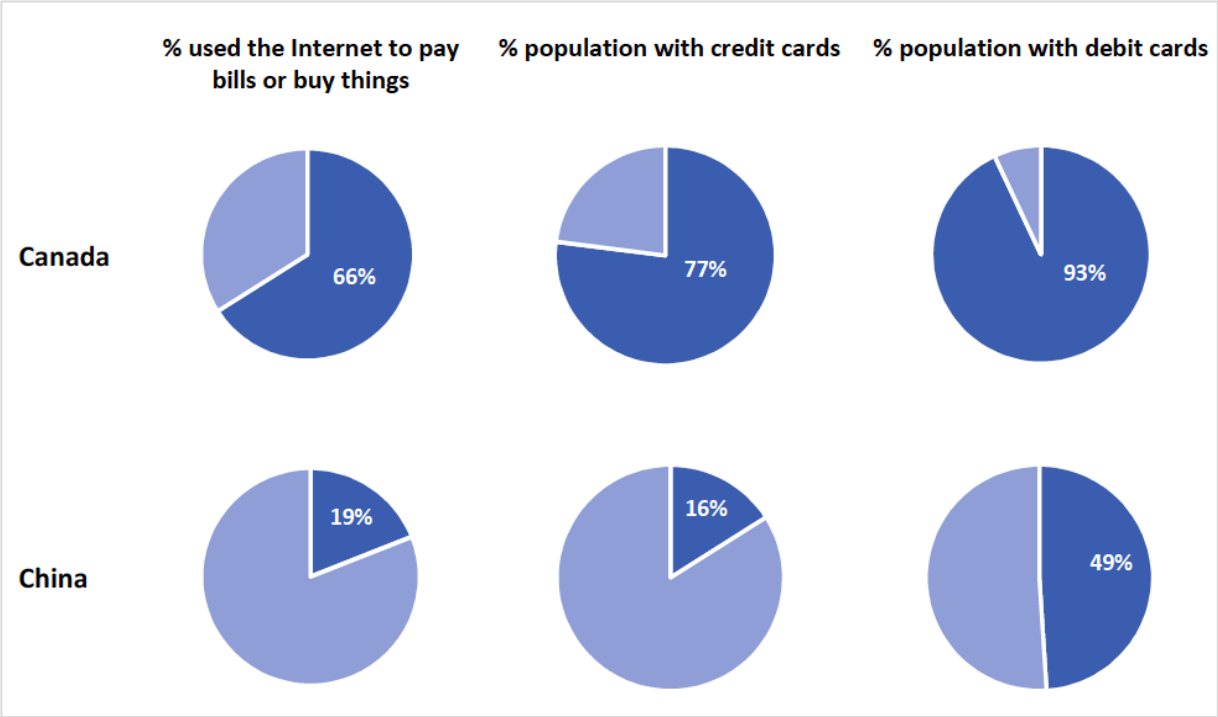
Consumer familiarity, willingness, and actual usage are necessary conditions for mobile payments to take off.

The MasterCard study also reports that "consumer readiness is a critical success factor. The most advanced infrastructures in the world, with responsive legal systems, mature economies, and sophisticated technology networks, may be fertile ground, but until consumers embrace mobile payments, that ground will remain fallow. Consumer familiarity, willingness, and actual usage are necessary conditions for mobile payments to take off."[24]

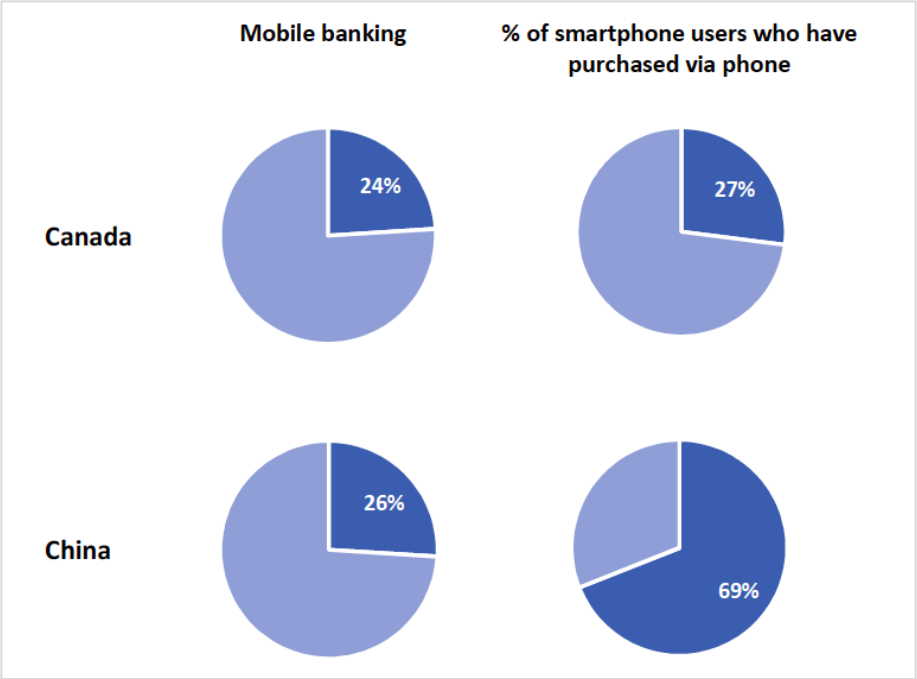
E-commerce drives e-payment and vice versa.

The MasterCard report claims that "more consumers are using mobile payments for m-commerce than for person-to-person or point-of-sale transactions in the vast majority of the markets," and "significant consumer experience with e-commerce is part of the reason why m-commerce is the leading mobile payment type in most of the markets surveyed."[25] At the same time, the United Nations Conference on Trade and Development claims that the emergence of secure and reliable e-payment instruments is an essential element for expanding e-commerce.[26] Thus, e-/m-commerce and e-/m-payment reinforce demand for each other spurring growth in both industries.

Figure 4. Comparison on the use of different e-payment methods in Canada and China



[23] MasterCard (2012) The Mobile Payments Readiness Index: A Global Market Assessment.
[24] Ibid.
[25] MasterCard (2012) The Mobile Payments Readiness Index: A Global Market Assessment.
[26] United Nations Conference on Trade and Development (2015) *Information Economy Report 2015: Unlocking the Potential of E-commerce for Developing Countries* (Geneva).



Sources: World Bank Global Findex 2014, WeAreSocial.sg and Our Mobile Planet, Google, http://think.withgoogle.com/mobileplanet/en/downloads/.

Pillar 4: Innovation

Generally, high-income economies have better human resources and more financial resources to develop innovative products and services. The exception is China, home to Alipay, Taobao and Tenpay. China has already emerged as the largest global market for business-to-consumer e-commerce—measured both by online buyers and by revenue, and most of the top e-commerce companies are from either China or the United States.[27]

Other economies to watch out for to come up with innovative e-payment solutions include Indonesia and Philippines. According to the World Economic Forum's Executive Opinion Survey, Indonesia received a score of 4.8, and the Philippines a score of 4.5 out of 7 for the capacity of companies to innovate. This is on par with economies like Hong Kong (4.5) and the Republic of Korea (4.7).

Partly this can be attributed to expected innovations in smartphone technologies. In line with actual and forecast increases in smartphone penetration, many of the innovative products being developed leverage smartphone technology. Among those innovating are non-banks, which have invested significant resources into the development of mobile payment systems.[28]

There is a need for collaboration among banks and non-banks in order to accelerate innovation. This includes mobile money and agent banking ventures, for instance encouraging non-bank players—such as retailers, e-commerce platforms, and telecommunication firms—to join the system of financial services delivery and access providers in an interoperable and open manner.

The most high-profile of the virtual currencies, Bitcoin, while still small in terms of volume, and still predominantly used in North America, is gaining traction in other parts of the world with, for

[27] Ibid.
[28] Capgemini and RBS, World Payments Report 2014.

Table 7. Innovation

Ranking	Economy	Scores
1	United States of America	84.6
2	Japan	67.5
3	Hong Kong SAR, China	61.0
4	Singapore	57.4
5	Taiwan	55.1
6	Australia	54.4
7	Korea	53.9
8	New Zealand	51.2
9	Canada	48.7
10	China	45.3
11	Malaysia	38.2
12	Indonesia	29.9
13	Russian Federation	27.4
14	Chile	25.5
15	Thailand	23.5
16	Philippines	21.2
17	Brunei Darussalam	19.6
18	Mexico	16.8
19	Vietnam	14.0
20	Peru	13.6
21	Papua New Guinea	12.9

example, 171 bitcoin nodes in the Russian Federation and 97 in China.[29] In addition to China and the Russian Federation, there has been recent investments in bitcoin and bitcoin-related services in smaller economies in Cluster 3 such as Mexico, Philippines, Thailand and Vietnam. Nevertheless, like many other Cluster 3 economies, they need to overcome regulatory, infrastructure and security challenges in order to be able to fully harness the opportunities in innovative e-payment and m-payment products and services.

Conclusion

The key trends and insights that emerge from this Index include the following:

- Globally, the rate of e-payment adoption continues to rise, and the range of e-payment channels is broadening significantly.
- APEC economies' level of advancement and experience in the development of an e-payment ecosystem varies widely. The growth of and innovation in e-payment can come from all income levels but the types of innovation will be different as the needs that these innovations are trying to meet are different.
- The readiness and capacity of an economy to engage in e-payment is strongly influenced by its stage of development. High-income economies are more likely to have a thriving ecosystem for e-payment.
- Yet, APEC is becoming mobile first and major growth will come from economies where smartphone adoption is growing and the proportion of services offered through smartphones are increasing. These economies are not necessarily high-income ones.
- None of the economies ranked in the top five of all the pillars in the e-payment ecosystem. Thus, in economies in every stage of development have an opportunity to improve on one or more aspects of the e-payment ecosystem.
- There is no single pathway to promoting and developing e-payment. E-payment needs to be developed holistically by considering the ways in which each of the pillars in the e-payment ecosystem affect or reinforce the other in the context of each individual economy.

[29] Ibid.

Regulatory and Policy Environment

- Many economies need to improve ease of doing business and focus on fostering a favourable regulatory and policy environment to enhance the confidence of businesses and consumers.
- Government's vision and efforts to make use of technology to improve transparency, efficiency and accountability in its own finances through e-payments can kick-start a virtuous cycle of adoption. This should be achieved through public-private partnerships involving the finance, retail, and telecommunications sectors in particular.

Infrastructure

- The gap or divide between high-income, upper-middle-income and lower-middle-income economies is most obvious in the infrastructure pillar.
- Bridging the digital divide will be essential to fully leveraging the opportunities in e-payments. This includes increasing smartphone penetration, broadband access, and affordability. Focusing on availability and affordability of basic financial services is key in driving e-payments.
- At the same time, innovations in overcoming infrastructure challenges are contributing to higher uptake of e-payment and m-payment services, and are acting as gateways into the banking system for unbanked consumer segments.

Demand

- Populations in upper-middle and lower-middle income economies are less likely to have bank accounts and the ownership of credit cards is low, but those with smartphones have readily used it to make payments.
- As more people get connected in these economies, particularly through the rapid uptake of mobile phones and social media, the market for e-payment and m-payment is likely to grow exponentially.
- E-commerce and e-payment are closely interlinked; e-commerce can drive e-payment growth and e-payment will facilitate e-commerce growth.

Innovation

- Generally, high-income economies have better human resources and more financial resources to develop innovative products and services.
- But developing economies are coming up with innovative e-payment solutions as well to meet their development needs. China has been one of the key innovators in e-payment with solutions like Alipay, Taobao and Tenpay.
- Other economies to watch out for to come up with innovative e-payment solutions are Indonesia and Philippines.
- As the number of non-bank players in the e-payment system increases, particularly in developing m-payment solutions, there is a need for collaboration among banks and non-banks in order to accelerate innovation.

3. Case Studies: In-Depth Look at Selected Economies

The APEC E-payment Index provides a high-level view of the entire APEC economy and a systematic analysis of various elements of the e-payment ecosystem. As the vast number of indicators that were aggregated in the Index shows, however, e-payment readiness and adoption depend on a multitude of factors. Each economy also has a different baseline and a different set of challenges to surmount. To complement the findings from the Index, this section provides a set of case studies which assesses a mix of advanced and nascent e-payment ecosystems, namely Australia, Hong Kong, Indonesia and the Philippines.

Australia

Given that Australia is one of the most developed APEC economies, it will be disappointed that it is ranked fourth overall in the Index, behind the United States, Singapore and New Zealand, and ranked third in the ICT and financial infrastructure pillar, behind the Republic of Korea and the United States. With a high GDP per capita of over USD60,000, and a fairly young and vibrant demographic, it would seem that Australia would be an ideal environment for e-payments and other innovative services to flourish. However, closer observation, as revealed from the Index findings, indicates that there is much room for improvement in the regulatory, demand and innovation pillars.

Australia is the sixth-largest economy in the world and the least densely populated, but it has done a commendable job in ensuring that the entire economy is well covered by mobile networks, Internet, ATMs and bank branches. While the government has encountered some hiccups in terms of its National Broadband Network (NBN) rollouts to bring about high-speed broadband access nationwide, it remains on track to meet its goal of 1 million connected premises by the end of 2015.[30] Although most Australians have a mobile phone and some form of Internet connection, the next target is for all Australians to own a smartphone, and a high-speed broadband connection. Australia is well set to reach this next target, and has one of the highest smartphone penetrations which, coupled with high-speed broadband promised by the NBN, will enable a host of e-payment opportunities for services such as e-commerce, high-definition videos and music, online games and many more.

However, while Australia has been doing well in 'hard' infrastructure, its 'soft' infrastructure needs to improve to encourage the development and adoption of innovative payment services. ICT regulations and policies are not as developed compared with other APEC economies, and it is not as active in using ICTs to enhance the economy's competitiveness. Australians are no strangers to different forms of payments with a high credit and debit card penetration and usage, some exposure to using e-payments for purchasing goods and paying bills, and access to a wide range of international e-commerce sites and global payment providers. The economy is in a good position to develop a healthy e-payment ecosystem, but it could do with a greater push and assistance by the government to provide direction and encourage innovation.

Recent E-payment Developments

In the middle of 2013, the payments industry in Australia began a collaborative programme to develop a New Payments Platform (NPP), a new national infrastructure for "fast, flexible, data rich payments".[31] The NPP that is set for completion in 2015 and, when operational in 2017, will establish

[30] Colley, A. (2015) NBN on track to reach million premises milestone, http://www.itnews.com.au/News/404496,nbn-on-track-for-million-home-milestone.aspx.

[31] Australian Payments Clearing Association (2015) New Payments Platform, http://www.apca.com.au/about-payments/future-of-payments/new-payments-platform-phases-1-2.

an infrastructure connecting all financial institutions. This will allow payments to be processed swiftly between financial institutions and customer accounts, where funds will be accessible almost as soon as payment is received—even when the payer and payee use different financial institutions. However, a *Business Attitudes to Electronics Payments Systems* study by HCL and Roy Morgan reveals that 73% of local businesses are still unaware of the NPP.[32] While the industry has been forward looking and is developing a streamlined system for payments, awareness and education among businesses and consumers are still lacking.

In August 2014, requirements for all card payment terminals to use chips and pins kicked in, replacing signatures for authorising payments made by locally issued cards. The PINwise[33]-led initiative is meant to increase security and combat card fraud. However while well-meaning, PayPal Australia findings revealed that two months before the mandate, 54% of SMEs were still not yet prepared for the change.[34] SMEs generally do not have the resources of big companies to understand and adopt the newest and latest payment technologies. The government and industry can play a role in bridging this gap by improving education efforts, and providing financial support.

The Australian Taxation Office declared in December 2014 that bitcoin and all other cryptocurrencies will not be treated as money or foreign currency, but will instead be treated as non-cash barter transaction, and taxed accordingly.[35] As such, bitcoin is classified as a 'good', and under the Goods and Services Tax (GST) regulations, will be taxed twice for both bitcoin and the goods for all bitcoin-for-goods transactions within Australia. Such restrictions have seen local start-ups such as CoinJar relocate to the United Kingdom where it will be exempted from the 10% GST.[36] And while the Australian Securities and Investments Commission (ASIC) have declared that cryptocurrencies are not a financial product, and operators do not require licenses to trade or hold them, businesses that connect cryptocurrencies to other legally defined financial products will still require market or financial services licenses.[37]

Sydney launched a fintech hub, "Stone and Chalk", in March 2015 to bring together entrepreneurs, venture capitalists, corporations and the New South Wales government to incubate financial services start-ups. ASIC will act as an advisor to the hub. With the Financial System Inquiry's report calling for the government to establish a public-private sector Financial Innovation Collaboration Committee, fintech looks set to be part of a concerted and coordinated push to place Australia at the forefront of e-payments development.[38]

Looking Ahead

Australia is already in a good position for adopting and innovating e-payment products and services, but particular attention needs to be paid to SMEs and start-ups that are facing problems keeping pace with advances in the local payments sector. Well-meaning initiatives, such as the NPP and chip

[32] HCL Technologies (2015) New Study Reveals Electronic Payments Extremely Critical for Two-thirds of Australian Businesses, http://www.hcltech.com/press-releases/corporate/new-study-reveals-electronic-payments-extremely-critical-two-thirds.
[33] An industry collective of major local banks and card providers.
[34] PayPal (2014) Aussie SMEs not prepared for chip and PIN mandate: PayPal research reveals, https://www.paypal-media.com/au/press-releases/aussie-smes-not-prepared-for-chip-and-pin.
[35] Australian Taxation Office (2014) Tax treatment of crypto-currencies in Australia – specifically bitcoin, https://www.ato.gov.au/General/Gen/Tax-treatment-of-crypto-currencies-in-Australia---specifically-bitcoin/.
[36] Spencer, L. (2014) Australia's CoinJar moves HQ to UK for 'progressive' bitcoin scene, http://www.zdnet.com/article/australias-coinjar-moves-hq-to-uk-for-progressive-bitcoin-scene/.
[37] Parliament of Australia (2014) Digital Currency Submissions, http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Digital_currency/Submissions.
[38] Financial System Inquiry (2014) Executive Summary, http://fsi.gov.au/publications/final-report/executive-summary/.

and pin systems, need to go hand-in-hand with education efforts and implementation assistance to help SMEs, as this is often the constituency that can benefit most from the new systems.

With a Digital Finance Advisory Committee planned by ASIC to help fintech start-ups better understand and navigate regulations and policies, the government needs to avoid making licensing rules on new financial services, such as cryptocurrencies, too onerous or restrictive that they either prevent or chase away start-ups from entering the space.[39] Nevertheless, the Australian government has yet to outline any overarching plan for e-payments. Any such approach will require the Department of Finance, the Australian Communications and Media Authority (ACMA), and other relevant agencies working together to facilitate e-payment services across the economy. In order for Australia to remain a leader in e-payment, the whole-of-government approach to encourage agencies to coordinate and continuously provide the supportive hard as well as soft infrastructure is needed.

[39] ASIC (2015) Harvesting the opportunities from financial innovation: How can ASIC help you? http://download.asic.gov.au/media/3221016/harvesting-the-opportunities-from-financial-innovation-how-can-asic-help-you-speech-28-april-2015.pdf.

Hong Kong

Although Hong Kong ranked sixth in the Index, behind the United States, Singapore, New Zealand, Australia, and Canada, rankings between second-placed Singapore and eighth-placed Japan were fairly close, with less than seven points separating the seven economies, illustrating a strong competitiveness – and readiness – between these economies in the rankings. Nevertheless, their scores varied significantly in different pillars, meaning that the opportunities and constraints were different for each economy. Hong Kong ranked second in the ICT and business regulations and policies pillar (behind Singapore), and ranked third in the innovation pillar (behind the United States and Japan), but only managed to score slightly above the average on the infrastructure and demand pillars.

Hong Kong has emerged as a major global trade hub and financial centre, with the government adopting a relatively light-touch regulatory approach to the economy, and adhering to its official policy of 'positive non-interventionism' since 1971. As a special administrative region of China since 1997, Hong Kong operates under a principle of 'one country, two systems', with a distinctly different style of governance from the People's Republic of China. As a frequent top three ranker in the World Bank's *Ease of Doing Business* Index, Hong Kong is popular among multinational companies for setting up regional offices and headquarters, and for its business-friendly regulatory environment.[40] However a lack of overt government direction for innovation and demand has cost Hong Kong points in the rankings, and could be a stumbling block in fully realising the potential for e-payments.

Hong Kong consumers are generally familiar with different forms of non-cash payments. Plastic cards are ubiquitous in Hong Kong, where practically every citizen owns an Octopus contactless stored-value card. Initially developed and primarily used for paying public transport fees, the Octopus card has now expanded in use to small retail purchases, carpark payments, and even as a library card, or building security key.[41] The next challenge for Hong Kong is in stimulating greater demand for the use of e-payments outside of Octopus cards, to pay for items on e-commerce sites, social media and other online platforms, thereby growing the online sector.

In comparison to many other economies in the Index, Hong Kong is exceedingly densely populated (also true for Singapore), which works in Hong Kong's favour in terms of Internet connectivity. The close proximity of high-rise residential and commercial buildings means that the distance between fibre cables are short, in turn reducing the cost of providing broadband. The open and competitive broadband market has also encouraged service providers to innovate using different solutions, such as different cell-sizes, Wi-Fi hand-off for data traffic, fibre backbones and digital network management techniques such as software defined radio and multiple-input and multiple-output antennae, to ensure that wireless coverage is comprehensive and reliable. Hong Kong however loses most points under infrastructure for the ratio of the number of ATMs and commercial bank branches to people, at 15 and 24 respectively per 100,000 adults.

Recent E-payment Developments

AsiaPay and Octopus formed a partnership in February 2015 to give Octopus card users the ability to pay through their near-field-communication-enabled mobile devices at merchants that accept the

[40] World Bank (2014) *Doing Business 2015: Going Beyond Efficiency* (Washington D.C.).
[41] Octopus (2015) Corporate Profile - Services in Hong Kong, http://www.octopus.com.hk/about-us/corporate-profile/services-in-hong-kong/en/.

AsiaPay payment gateway.[42] However the availability of more mobile payment options does not necessarily translate into more usage and adoption.

Hong Kong boasts a fairly lively cryptocurrency scene, in part due to a lack of regulatory oversight. However in February 2015, local bitcoin exchange MyCoin, which allegedly operated as a pyramid scheme, suddenly ceased operations running off with USD380 million in client funds, prompting the Hong Kong Monetary Authority to warn people against investing in cryptocurrencies.[43] The official stance on cryptocurrencies currently identifies them as a commodity rather than currency, and thereby has left it largely unregulated. While the lack of regulation may appeal to those who prefer a hands-off approach, allowing firms to innovate without restrictions, the lack of regulation may be negatively interpreted as a lack of clarity and support, resulting in fear that cryptocurrency may be banned in the future. This has discouraged start-ups such as CoinPip from basing in Hong Kong, choosing to do so in Singapore instead, where the regulators have been largely supportive of innovation.[44]

While the government has been generally quiet on regulating cryptocurrencies, it did announce in March 2015 to establish a Steering Group on Financial Technologies, which will send a positive message to investors and entrepreneurs that the government is prepared to provide direction and support for the development of some forms of fintech in Hong Kong.[45]

Global business management consulting firm Accenture launched its first FinTech Innovation Lab out of the United States in Hong Kong in September 2014. The Lab was launched with eight chosen start-ups who were mentored by leading executives from financial services firms, with the aim to foster innovation in financial services using technology. Accenture chose Hong Kong for its status as a regional financial hub, and for its close ties to China, which makes it an ideal gateway for future Chinese investment.[46]

Looking Ahead

Hong Kong has the potential to take a leading role in the use of e-payments with its developed infrastructure and light-touch regulatory environment. As a transitioning economy, the government can continue its preferred stance on positive non-interventionism, while ensuring the regulatory and physical infrastructure support dynamic market growth.

Some see that the e-payments industry could benefit from more support from government in encouraging demand and use, particularly if it is to compete with other financial centers such as Singapore and Shanghai where the government has been playing an increasingly active role in steering innovation and development of e-payment products and services. This could include the use of incentives, such as tax breaks, greater use and feature in government services, and other such initiatives to encourage start-ups to develop solutions for the local market.

---

[42] AsiaPay (2015) AsiaPay Partners with Octopus to Expand Payment Gateway for Octopus Online Payment Service, http://www.asiapay.com/pdf/PR%20Octopus%20Online%20Payment%20Service%20en.pdf.

[43] Price, M. (2015) Hong Kong warns over digital currencies amid alleged bitcoin fraud, http://www.reuters.com/article/2015/02/10/us-bitcoin-hongkong-idUSKBN0LE09A20150210.

[44] Wong, M. (2015) Nurture or Neuter: The Bitcoin Brouhaha, http://harbourtimes.com/2015/05/22/nurture-or-neuter-the-bitcoin-brouhaha/.

[45] Hong Kong's Information Services Department (2015) Fintech advisory group formed, http://www.news.gov.hk/en/categories/finance/html/2015/03/20150330_162956.shtml.

[46] Groenfeldt .T (2014) Accenture's FinTech Innovation Lab Launches in Asia, http://www.forbes.com/sites/tomgroenfeldt/2014/06/26/accentures-fintech-innovation-lab-launches-in-asia/.

Indonesia

Indonesia has been gaining increasing attention as Asia's next focal market for e-commerce and e-payments. Its growing economy, emerging middle class, youthful demographic, increasing spending power and rapidly growing Internet user-base are all reasons to be optimistic about the future prospects of Indonesia's digital economy.[47] Yet Indonesia still performs comparatively poorly across the APEC E-payment indicators; its overall ranking is 16 out 21, ahead only of the Philippines (17th) and Vietnam (20th) among its South East Asia peers.

The immediate priority for Indonesia appears to be on improving the ICT infrastructure to provide secure and reliable Internet connectivity. While mobile penetration has reached near ubiquitous levels, broadband connectivity is still limited, and national cybersecurity capabilities remain questionable.

Indonesia also needs a strategy for unlocking the nascent demand for e-payments, as this is Indonesia's weakest pillar (21st). The low ranking can be explained by Indonesia's heavy cash-dependency. Only 20% of the population is banked, with credit penetration at around only 5%, one of the lowest among APEC economies.[48] While 1 out of 4 Indonesians own a debit card, only 1 out of 10 would actually use it.[49] However, Indonesia is also the world's fourth largest economy with a very young population and therefore the *potential* for growth amongst Indonesian consumers and businesses remains potent, and e-commerce and e-payments, particularly when delivered via mobile connectivity offer ways around many of the existing market constraints.

In the regulatory and policy pillar Indonesia fares relatively better (14th), as it does in the provisioning of e-payment products and services (12th). There is, however, still a lot of room for Indonesia to improve the ease of doing business, the effectiveness of its legal system and the investment climate. Bureaucratic hurdles of market entry and investment clearly need to be addressed for Indonesia to fully benefit from the efficiencies and social gains possible from digital payments.

Recent E-payment Developments

More favourable regulatory change has begun to take place in recent years as the government has come to recognise the potential of e-payments in fostering financial inclusion. A case in point is branchless banking, which uses agents and mobile phones to provide basic savings and transaction services, that has risen to prominence in Indonesia's national agenda. In 2013, Bank of Indonesia (BI) released guidelines for allowing selected banks and mobile network operators to pilot agent-model and mobile wallet initiatives to test the viability of the business model.[50] A year later, the Financial Services Authority (OJK) formally opened the door for banks to hire agents to improve financial inclusion and expand basic financial services to remote and rural parts of the economy,[51] eventually

[47] TechAsia (2015) Barriers to Indonesian e-commerce: Separating fact from friction, https://www.techinasia.com/friction-points-and-barriers-indonesia-ecommerce/.
[48] Only 1.6% of 15 years or older Indonesians have credit cards, lower than Vietnam (1.9%) according to the World Bank's 2015 Findex figure. The figure for Papua New Guinea was not available. See http://datatopics.worldbank.org/financialinclusion/.
[49] World Bank (2015) Global Findex Database, http://datatopics.worldbank.org/financialinclusion/.
[50] CGAP (2013) Latest on Branchless Banking from Indonesia, http://www.cgap.org/blog/latest-branchless-banking-indonesia.
[51] The Jakarta Post (2014) OJK Targets Deeper Financial Market with New Rules, http://www.thejakartapost.com/news/2014/11/21/ojk-targets-deeper-financial-market-with-new-rules.html.

launching a nationwide campaign, *Laku Pandai*, in March 2015.[52] The four banks participating in this campaign plan to hire over 128,000 agents by the end of 2015.[53] Once OJK approves all pending licensing requests from 13 other banks, the number of agents is expected to grow to 350,000 with coverage extending across 75% of Indonesia's geography, drastically improving the accessibility of mobile-based financial services.[54] While it is still early days for the programme, hopes are high among banks, with Bank Mandiri for example expecting to grow its customer base from the current 14 million to some 50-100 million.[55]

Similar developments on the horizon should further help Indonesia move up the ranks in coming years, such as the Ministry of Communication and Information Technology's aspirations to improve broadband connectivity and to establish a national control tower for cybersecurity. The Ministry's forthcoming e-commerce roadmap will also provide regulatory clarity and boost the already-growing e-commerce market, and in turn, e-payments as well.[56]

The private sector is also weighing in on Indonesia's e-payments opportunities. In May 2013, for example, the three leading mobile network operators went live with a ground-breaking initiative to make their mobile wallet services interoperable.[57] This allowed Telkomsel's T-cash, Indosat's Dompektu and Xk Tunai users to send money electronically across any network.

Looking Ahead

While banks and telcos currently dominate the e-payment market, e-commerce and alternate payment solutions providers will play a critical role in spurring demand in the future. E-commerce platforms such as Lazada and Tokopedia have circumvented the limitations on current e-payment infrastructure by offering cash-on-delivery and bank transfers. As more and more Indonesians become accustomed to the convenience of online commerce, the demand for digitally-enabled payments will continue rise, particularly among young and tech-savvy Indonesians.

Another hurdle is inconsistent regulations and the siloed approach of different government agencies. BI, for example, has one set of governing rules for e-money while, OJk has another for *Laku Pandai*, with the latter linked to savings accounts.[58] The programme is thus heavily reliant upon banks with limited support from telcos, limiting the programme's potential reach.[59]

Finally, consumer mistrust of e-payment systems needs to be addressed. Progress has been made[60] but there is still a long way to go in improving the reliability of payment gateways, for example.[61]

---

[52] Participating banks include Bank Mandiri, Bank Rakyat Indonesia, Bank Central Asia and Bank Tabungan Pensiunan Nasional.
[53] The Jakarta Post (2015) Four Major Banks Launch Branchless Banking Program, http://www.thejakartapost.com/news/2015/03/27/four-major-banks-launch-branchless-banking-program.html#sthash.mgLqXTEm.dpuf.
[54] Ibid.
[55] Ibid.
[56] The Jakarta Post (2014) Government to Launch E-commerce Law Framework This Year, http://www.thejakartapost.com/news/2015/03/07/govt-launch-e-commerce-law-framework-year.html
[57] GSMA (2013) Implementing Mobile Money Interoperability in Indonesia, http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2013/10/Implementing-mobile-money-interoperability-in-Indonesia.pdf
[58] The Wall Street Journal (2015) Mobile Banking Struggles in Indonesia
[59] Ibid
[60] Tech in Asia (2014) Doku Transacts IDR 520 million, https://www.techinasia.com/doku-2014-520-million-transaction/

The Philippines

With a relatively long history in mobile payment services and a growing e-commerce market, the Philippines is primed to be a hotbed for e-payments. Yet, the APEC E-payment Index shows that the Philippines is still underdeveloped relative to its potential. Ranked 18th out of the 21 APEC economies, the Philippines scores ahead of only Peru, Vietnam and Papua New Guinea. Scores across the regulatory and policy pillar, ICT and financial infrastructure, and demand are all low, placing 17th, 18th and 19th respectively, while for innovative products and services (16th), the Philippines comes out ahead of Indonesia and slightly behind Thailand.

At the macro level, the Philippines still has some way to go in improving rule of law and the business environment, both of which dragged the economy's scores down in the regulatory and policy environment pillar. According to the assessment of the United States Agency for International Development (USAID) and the American Bar Association, Philippine courts are burdened with lengthy backlogs, making timely delivery of justice difficult and ultimately undermining the credibility of the judicial system.[62] Despite government efforts at improving the business climate, the economy is losing ground to its peers when it comes to facilitating market entry of new businesses (below Malaysia, Thailand and Vietnam).

While the Philippines fares well in mobile penetration, there is still significant room for improving ICT infrastructure security and access to formal financial systems. Its score in the Global Cybersecurity Index lags behind regional and income peer groups, and formal financial services remain out of reach for the majority of Filipinos. Supporting the latter assessment are indicators on the ownership and use of credit cards in the Philippines, amongst the lowest in APEC at 2%.

The silver lining is the active use of the Internet and social media by the country's young and growing population. While the majority of Filipinos have yet to use the Internet or mobile for day-to-day payments activities (only 2.5% of the population are using their mobile to make a transaction according to the latest Findex results), the current levels of social media use show significant latent demand to be tapped.

The growth trajectory of e-commerce also shows that Filipinos are increasingly becoming comfortable with online shopping. The e-commerce market is projected to grow at a compound annual growth rate (CAGR) of 101.5% during 2013-2018,[63] led by regional e-commerce juggernauts such as Zalora and Lazada, and local retail heavyweights such as the SM group. The overseas Filipino worker community, whose remittance amounts to 8.5% of the economy's GDP in 2014,[64] is another factor that is likely to contribute to the increasing demand for e-payment products and services.

The Philippines is relatively well positioned when it comes to the supply side of the e-payment services and products. Home to two of the earliest mobile payments services in the world—GCash and Smart Money, launched in the early 2000s—the Philippines enjoys a plethora of options when it comes to mobile payments. Leading forces include the telco duopoly (PLDT and Globe), and

---

[61] According to Veritrans, a typical payment gateway in Indonesia had reliability of 96% (4 out of 100 transactions will return error) when the company was first established. The company subsequently improved the rate to 98% but is still below international average, which is above 99.9%.

[62] The American Bar Associations, The Rule of Law Programs in the Philippines, http://www.americanbar.org/advocacy/rule_of_law/where_we_work/asia/philippines/programs.html

[63] Ken Research (2014) The Philippines E-Commerce Market Outlook to 2018, http://www.kenresearch.com/it-enabled-services/e-commerce-industry/philippines-ecommerce-market-research-report/590-105.html

[64] Manila Times (2015) OFW Remittance Hit Record High, http://www.manilatimes.net/ofw-remittances-hit-new-high/163522/

alternative payments services by international players such as PayPal and Dragonpay. The key priority for the Philippines is to drive adoption widely throughout the economy so that the pervasiveness of the e-payment reaches critical mass. Building consumer trust is key in driving adoption but that requires sustained efforts from services providers, supported by an enabling legal and regulatory environment.

Recent E-payment Developments

In recent years, the Philippines government has paid particular attention to the potential of e-payments in reducing corruption and increasing efficiency of financial flows in the public sector.[65] As a result, the government has initiated a number of initiatives that show a deliberate and strategic shift toward e-payment systems.

In 2011, the government started a number of e-government initiatives to create an integrated financial management information system for a more transparent and effective way of monitoring public funds. One of the initiatives is the development of an e-procurement system (PhilGEPS) to allow e-bids, e-payments and e-transactions in the use of public funds. PhilGEPS eventually went live in 2013 in partnership with the Land Bank of the Philippines, allowing government agencies to pay for procured items through an online portal. The Department of Science and Technology further supported the shift with the launch of a payment platform for all government agencies, PhPay, in 2013, which integrated existing market services providers such as DragonPay, PVB Card, Asia Pay and Rural Net. The National Telecommunications Council and the Social Security System followed suit by implementing and accepting real-time online payments.

Bangko Sentral ng Philipinas (BSP) has also played an important role in enabling the growth of mobile money services. In part due to its financial inclusion mandate, BSP has taken a 'test and learn' attitude instead of an *ex-ante* approach to mobile money regulations, enabling innovations from market players. This includes approving non-bank agents to perform cash in/out in 2005, effectively turning pawnshops, airtime sellers and moneychangers in the rural areas into e-payment network extensions.[66]

The latest development in the government-to-consumer space stems from the Kasambahay Law, which aims to improve social security benefits of overseas domestic workers. The law prompted Globe and Smart to roll out new mobile wallet offerings. Smart Communications, a subsidiary of PLDT, for example, rolled out BayardLoad, an e-money platform to facilitate employers of overseas Filipino workers to subscribe to and pay for government social benefits, including the Social Security System, Philippine Health Insurance Corp (PhilHealth), and the Home Development Mutual Fund.[67] With such developments the Philippines has become one of the most interesting markets for e-payment initiatives and can be expected to rise up the rankings in coming years.

Looking Ahead

While the Philippines has been slowly moving towards a 'cash-lite' society for some time, a few impediments in market conditions need to improve for the economy to make it to the next stage of broad-based e-payment adoption. The long-standing duopoly of PLDT and Globe has reduced the incentives for the companies to work together and thus make the e-payment pie bigger. The fact that GCash and Smart Money are still not interoperable a decade after their inception is a case in

[65] World Bank (2015) Infrastructure Challenges in the Philippines, http://www.worldbank.org/transport/transportresults/regions/eap/infra-chall-philippines.pdf
[66] GSMA (2012) Mobiel Money in the Philippines – The Market, the Models and Regulation.
[67] Also known as Pag-IBIG Fund. CGAP (2013) http://www.cgap.org/blog/innovation-person-government-payments-philippines

point. Anecdotal evidence shows that existing e-payment players are not investing enough to improve the consumer experience in e-payments.[68] New entrants such as Coins.Ph, a cryptocurrency-based peer-to-peer payment platform, is banking on this gap to be able to penetrate and grow in the market.

[68] Telephone interview with Ron Rose, Founder of Coins.Ph. Dated 15 June 2015.

4. Conclusion and Recommendations: Looking Ahead

E-payment enables economies to run better and boosts growth through factors such as reducing transaction costs, expanding formal financial services to the 'uneconomic', inducing productivity gains for government and businesses, and opening markets and increasing access for SMEs.

This study documents the linkages between e-payment penetration and economic growth and canvasses where each APEC economy stands in the usage and level of development in e-payments. The APEC E-payment Index provides a tool with which to understand where the barriers are and which areas need to be improved in order to benefit from the opportunities presented by e-payments.

Noting the wide-ranging socio-economic impacts e-payments adoption can have on APEC economies, the following are some of the lessons that can be taken forward by the APEC Business Advisory Council.

- **Understanding that the level of economic growth is not the sole determinant of e-payment readiness or adoption.** While supportive infrastructure such as ICT and payment networks are heavily influenced by income level, others such as regulatory regimes, demand, and even the capacity to innovate, show weak correlation to income level.

- Conversely, **fostering digital payments, or transactions can enable an economy to 'leapfrog' in its economic development trajectory**. This involves a systemic focus and a whole of government policy-driven approach to establish an environment that promotes e-payment adoption and innovation.

- While each economy can have a different pathway towards maximizing e-payments, **a few building blocks need to be in place for a transformational shift towards e-cash-lite society**.
    - No matter the stage of development of the e-payment ecosystem, facilitating an attractive market (including business) climate, and investments into innovative e-money solutions is important to sustain development of e-payment ecosystem.
    - Building consumer trust is crucial to achieving the desired network effects of e-payments.

- **Understanding that future growth will come disproportionately from emerging economies fuelled by affordable smartphones and interoperable network access**. The playing field for innovations is being levelled for both developed and developing countries.

- **Government adoption of e-payments creates new opportunities, new needs for payment infrastructure and a change in consumer cash dependence**.

- **Fostering e-payments is a multi-faceted endeavour that cuts across different sectors and government agencies.** Therefore, bridging various issues – services and technology, financial and Internet access, for example, in the policy and creating the conditions for industry collaborations especially among financial institutions, telcos, and alternative payment service providers are important for balanced development of e-payments.

- The region includes a mix of developed and emerging markets operating with different agendas and multiple regulations that govern e-payments. For SMEs to fully benefit from the market access and growth opportunities e-payments offer, **APEC economies need to create a consistent approach to e-payments regulations**, including harmonisation of procedures and e-payment policy alignment.

In addition, there are areas of future works that can be considered:

- **For a longitudinal view of APEC**: Compile the APEC E-payment Index on an annual basis so that economies can build a trend-line of information to track progress

- **Empirically substantiate the linkages between use of e-payments and economic growth**: Conduct a thorough econometric modelling of the economic contribution of e-payments across all 21 APEC economies over an extended period of time

- **To understand market dynamics**: Conduct a country-level research that creates a matrix of stakeholders and existing regulations that govern e-payments matrix. This will help identify where the inconsistencies and gaps are that throttle adoption and innovation.

- **To provide insights on how best to roll out e-payment regulatory framework**: Research potential operational risks stemming from diversity, concentration and complexity of various payments players and networks.

Digitisation of payments is not a question of 'if', but 'when'. Cash-dependent economies face not only frictions in businesses transactions but in public service delivery, cross-border trade and inclusive financial growth. While there are many barriers to adoption, the benefits of e-payments far outweigh the risks of non-adoption. Wider use of e-payments and policies that support their adoption is a priority no APEC economy can afford to ignore.

Appendix 1. Econometric Methodology and Results

Data

The dataset used in this proof-of-concept econometric analysis includes variables listed below for five economies, namely Australia, China, Indonesia, Japan and Republic of Korea, observed across four years, spanning from 2010 to 2013.

Methodology

Since the purpose of the econometric modelling was to prove that the Deloitte modelling used for the Europe is applicable to the APEC economies, the researchers simplified the Deloitte modelling into the following equation.

$$\ln(GDPpercap_{i.t}) = (\alpha + \beta\ln(GDPpercap_{i.t})) + \gamma \ln\left(OnlineRetailSales_{i,t}\right) + x_{i,t}\delta + \theta_i + \varepsilon_{i,t}$$ where $x_{i,t}$ includes $Invt_{i,t}$, $GovExp_{i,t}$, $LabPart_{i,t}$ and $Trade_{i,t}$,

wherein the variables used are defined as below:

Table A-1. Variables

Variable Name	Variable Description
LnGDPpercap	Log of GDP per capita in constant 2005 USD
GovExp	Gen government final consumption expenditure as a share of GDP
LnOnRetailSales	Log of Online Retail Sales
Invt	Gross capital formation as a share of GDP
LabPart	Labour force participation rate
Trade	Trade as a share of GDP

The econometric results are as follows:

Tabel A-2. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31. 973	5	6.395	61.857	.000[b]
	Residual	1.861	18	.103		
	Total	33.833	23			

a. Dependent Variable; LnGDPpercap

b. Predictors: (Constant), GovExp, Trade, Invt, LaborPart, LnOnlineRetail

First, the fitness of the model to the data was tested (see Table S-2). An F-test in regression compares the fits of different linear relationships and can assess multiple coefficients simultaneously. The F-test of overall significance determines whether this model is statistically significant. The regression analysis shows that the F-test outcome is highly significant (< .001), so the model does fit the data.

Table A-3. R square

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.972[a]	.945	.930	.32152

a. Predictors: (Constant), GovExp, Trade, Invt, LaborPart, LnOnlineRetail

In regression, the R-squared coefficient of determination is a statistical measure of how well the regression line approximates the real data points. Despite the modification in the modeling from the Deloitte study, R square shows the percentage of the dependent variable variation that is explained by the model. In our case, 94.5% of the variance in GDP per capita can be explained by all the independent variables (see Table A-3).

Table A-4. Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	6.488	1.743		3.722	.002		
	Lnonlineretail	.109	.048	.241	2.268	.036	.271	3.694
	Invt	-.041	.011	-.309	-3.579	.002	.411	2.435
	LaborPart	.001	.021	.005	.050	.961	.368	2.719
	Trade	-.001	.004	-.011	-.153	.880	.572	1.749
	GovExp	.248	.039	.658	6.337	.000	.284	3.527

a. Dependent Variable; LnGDPpercap

Online retail sales shows a significant coefficient and has a low p-value (<.05), which suggests that changes in its value are related to changes in GDP per capita. The results suggest that a 1% change in online retail sales is associated with 0.1 % change in GDP per capita.

Appendix 2. APEC E-payment Index – Methodology

The E-payment Ecosystem

The APEC E-payment Index gauges the readiness and capacity of the 21 economies that comprise APEC[69] to engage in e-payment, the level of use of e-payment and m-payment services, as well as their development potential based on each economy's e-payment ecosystem.

Using around 40 business, technology, financial access and payments-specific variables, the Index scores and ranks the 21 economies to identify who are successful in adopting and utilising electronic forms of payment today but also those that offer future potential in terms of capacity to innovate.

Four pillars make up the e-payment ecosystem, and the weighting given to each pillar in the Index is as follows:

1. **Regulation and Policy** (business climate and openness to technology) – 20%
2. **Infrastructure** (level of enabling technology and financial connectivity) – 30%
3. **Demand** (e-payment usage level and latent demand) – 30%
4. **Innovative Products and Services** (the supply-side landscape and capacity to innovate) – 20%

Pillar 1 looks at the extent to which regulations and policies are hindering or fostering the development and growth of businesses related to e-payment, as well as e-payment adoption by businesses and individuals. It therefore focuses on the regulatory and policy environment for both the technology and business sectors. It reflects on the presence of ICT-related regulations and policies (e.g., electronic commerce, digital signatures, consumer protection), and the extent to which government is using technology to enhance competitiveness. It also examines the time and costs required to start a business, the efficiency of the legal framework in settling disputes and challenging regulations, and the range of financial products and services available to businesses.

Pillar 2 includes indicators on the connectivity and financial infrastructure required to provide reliable and secure e-payment services. It captures the level of penetration of the Internet, wireless broadband, mobile phones and smartphones, as well as the coverage of payment options through ATMs and commercial bank branches in each economy. It also examines national capabilities in cybersecurity. Capabilities to address security risks are vital to enable both the demand for e-payment, as well as promote e-payment innovation.

Pillar 3 provides a picture of both latent and actual demand for e-payment services from businesses and consumers. It contains indicators on three aspects: the use of cashless transactions, the use of mobile payments, and the usage level of the Internet at large. Indicators for the latter include the use of the Internet to buy things and pay bills, and as e-payment options are being introduced through social media, the time spent on social media is also measured.

Pillar 4 focuses on the supply-side of e-payment, including the presence of international e-commerce and e-payment players such as Alibaba, Alipay, Amazon, Bitcoin, eBay, PayPal, Taobao and Tenpay, and each economy's capacity to develop innovative e-payment solutions. The presence of international players both promotes and is indicative of open access and demand, which leads to

[69] The 21 APEC economies are: Australia, Brunei Darussalam, Canada, Chile, China, Hong Kong, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Taiwan, Thailand, United States of America and Vietnam.

diverse business models and competition. This pillar is represented by indicators assessing the intensity of local competition, venture capital availability, ICT patents application, and the extent to which the government is offering electronic transactional services as part of e-government initiatives.

A team of researchers collected data for the Index in May and June 2015. The process of developing the Index included establishing relevant sub-indexes or pillars, selecting relevant indicators for each pillar, normalising the data, addressing missing data, and finally calculating the Index. The Index is based on a 100-point scale, where 1 represents the worst situation and 100 the best.

Selecting the Indicators

A total of 39 indicators were selected for the APEC E-payment Index. Only indicators with data available for at least two-thirds of APEC economies were used. For all the indicators, the latest data available at the time of research was used, and the values for each indicator were taken from the same year, with the exception of Brunei Darussalam.[70]

The indicators selected for each of the pillars are summarised below:

1.Regulation & Policy *(8 indicators)*	**2. Infrastructure** *(8 indicators)*	**3. Demand** *(15 indicators)*	**4. Innovative Products &Services** *(8 indicators)*
Time and cost required to start a business	Commitment to cybersecurity	Use of electronic payment – to buy things, pay bills, etc. (3 indicators)	Capacity for innovation
Efficiency of legal framework in settling disputes	Number of secure Internet servers	Use of mobile payment – to buy things, pay bills, receive wages, receive government transfers (6 indicators)	Intensity of local competition
Efficiency of legal framework in challenging regulations	Number of Internet users	Average daily use of the Internet via a PC or tablet	Transactional and connected e-services offered by government
Business impact of rules on foreign direct investment	Wireless broadband subscriptions	Hours per day on social media	PCT ICT patents application
Level of development of laws relating to ICT	Smartphone penetration	Number of people with credit card	Venture capital availability
Importance of ICTs to government vision of the future	Mobile subscribers	Number of credit card used	Availability of Amazon, PayPal and eBay in a country
Government success in ICT promotion	Number of automated teller machines (ATMs)	Number of people with debit card	Availability of Alibaba, Taobao, Alipay and Tenpay in a country
Availability of financial services	Number of commercial bank branches	Number of debit card used	Number of Bitcoin nodes

The indicators under each pillar were weighted equally.

[70] The latest World Economic Forum's Networked Readiness Index 2015 did not include Brunei Darussalam, therefore in cases where the indicators used were from this Index, Brunei Darussalam's data came from the 2014 Index while the other economies used the 2015 Index.

Normalisation

As the indicators had different units and scales, any indicator that did not use a 100-point scale had to be normalised to make the indicator values comparable, as well as to construct aggregate scores for each economy.

Some indicators, such as the one utilising the International Telecommunication Union Global Cybersecurity Index, and the number of Internet users per 100 habitants, already used a 100-point scale so these did not need to be normalised. Indicators not based on a 100-point scale, such as the indicators using the results from the World Economic Forum's Executive Opinion Survey which gave a rating of 1 to 7 for each economy, were normalised.

For indicator values that required normalisation, minimum and maximum values were set in order to transform the indicators expressed in different units into indices between 0 and 100 using the following formula:

Normalised value = ((actual value – minimum value) / (maximum value – minimum value)) X 100

Certain indicators, such as the one on mobile subscription per 100 inhabitants had values over 100. For these indicators it was decided that the maximum value would be 100, and any economy with a value over 100 was adjusted to 100.

Treatment of Missing Values

Many of the indicators contained missing values for a handful of economies. Brunei Darussalam, Chile, Hong Kong, Papua New Guinea, Peru and Taiwan in particular had missing data for a number of the indicators. It was necessary to estimate the missing values because missing values would have led to a bias in calculating the Index and limited the ability to make comparisons across economies.

To estimate the missing values for an economy, a clustering technique was used. The economies were grouped by the World Bank's income classification, and for a particular indicator with missing value, the average of the normalised data for each income group was calculated to estimate the missing values.

World Bank's income classification used to group the economies is as follows:

- *High-income economies* (GDP per capita of USD 12,746 or more): Australia, Brunei Darussalam, Canada, Chile, Hong Kong, Japan, Republic of Korea, New Zealand, Russian Federation, Singapore, Taiwan, United States of America
- *Upper-middle-income economies* (GDP per capita of USD 4,126 to USD 12,745): China, Malaysia, Mexico, Peru, Thailand
- *Lower-middle-income economies* (GDP per capita of USD 1,046 to USD 4,125): Indonesia, Papua New Guinea, Philippines, Vietnam

For example, to estimate the missing value for Papua New Guinea for a particular indicator, an average of the normalised data for the lower-middle-income economies, that is Indonesia, Philippines and Vietnam, was used.

A disadvantage of this technique is the overestimation of some of the missing data for economies like Brunei Darussalam, Chile and Papua New Guinea.

Aggregation and Production of the APEC E-payment Index

Once all the values were normalised and the missing values estimated, an average was calculated for each economy in each pillar. This allows us to see the economies' score and ranking for each pillar.

To calculate the overall score, the sum of the score for each pillar was used, taking into consideration the weight given to each pillar. For example, for Australia, the average score for each pillar was as follows:

1. Regulation and Policy (20%) – 55.5
2. Infrastructure (30%) –71.5
3. Demand (30%) – 46.1
4. Innovative Products and Services (20%) – 54.4

The overall score was calculated as follows:

(55.5 X 20%) + (71.5 X 30%) + (46.1 X 30%) + (54.4 X 20%) = 57.3

Data Sources

The indicators and data were drawn from official and publicly available sources such as the International Telecommunication Union, United Nations and World Bank.

While many of the datasets are hard, factual data such as the Internet penetration rate, some of the data are more subjective and are taken from, for example, the World Economic Forum's Executive Opinion Survey that gathers the opinions of decision makers and influencers who are familiar with a particular economy. The survey is used to measure concepts that are qualitative in nature or for which internationally comparable statistics are not available for enough economies, and a rating of 1 to 7 is provided for each economy, where 1 corresponds to the worst situation and 7 the best. For example, one of the indicators looks at the extent to which government have a clear implementation plan for utilising ICTs to improve the country's overall competitiveness, 1=no plan and 7=clear plan.

The complete data sources are listed below.

- Bitnodes, Global Bitcoin Nodes Distribution, https://getaddr.bitnodes.io/
- International Telecommunication Union, Global Cybersecurity Index 2014
- International Telecommunication Union, World Telecommunication/ICT Indicators Database 2014
- Our Mobile Planet 2013, http://think.withgoogle.com/mobileplanet/en/downloads
- United Nations, E-government Survey 2014
- United Nations Conference on Trade and Development, Information Economy Report 2015
- We are social, http://wearesocial.sg/tag/apac/
- World Bank/International Finance Corporation, Doing Business 2014: Understanding Regulations for Small and Medium-Size Enterprises
- World Bank, Global Findex Database, http://datatopics.worldbank.org/financialinclusion/
- World Bank, World Development Indicators, http://data.worldbank.org/data-catalog/world-development-indicators
- World Economic Forum, Global Competitiveness Index 2014-2015
- World Economic Forum, Networked Readiness Index 2014 and 2015

TRPC

TRPC is a boutique consulting and research firm with over 25 years' experience in the telecommunications and ICT industries in the Asia-Pacific. We offer specialised advisory, research, and training services, with a focus on regulatory and strategic business issues, and possess an extensive network of industry experts and professionals throughout the region.

Our research focuses on the economics of telecommunications and information technology, and the policy and regulatory issues associated with national information infrastructure development, with an emphasis on the Asia and the Pacic region.

For more information, please visit us at
www.trpc.biz

THE AUSTRALIAN APEC STUDY CENTRE
Asia-Pacific Economic Cooperation

RMIT UNIVERSITY

The Australian APEC Study Centre (AASC) at RMIT University is a leading centre in the Asia-Pacific region for the advocacy of APEC's objectives. It is a capacity building institution for policy makers and regulators from APEC and other Asia-Pacific regional economies. The Centre also hosts conferences, symposia and dialogues to promote regional understanding, the exchange of information and experience sharing between regional and international policy makers and regulators, the private sector and academia.

The AASC publishes research and issues papers on matters important to APEC. This work contributes to fostering debate and understanding between Governments, the private sector and academia, and also supports the program development of capacity building initiatives and policy dialogues. The Australian APEC Study Centre also acts as the secretariat for ABAC Australia.

For more information please visit us at
www.apec.org.au