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Digital Divide and the Platform Economy: Looking for the Connection from the Asian Experience

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Abstract

This study presents the indications of the presence of a digital divide in Asia through indicators for the region and selected Asian countries. The digital divide can be seen as a determinant for the use of digital platforms as material access and skills access affect how digital platforms will be used and maximized. Data from a number of countries in Asia show that certain segments of the population have better access (motivational, material, skill, and usage) to computers and the internet. These would include those who live in the urban or more affluent areas, those who are neither too old nor too young to utilize the technology, those who are male, those who are more skilled/educated, and those who have high levels of trust. van Dijk's model posits that these groups would also be more likely participate in - and benefit from - the platform economy. As noted by van Dijk's model, the digital platforms will face their own divide, which has already started to manifest in certain platforms. The case of accommodation platforms show that the more commercialized and touristy areas will benefit the most. This will place a wider gap between commercial and touristy areas and its periphery. Other platforms also face trust issues and security issues. Capital platforms will tend to increase the income inequality among individuals as documented by the study of JP Morgan. Those who have assets would tend to earn more from digital platforms. To address the inequality that may be caused by the digital platforms, policy interventions should address not only the provision of material access but also addressing the other forms of divide.

Keywords: *digital divide, platform divide, internet, access, gender, inequality*

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List of Acronyms

ADB	Asian Development Bank
APEC	Asia-Pacific Economic Cooperation
CIS	Commonwealth of Independent States
CUTS	Consumer Unity & Trust Society International
DICT	Department of Information and Communications Technology
GDP	Gross Domestic Product
HS	High School
HTML	Hypertext Markup Language
IAMAI	Internet and Mobile Association of India
ICT	Information and Communications Technology
ITU	International Telecommunication Union
k2c	Konek2CARD
LCMS	Learning Content Management System
LDC	Least Developed Country
LMS	Learning Management System
LTE	Long Term Evolution
MENA	Middle East and North Africa
MOOC	Massive Open Online Courses
OECD	Organisation for Economic Co-operation and Development
PDA	Personal Digital Assistants
PRC	People's Republic of China
PSTN	Public Switched Telephone Network
ROK	Republic of Korea
TESDA	Technical Education and Skills Development Authority
TOP	TESDA Online Program
UGC	User-Generated Content
UNCTAD	United Nations Conference on Trade and Development
US	United States
WEF	World Economic Forum
WiMAX	Worldwide Interoperability for Microwave Access

Digital divide and the platform economy: Looking for the connection from the Asian experience*

Francis Mark A. Quimba, Maureen Ane D. Rosellon, and Sylwyn C. Calizo Jr.[1]

1. Introduction

In 2019, there were 5.2 billion people (62.0% of global population) subscribed to mobile services (UNCTAD 2019). Mobile technologies and services, including digital platforms, generated about USD4.1 trillion of economic value added or about 4.7 percent of global Gross Domestic Product (GDP), and countries continue to reap the benefits resulting from the improved productivity and efficiency of mobile services. Indeed, GSMA (2020) – an organization that represents the interests of mobile operators worldwide – projected that the economic value of mobile services will increase to 4.9 percent of world GDP by 2024. This indicates the strengthening foundation for the platform economy.

However, large segments of the population are not able to accrue benefits from the platform economy, partly because of the digital divide – "the gap between individuals, households, businesses, and geographic areas at different socio-economic levels with regard to both their opportunities to access information and communication technologies (ICT) and to their use of the Internet for a wide variety of activities (OECD 2001)" – and because of the platform divide, which is a narrower experience of the digital divide.

Majority of the 70 highest valued digital platforms are based in the United States (US), followed by Asia, especially the People's Republic of China (PRC). Meanwhile, platforms in Latin America and Africa are relatively marginal. Despite Asia being second to America in terms of the digital economy's size, Asian economies have already noted that benefits may not be uniformly distributed across and within countries.

For instance, the Asia-Pacific Economic Cooperation's (APEC) Internet and Digital Economy Road Map (APEC 2017) launched in 2017 recognized the need for APEC economies to "bridge the digital divides between and within economies, regions, and groups (p.6)." In addition, APEC economies agreed to take steps to "bridge the digital gender divide" and to "ensure that digital strategies incorporate a gender perspective that addresses women's needs and circumstances (p.6)."

[1] Senior Research Fellow, Supervising Research Specialist, and Research Specialist, respectively, at the Philippine Institute for Development Studies

1.1 Objectives of the study

This study looks at the pattern of digital divides in Asia and relates these to participation in digital platforms. Particularly, this study is guided by the following research questions:

1. How does the digital divide affect the platform economy?
2. How can the platform economy affect existing divides (not necessarily digital)?

1.2 Significance of the study

The value of digital platforms and rapid growth of digital platforms has already been observed in Asia (Google, Temasek, and Bain 2019). On the one hand, a number of studies (Fraiberger and Sundararajan 2015; CUTS International 2018a and 2019; Quimba and Calizo 2018) believe that digital platforms reduce inequality by spreading opportunity and providing income to people at the bottom of the income distribution. On the other hand, digital platforms, as part of the sharing economy[2], may be contributing to the increase in inequality (Schneider 2014; Schor 2014). For instance, well-off or highly educated providers are using digital platforms to increase their earnings.

This paper does not attempt to settle the debate about the digital divide but instead provides Asia's experience to try to understand how the digital divide is affecting the various cultures and economies in the region. It attempts to provide a link to the level of digital access and the participation in the platform economy. Knowing that this link exists provides policy makers an idea of how to improve participation in the platform economy.

1.3 Organization of the paper

The rest of the paper is organized as follows: Section 2 presents an extensive discussion about the platform economy and the digital divide by providing important concepts and case examples from Asian economies. Section 3 then concludes this paper by providing policy recommendations.

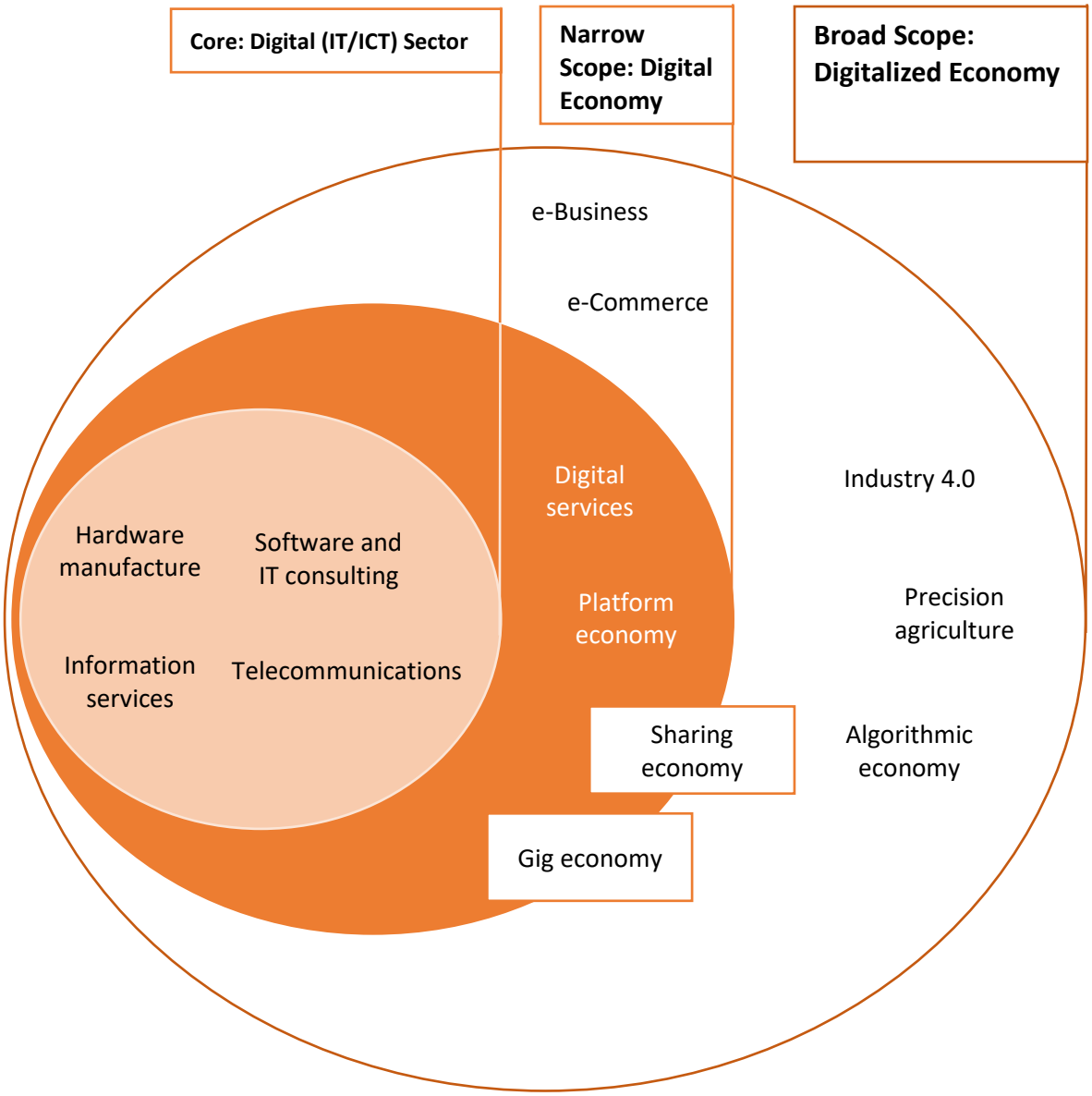
2. Platform Economy and Digital Divide

2.1 What is the platform economy?

Based on the approach used by the United Nations Conference on Trade and Development (UNCTAD 2017), the platform economy belongs to the narrow definition of the digital economy which is founded on the digital sector – the core of the digital economy (**Figure 1**).

[2] The sharing economy refers to businesses that focus on the sharing of underutilized assets, monetized or not, in ways that improve efficiency, sustainability, and community (Rinne 2017). Under its broad umbrella is the popular accommodations giant Airbnb and the multi-modal transport platform Grab.

Figure 1 Representation of the digital sector, digital economy, and digitalized economy



Source: Adopted from Bukht and Heeks (2017) as cited by UNCTAD (2017)

Both the sharing economy and the gig economy are part of the narrow definition of the digital economy because these make use of digitally-enabled platforms to achieve more efficient utilization of physical assets and/or time (UNCTAD 2017). Parker et al. (2016) found that the digital platforms create value by achieving economies of scale more rapidly, minimizing costs through fewer owned physical assets, and compiling and utilizing big data. These digital platforms, typically accessed via smartphones, utilized the power of applications to more efficiently coordinate and aggregate both demand and supply compared to the traditional ways of accessing goods and services (e.g., visiting physical stores or flagging a taxi by the road). Digital platforms also helped areas where lower densities tended to make business more complicated.

Digital platforms created new business opportunities. Transaction and search costs, as well as *friction* were reduced by easily linking consumers to those offering assets or services. These platforms are effectively new *market places* that instantaneously match supply and demand on

a massive scale, for a number of needs and services such as location-bound work (e.g., Uber and TaskRabbit), online location-independent (e.g., tasks through Upwork or Amazon Mechanical Turk), and others.

This study adopts the definition of digital platform following UNCTAD (2019) description of the digital platform landscape to cover as many types of digital platforms as possible. Thus, the digital platform would include non-profit oriented digital platforms and the profit oriented digital platforms. This study will include examples from various sub-categories of profit oriented digital platforms such as electronic payments, e-commerce platforms, services e-commerce platforms (e-health, tourism, digital labor). This would allow the study to use as case examples the performance of specific platforms in certain countries.

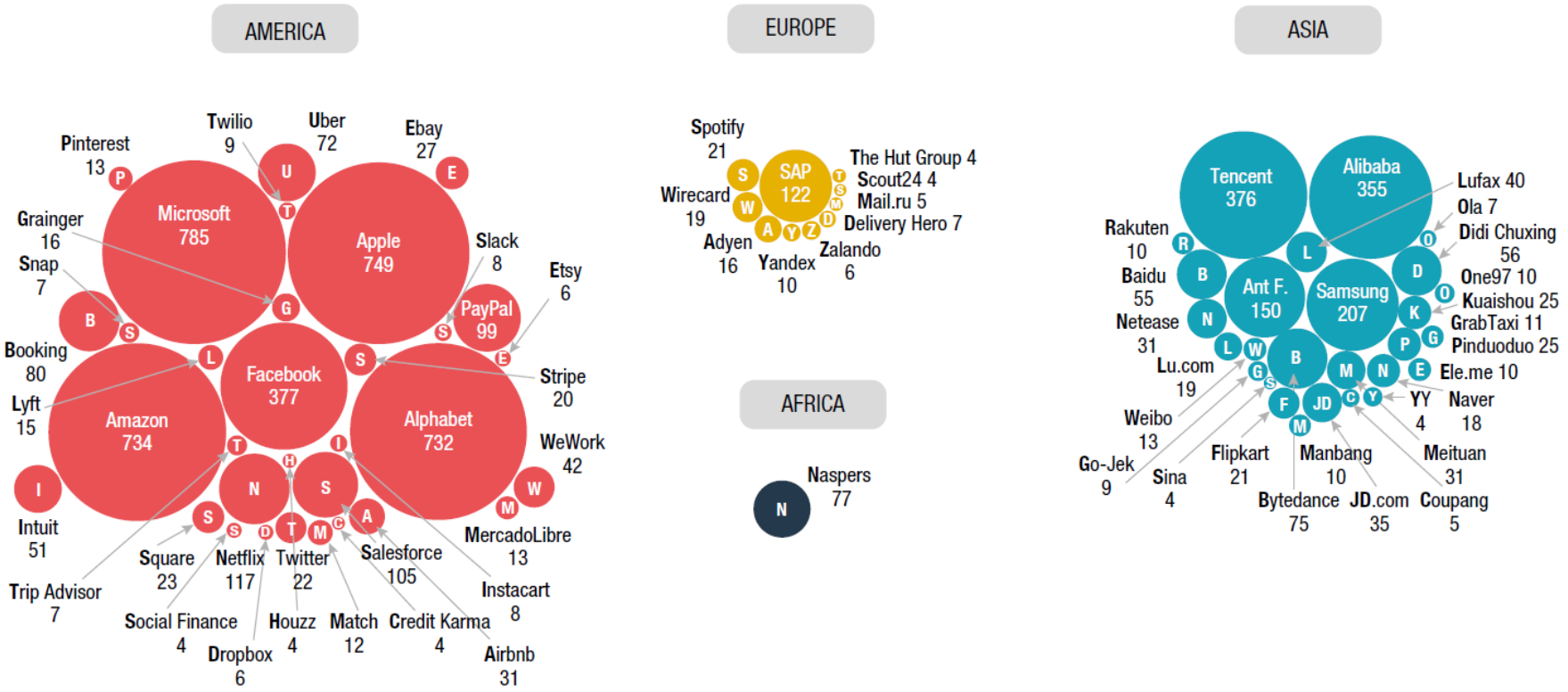
2.2 Performance of the digital and platform economies

The performance of the digital economy is tempered by the issue of the digital divide and the deeper issue of inequality. The benefits of the platform economy are not equitably distributed within and across countries, and gaps exist within countries based on levels of income, education, gender, and geographical location.

A platform mapping by UNCTAD (2019) indicates that the top global digital platforms are highly concentrated geographically, particularly in the US and the PRC (**Figure 2**). In the US, these companies include Airbnb, Alphabet, Amazon, Apple, Booking.com, Ebay, Facebook, Microsoft, Netflix, PayPal, and Uber, among others, while in Asia, these are Alibaba, Baidu, Grab, Naver, Rakuten, Samsung, and Tencent, among others. Meanwhile, Europe has SAP, Spotify, and Wirecard as examples. In Africa, Naspers has the largest market capitalization although relatively small as it is only about 10.0 percent of the top global platforms.

Further driving the point that the digital divide goes beyond physical access, GSMA (2020) data for the Asia-Pacific shows that mobile broadband coverage is already at 94.0 percent on average. The GSMA data also shows that 1 in every 2 people is covered by mobile broadband but chooses not to use the internet.

Figure 2 Distribution of main global platforms (2018), by region

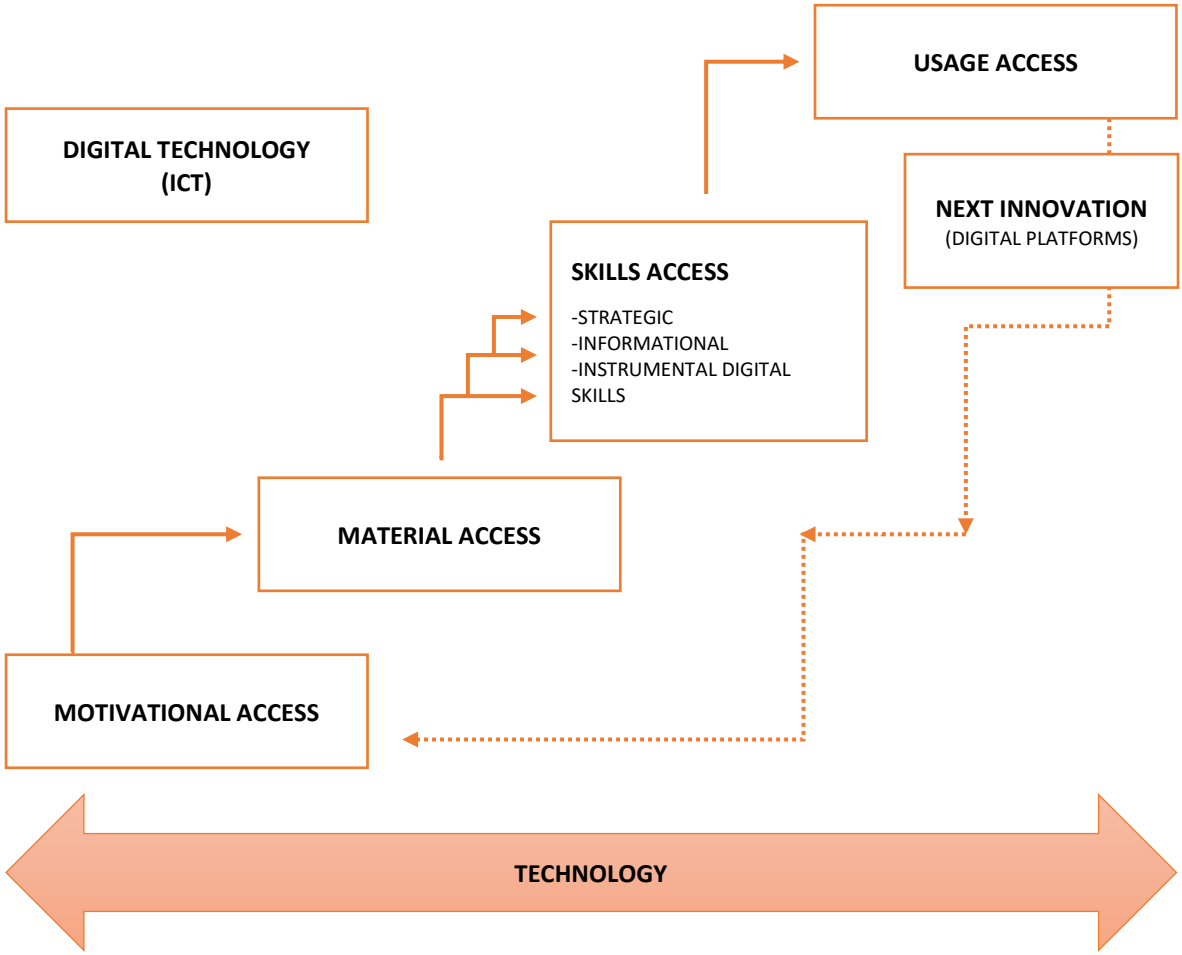


Source: Lifted from UNCTAD (2019)

2.3 Cumulative and recursive model of digital divide

As a means of explaining the relationship of digital divide and the platform economy, this paper slightly modified van Dijk's (2006) cumulative and recursive model (**Figure 3**). This model extends the basic concept of access – understood as *material access* or the counting of people with computers or access connection at their disposal – to include *motivational access* or the social, psychological, and cultural backgrounds of people. Furthermore, digital skills (*skills access*) and competency to use technology and applications (*usage access*) were also included.

Figure 3 Cumulative and recursive model of successive kinds of access to digital technologies



Source: Adopted from van Dijk (2006), with slight modifications

Moreover, van Dijk (2006) distinguishes four kinds of barriers to access (divides) corresponding to each of the four types of access: motivational or mental; material; skills; and, usage. First, the *motivational or mental access divide* is driven by the lack of elementary digital experience, presence of technology anxiety, and a felt intimidation from new technology. Other factors that may contribute to this particular divide includes low levels of income and education, and lack of time to learn new things (Ghobadi and Ghobadi 2013).

Second, the *material access divide* includes barriers that limit physical access to a computer or a mobile phone, and network connection. This would also include the cost of internet

subscriptions and mobile phone accounts. Similar to the first access divide, low levels of income and education, and the absence of occupation may contribute to this barrier.

Third, the *skills access divide* is related to the user's capability to maximize benefits from ICT. Skills access pertains toto three types of skills, which begins with a user's knowledge of how to operate hardware and software (operational skills). Building on sufficient operational skills, Users then acquire informational skills necessary to navigate and process the information that they encounter using their computer and network sources. Finally, building on both operational and informational skills, users also need to develop the skills to make use of ICT for personal and societal development. This final set of skills fall under strategic skills (van Deursen and van Dijk 2011; Ghobadi and Ghobadi 2013). Skills access can be limited by insufficient digital skills caused by a lack of user-friendliness in technologies, inadequate education, or social support. Ghobadi and Ghobadi (2013) points out that education is a critical factor on all three types of skills.

Lastly, the *usage access divide* is about how individuals actually utilize ICT, which can be affected by their demographic characteristics (e.g., social class, education, age, gender, and ethnicity) and the quality of their digital infrastructure (e.g., reliability of Internet connection). Apart from the actual use of ICT, usage access divide also includes users' active and passive use of ICT. The former is about how Internet users contribute creative content that are published through their personal website, web blog, online bulletin board, newsgroup or community, among others, whereas the latter describes how Internet users consume the creative content published by active users.

The first three types of access follow a relatively linear order of precedence, particularly the skills needed to participate in the platform economy is conditional on having not only the motivation to learn but also on having the physical access to basic technology that one can participate and apply their skills with. It is only when one has acquired the necessary skills can s/he participate in the platform economy or gain usage access.

van Dijk's (2006) model suggests that when the full process of technology appropriation is completed, a new innovation comes up and the entire process repeats. Usage access enables people to maximize the use of the technology which may lead to the development and use of new innovations. Usage opportunities become more enhanced in the discovery and use of more complex applications and innovations. This would include the platform economy.

Digital platforms, for example, is a value addition to having access to computers, internet, and digital technology. In reality, it would be nearly impossible to separately discuss digital platforms from ICT and the ICT sector. The digital sector, as the core of the digital economy, is consistent with the representation of the digital economy used by Bukht and Heeks (2017) and cited by UNCTAD (2017) (**Figure 1**).

Underpinning the platform economy is the IT/ICT sectors or the foundation of the digital economy. Thus, the digital divide can be seen as a determinant of the use of digital platforms as material access and skills access affect how digital platforms will be used and maximized. However, the digital divide, often referred to as the lack of material and skills access, would also be a characteristic of digital platforms as these would also face motivational, material and skills barriers.

Figure 3 also depicts that any new product or innovation would have to face the same types of access and limitation to those access. As a new product or service, platforms would have to

break the psychological and motivational barriers preventing people from accessing or using these platforms. Some of these factors would be similar to those of ICT and digital technologies but there would be factors that are specific to the platform itself. For example, trust of the platform, perception of the ease of use, personal innovativeness, and task characteristics are important factors specific to the platform itself.

Material access specific to platforms would be limited by the availability of the applications on specific mobile operating systems. For instance, if the platform is only accessible through Apple's iOS, then those using Android[3] mobile phones would automatically be excluded.

The knowledge on using mobile applications or digital platforms also affect their use. Gharaibeh and Arshad (2016) has documented the need for training to use the digital application. Often, users learn to use digital platforms by trial and error. For risk averse individuals and businesses, this may not be a risk that they would be willing to take as figuring out how to use the platform may be too costly in terms of time and money, among others. Effective usage of platforms would also be affected by policy and infrastructure.

The next section of this paper presents some indicators of the digital divide in Asia. It then relates the patterns of digital divide to patterns of use of digital technology related to participating in digital platforms. This would include participation in digital payments, e-commerce, accommodation platforms, gig work, e-health, and e-learning. Box 1 provides a description of these activities.

2.4 Certain segments of the population have better access to computer and the internet

Following the framework of digital divide presented in the preceding section, the following indicators portray the gap that exists in the various areas of access. These indicators paint the picture of the existing digital divide in Asia. This could be manifested in a global divide (across countries) or in a social divide (within countries).

2.4.1 Motivational access

Motivational access refers to the desire to have a computer or a mobile phone and be connected to the internet. This desire is affected by social, cultural, or psychological factors.

2.4.1.1 Trust and perception of the internet

One of the main barriers for accessing the internet would be knowing what it is and what it can do. In a survey conducted by Wu et al. (2016) in 11 countries[4] from 2014 to 2015, it was found that over two-thirds of those currently offline did not know what the internet is (**Figure 4**). For instance, only 13.0, 11.0, and 5.0 percent knew what the internet is in Thailand, Indonesia, and India, respectively.

[3] Android and Apple's iOS are mobile operating systems widely used in the industry. However, the iOS is used exclusively by Apple while Android is developed and used by multiple parties, such as Google and the Open Handset Alliance.

[4] The 11 countries surveyed by Facebook include Brazil, Colombia, Ghana, Guatemala, India, Indonesia, Kenya, Nigeria, Rwanda, Thailand, and Uganda.

Box 1 Examples covered in this paper

Accommodation platforms operate an online community marketplace for suppliers to list, discover, and book accommodations worldwide, whether online or through a mobile phone provided to visitors (individuals or businesses). Suppliers advertise their home, apartment, or room and couch using a platform or app. Visitors use the app to search for an accommodation based on a certain criteria, which could include location, cost, access, ratings, or special needs, among others. An example of such a platform is Airbnb that provides the means of communication between the landlord and the guest, thus, becoming a mediator between the supplier and the visitor. The platform sometimes also provides a means of payment. Airbnb is an example of an accommodation platform that provides users the benefit of lower search costs, access to alternative modes of accommodation (e.g., couch, homes for rent, or apartments for rent) and additional benefits, such as sustainable and conscious consumption and even sources of travel information (Pins n.d.).

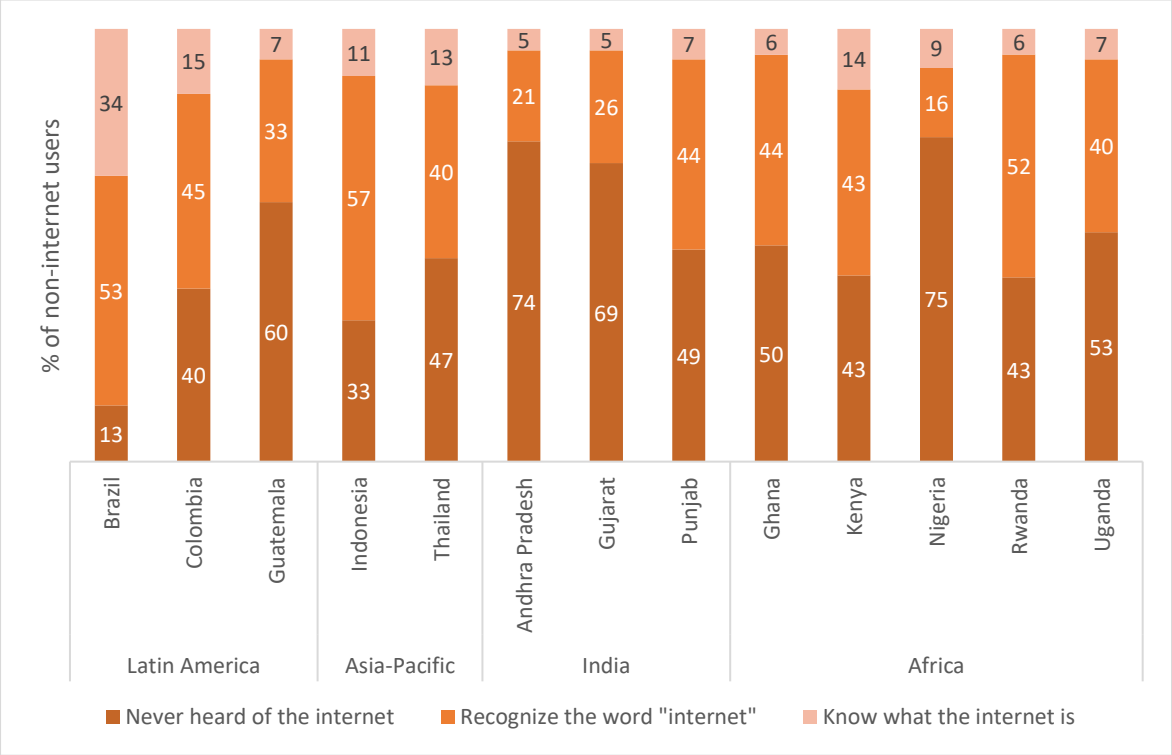
Remote work platforms provide a venue for freelancers to gather and cater to a broad range of clients (e.g., business owners, startups, and entrepreneurs, among others). An example of such work platforms would be Upwork (Fulltime Nomad 2017). Job posts in Upwork are broad with listings under 12 major sections: (1) web, mobile and software development; (2) IT and networking; (3) data science and analytics; (4) engineering and architecture; (5) design and creative; (6) writing; (7) translation; (8) legal; (9) administrative support; (10) customer service; (11) sales and marketing; and, (12) accounting and consulting.

Digital finance refers to "financial services delivered through mobile phones, personal computers, the internet or cards linked to a reliable digital payment system (Ozili 2018, p.330)."

Digital health platforms were brought about by the "disruptive technologies that provide digital and objective data accessible to both caregivers and patients leading to an equal level of doctor-patient relationship with shared decision-making (Mesko et al. 2017)." Related to digital health is mobile health (mHealth), which is the use of mobile devices, such as mobile phones, patient monitoring devices, Personal Digital Assistants (PDAs) and wireless devices, for medical and public health practice.

E-learning refers to the use of ICT to support learning and/or deliver education, either in a synchronous (when the lessons are carried out in real-time) or asynchronous format (pre-recorded and the learners progress at their own pace.) Virtual classrooms are examples of synchronous e-learning while the Massive Open Online Courses (MOOCs) are examples of asynchronous e-learning. Another evolution of e-learning is mobile learning, which is defined as "any sort of learning that happens when the learner is not in a fixed, pre-determined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies (Ko et al. 2015)." The set of online services that allows community of learners and facilitators to interact, have access to information, tools and resources for the delivery and management of teaching and learning activities is called the e-learning platform. There are two types of e-learning platforms: the Learning Management System (LMS) that refers to platforms that enable the provision of e-learning courses, or the Learning Content Management System (LCMS), which directly manages the contents.

Figure 4 Awareness and understanding of the internet among non-users (2014-2015)

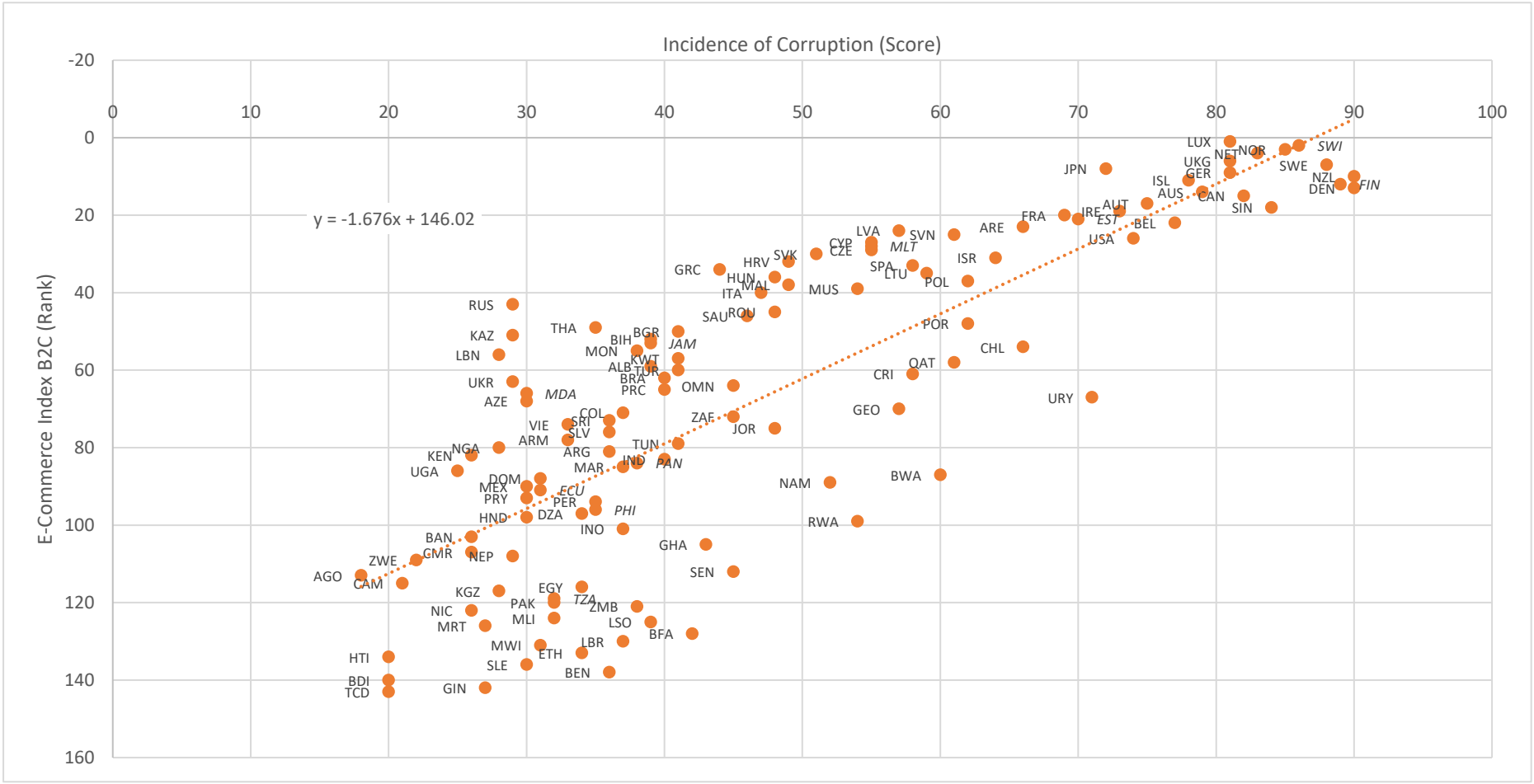


Source: Wu et al. (2016)

As discussed above, perception and trust affect the use of digital technology, and such factors would affect participation in the platform economy. Looking at lack of trust as a motivational barrier, we look at the relationship of e-commerce and corruption. Corruption tends to breed distrust in the policy environment, and such distrust may affect the use of digital technology to undertake e-commerce transactions. As the platform economy is largely associated with digital transactions and e-commerce, high levels of corruption would dissuade participation in the platform economy.

Countries with low incidence of corruption (e.g., Israel, Japan, Singapore, and Switzerland) are associated with a higher rank in the use of e-commerce while countries that rank lowest in e-commerce index also have high incidence of corruption (**Figure 5**). Similarly, UNCTAD (2017) posits that the lower propensity for online shopping than participation in social networks among developing countries may be reflective of the lack of trust in the online environment, limited awareness of e-commerce, and cultural preferences.

Figure 5 Corruption and e-commerce (2017)



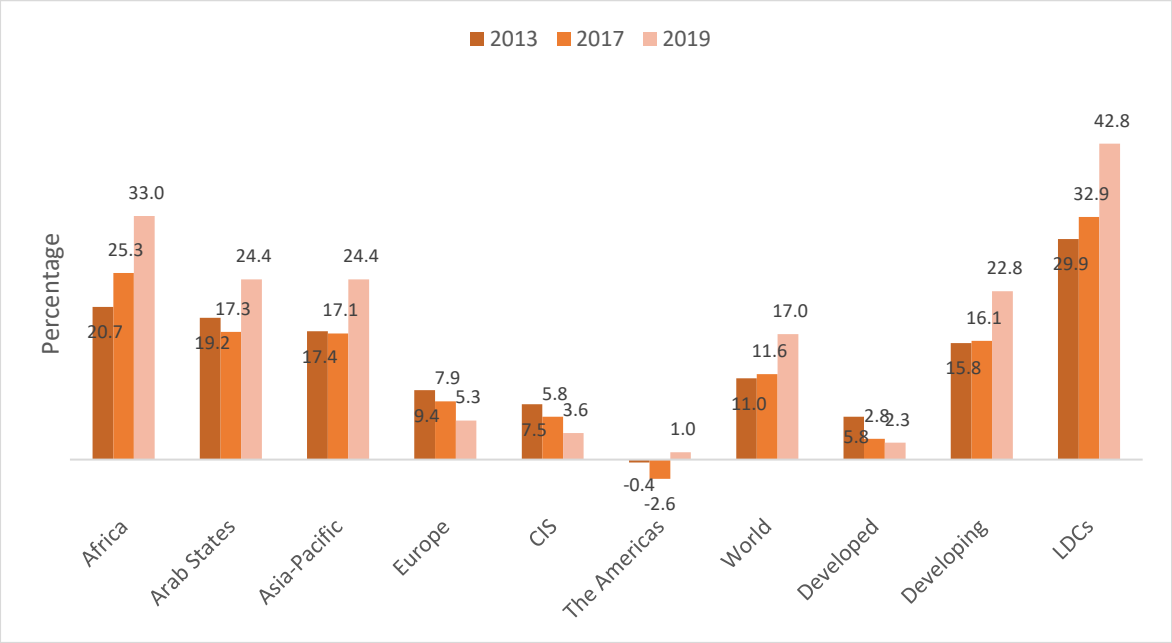
Note: Country labels are placed to the left of their data point but some country labels (italicized) are placed to the right of their data point to improve chart readability.
Source: Authors' calculation using data from TCdata360 (https://tcdata360.worldbank.org/)

2.4.1.2 Gender divide

Another indicator of motivational or cultural divide would be that of discrepancy in access among gender. The digital gender gap is one of the connectivity indicators being observed as ICT is developing globally. UNCTAD (2019) reported that in about two-thirds of countries worldwide, the proportion of internet users is higher for males than females (**Figure 6**). It is only in the Americas that the proportion of women using the internet is higher than that of men.

The difference between male and female internet user penetration rates is on average about 22.8 percent in developing countries and 2.3 percent in developed countries. The more significant gaps are observed in Least Developed Countries (LDCs) at 42.8 percent and Africa at 33.0 percent. The gap has widened from 2013 to 2017 and even further in 2019. Noticeably, a large increase in the gender gap was felt from 2017 to 2019 as the global gap rose from 11.6 percent in 2017 to 17.0 percent in 2019 – an increase of 5.4 percentage points in just two years.

Figure 6 Internet user gender gap (%) in 2013, 2017, and 2019

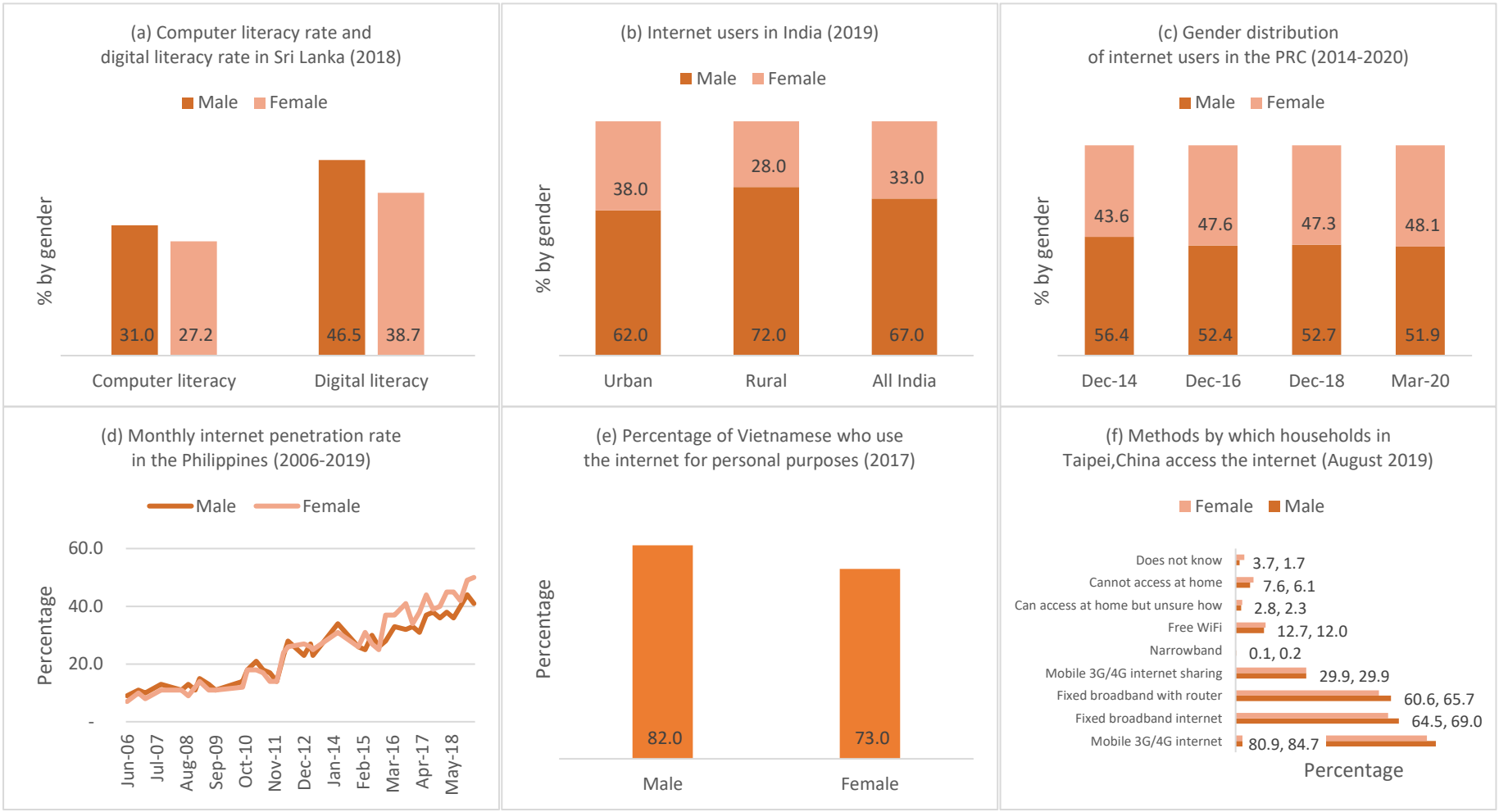


Source: ITU (2017 and 2019)

Data for a number of economies[5] also show that ICT access is commonly better for males than females (**Figure 7**). The data on internet users for India and the PRC shows that internet users are mostly male. Moreover, not only is ICT access higher for males but data for Sri Lanka also shows that females have lower computer and digital literacy than males. In Viet Nam, there is also a wide discrepancy between the proportion of males (82.0%) using the internet for personal use as compared to females (73.0%). Similarly, the proportion of females in Taipei,China who have access to the internet at home is significantly lower for paid services (e.g., mobile 3G or 4G internet, fixed broadband internet, and fixed broadband with router). Interestingly, the proportion of women who cannot access internet at home is higher than that of men. Only data for the Philippines shows females having better access to the internet.

[5] These economies are the PRC, India, the Philippines, Sri Lanka, Taipei,China, and Viet Nam.

Figure 7 Indicators of ICT access in selected Asian economies, by gender



Source: Department of Census and Statistics Sri Lanka (2018); Ecomobi (2017); Internet and Mobile Association of India (IAMAI and Nielsen 2019); Statista[6]

[6] For brevity, all references to Statista have been listed in Appendix 1.

These figures are consistent with Junio (2019) that finds some countries being able to reverse the gender gap on some ICT indicators. The variations in individual country performance does highlight the various sources of constraints that foster a gender digital divide. Thus, it is important to recognize the need for a varied approach to address digital divide.

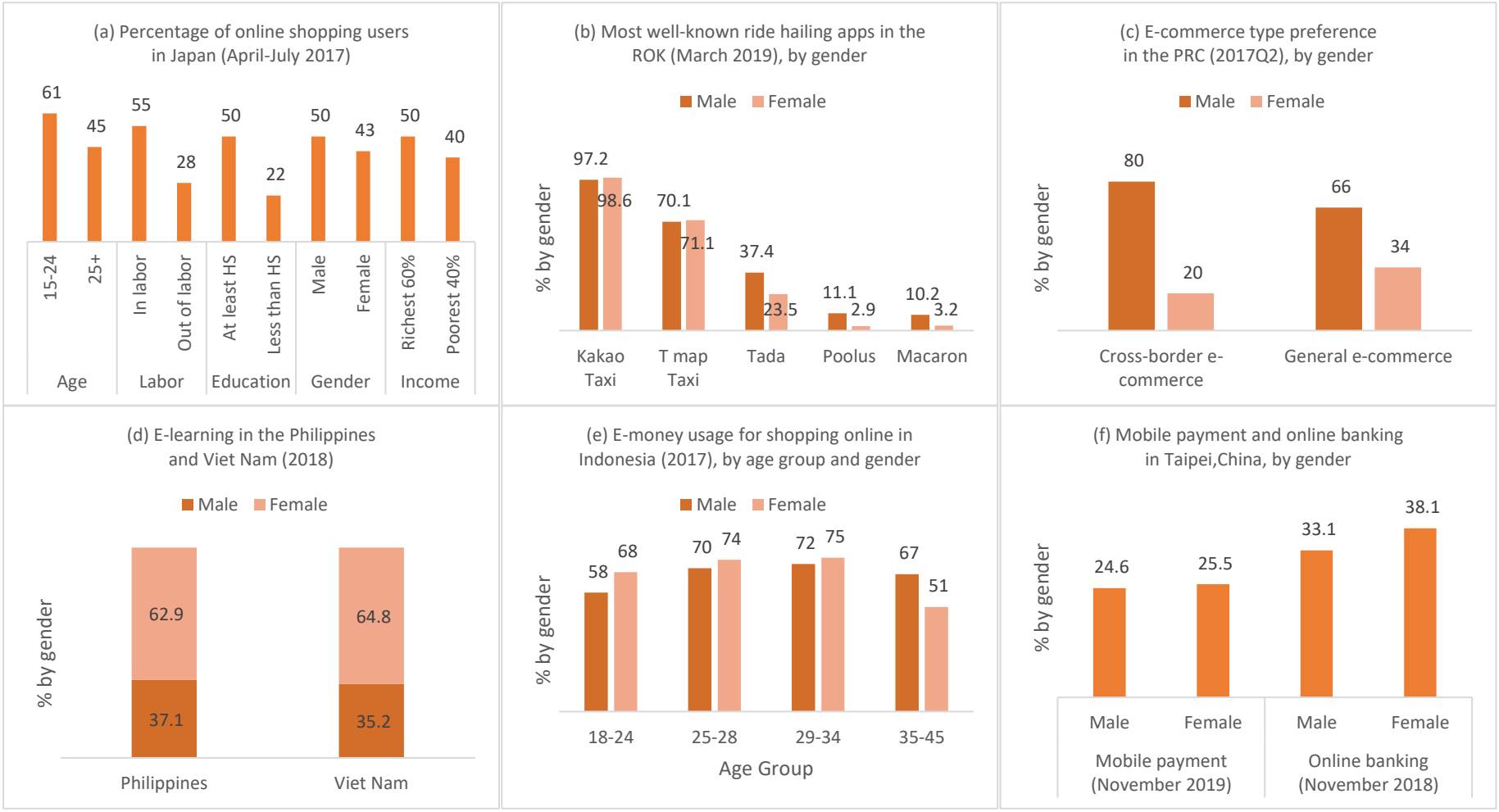
The divides in access may translate into divide in usage of platforms. Junio (2019) found that there is a gender divide in digital financial services. Country-specific data also supports this finding. In Japan, males tend to participate more in online shopping than females (**Figure 8**). Data for the Republic of Korea (ROK) also shows that while there seems to be more women using the more popular ride-hailing apps, more men tend to use the less popular ride hailing apps which means there are fewer options for females than for males.

However, economy-level data also shows that there are breakthroughs in the participation of women in digital technology. For instance, data for the PRC and Taipei,China show that women tend to participate in the digital economy more. For Taipei,China, this is manifested in more women using online banking and mobile payments than men. For the PRC, e-commerce activity is higher for women than men. Also, access to e-learning is higher for females than males in both the Philippines and in Viet Nam. This is consistent with the findings of the United Nations University (Junio 2019) where there were breakthroughs for females in access to digital technology.

There may be various reasons for the disparity in access to the internet and participation in the digital economy but a major part of it would be played by having physical access and also other factors, such as socio-cultural characteristics of women, interest, and ability. Sey, Kang, and Junio (2019) explains how culture, interest, and ability affect women's access to the internet and participation in digital economy. This would include lack of interest and lack of knowledge on how to use the internet. Lack of useful content for women also affects their use of the internet.

Furthermore, Gillwald, Galpaya, and Aguero (2019) surveyed the gender gaps in Bangladesh, Cambodia, India, Myanmar, and Pakistan. They found that despite internet services being relatively affordable in Bangladesh, India, and Pakistan, the significantly lower income for women makes mobile services unaffordable for them. In addition, they find that the lack of skills prevents women from going online while for those who are online, lack of skills leaves them vulnerable to privacy and safety threats. Social and cultural norms and attitudes also greatly affect women's use of the internet. Change is needed in the attitudes and perceptions that shape the ways in which women gain access to technology and are able to make use of it.

Figure 8 Gender divide in the usage of ICT, by selected Asian economies



Source: Cabauatan et al. (2018); CUTS International (2018a); Statista

2.4.1.3 Age divide

There tends to be better internet access for those who are not so old or not so young. Participation in digital platforms is more common in the not so young or not so old, which can be seen in the patterns for Canada, the PRC, India, Japan, the Philippines, and Taipei,China (**Figure 9**). What is interesting would be for the Philippines because while online shoppers are highest for 18-24 years old, they are only the second largest online shopping group. It is the 25-34 who are shopping more perhaps because this is the group that is already earning their own income.

Another interesting case would be Japan, which shows that there are digital platform activities in which younger generations participate, such as video sharing and uploading, but activities that involve monetary transactions would be higher among those already earning an income.

Data for the PRC, the ROK, Singapore, and Sri Lanka shows additional information about access to the internet (**Figure 10**). For instance, in Singapore, 96.0 percent of those who are 15-34 in 2018 have individual computer usage. In contrast, the proportion is only 33.0 percent of those who are 60 years old and above. For the ROK, the pattern for mobile internet usage is similar although the peak is wider at 20-49 years old. Also, 60-69 years old have a much higher mobile internet use but the statistic is significantly lower for 70 years old and above.

The discrepancy in access by age groups is not only for material access but also in terms of skills as exemplified by the case of Sri Lanka. Those who are computer or digitally literate is highest among 15-19 and 20-24 years old. The younger age groups (i.e., 5-9 and 10-14 years old) and older age groups (i.e., 50-59 and 60-69 years old) have smaller proportions. These are similar to the patterns displayed for the ROK and Singapore. The pattern is also similar in the PRC where internet users are mostly 20-29 years old and 30-39 years old. The age group with lowest proportion would be those below 10 years old and those above 60 years old.

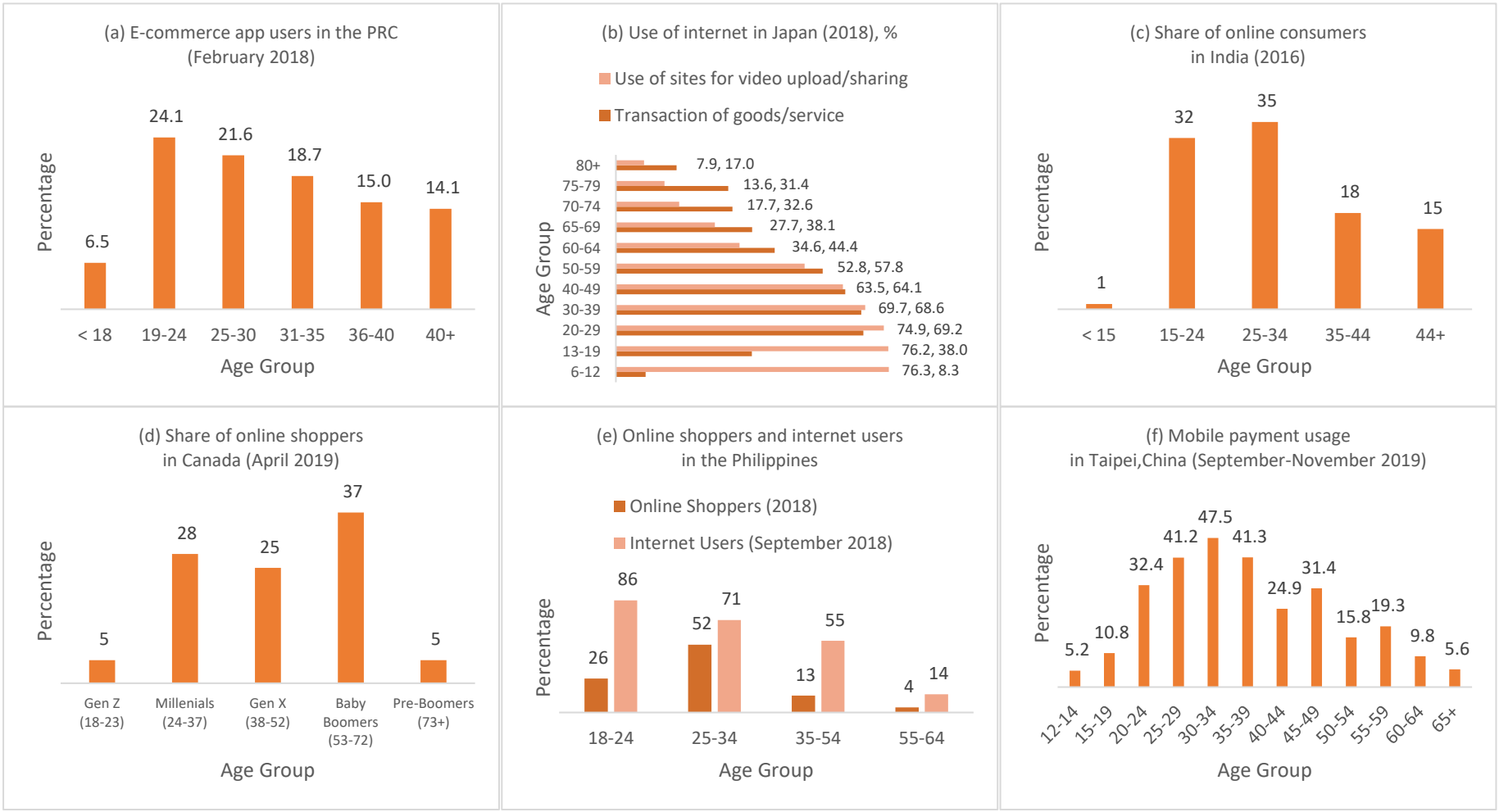
One of the reasons for those who belong to the older age group – commonly called Boomers or those born at around 1946-64 (Dimock 2019) – ranking last in usage of technology and participation in the digital economy was that the generation did not grow up with the rapidly evolving digital technology unlike those who were born in the 1990s (Viens 2019).

Another possible reason for older age groups participating less in digital platforms, particularly social media, would be the lack of need to establish personal and social identities. Older age groups would have been 40-64 years old when Facebook was launched. This means that they would most likely have well-established personal identities and, thus, would not be attracted to use social media.

Motivational barriers, such as interest and security, also explain the limited use of internet for the older generation. Many older people fail to see a good reason to go online. The older generation are the least confident in terms of protection for a range of security threats (Murnane 2016), and are also engaged less frequently in online activities, such as shopping, playing video games, and banking, compared to younger users (Lazer and Mayer-Schonberger 2007).

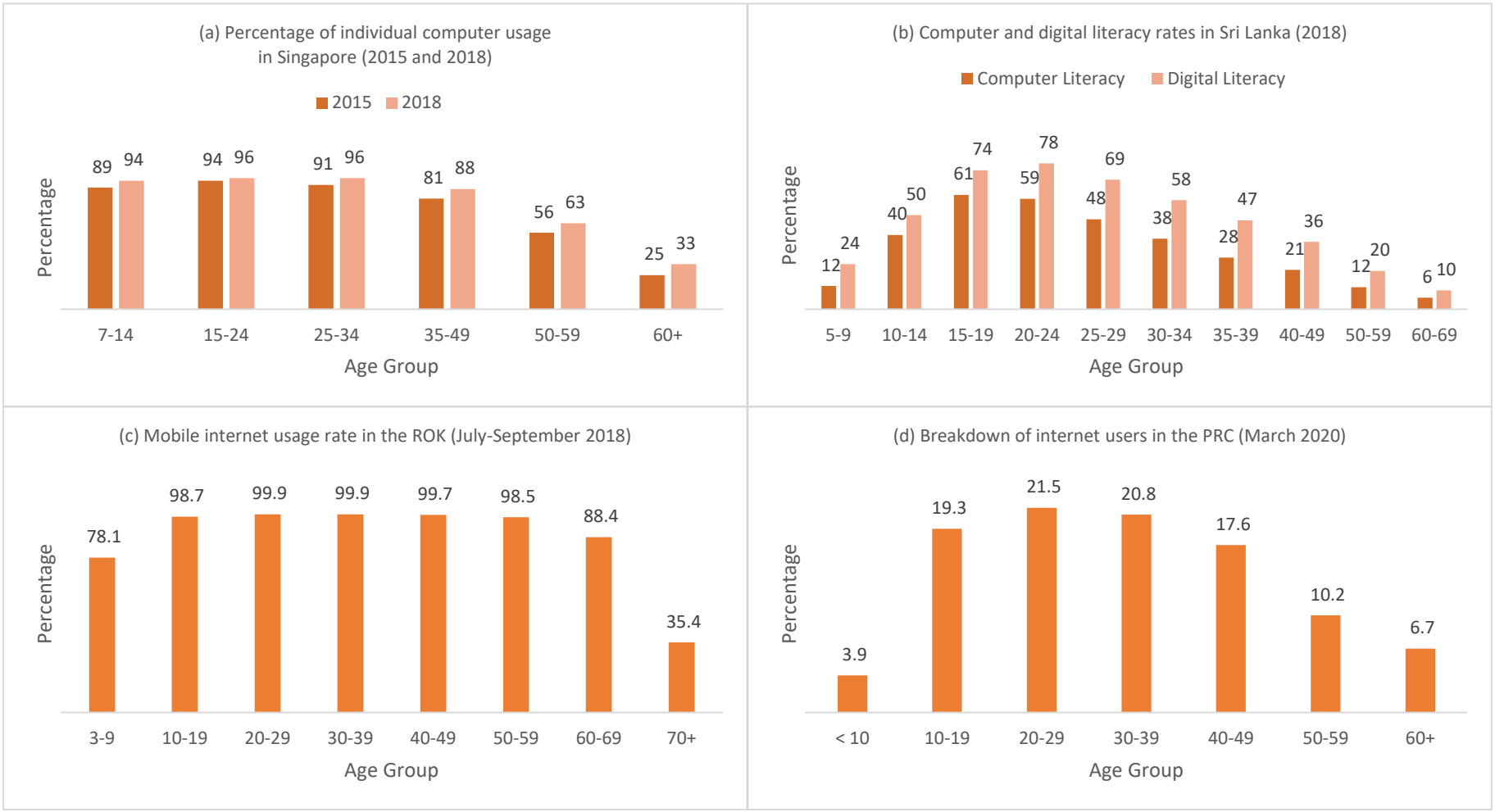
As for those who are too young to participate in the digital economy, it is clear that the major barrier would be related to income. The results for Japan and the Philippines show that the younger population are able to participate in activities that do not require spending money (e.g., creation of video content and blogging) but not for those that would involve spending money (e.g., shopping and buying online content).

Figure 9 Participation in the digital economy in selected economies, by age group



Source: Ministry of Internal Affairs and Communications, Japan; Statista

Figure 10 Access to the internet in selected countries, by age group



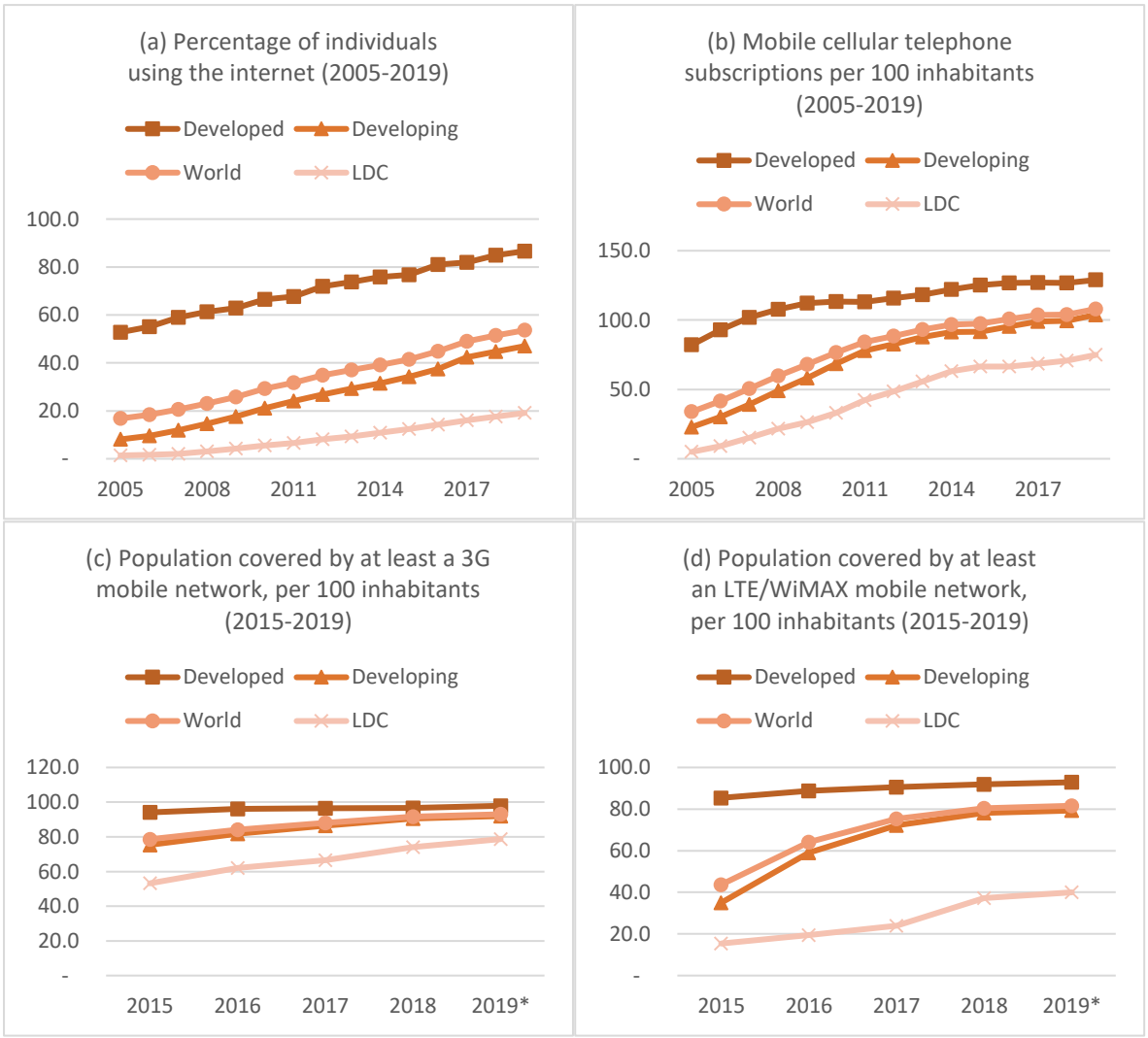
Source: Department of Census and Statistics Sri Lanka (2018); Infocomm Media Development Authority; Statista

2.4.2 Material access

Indicators of material access would include physical access to mobile phones, computers, and the internet. Indicators related to the quality of access to the internet (type of connection) and use of internet are also part of the set of indicators of material access. The material access divide is manifested in the gap in physical access to computers, network, and platforms among developed, developing, and LDCs.

Data on the number of internet users – those who used the internet (regardless of location) in the last three months – as a percentage of total population is an indicator of the availability of the internet to the population. Since the internet can be used via a number of devices (e.g., computer, mobile phone, personal digital assistant, video game consoles, or digital television), the indicator is able to illustrate the differences in access among countries regardless of the availability of devices. **Figure 11 (a)** shows that developed countries have more than 85.0 percent of the population having used the internet in 2019. The proportion is much lower for developing countries and LDCs at 53.6 and 16.1 percent, respectively.

Figure 11 Selected material access indicators, by income groups



Note: 2019 (Estimated)
Source: Authors' calculation using data from the ITU Indicators Database (https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx)

In terms of country groups, the Asia-Pacific has the second lowest proportion of people having used the internet in the past three months in 2019 while Europe, America and the Commonwealth of Independent States (CIS) countries[7] have the highest proportion in the same time period (**Figure 12**).

Figure 12 Selected material access indicators, by region

Note: 2019 (Estimated)
Source: Authors' calculation using data from the ITU Indicators Database (https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx)

[7] The CIS was founded in 1991 after the dissolution of the Union of Soviet Socialist Republics. The CIS refers to 12 countries, namely: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

Mobile cellular telephone subscriptions refer to "subscriptions to a mobile telephone service that provides access to the Public Switched Telephone Network (PSTN) using cellular technology."[8] As the indicator includes both postpaid and prepaid subscriptions as well as analogue and digital cellular systems, it is an indication of the accessibility of mobile cellular phone services to the population. **Figure 11** has shown that developed countries have significantly outpaced developing countries and LDCs in mobile cellular telephone subscriptions.

By region, CIS has the highest mobile phone subscriptions since 2009, thus, overtaking Europe (**Figure 12**). Moreover, the Asia-Pacific has been increasing steadily since 2005, closing the gap with Europe and the Americas. This is indeed in line with the trend of Asia's performance on the digital economy (Google, Temasek, and Bain 2019).

Mobile coverage of at least a 3G network indicates the availability of internet or mobile connection that can be used to participate in the digital technology. **Figure 11 (c)** shows that developed countries still outpace both developing countries and LDCs in providing 3G mobile network. The divide is more prominent for Long Term Evolution (LTE) and Worldwide Interoperability for Microwave Access (WiMAX) as shown in **Figure 11 (d)**. The availability of a more advanced mobile network is necessary for new innovations in the digital economy (Docebo 2018; GSMA 2020). With developing countries and LDCs falling behind, this will surely lead to a gap in the usage of new applications. The Asia-Pacific seems to be at par with the front-runner in this field as it has significantly increased from 2015, thus, overtaking the Americas [**Figure 12 (d)**].

Data from GSMA's (2020) Consumer Insights Survey 2019[9] shows that while Developing Asia has a high proportion use of smartphones for communication, it is lagging behind in terms of the use of smartphones for information, entertainment, and financial/digital commerce (**Table 1**). The proportions for Developing Asia is similar to Sub-Saharan Africa.

Table 1 Percent of smartphone users engaging in activity at least once per week (2019)

	Communication	Information	Entertainment	Financial/Digital Commerce
Developed Asia	58	34	31	28
Developing Asia	68	18	25	12
Europe & CIS	63	36	30	26
Latin America	79	42	40	22
MENA	78	49	43	32
North America	60	35	38	28
Sub-Saharan Africa	67	19	22	17

Source: GSMA (2020)

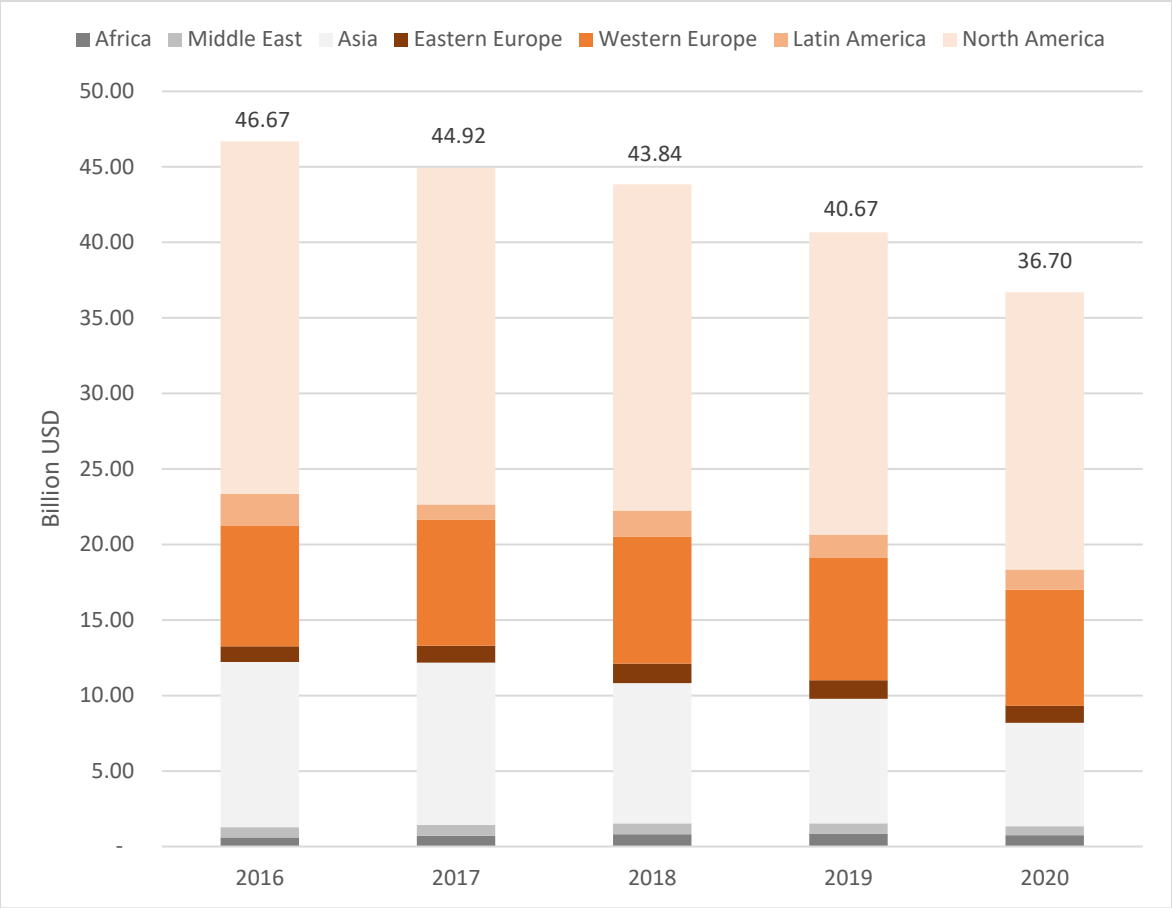
North America, Western Europe and Asia have the largest share of revenue in e-learning (**Figure 13**). This may imply that these regions would be reaping the benefits of e-learning ahead of other regions. Furthermore, North American vendors may be exploring more advanced technologies related to e-learning, such as artificial intelligence, virtual assistants,

[8] This definition was adopted from the World Bank, see: https://data.worldbank.org/indicator

[9] This Survey covers seven country groupings, namely: (1) Developed Asia; (2) Developing Asia; (3) Europe and CIS; (4) Latin America; (5) Middle East and North Africa (MENA); (6) North America; and, (7) Sub-Saharan Africa.

augmented reality, and virtual reality in e-learning solutions. So while other countries are still exploring available technologies in e-learning, such as the development of MOOCs, more advanced regions are pushing boundaries that are possibly expanding the divide.

Figure 13 Worldwide revenue forecasts for self-paced global e-learning market size (2016-2020), by region



Source: Docebo (2018)

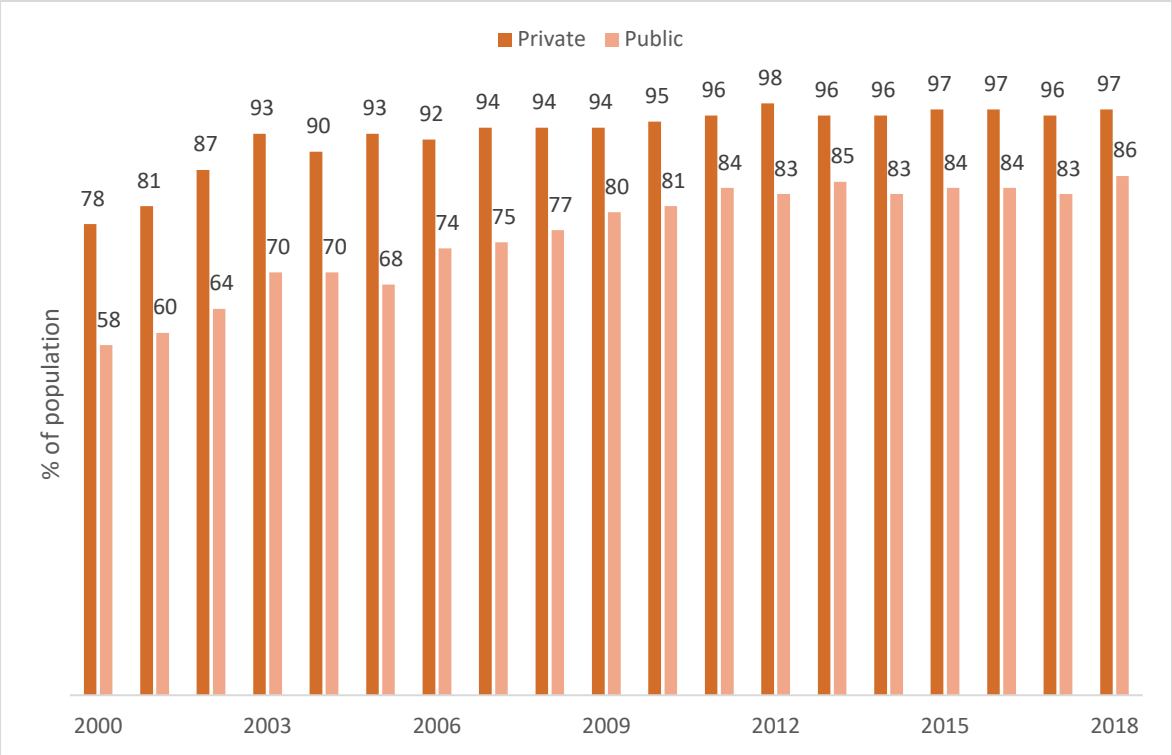
Since the platform is built on the use of the internet, the digital divide is directly associated with the platform divide. However, the divide in the use of the platform also exists outside of the digital divide. For developed countries where access to digital technology may have been universal, there still exists areas where the benefits of the platform accrue only to a certain group of people.

The digital divide is also manifested in the access gap between people with high and low income or education, major versus minor ethnicity, and the gender divide. According to the UNCTAD's (2019) Digital Economy Report, there exists gaps within countries based on levels of income, education, gender, and even geographical location, regardless of the country's level of development.

The material access divide can also be seen in developed countries. For instance, computer ownership is drastically different for those living in private housing and those living in public housing in Singapore (**Figure 14**). Only about 86.0 percent of those living in public housing own computers while the proportion is 97.0 percent for those who live in private housing. As

private housing in Singapore is dominated by higher-income Singaporean citizens, permanent residents, expatriates, and private investors,[10] this discrepancy in access may be an indication of the role of income as a determinant in computer ownership and internet access.

Figure 14 Computer ownership in Singapore (2000-2018), by housing type



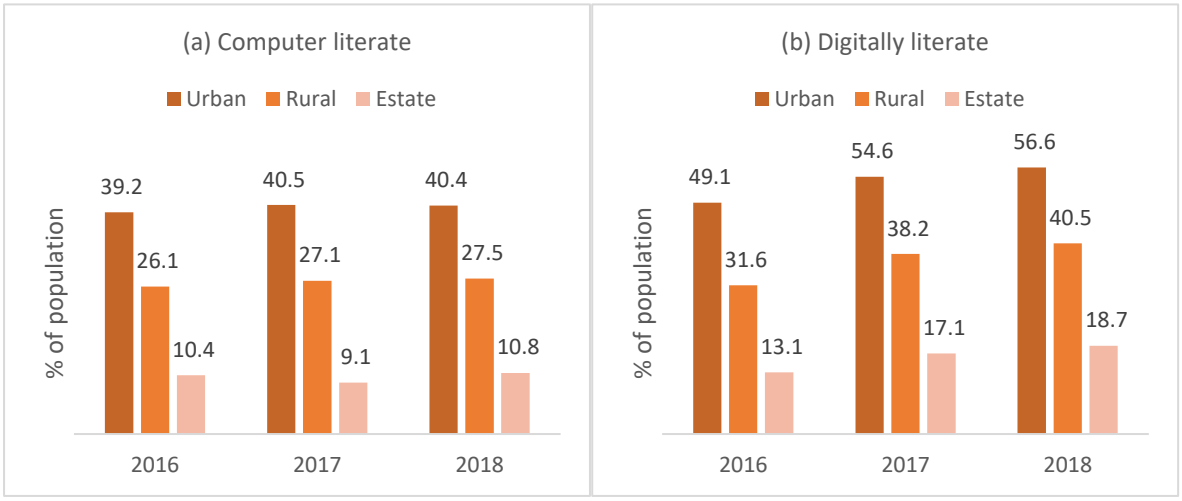
Source: Infocomm Media Development Authority

In addition, the case of Sri Lanka looks at the skills in using computer and digital technology (**Figure 15**). Computer and digital literacies are significantly higher for those living in urban areas. In 2018, 40.4 percent of those living in urban areas are considered computer literate while in rural areas the proportion is only 27.5 percent. Much lower than this would be those living in Estate[11] areas in which only 10.8 percent is digitally literate. This is consistent with the case of Singapore which relates richer or more affluent areas to better internet access.

[10] See Phang and Helble (2016) for housing policies in Singapore and Eng (1978) for residential choice in public and private housing in Singapore.

[11] In Sri Lanka, estate areas refer to "all plantations which are 20 acres or more in extent and with ten or more resident laborers." These areas are characterized by low living standards and widespread poverty. Also, the Estate sector has traditionally been behind both the urban and rural sectors. For a background on Sri Lanka's poverty and welfare, see: Newhouse, Suarez-Becerra, and Doan (2016)

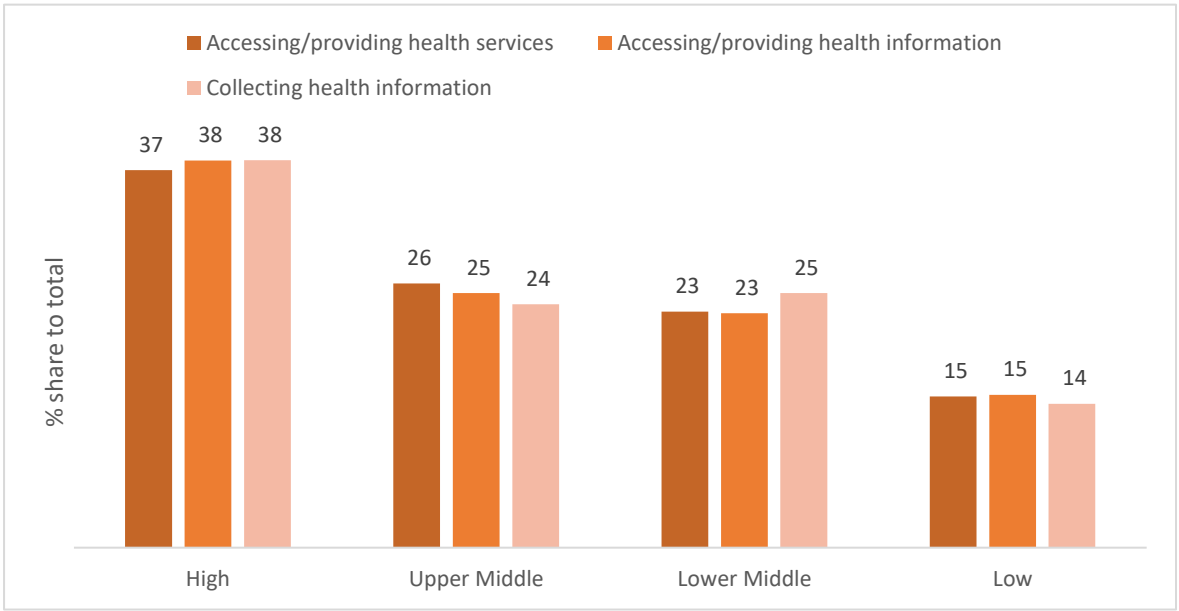
Figure 15 Computer and digital literacy in Sri Lanka (2016-2018), by urban and rural area



Source: Department of Census and Statistics Sri Lanka (2018)

High income countries have more mobile health programs than low income countries (**Figure 16**). For instance, from among all countries that accessed or provided health services, high income countries had a 37.0 percent share, which is more than double the share of low income countries. This supports the observation that more affluent areas tend to participate more in the digital economy. Meanwhile, upper middle and lower middle income countries tend to perform relatively the same.

Figure 16 Distribution of mHealth programs, by income group



Note: Accessing/providing health services include health call centers, toll-free emergency calls; treatment adherence; appointment reminders; mobile telehealth; and emergencies, while accessing/providing health information includes community mobilization; access to info, resources, databases, and tools; decision support systems; electronic patient information/records; and, mLearning. Meanwhile, collecting health information refers to health surveys; surveillance; and, patient monitoring.
Source: Authors' calculation using data from WHO (2016)

2.4.3 Skills access

Countries with higher income tend to have a higher proportion of the population with digital skills. This is true for all regional classifications (**Table 2**). As the benefits of the digital and platform economy accrue more to those countries where the population have sufficient digital skills, countries belonging to the low income and lower-middle income group will fall further behind by not having the basic computer, coding, and digital skills.

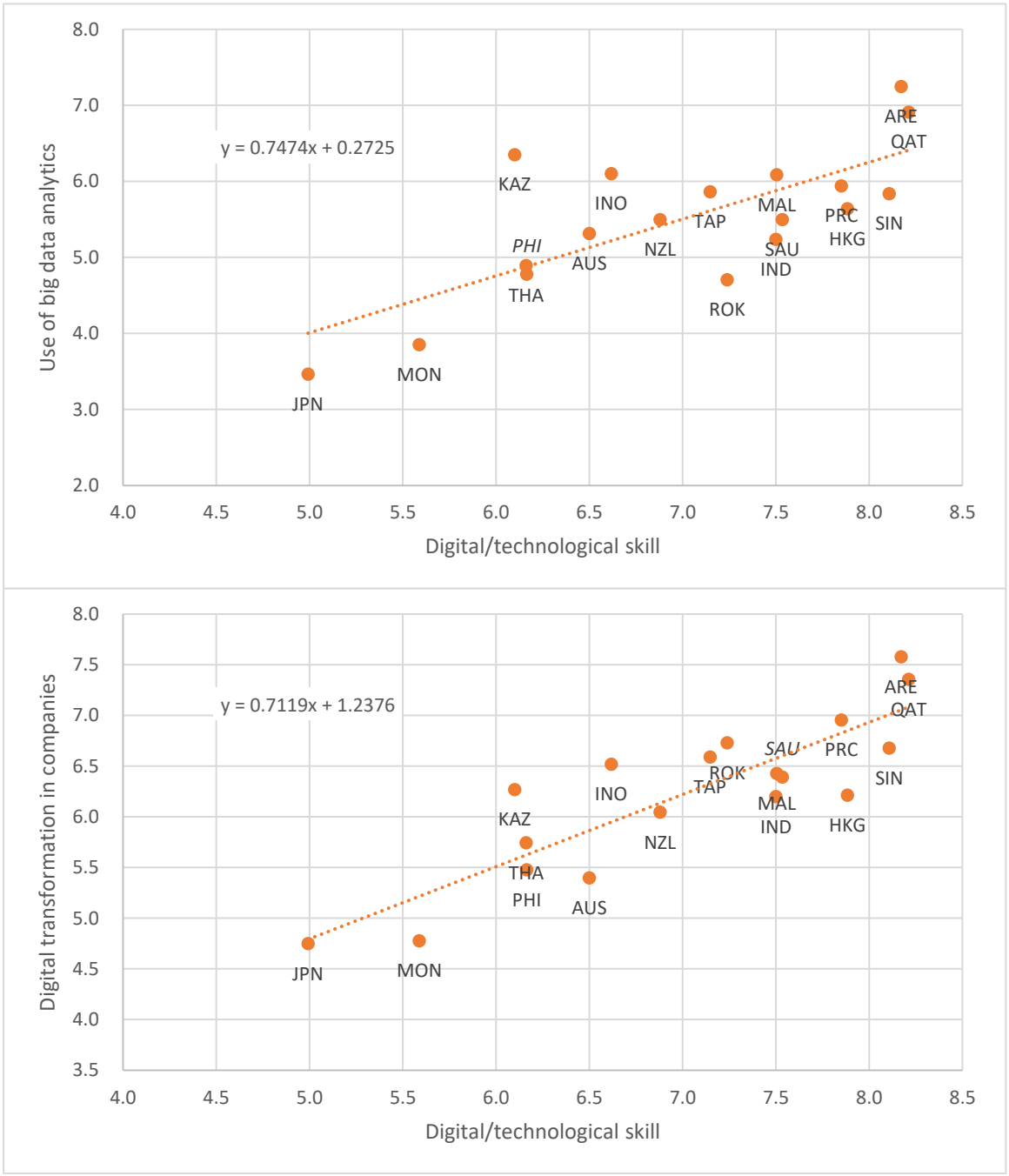
Table 2 Digital skills by region and income group (2017 and 2019)

Region and Income group	2017	2019
East Asia & Pacific	4.7	4.6
High income	5.1	5.0
Upper middle income	4.8	4.8
Lower middle income	4.1	4.1
Europe & Central Asia	4.7	4.6
High income	4.9	4.9
Upper middle income	4.3	4.3
Lower middle income	4.4	4.3
Low income	no data	4.4
South Asia	3.8	4.0
Upper middle income	3.9	4.2
Lower middle income	3.9	4.0
Low income	3.7	3.7

Note: Extent to which population possess sufficient digital skills (e.g., computer skills, basic coding, and digital reading); [1 = not all; 7 = to a great extent]. The data used for this table is based on the World Economic Forum (WEF)'s Global Competitiveness Index 4.0: Digital Skills Among Population indicator. A change in methodology occurred in 2018, so 2017 data have been backcasted. WEF published a technical note on how they backcasted data, which can be read in full here: https://reports.weforum.org/global-competitiveness-report-2018/appendix-c-the-global-competitiveness-index-4-0-methodology-and-technical-notes/ (accessed 14 May 2020)
Source: Authors' calculation using data from TCdata360 (https://tcdata360.worldbank.org/)

Digital skills are important in order for the population to maximize the use of the digital economy. **Figure 17** shows that there is a positive correlation of having digital technological skill with the use of advanced data analytics and data analysis. There is also a positive correlation with digital and technological skills availability with digital readiness of companies. Without digital and technological skills, countries and would tend to use ICT for less productive purposes.

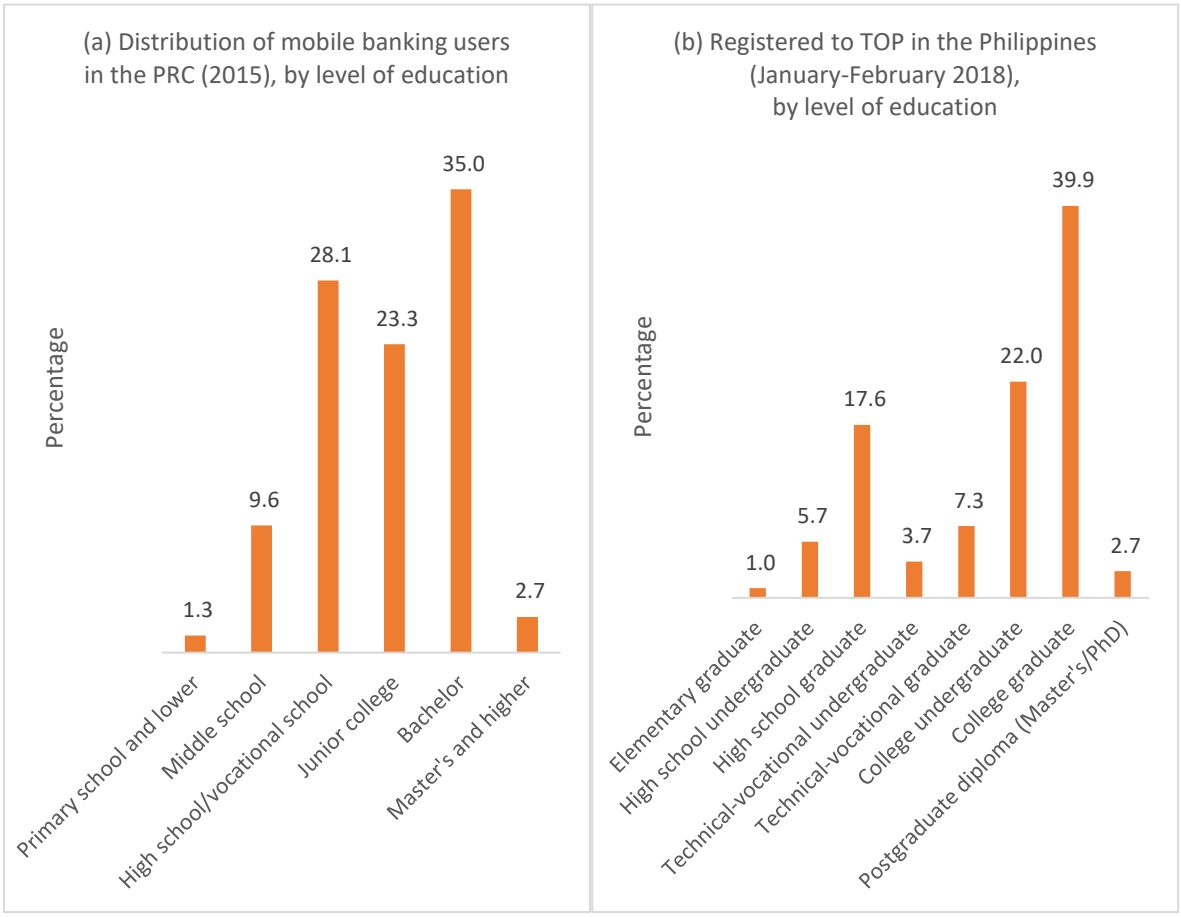
Figure 17 Digital and technological skill and use of advance technologies in selected Asian economies (2019)



Note: Use of big data analytics is the assessment of the respondents to the Executive Opinion Survey on whether companies are very good at using big data and analytics to support decision-making. They score from 1 (lowest) to 10 (highest). Digital transformation in companies is based on the assessment of the respondents to the Executive Opinion Survey on whether digital transformation in companies is generally well implemented. Respondents score 1 (lowest) to 10 (highest). Economy labels are placed below their data point but some economy labels (italicized) are placed above their data point to improve chart readability.
Source: Authors' calculation using data from the World Competitiveness Online (https://www.imd.org/wcc/products/eshop-world-competitiveness-online/)

Moreover, **Figure 18** shows that the better skilled have better access. Usually, college undergraduates and college graduates would register to the TESDA Online Program (TOP).[12] It is also those who have higher education who make use of mobile banking in the PRC. Previously, **Figure 8** has shown the case for Japan that those who have more education tend to participate more in the digital economy by participating in online shopping.

Figure 18 Selected cases and educational attainment



Source: Cabauatan et al. (2018); Statista

The case for the Philippines reveals that access to computers and use of it may not be the complete story. Analysis of unpublished data has shown that people who have access to computers make use of the technology mostly for basic communication and for entertainment and gaming. A smaller share of those who have access to computers are use it to send emails (plain text or with attachments), encode data, use word processing software and transfer files between a computer and other devices, and even distance/online/computer-aided learning. The more advanced tasks, such as running a software program, data management and analysis, using modeling, simulation, and rendering software have the lowest proportion of computer users of which majority have higher education (high school/vocational school and College and Higher).

[12] In the Philippines, the Technical and Education and Skills Development Authority (TESDA) is a government agency that provides technical and vocational education and training. One of their programs to expand reach is the TOP. For more on the TOP, see: https://www.e-tesda.gov.ph/

In a similar vein, unpublished data for the Philippines show that those who have higher education tend to use the internet for more advanced tasks, such as using the internet for learning (e.g., online courses, academic research, e-books, and dictionaries), production of creative or User-Generated Content (UGC) (e.g., managing a personal homepage, blogging, and vlogging), and online transactions (e.g., online banking, online booking/reservation, and online shopping).

2.5 Digital platforms also face (or cause) their own usage divide

As platforms continue to be embraced, new manifestations of divides stemming from the use of the platform may be observed. This section looks at the various platforms to observe the existence of indicators of digital divide.

Based on the van Dijk (2006) model, digital divide on ICT would affect the use of the digital technology and maximizing the platform economy. As early as 2011, van Deursen, van Dijk, and Peters (2011) had already foreseen the appearance of a usage gap between parts of the population systematically using and benefiting from advanced digital technology (e.g., digital platforms) and the more difficult applications for work and school while other parts only using basic digital technologies for simple tasks with a relatively large part being entertainment.

The following section provides the cases of usage divide that surrounds the digital platforms. While this is not a comprehensive list of cases, these illustrate the need to understand the divides surrounding digital platforms and initial indications of it. Other indications of divide in digital platforms would still include mental divide and material access divide.

2.5.1 Platforms may disproportionately benefit those who are already better off

2.5.1.1 Accommodation platforms

Airbnb is one of the successful start-ups that benefited from the sharing economy. Airbnb defines itself as "a social website that connects people who have space to spare with those who are looking for a place to stay (Quattrone et al. 2016)." Since the company's establishment in 2008, it has grown to more than 1.5 million properties and a global presence in over 190 countries that are further divided in to 34,000 cities.

Using data from Inside Airbnb,[13] Tom Slee,[14] and unofficial maps available online at GADM,[15] we were able to observe Airbnb postings in four areas: Hong Kong, China (**Figure 19**); Seoul City, the ROK (**Figure 20**); Singapore (**Figure 21**); and, Sri Lanka (**Figure 22**). We can observe that there is a concentration of Airbnb postings in the central districts and busy areas

[13] Inside Airbnb is a website maintaining open data of public Airbnb listings across 25 countries. For more on Inside Airbnb, see: http://insideairbnb.com/

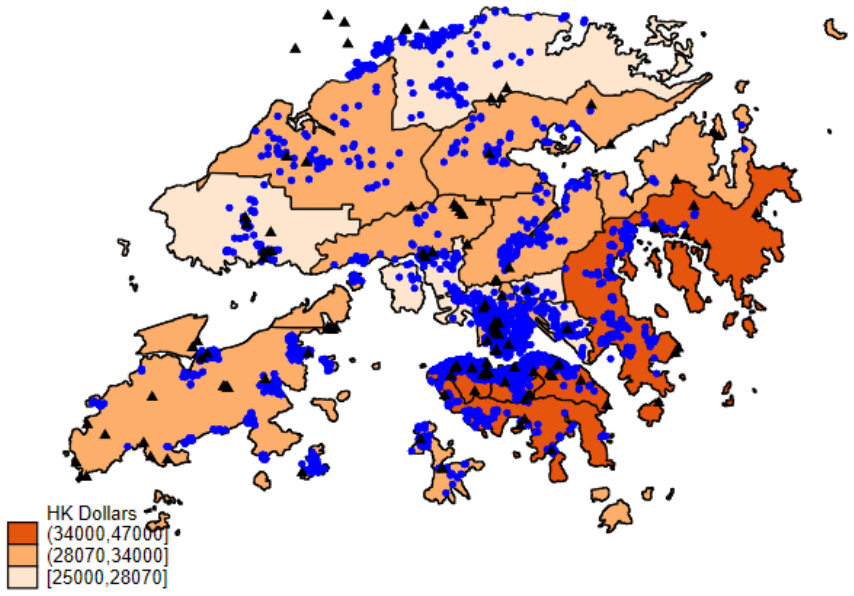
[14] Tom Slee is an individual that has collected Airbnb listings from cities around the world. He provides open access data through his blog, see: https://tomslee.net/category/airbnb-data

[15] GADM is a project hosted by the Center for Spatial Sciences at the University of California, Davis that provides shape files of administrative areas in all countries at all levels of sub-division.

(represented by dark orange districts) in Seoul City and Singapore. The same can be observed for Sri Lanka. Areas in the periphery, while having some Airbnb postings, do not enjoy the scale that is observed in the central districts.

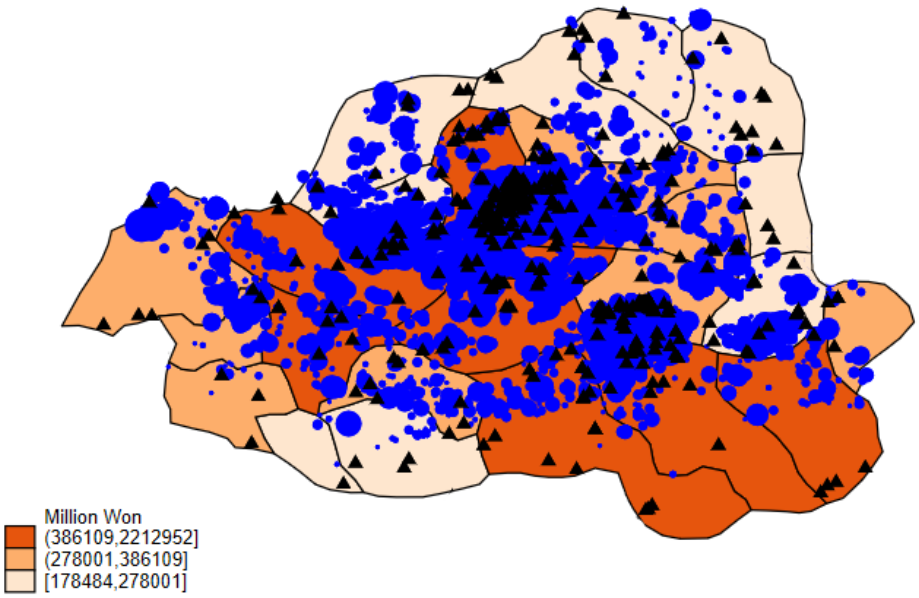
Airbnb listings proliferating in areas with high levels of commercialization and near areas of interest have also been observed in other European countries, such as Bulgaria (Roelofsen 2018), Switzerland (Larpin et al. 2019), and Spain (Adamiak et al. 2019). Furthermore, studies have shown that the patterns of participation in Airbnb (proxied by the distribution of Airbnb listings) is closely related to the distribution of tourism demand and accommodation capacity (Adamiak et al. 2019; Domenech et al. 2019; Strommen-Bakhtiar and Vinogradov 2019). This has implications on inequality, especially between rural and urban areas. The use of the platform may exacerbate the highly unequal distribution of income and development between these areas resulting in an observable gap in development.

Figure 19 Airbnb units in Hong Kong, China (as of 13 January 2020)



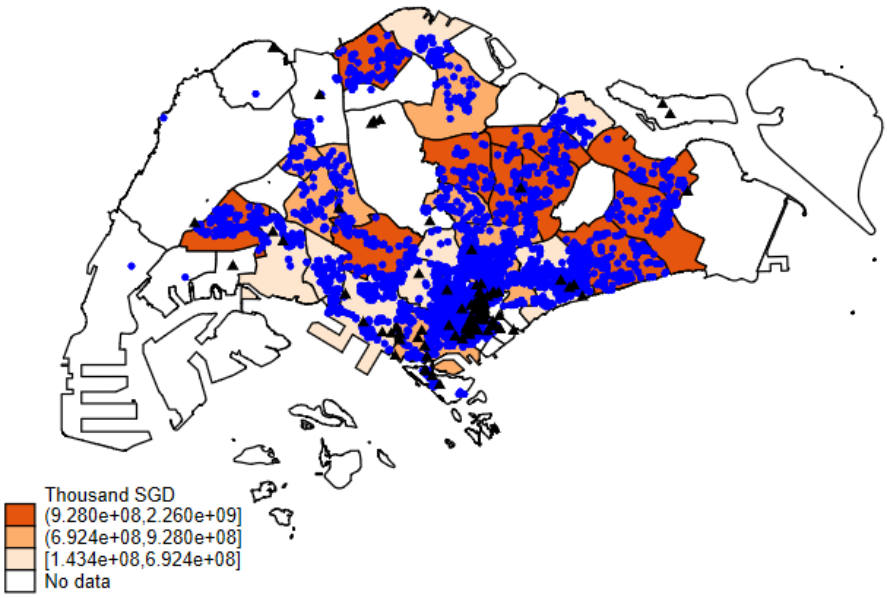
Note: Airbnb units are represented as blue points while points of interest are marked by black triangles. Shaded areas are based on median household income in 2016.
Source: Census and Statistics Department; GADM; Inside Airbnb; MapCruzin

Figure 20 Airbnb units in Seoul City, the ROK (as of 17 July 2017)



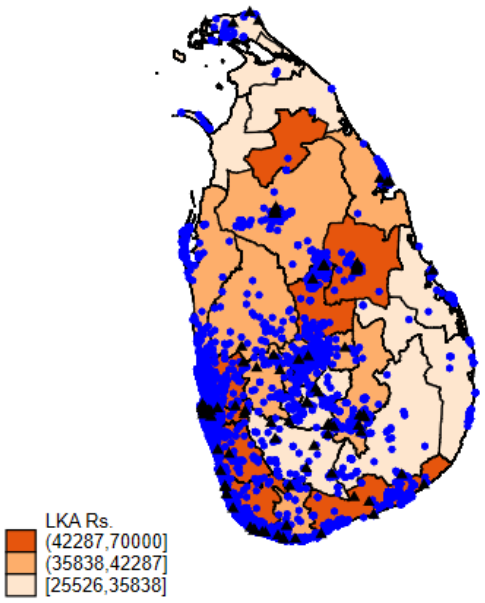
Note: Airbnb units are represented as blue points while points of interest are marked by black triangles. Shaded areas are based on city tax collections in 2012.
Source: GADM; Korean Statistical Information Service; MapCruzin; Tom Slee

Figure 21 Airbnb units in Singapore (as of 27 February 2020)



Note: Airbnb units are represented as blue points while points of interest are marked by black triangles. Shaded areas are based on total household income in 2015.
Source: Department of Statistics; Inside Airbnb; MapCruzin; Urban Redevelopment Authority

Figure 22 Airbnb units in Sri Lanka (as of 19 July 2017)

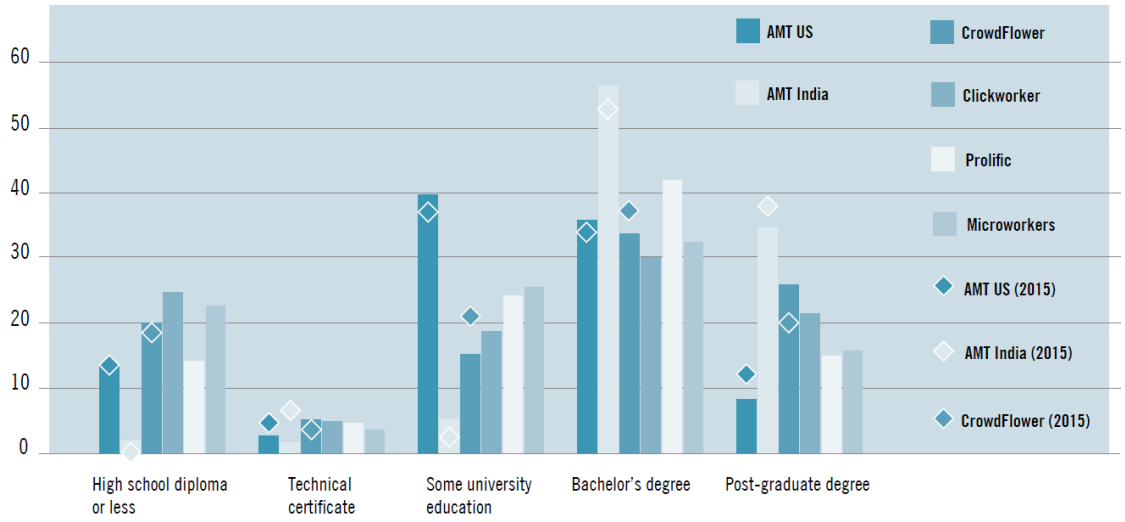


Note: Airbnb units are represented as blue points while points of interest are marked by black triangles. Shaded areas are based on median household income in 2016.
Source: Department of Census and Statistics; GADM; MapCruzin; Tom Slee

2.5.1.2 Case of Upwork / Gig Economy

Crowdworkers are well-educated as shown by data in 2017. Those having at most a high school diploma only makes up barely 18.0 percent of crowdworkers. Close to one-fourth of the workers have a technical certificate or have some university education, and 37.0 percent have a bachelor's degree while 20.0 percent have a post-graduate degree or higher education (**Figure 23**).

Figure 23 Educational level of crowdworkers, by platform (%)



Source: Lifted from Berg et al. (2018)
Note: The ILO conducted two surveys of crowdworkers: one in 2015 (diamonds) and another in 2017 (bars). The 2015 survey's sample consisted of workers who were based in either the United States or India, had completed at least 500 tasks, and had achieved a 95.0 percent or greater task acceptance rate from the platform Amazon Mechanical Turk (AMT). Apart from AMT, the 2015 survey also included quality workers from CrowdFlower. In 2017, the survey's sample was expanded to include other quality workers from other crowdsourcing platforms, such as Clickworker, Microworkers, and Prolific.

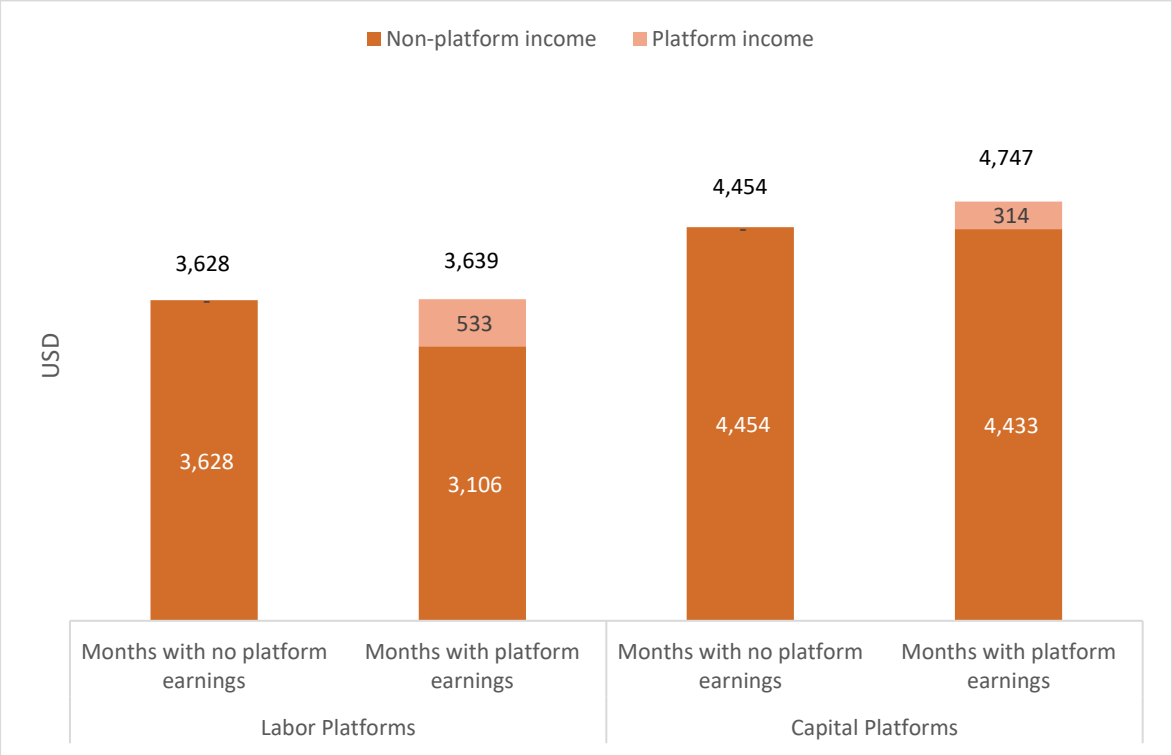
In addition, Upwork jobs remain limited by freelancers' skills and capabilities. For instance, data from Upwork shows that most of the jobs available to freelancers (e-lancers) require advanced knowledge in computer programming. A quick scan of the top 30 trending jobs posted in the past 12 hours[16] requires technical skills that can be divided into three major groups: first, creative (photo editing, creative writing, copywriting, animation, landscaping, graphic design); second, technical (technical writing, Hypertext Markup Language (HTML) or website development, programming (Python), data extraction, and language translation); and third, administrative support. Only two job posts (6.7%) required administrative support.

2.5.1.3 Earning from platforms is affected by ownership of capital

Another indication of a usage divide could be seen in how Americans earn from digital platforms. The study by Farrel and Greig (2016) shows that those who are able to earn more from digital platforms are those who have assets which can be rented out to earn supplemental income (**Figure 24**). This is in contrast to people who participate in labor platforms which participate in the platform economy to offset monthly earnings.

[16] Top 30 trending jobs in Upwork as of 19 May 2020, 1:48PM (Philippine Standard Time). Upwork's freelance jobs by category can be accessed here: https://www.upwork.com/freelance-jobs/

Figure 24 Earnings in months with and without platform earnings (United States)

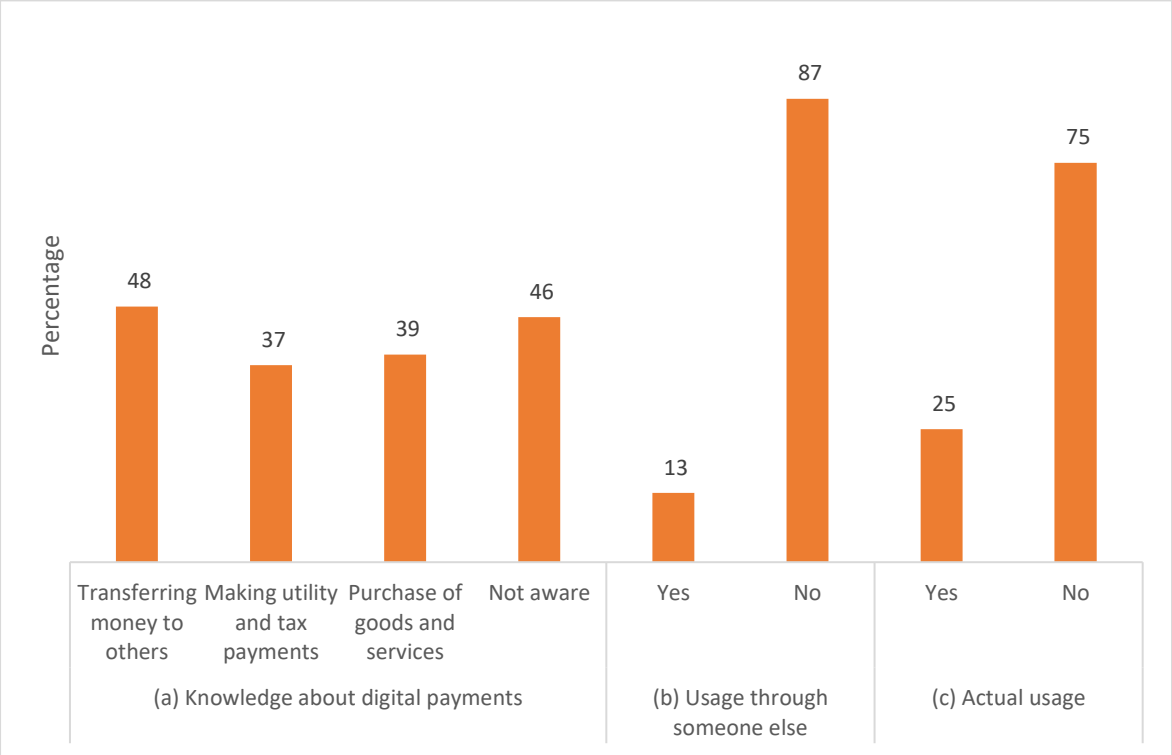


Source: Farrel and Greig (2016)

2.5.2 There are indirect users of digital platforms

While there is an increasing number of people in Asia obtaining access to ICT, it has been observed that certain segments of the population have been making use of platforms through proxies. For instance, the Consumer Unity & Trust Society International (CUTS International 2018b) conducted a study on digital payments in India (**Figure 25**). Based on their survey 48.0 percent of respondents were aware that digital payments can be used to transfer money to others, 37.0 percent are aware that it can be used to make utility and tax payments, and 39.0 percent are aware that it can be used to purchase goods and services. However, of those who are aware of the use of digital payment channels (54.0% of the respondents), only 25.0 percent actually make use of it, while 13.0 percent actually used digital payments through the help of others (i.e., proxy users). This reflects the limited capacity and trust of consumers on using digital payment services themselves, which shows that digital platforms also face motivational access barriers.

Figure 25 Digital payment indicators in India (2018)



Source: CUTS International (2018b)

In addition, Llanto, Rosellon, and Ortiz (2018) analyzed the case of Konek2Kard[17] in the Philippines. The study found that clients experienced an easier, faster, and more convenient service, which includes the ability to transact in real-time throughout the day – an important feature considering that these clients are either working or busy with household chores. Proxy users, such as older clients who let their grandchildren or younger kin operate their online activities, were also observed. This implies that there is still a skills gap between knowing how to use a mobile phone as against doing transactions on digital platforms.

Another indication of proxy usage would be that of Myanmar as documented by Gillwald, Galpaya and Aguero (2019). Through a semi-structured interview of internet users in Myanmar in 2017, the researchers found that many of the respondents had their Facebook account (username and password) created by shop workers who sold them their phones. In effect, causing their social media accounts (mainly Facebook) to be regularly hacked. In addition, not everyone even knew that Facebook required a password. This would affect the participation not only in social media platforms but also in other platforms that can use Facebook log-in credentials to create an account.

2.5.3 Trusting and comfortably using ICT does not translate to trusting digital platforms

Literature (Kovachev et al. 2011; Rogers 2011; Handal, MacNish, and Petocz 2013; Sarrab et al. 2013; Kim, Lee, and Kim 2014; Rius, Masip, and Clariso 2014; Cabauatan et al. 2018;

[17] "Konek2CARD" or "k2c" is a mobile banking application introduced by CARD Bank, a microfinance-oriented rural bank in the Philippines (Llanto, Rosellon, and Ortiz 2018).

CUTS International 2018a) has raised a number of challenges to achieving effective e-learning, which are strongly related to digital divide. The clearest relationship would be related to material access. These same studies have raised the importance of having access to stable and reliable internet in order for e-learning to be successful, but as demonstrated by van Dijk's (2006) model, the platform technology will face their own set of barriers to access. For instance, the motivation and perception of teachers and students from the very beginning needs to be addressed in order for e-learning to be successful. In Viet Nam, it was raised that teachers and students doubt the effectiveness of internet learning with the perception that e-learning is inferior to face-to-face learning (MacCallum and Jefrey 2009; CUTS International 2018a). Other frequently cited factors that affect motivation in use of e-learning platforms would include privacy concerns (Cummings, Merrill, and Borrelli 2010; Binsaleh and Binsaleh 2013; Popescu and Ghita 2013) and distractions (Handal, MacNish, and Petocz 2013; Morales 2013). Segments of the population that face this motivational divide would not even consider using e-learning.

In a similar fashion, the case of E-clinic services in India face limits to trust and confidence in the efficacy of services obtained through digital platforms. The study found that one of the most common reasons for never using e-clinic services despite its availability is the lack of trust (CUTS International 2019). In addition, the presence of alternatives (i.e., existing health services are good and accessible) make e-clinic services less preferable as users prefer face-to-face interaction to obtain advice from specialist doctors.

3. Conclusion and Policy Recommendations

This study presents the indications of the presence of a digital divide in Asia through indicators for the region and selected Asian economies. It has looked at the digital divide in terms of ICT indicators as well as other factors related to access, such as culture, trust, and skill. These are manifested in the difference of access of certain groups, such as those who live in well-off/urban areas, those who are male, those who are not so young nor so old, and those who have adequate skills. These same segments of the population are seen to benefit more from the digital economy. They participate more in online shopping, producing content online, and utilizing both e-learning and e-health platforms.

As noted by van Dijk's (2006) model, the digital platforms will face their own divide, which has already started to manifest in certain platforms. The case of accommodation platforms show that the more commercialized, well-off, and touristy areas will benefit more from digital accommodation platforms. This will place a wider gap between commercialized, well-off, and touristy areas and its periphery. Some platforms also face trust issues and security issues while other platforms will tend to increase the income inequality among individuals as documented by the study of JP Morgan (Farrell and Greig 2016). Those who have assets would tend to earn more from digital platforms.

Given the findings of this paper, the following are recommendations to the Asian Development Bank (ADB):

1. Work with the member economies to define and measure various indicators in the four areas of access and participation in digital platforms. This paper suffers from the limited examples from Oceania and other island countries in the Pacific. There is a need to fully

understand the picture in Asia and not having an indicator and measurement of access and participation in digital platforms already shows some divide among countries.

2. Addressing the barriers for each type of access is dependent on the socio-cultural and policy environment of the country. It is advised that the barriers in the various types of access be addressed simultaneously as the factors affect various forms of divide. Providing material access and the supporting infrastructure to support internet access is a necessary condition for digital platform participation, but this is not sufficient. There is also a need to address cultural barriers and skills barriers. The barriers have to be addressed simultaneously because the value of digital platforms and applications become limited if not maximized by certain segments of the population.

3. While there is a need to address barriers simultaneously, it is recommended that ADB generously support projects that would support material access to ICT in LDCs. Data has shown that LDCs fall behind other economies in having access to ICT and participating in the platform economy. Without the basic ICT infrastructure on which people can begin to practice and learn using ICT, it would be hard for LDCs to reach the level of the developed economies.

4. It is recommended that ADB works with Governments in order to formulate plans for utilizing digitization, facilitating innovation, and supporting start-ups as a number of platforms are based on mobile applications. Governments also need to recognize the income inequality that may worsen because of the opportunities to earn more income from the digital platforms. There should be plans to redistribute the benefits to segments of the population to ensure that income distribution does not deteriorate.

5. It is also recommended that ADB facilitate cooperation among countries to ensure, over time, the convergence in the level of ICT access and participation in the platform economy.

6. Greater skills development for the youth. The case of Upwork revealed that most of the tasks involved are computer-related and would require familiarity with the internet. Reskill and retool adults. There is also a need to change the mindset on using technology. This is related to the case of absentee platform users.

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Appendix 1 List of Statista references

Figure	Description	Source Link (accessed 8 July 2020)
8c	Distribution of internet users in China from December 2014 to March 2020, by gender	https://www.statista.com/statistics/265148/percentage-of-internet-users-in-china-by-gender/
8d	Monthly internet user penetration rate in the Philippines from June 2006 to March 2019, by gender	https://www.statista.com/statistics/1104737/philippines-monthly-internet-user-penetration-rate-by-gender/
8f	Methods and devices used by households to access internet in Taiwan as of end of August 2019, by gender	https://www.statista.com/statistics/1100096/taiwan-ways-to-access-internet-by-gender/
9a	Share of people using the internet to buy something online in Japan in 2017, by type of population	https://www.statista.com/statistics/942094/japan-online-shopping-user-share-by-population-type/
9b	Most well-known ride hailing apps in South Korea as of March 2019, by gender	https://www.statista.com/statistics/1013472/south-korea-wellknown-ride-hailing-mobile-apps/
9c	Preferred e-commerce types in China as of 2nd quarter 2017, by gender	https://www.statista.com/statistics/856357/china-preferred-e-commerce-types-by-gender/
9e	Distribution of men using e-money for online shopping in Indonesia as of November 2017, by age group	https://www.statista.com/statistics/959224/indonesia-male-e-money-usage-for-online-shopping/
9e	Distribution of women using e-money for online shopping in Indonesia as of November 2017, by age group	https://www.statista.com/statistics/959452/indonesia-female-e-money-usage-for-online-shopping-by-age/
9f	Mobile payment penetration in Taiwan as of November 2019, by gender	https://www.statista.com/statistics/968345/taiwan-mobile-payment-penetration-by-gender/
9f	Online banking penetration in Taiwan as of November 2018, by gender	https://www.statista.com/statistics/968325/taiwan-online-banking-penetration-by-gender/

10a	Age distribution of e-commerce app users in China as of February 2018	https://www.statista.com/statistics/871581/china-age-distribution-of-e-commerce-app-users/
10c	Distribution of online consumers across India in 2016, by age group	https://www.statista.com/statistics/759142/india-distribution-online-consumers-by-age-group/
10d	Distribution of online shoppers in Canada as of April 2019, by age group	https://www.statista.com/statistics/1044434/canada-online-shoppers-by-age-group/
10e	Distribution of online shoppers in the Philippines in 2018, by age group	https://www.statista.com/statistics/1032036/age-group-distribution-online-shoppers-philippines/
10e	Share of internet users in the Philippines as of September 2018, by age group	https://www.statista.com/statistics/998362/share-internet-users-philippines-age-group/
10f	Mobile payment penetration in Taiwan as of November 2019, by age group	https://www.statista.com/statistics/968341/taiwan-mobile-payment-penetration-by-age-group/
11c	Mobile internet usage rate in South Korea in 2018, by age group	https://www.statista.com/statistics/1012884/south-korea-mobile-internet-usage-rate-by-age-group/
11d	Breakdown of internet users in China from December 2016 to March 2020, by age	https://www.statista.com/statistics/265150/internet-users-in-china-by-age/
19a	Distribution of mobile banking users in China in 2015, by level of education	https://www.statista.com/statistics/646164/china-mobile-banking-users-by-level-of-education/