

ERIA Discussion Paper Series

**Developing Asia in the Era of
Cross-border E-commerce**

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Cross-border e-commerce has been a major development trend of international trade and globalization. In the next 5–10 years, the top three fastest-growing markets in the world—India, Indonesia, and Malaysia—will all come from Asia. Connectivity is the cornerstone of e-commerce development. E-commerce supporting connectivity aims to ease free information flow, logistics, free cash flow, and seamless links between the virtual and physical parts of e-commerce network. Accordingly, policy efforts include: increasing the supply of public goods to improve connectivity infrastructure in both physical world and cyberspace; establishing rules and regulations to ensure dynamics and competition of online marketplace; improving connectivity-derived services to generate more value added; prioritizing smartphone economy and Internet financial innovation, and collaboration in the region-wide E-commerce supporting environment.

Keywords: digital economy, e-commerce, connectivity, developing Asia

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1. E-commerce in developing Asia

Electronic commerce (e-commerce) has been radically altering our society. Economic activities using tools of the Internet or new information and communications technology (ICT) to make purchases of goods or services or doing business online are rapidly expanding. Global cross-border e-commerce has been increasingly important in international economy (European Commission, 2011). Various factors have laid a solid foundation for the booming cross-border e-commerce, such as the use of smartphones, high-speed Internet, the maturity of online payment systems, the changes in consumer behaviours, services sector liberalization, and so on.

Cross-border e-commerce has introduced new dynamics to international trade. It typically involves less intermediate links between sellers and buyers, but has higher demand on services, especially information, payment, and logistics. Cross-border Business-to-Business (B2B) e-commerce has been steadily growing since the 1990s. The growth has accelerated with the outspread and deepening of global value chains (GVCs) in the 21st century. Until now, B2B still dominates cross-border e-commerce. But the 'e-related' changes could be disruptive. It is the radical growth of Business-to-Consumer (B2C) and Consumer-to-Consumer (C2C) that has attracted the public's attention to global e-commerce. UNCTAD (2016) shows that global B2C e-commerce has been growing faster than B2B transactions; and the e-commerce market in the Asia-Pacific region is now growing faster than other regions in the world.

Consumers take advantage of individual company's retail websites focusing on B2B and B2C as well as online marketplaces that also provide C2C services, such as Amazon and eBay. The total number of digital shoppers worldwide grew by over 100 million between 2011 and 2012. And the group kept on expanding afterward. Digitalization provides shoppers diversified retail channels with more options. The share of online sales in total revenue kept increasing in recent years. Moreover, new business models, such as the combination of online market with brick-and-mortar store, have also emerged and increasingly got adopted by sellers and buyers.

E-commerce sales have climbed steadily worldwide, with sustained growth in sight. E-Commerce Foundation (2017) believed that the actual market turnover of B2C e-commerce was as much as US\$2.3 trillion by the end of 2015. Asia-Pacific is the region where e-commerce experienced fastest growth in the world. The share of e-commerce in

total global retail sales increased by 12 percentages between the years 2015 and 2016'. During this period, the markets of B2C e-commerce in China and India were booming rapidly. Chinese market expanded by 27%, and that of India increased by 75%. China has been the world largest B2C e-commerce market. In 2016, Chinese annual B2C e-commerce turnover reached US\$975 billion, equivalent to the combined market size of the United States (the second largest) and the United Kingdom (the third largest). Measured by global Internet reach, 8 out of the 13 global largest online retail and auction sites (by mid-2014) are Chinese companies. In 2015, the Indian market was equivalent only to around 70% of Canadian market. However, in a year, its market size reached US\$44.7 billion and surpassed that of Canada.

Global revenue from cross-border e-commerce was projected to reach US\$600 billion in 2018, twice as much as that of 2012. China is among the frontrunners of cross-border e-commerce. The gross market value of cross-border e-commerce by China represented about one-eighth of its total trade in 2013. Its share was expected to further increase to around 20% by the end of 2017. Overall, the scale of digital economy in ASEAN is projected to increase by 5.5 times by 2025 (Think with Google, 2017). At that time, the Asian market will account for nearly 40% of the world total revenues generated by cross-border e-commerce, making Asia the global epicentre of e-commerce (BCG, 2014).

China tends to be a main engine of e-commerce growth. Between 2015 and 2020, the e-commerce penetration into Chinese foreign trade is estimated to increase at the rate of 20%–40% per year, higher than the annual growth rate of international trade in goods. According to the projection published by AliResearch (2016), by 2020, the size of Chinese cross-border e-commerce market transaction will reach 12 trillion Chinese Yuan (CNY), about three times as that in 2015, representing almost 40% of its total import and export. B2B exports still dominate China's cross-border e-commerce, but B2C has been gaining certain progress and increasing its share, on both export and import side. By 2020, China's gross e-retail sales (B2C plus C2C) are expected exceed CNY 10 trillion, accounting for 20.7% of total retail sales of consumer goods. Cross-border e-commerce retail turnover will exceed CNY3.6 trillion, which 1.5 trillion CNY in imports and 2.1 trillion CNY in exports.

From the technical perspective, the combination of e-payment and smartphone has greatly facilitated online shopping. Smartphone access has accounted for more than half of retail websites visit worldwide and around one-third of e-retail revenues. Companies specialized in cross-border e-commerce have experienced fast development in mobile

business. For example, in the case of DHgate.com, the website visits from mobile devices accounted for 42% of the platform's total visits in June 2014. The number of orders sent from mobile terminals has increased over two times yearly. Another company, Lightinthebox.com, also saw mobile business a main driving force behind its revenue growth. Over 30% of the orders in 2014 came from mobile devices (AliResearch, 2016).

The total annual revenue of the global mobile payment market was estimated to reach US\$450 billion in 2015. The market is projected to expand by US\$150 billion–170 billion per year. According to the projection, the size will break the mark of US\$1 trillion by 2019. Mobile and PC platforms tend to interact further with each other. It has been popular for mobile business to adopt multi-app strategies. In the next 5 years, an increasing share of private consumption increment will come from global e-commerce growth. Sustained growth of online shoppers provides the solid base of e-commerce consumption. By June 2016, the scale of online shoppers in China has reached 448 million and online shopping usage rate has reached 63% (CNNIC, 2016). Singapore (60%), Malaysia (52%), and Thailand (51%) are among the world's top markets with the highest online shopping penetration rate as well.

2. Opportunities and potentials

The market of e-commerce is getting mature, thanks to the diffusion of massively improving technology and policy supporting growth conditions. The radical growth of e-commerce could be a double-edged sword. On one side, economic digitalization tends to facilitate international trade as consumers and producers can obtain information from a wide range of geographical locations at low cost within a short time. This injects new dynamics into the global market. With new entrants, new products, new services, new business models, as well as changes in innovation and technology diffusion processes, the price level is lowered, the variety of supply increases, and market competition intensifies. On the other side, the region needs to face more intensive competition, either within the region or with the outside world. Technology progress may widen development gaps among countries if those latecomers cannot manage to grasp the opportunities to accelerate the growth. Equally, there is no guarantee that frontrunners in the past can still perform

well in the future. In a digital economy, one should continuously adjust in response to technology and market changes to keep the edge of competition sharp.

The growth of e-commerce follows an exponential path because of the disruptive technological progress in ICT. This is very different from the growth path of traditional economy. Accordingly, when anticipating a market's future performance, one should weigh more its potentials instead of relying much on its achievement or failure in the past.

Most opportunities that e-commerce brings to developing Asia are at the same time challenges. In principle, the region needs to maximize the e-commerce-related opportunities but minimize or eliminate the associated risks to turn the potential into the real engine of growth. For Asia, there are three sources of potential. First, adaptiveness – economic digitalization is a worldwide phenomenon. From the economic aspect, the information revolution is associated with the emergence of new market conditions and dynamics in global business environment. This requires the Asian economy, both the public and the private sectors, to respond to those changes quickly. Second, readiness – e-commerce development needs support from technology, market, and policy. Countries' preparation and readiness to support the digital economy will determine the performance of their business in e-commerce. Third, market gravitation – despite those new features of digital economy, the development of e-commerce also depends on traditional conditions for economic development such as market size, trade facilitation, investment freedom, and so on.

2.1. Adaptiveness to global economic digitalization

The concept of e-commerce is probably as old as the World Wide Web (WWW) itself. Market leaders and policymakers realized the potential of e-commerce since the beginning when the Internet was opened for civil use. During the 1998 OECD ministerial conference on e-commerce in Ottawa, Canada, ministers from developed countries concluded that e-commerce would be the key engine for economic growth (OECD, 1998). However, at that time, the development of e-commerce was still subject to various constraints in the areas of technology availability, consumer behaviour, trade and services liberalization, and so on. After over 2 decades' evolution, the market has become mature to accommodate e-commerce development. Additionally, progress in globalization, trade liberalization, and regional integration has made it closer to a borderless world of global e-commerce than ever before.

Asia has also detected the new juncture of growth. Although Asian countries are not the frontrunners of digital economy at the early stage, they are quick reactors to and good learners of the global trend. Many Asian countries have put great effort to accelerate the learning process and adopt new technologies. To some extent, the region's adaptiveness to global economic digitalization comes from its capacity in technology adoption and incremental innovation. Firstly, the deep involvement to GVCs opens the window for developing Asia to access the latest technologies; it also facilitates their learning. Secondly, countries' capacity in incremental innovation allows them to benefit from second-mover advantages to grow faster and even jump to the market frontier – the popular use of e-payment in China and the success of the Alibaba group are the typical examples.

According to World Economic Forum's Executive Opinion Survey, businesses in developing Asia, particularly those in China, Indonesia, Malaysia, and Thailand, have managed to adopt the last ICTs to link with the global market. In comparison, the speed of firm-level technology adoption in the region is higher than the world average level (see Table 1).

Table 1: Firm-level technology adoption in ASEAN, China, and India, 2007-2017

Country	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
Brunei		5.07	4.96	4.82	4.86	4.85	4.78			4.37
Cambodia	4.15	4.13	4.42	4.43	4.70	4.86	4.59	4.27	4.27	4.20
Indonesia	4.70	4.79	4.81	4.88	4.98	4.95	5.08	5.06	5.06	5.00
Lao PDR							4.47	4.30	4.30	4.11
Malaysia	5.78	5.61	5.39	5.49	5.59	5.56	5.46	5.58	5.58	5.46
Myanmar							2.73	2.94	2.94	
Philippines	4.94	5.11	5.06	4.98	5.06	5.17	5.22	5.07	5.07	4.70
Singapore	6.05	5.99	6.03	5.96	5.97	6.02	5.83	5.71	5.71	5.67
Thailand	5.16	4.88	4.91	4.88	4.73	4.98	5.02	4.86	4.86	4.92
Viet Nam	5.08	5.07	5.08	4.96	4.56	3.98	3.76	3.89	3.89	4.38
ASEAN average	5.12	5.08	5.08	5.05	5.06	5.05	4.69	4.63	4.63	4.76
China	5.00	5.15	5.14	4.95	4.91	4.75	4.69	4.66	4.66	4.60
India	5.58	5.52	5.47	5.32	5.28	5.24	5.05	4.19	4.19	4.36
CIA average	5.16	5.13	5.13	5.07	5.06	5.04	4.72	4.59	4.59	4.71
World average	4.76	4.81	4.85	4.85	4.82	4.81	4.73	4.66	4.68	4.59

Notes:

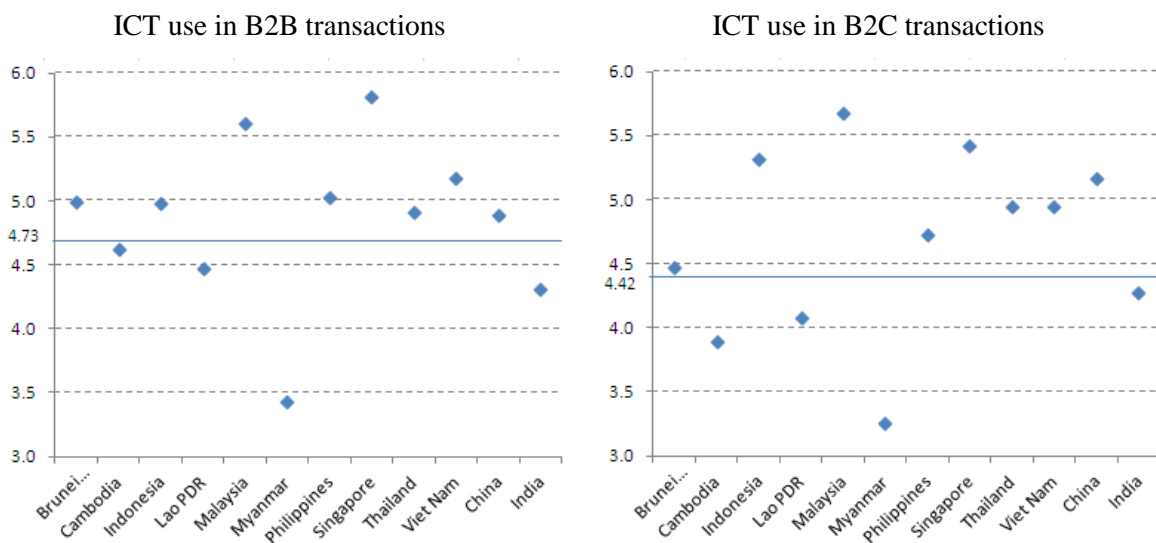
1. CIA = China, India, and ASEAN; n.a.= not available

2. Survey question, “In your country, to what extent do businesses adopt the latest technologies? [1 = not at all; 7 = to a great extent]”

Source: WEF (2017), Executive Opinion Survey 2016.

In the same report, companies were also asked about the use of ICT in business transactions, both B2B and B2C. Figure 1 shows that the scores of most developing Asian countries are higher than the world average between 2014 and 2016. This suggests developing Asia’s advance in applying ICT in daily business. Only CLM countries (Cambodia, the Lao PDR, and Myanmar) lag behind in the process. India’s score is also below the world average level due to its large population and domestic development gaps. The results here reaffirm the figures in Table 1. The business sector in developing Asia has been quickly catching up with the new dynamics of global economy and actively promoting digitalization.

Figure 1: ICT use in business transactions, 2014–2016



Notes: Survey question, ‘In your country, to what extent do businesses use ICTs for transactions with other businesses? [1 = not at all; 7 = to a great extent]’

Source: The Author. Raw data was retrieved from WEF (2017), Executive Opinion Survey 2016.

There have been policy efforts on promoting e-commerce as well, from both the regional and national levels. Region-wide, ASEAN Leaders initiated the E-ASEAN project in 1999. The E-ASEAN Framework Agreement, signed in 2000, aims to promote a productive ASEAN ‘e-space’ via (i) the enhancement of the ICT sector competitiveness, (ii) reducing the digital divide within and among individual ASEAN Member States

(AMSs), (iii) promoting partnership between the public and the private sectors, and (iv) trade and investment liberalization in ICT goods and services (ASEAN, 2000: 3). Facilitation of the growth of e-commerce is one of the six main areas² covered by the agreement. Moreover, there are joint actions with measures of international trade facilitation as well. For example, the region has already launched the AMS national single window and the ASEAN single window programmes.

In most countries, developing digital economy and e-commerce has already been part of the national strategies and action plans. For instance, 8 of 10 AMSs have already published their broadband plans (see Table 2). As for cross-border e-commerce, national actions normally combine with trade and investment facilitation as well as economic openness. For instance, in 2015 the Ministry of Industry and Information Technology in China announced that foreign investors are now allowed to set up wholly foreign-owned e-commerce companies in the Shanghai Free Trade Zone. The new rules will lift the 50% foreign ownership cap on e-commerce, with which foreign companies can play fairly in the Chinese market. This will also pave the way for the expansion of cross-border e-commerce and make China more integrated to the global network. In comparison, India's current laws still forbid foreign investment in online retailing in principle. However, some international e-commerce companies such as Amazon and eBay are operating. They are defined as intermediate Internet-based platform providing services to third-party sellers and buyers, not online retailers (Horowitz and Phelan, 2016).

² The framework covers (i) ASEAN Information Infrastructure, (ii) Electronic commerce, (iii) Trade and investment liberalization in ICT goods and services, (iv) Trade facilitation in ICT products, (v) e-Society, and (vi) e-Government.

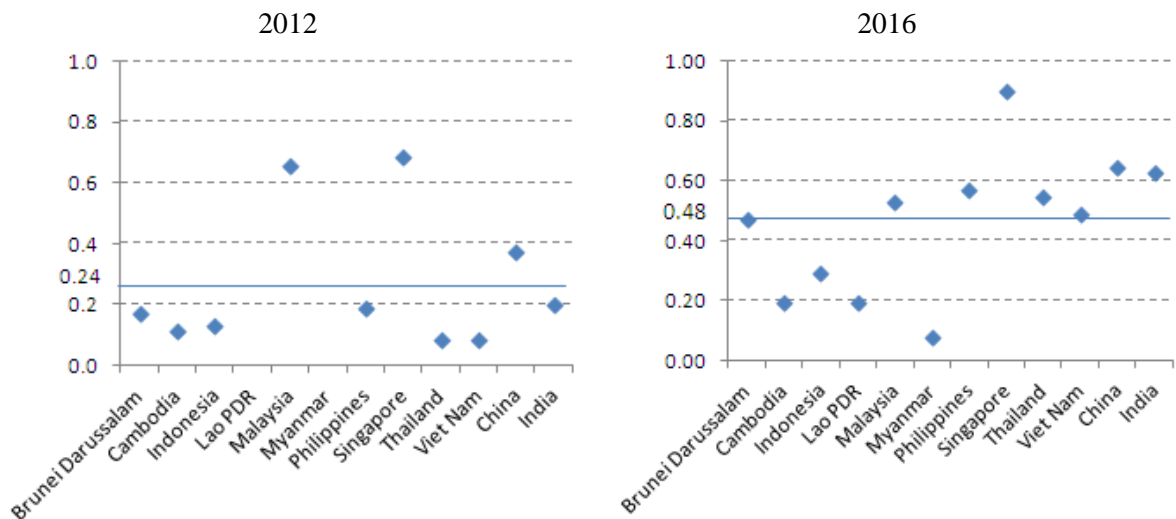
Table 2: Broadband plans in ASEAN

Country	Broadband plans	Year
Brunei Darussalam	National Broadband Blueprint	2008
Cambodia	Cambodia ICT Development Strategy 2011–2015	2011
Indonesia	The Indonesia Broadband Plan 2014 – 2019	2013
Malaysia	National Broadband Implementation Strategy (National Broadband Initiative – NBI)	2010
Philippines	The Philippine Digital Strategy Transformation 2.0: Digitally Empowered Nation	2011
Singapore	Intelligent Nation 2015	2005
Thailand	National Broadband Policy	2010
Viet Nam	the Prime Minister's Decision No. 158/QD-TTg and Decision No. 1755/QD-TTg to approve the national strategy to strengthen the information and communication technology sector in Viet Nam	2010

Source: EIU (2014); Figure 2. Tayyiba (2015). ITU (2012).

To assess the quality and usefulness of information and services that a country provides to the whole society using ICT tools, the United Nations developed the E-Participation Index as a measure of the quality, relevance, and usefulness of governmental effort (by using website, online database, etc.) in providing online information and participatory tools and services. The value of the index ranges from zero to one. Higher score means higher quality of e-government services.

Figure 2: E-participation in ASEAN, China and India, 2012 vs. 2016



Source: The author. Raw data was retrieved from United Nations Department of Economic and Social Affairs (UNDESA), UN E-Government Development Database, <http://unpan3.un.org/egovkb/>

Figure 2 shows that the world average level of e-participation increased from 0.24 in 2012 to 0.48 in 2016. A comparison of the scores of Asian countries in 2012 and in 2016 reveals the region’s effort in improving public services using digital technologies. In 2012, only China,

Malaysia, and Singapore had scores higher than the world average, whereas in 2016, most countries' scores were higher than the world average. CLM's scores were still relatively low even though they have made progress significantly. This is mainly due to their capacity rather than the willingness. The 2000 e-ASEAN Framework Agreement recommend 'enable Member States who are ready to accelerate the implementation of this Agreement ... to assist other Member States to undertake capacity building' (ASEAN 2000: Article 3g).

Eventually, economic digitalization tends to improve the adaptability of Asian countries to the world economy and to facilitate the country's integration into GVCs. There are efficiency gains associated with the application of digital technologies. For instance, it helps producers or service providers create/enlarge their market, lower operating costs, facilitate transactions, and improve competitiveness. For consumers, it offers them more information, more choice, easier ways to purchase, and higher quality of services. In addition, WEF (2017) shows that many business leaders believed that digitalization would introduce new business/organizational models to the region as well. Accordingly, knowledge-intensive activities can create more job opportunities for workforces. The International Labour Organization (2016) concludes that by the end of 2012, knowledge-based jobs have absorbed more than 7% of workforce in China³. In ASEAN, knowledge-intensive activities created about 42 million jobs in 2012. In 2016, more than 51 million employees had knowledge-intensive jobs, representing over 13% of the total workforce in the region.⁴

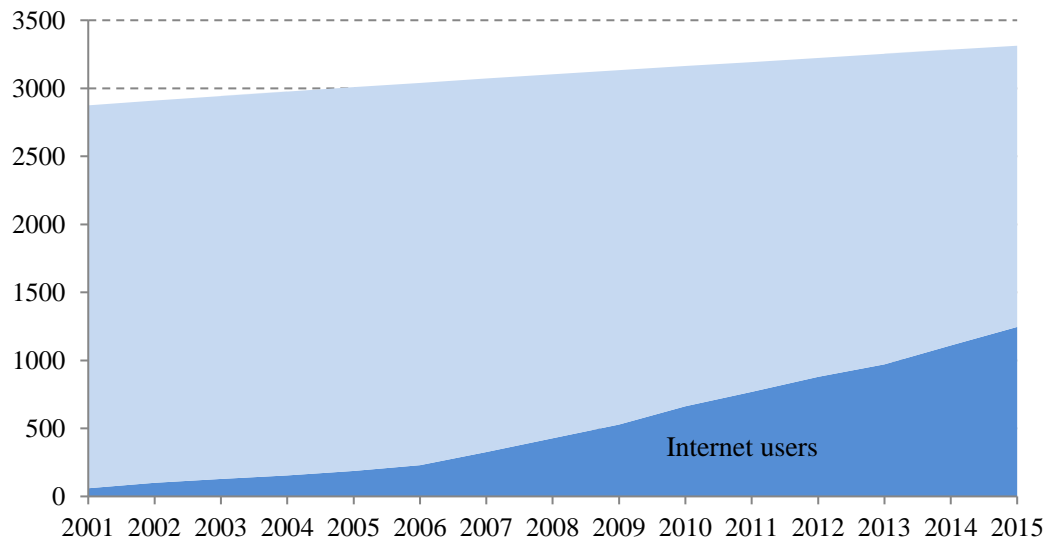
2.2. Gravitation of e-commerce activities

The total population of ASEAN, China, and India reached 3.3 billion by the end of 2015. As for the age distribution, 70% of population is between 15 and 64 years, representing a large market on the consumer side and a big group of labour force on the producer side. Within 15 years, the number of people with Internet access increased from less than 60 million in 2001 to more than 1.2 billion in 2015 (see Figure 3). Overall, about 47% of households in ASEAN, China, and India already have access to the Internet. Chinese has been the second (next to English) most popularly used language on the Internet. Malay is ranked 7th of the top 10 languages. It has more users than Russian or French.

³ By definition, knowledge-intensive jobs include the following ISCO-08 categories: (i) managers, (ii) professionals, and (iii) technicians and associate professionals.

⁴ Here the aggregate data of ASEAN does not include the Lao PDR and Myanmar due to the lack of data for these two countries.

**Figure 3: Internet users and total population in ASEAN, China, and India
2001–2015 (unit: million)**



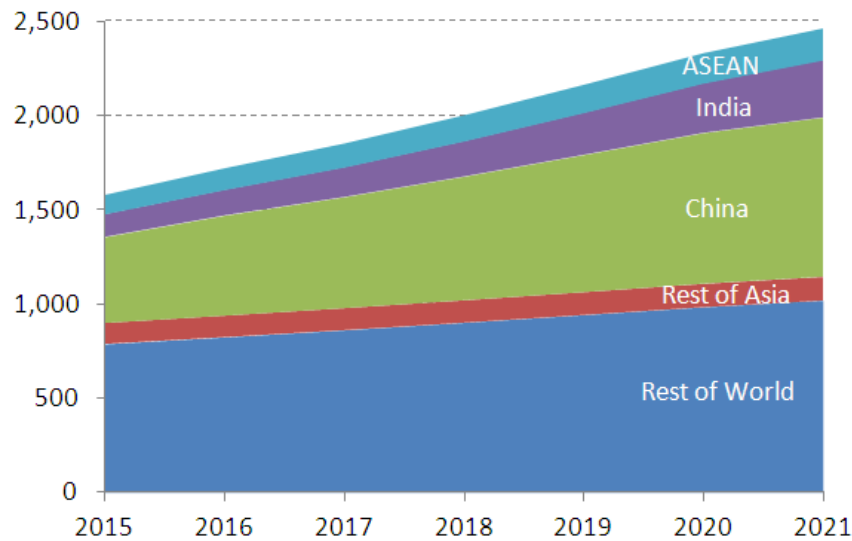
Source: The author. Raw data from ITU and World Bank online database.

It is evident that Internet access is positively correlated with per capita income and education. People with higher income and higher education tend to use the Internet more. In this regard, population with Internet connection not only represents those consumers directly linked to the e-commerce market but also suggests those who may have higher purchasing power in the society. ASEAN has the world’s fourth-largest population with Internet access. Internet has been very popular in Singapore and Malaysia, and plays the important role in their economies. Nearly 90% of households in Singapore are Internet users. In 2012, Internet-related economy accounted for 4.1% of Malaysian national gross domestic product (McKinsey Global Institute 2016). Less-developed countries, such as Cambodia, the Lao PDR, Myanmar, and Viet Nam (or the CLMV countries) are quickly catching up. Between 2001 and 2015, the share of Internet users in the total population of Viet Nam increased from 1.3% to 52.7%. The number of Internet users grew at 34.7% in Cambodia and 32.4% in Myanmar per year. In case of India, in 2010, less than 8% of the population had Internet access; however, in 2015 at least one out of four Indian people used the Internet.

ASEAN, China, and India together accounted for over 50% of world Internet population in 2015. This is higher than their share in world total population. In 2015, around 700 million e-commerce users are in ASEAN, China, and India. The number is projected to double by 2021 when Internet users in India will increase from nearly 400 million in 2015 to more than 600 million, accounting for almost one-quarter of regional total Internet population. The Internet penetration rate on average of ASEAN will surpass 60%, driven by the booming Internet users in Indonesia and the Philippines.

During this period China will see the number of its Internet users grow by about 6% per year, whereas its average annual growth rate of population is less than 0.4% in sight. With 950 million Internet users, China will consolidate its position as the world’s most populous e-commerce market. Endorsed by growing population and increasing Internet penetration rate, the region will host around 60% of total Internet users by the end of 2021 (Figure 4). The large Internet-accessible population allows the Asian market to generate more gravitation to global e-commerce activities.

Figure 4: E-commerce users, 2015–2021 (unit: million)



Source: The author. Raw data from Statista (2016).

2.3. Readiness for e-commerce development

Looking back, e-commerce took off with widespread Internet use. The development got accelerated by the ICT technologies that expanded the volume and capacity of online communications, especially the use of fibre-optic cables and commercial satellites. Physical infrastructure that provides stable, good-speed Internet connection is a precondition of e-commerce development. Table 3 pictures the stage of development of e-commerce supporting ICT infrastructure in the region. Overall, the 3G Network coverage in the region is close to the world average level although in most countries the speed of Internet connection seems to be slower.

Table 3: Asia's 'information highways'

	Fixed broadband		Mobile broadband		Bandwidth capacity (Kbps per user)	3G Network coverage (% of population)	Number of Internet exchange points (IXP) per 1,000 inhabitants
	Average upload speed (Mbps)	Average download speed (Mbps)	Average upload speed (Mbps)	Average download speed (Mbps)			
Cambodia	10	8	5	8	18	70.0	13
Indonesia	4	7	4	8	7	60.0	16
Malaysia	6	10	4	8	34	92.0	33
Myanmar	10	6	1	3	4	79.3	n.a.
Philippines	3	5	3	6	37	78.0	30
Singapore	96	97	22	38	737	100	903
Thailand	5	18	9	18	65	97	45
Viet Nam	18	16	2	5	24	64	11
China	10	32	12	22	7	57	4
India	6	7	2	6	6	75.0	5
world average	10	16	5	10	62	75.7	96

Source: The author. Raw data from EIU (2017).

Particularly, emerging Asian countries have made great progress in mobile broadband building. By the end of 2014, mobile broadband has covered above 43% of the region. The relative cost of data usage, as measured by its share in gross national income (GNI), decreased from 37% in 2010 to 6.2% in 2013. This positively impacted regional connectivity as more people living in the rural areas or countryside can now access the Internet using smartphones. In China, 3G/4G network has been available for three-fifths of its Internet users. In 2015, there was a 50% fee cut for fixed-line data surfing and 40% fee cut for wireless data roaming.

With the expansion of mobile broadband, the popularization of smartphones, the reduction in the cost of data usage, and the richness of online shopping and payment tools available on portable devices and platforms, a new wave of e-commerce growth is under way. Almost 80% of Chinese users and two-thirds of users in ASEAN use smartphone to access Internet. CLMV countries have the highest growth rate of mobile subscriptions per 100 inhabitants. The compound annual growth rate ranges from 36% in Cambodia to 70% in Myanmar.⁵ Indian users also catch up quickly. The smartphone penetration rate is projected to increase from 58% in 2015 to 74% in 2021.

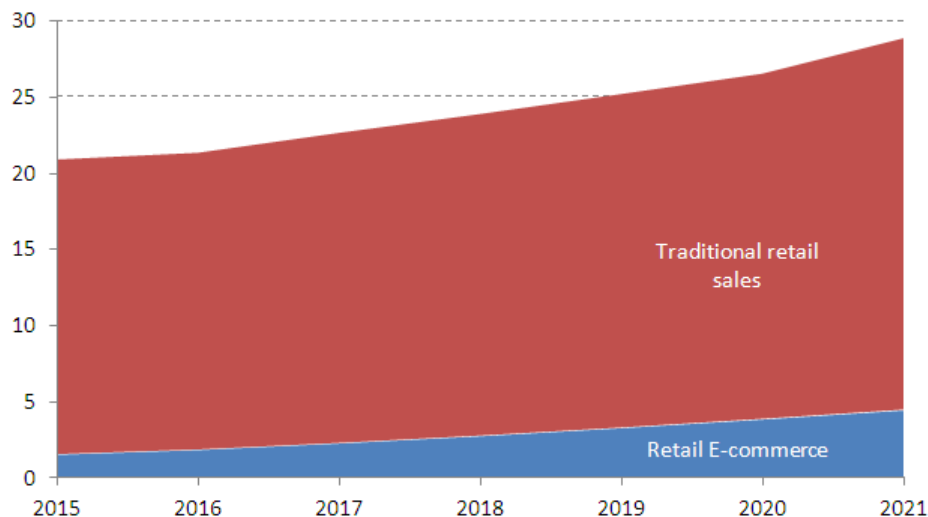
⁵ ITU online database. Available at <http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>

Wide smartphone use has become a de facto driving force of e-commerce development in Asia. A survey⁶ on 30,000 owners of mobile devices across the world in 2016 shows that 46% of respondents in Asia-Pacific use their mobile devices, mainly with mobile apps, to purchase products and services online. This share is higher than that of Europe (32%) or North America (28%).

2.4. E-commerce market outlook

The scale of global e-commerce market keeps booming. The average annual growth rate of retail e-commerce sales will reach 20% or even more. This is much higher than the growth rate of traditional retail sales of 4% per year. The ratio between online and offline retail sales is projected to be 1:4 by 2021 (Figure 5).

Figure 5: Retail e-commerce sales worldwide, 2014–2021 (unit: US\$ trillion)

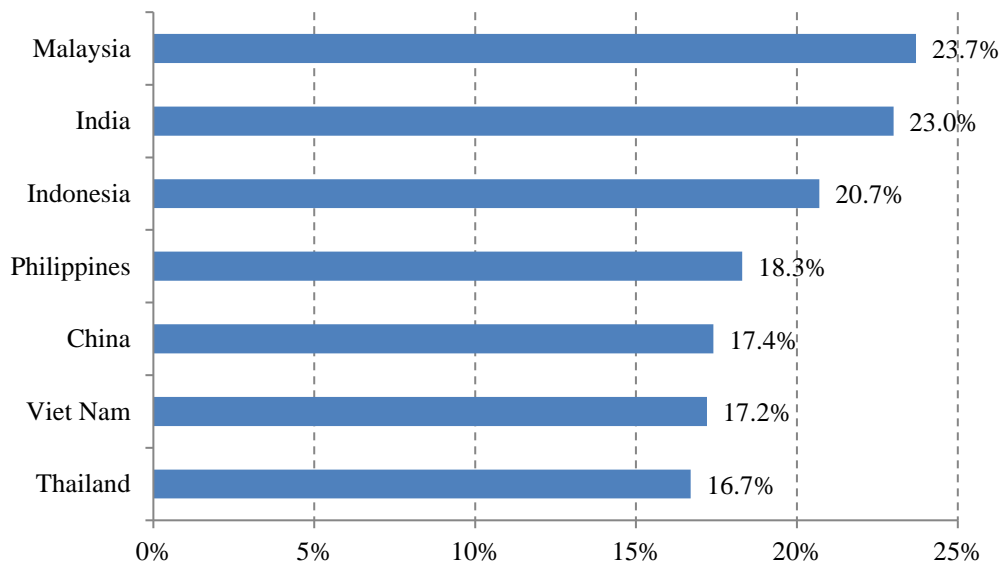


Source: The author. Raw data from Statista (2016).

E-commerce in most CIA markets will see double-digit growth in the next 5 to 10 years. According to Statista (2016), the top three fastest-growing retail e-commerce markets in the world will be Malaysia, India, and Indonesia – all grow at the rate of over 20% per year. By 2021, the size of e-commerce market in India will be larger than that of ASEAN. But e-commerce in China will keep high-speed growth as well, with annual growth rate of around 17% (Figure 6).

⁶ Statista online database. Available at <http://www.statista.com/statistics/418393/mcommercepenetration-worldwide-region/>

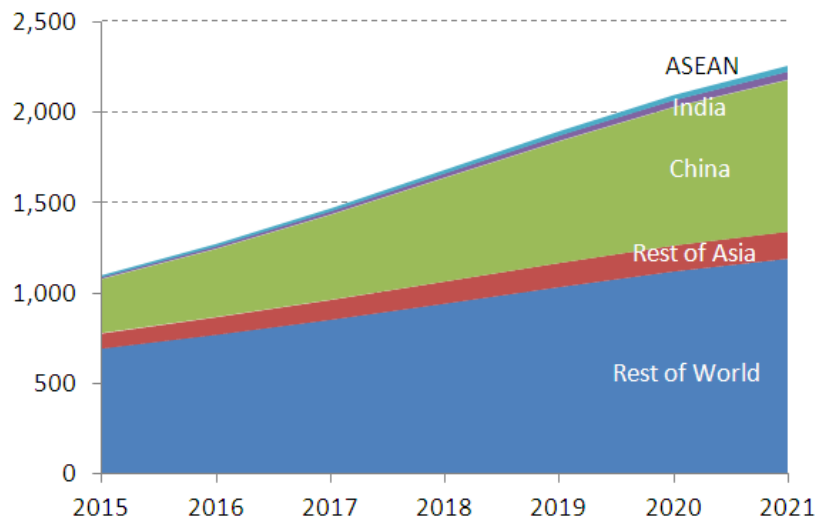
Figure 6: Compound Annual Growth Rate, 2015–2021



Source: Statista (2016).

From 2015 to 2021, regional total market revenue will increase from around US\$320 billion to over US\$900 billion. The Chinese market will contribute over 90% of the growth. Accordingly, China’s share in world e-commerce market will increase from about 30% in 2015 to nearly 40% in 2021. India and ASEAN will increase their combined weight in the global market from 2.5% to 4% (Figure 7).

Figure 7: E-commerce market revenue, 2015–2021 (unit: US\$ billion)



Source: The author. Raw data from Statista (2016).

3. Challenges

Challenges and opportunities of e-commerce come hand in hand. In many cases, there is no clear benchmark between the two. Whether it is a challenge or opportunity depends on the country's conditions in economy, geography, politics, society, and culture as well as the market reactions to the new trend of economic digitalization. Proper actions can turn challenges into opportunities, and vice versa. Therefore, it is important to spot the areas for the country/region to strengthen competitiveness. In this regard, Emerging Asian economies need to pay more attention to (i) connectivity, (ii) services, (iii) rules and regulations, and (iv) labour skills.

3.1. Connectivity

Connectivity is the cornerstone of e-commerce development. It consists of (i) the smooth exchange of data and information (information flow), (ii) the delivery of goods and services (logistics), (iii) the payment (cash flow), and (iv) the seamless links between the virtual and physical part of e-commerce network. In general, Emerging Asian economies face challenges from development gaps existing across different parts of the region, especially between metropolitans and remotely rural areas. The overall regional connectivity is to some extent limited by those 'short slabs'.

First, the development of e-commerce demands more stable and affordable Internet connection with higher speed. There are wide gaps in development despite CIA countries' efforts in pushing ICT infrastructure. This is evident in the difference in Internet speeds across countries as well as that within the country. According to Akamai (2017) survey, the quality of regional Internet infrastructure looks satisfactory compared to the world average level from the aspect of either the average or the peak speed of Internet connection. At the country level, the average Internet connection speeds in the region ranged from 20.3 Mbps in Singapore, ranked 7th globally, to 5.5 Mbps in the Philippines, ranked 100th. The peak Internet connection speeds in the region ranged from over 180 Mbps in Singapore, the world's no. 1, to 42 Mbps in the Philippines, 97th in the world.⁷

The picture is less optimistic when looking at the indicator of broadband adoption. Not so many Emerging Asian economies met the world average level. The gaps between the region and the world frontier seemed to get wider at higher tiers of broadband speeds, showing that Emerging Asian economies are still in the catch-up process in pushing ICT infrastructure; and within the country, the problems of uneven development of ICT infrastructure are quite significant (Table 4).

⁷ Data for Brunei, Cambodia, the Lao PDR, and Myanmar were not included in the original report.

Table 4: Internet infrastructure in Asia, as of 1st quarter, 2017

Country	Avg. Mbps	Peak Mbps	% Above 4 Mbps Broadband Adoption (IPv4)	% Above 10 Mbps Broadband Adoption (IPv4)	% Above 15 Mbps Broadband Adoption (IPv4)
Singapore	20.3 (7)	184.5 (1)	94 (17)	72 (4)	51 (6)
Thailand	16 (21)	106.6 (8)	97 (4)	72 (5)	43 (13)
Viet Nam	9.5 (58)	59 (61)	86 (49)	37 (48)	11 (57)
Malaysia	8.9 (62)	64.1 (50)	72 (80)	32 (52)	14 (52)
China	7.6 (74)	45.9 (86)	81 (59)	20 (62)	5 (70)
Indonesia	7.2 (77)	66.1 (43)	76 (71)	18 (68)	5 (69)
India	6.5 (89)	41.4 (97)	42 (104)	19 (64)	10 (58)
Philippines	5.5 (100)	45 (88)	39 (107)	11 (78)	6.2 (63)
World average	7.2	44.6	82	45	28

Source: The author. Raw data from Akamai (2017), Figure 23, 24, 25, 26, 27.

Notes: The number in the bracket indicates the country's global ranking.

From the aspect of technology, fibre-optic cables are the most efficient media to 'carry' data despite the rise of satellite use. Even when using mobile phone, the connection is only wireless between the device and the nearest cell phone towers. Data is carried over terrestrial or/and subsea fibre-optic cables. Fundamentally, fibre network building is a crucial part of the needed infrastructure of the digital economy. Compared to traditional fields of infrastructure, fibre technology is progressing rapidly. Building, maintenance, and upgrade of fibre networks require sustained input capital, technology, and managerial efforts. This poses some common challenges to all countries in the world. But Emerging Asian economies face some extra difficulties due to highly dispersed geography and large population. Additionally, there is always a 'budget problem' to solve, especially among capital-scarce countries.

Economically, factors like broadband penetration, the utilisation of broadband infrastructure, and applications are likely to enhance national aggregate outputs (Ng, Lye, and Lim, 2013). The development of ICT-related infrastructure in Emerging Asian economies is uneven. For instance, the entry-level broadband connection in Singapore is much faster than that in CLM countries. The Internet Society (2015) categorizes ASEAN countries in terms of three clusters of wired and wireless broadband (see Table 5). Relatively speaking, the gaps in wireless broadband are narrower than that in fixed wired broadband, but the differences across countries are still quite significant. Region-wide

development gaps in ICT infrastructure building may also imply high cost to connect the networks among countries as well.

Table 5: Broadband penetration in ASEAN countries

	Cluster 1	Cluster 2	Cluster 3
Types of broadband	Majority access	Partial access	Low access
Fixed-wired broadband	<ul style="list-style-type: none"> • Singapore: 26% • Brunei: 6% • Malaysia: 8% 	<ul style="list-style-type: none"> • Thailand: 7% • Philippines: 3% • Viet Nam: 6% 	<ul style="list-style-type: none"> • Indonesia: 1% • Lao PDR: 0.1% • Cambodia: 0.2% • Myanmar: 0.2%
Wireless broadband	<ul style="list-style-type: none"> • Singapore: 137% • Brunei: 7% • Malaysia: 14% 	<ul style="list-style-type: none"> • Thailand: 53% • Philippines: 27% • Viet Nam: 22% 	<ul style="list-style-type: none"> • Indonesia: 36% • Lao PDR: 2% • Cambodia: 10% • Myanmar: 1%

Source: The Internet Society (2015), Table 5.

Second, while e-commerce allows people to do business online, it still needs logistics to deliver the traded products. It is about not only trade cost but also safety, security, reliability, transparency, flexibility, and efficiency. Indeed, e-commerce has higher demands on speed and transparency, posing additional challenge to storage, parcel delivery, and express postal services. This will ask for additional efforts from both physical connectivity and trade-supporting services.

In CIA countries, there are still obstacles from poor quality of roads, incomplete road and railway networks, inadequate port, and problems in energy supply. Table 6 illustrates the uneven growth in the region.

Third, e-payment is the vital bridge between the virtual and the physical part of e-commerce. Its basic function is to provide technical solutions for buyers to pay for goods and services bought online although the money transaction could be either online or offline. Currently various solutions are available in the market, including cash on delivery, prepaid, credit cards, debit cards, e-banking, mobile payment, smartcard, e-wallets, etc. The existence of various payment modes is indeed a positive factor in promoting the growth of e-commerce, as the diversity gives consumers space to choose their preferred ways to pay for online business.

Table 6: Logistics infrastructure indicators

Country	Quality of roads ^a	Quality of railroad infrastructure ^b	Quality of air transport infrastructure ^c	Quality of port infrastructure ^d	Quality of overall infrastructure
Brunei Darussalam	4.70 (41)	2.07 (88) ^e	4.08 (84)	3.67 (87)	4.14 (67)
Cambodia	3.38 (93)	1.62 (98)	3.85 (99)	3.85 (76)	3.43 (95)
Indonesia	3.86 (75)	3.82 (39)	4.52 (62)	3.91 (75)	3.79 (80)
Lao PDR	3.42 (91)	n.a. ^f	3.77 (100)	2.01 (132)	3.74 (81)
Malaysia	5.46 (20)	5.06 (15)	5.70 (20)	5.44 (17)	5.48 (19)
Myanmar ^g	2.33 (136)	1.79 (96)	2.62 (132)	2.62 (123)	2.42 (135)
Philippines	3.07 (107)	1.97 (89)	3.25 (116)	2.92 (113)	3.04 (112)
Singapore	6.28 (2)	5.74 (5)	6.85 (1)	6.66 (2)	6.39 (2)
Thailand	4.21 (60)	2.52 (77)	4.95 (42)	4.18 (65)	4.03 (72)
Viet Nam	3.47 (89)	3.15 (52)	4.06 (86)	3.84 (77)	3.63 (85)
China	4.77 (39)	5.07 (14)	4.81 (49)	4.59 (43)	4.55 (43)
India	4.43 (51)	4.48 (23)	4.49 (63)	4.53 (48)	4.45 (51)
World	4.05	3.38	4.41	4.04	4.06

Notes:

- a. Survey question, ‘In your country, how do you assess the quality of the roads? [1 = not at all; 7 = to a great extent]’
- b. Survey question, ‘In your country, how would you assess the quality of the railroad system? [1 = not at all; 7 = to a great extent]’
- c. Survey question, ‘In your country, how do you assess the quality of air transport? [1 = not at all; 7 = to a great extent]’
- d. Survey question, ‘In your country, how do you assess the quality of seaports (for landlocked countries, assess access to seaports). [1 = not at all; 7 = to a great extent]’
- e. data of 2012–2013
- f. n.a. = not available
- g. data of 2015–2016

Source: The author. Raw data was retrieved from WEF (2017), Executive Opinion Survey 2016.

Ideally, e-commerce development looks for an e-payment system that can accommodate those existing market solutions (those mentioned above) and keep open for new approaches in the future. Rather than simply a network of payment, it should be a service platform that can ensure transition security, trace credit records, and offer consumer protection. Security, privacy, creditability, reliability, and efficiency are among the factors to be considered. The project of building and maintaining the e-payment system is a resource-intensive, in term of capital, technology, and human capital. This will be a big challenge to those Emerging Asian economies whose domestic banking and financial sectors are still at the early stages of development.

Fourth, e-commerce supporting connectivity needs extra effort to smooth the connections between networks of different countries and coordinate the interactions among the three functioning networks (information, logistics, and cash flows) mentioned above. Seamless links between the virtual and physical parts are vital to the functioning of the whole network. This calls for services sector development through multilayer cooperation, including public–private partnership (PPP), inter-institutional cooperation, subregional cooperation, and the coordination among different duty departments of the government.

3.2. Service

Improving services is equally important as building physical infrastructure in every aspect of connectivity – from speed and accuracy to transparency and reliability. It is the existence of a reliable credit guarantee system that has effectively stimulated cross-border B2B e-commerce. Online e-commerce platform can collect and integrate information from various sources and provide users service packages. Both buyers and sellers would like to share with service providers real transaction data given the latter have a reliable transaction credit system to help them gain trust and therefore get better business opportunities. Extensively, with e-payment development, many financial institutions have found it profitable to provide fiduciary loans using Internet finance. E-commerce platform like eBay has started to launch cross-border insurance products to facilitate the transaction process.

From the aspect of logistics, service is a key to the efficiency of distribution networks. Online consumers could be more demanding, particularly on information. For instance, they would like to be updated on shipment preparation and tracking the delivery. When anything unexpected occurs, they want to know about the matters and the corresponding solutions. Such users' demand motivates supply chain operations to create a greater focus on near-sourcing, omni-channel, and faster transport solutions (Inbound Logistics, 2014). For that reason, a logistics network will not be optimized until it contains high standard services especially in some critical facilities in supply chains, such as mega e-fulfilment centres, parcel sorting centres (hubs), local parcel distribution centres for last-mile supply chains, local city logistics depots, and returns centres.

Simply put, connectivity derived service is the main area where e-commerce supporting networks can generate extra value-added. Services like providing online credit information can indeed generate value-added to e-payment. In this regard, the development

of e-commerce supporting services could be self-enforced. A challenge there will be market initiative – by triggering spring up of services and making the whole industry and supporting facilities more comprehensive.

3.3. Rules and regulations

Cross-border e-commerce calls for new rules and regulations to improve trust, security, and facility in the online marketplace. Without necessary regulations, there are risks that online business may give birth to some sort of ‘grey’ zones of international trade associated with problems such as tax evasion, fake product, or violation of intellectual property rights (IPR).

It needs collaboration among governments as well as private sector’s participation to set up rules and regulations to strengthen global e-commerce governance. Given the status of the World Trade Organization (WTO) as the only international organization that stipulates trade rules in a comprehensive manner and can enforce the implementation using its dispute settlement mechanism, multilateral trade negotiation seems to provide an ideal platform for developing countries to participate in global rule setting on e-commerce. However, partially because of the stalemate of WTO⁸, most issues about e-commerce are mainly addressed in bilateral free trade agreements. Developed countries and big multinational companies are the main driving forces behind the process. This implies twofold challenges to developing countries in Asia. First, the governments should be more active in international negotiation on new rule settings. Second, voice from the private sector in developing countries should be equally heard to improve the inclusiveness of international agreement(s) on e-commerce.

Regulations on e-commerce will cover traditional trade issues (i.e. tariffs and non-tariff measures, trade facilitation, IPR protection, etc.) as well as well as new issues (i.e. cross-border information flow, privacy protection, data localization, source codes disclosure, etc.). Although many countries have agreed on issues about trade facilitation such as the acceptance of electronic authentication in commercial transactions and the use of customized electronic formats in paperless trade, reaching an agreement on some core issues about e-commerce is never an easy task.

Rule setting in international information flow is a direct example. Information is the blood of e-commerce. It has extensive effects on the economy, society, and even national security. It is, however, difficult to balance free data movement and privacy protection. While insufficient regulations will not be able to ensure market fairness and competition, excessive restriction may generate negative impacts on free movement and accuracy of information.

⁸ In 1998, the WTO Ministerial Conference adopted the Declaration on Global Electronic Commerce aiming to establish a comprehensive work programme to examine all trade-related issues relating to global electronic commerce. But there was no substantive progress afterward.

Since cross-border e-commerce involves buyers and sellers located in different countries and governed by different laws and regulations, it needs both regional cooperation and domestic effort to investigate, pursue, obtain and, where appropriate, share relevant information and evidence, particularly on matters relating to cross-border fraudulent and deceptive commercial practices. (OECD, 2016) Measures such as data localization, privacy protection, and online censorship may have potential to lower e-commerce trade in the short term. But these are not necessarily trade barriers as far as the measures could help strengthen security, IPRs, and consumer protection, contribute to trust and legislation of online trade, and therefore eventually promote e-commerce.

3.4. Labour skills

The skills challenge has serious implications on e-commerce development in Asia. First, e-commerce is knowledge intensive. High-tech devices, software, and applications are widely used in production and business. Qualified labour must have sufficient technical skills to handle these tools proficiently, especially in problem solving. Second, endorsed by ICT and services sector development, GVCs functioning behind e-commerce are much more sophisticated than ever before. It needs high managerial skills to operate the network and monitor its functioning. Third, with the rapid growth of B2C and C2C, the skills and knowledge that only experts used to have become necessary for e-commerce users, such as knowledge about home and overseas markets, understanding different consuming habits, and learning about the trading rules. Fourth, human capital in e-commerce should be able to learn quickly about new technologies and business models that continuously emerge in the market. Fifth, innovation is a key to competitiveness. Reliance on homogenous products or services cannot lead to long-term success in e-commerce. Normally, the majority of value-added in GVCs is generated by the most innovative elements or stages.

The related challenge is basically twofold. First, it poses direct pressure on the countries' education and training system, regarding both the coverage and the quality of education. Frankly, the lagging behind of education compared to developed countries is not an e-commerce-specific problem. However, the rapid growth of e-commerce and the desire to grasp development opportunities associated with economic digitalization urge developing countries to accelerate their pace in improving education, which is supposed to be a long-term project by its nature. It will be critical to find a balance between expanding quantity and increasing quality, as well as between wide coverage and emphasis of growth.

Second, free movement of skilled labour helps diffuse knowledge. But labour mobility across countries in developing Asia is still subject to barriers such as non-recognition of

academic diplomas and professional certificates, lack of information about labour market opportunities, and domestic restriction on work permits to foreigners.

4. Policy recommendations

As earlier mentioned, opportunities and challenges of e-commerce are two sides of a coin. In a nutshell, it is the market's actions that determine whether and how to benefit from the new trend of global economy. National strategic development plans and associated economic policies will also play a role. Emerging Asian economies all have included digital economy and e-commerce in their national plans. When implementing the plans, however, it is highly recommended that governments had better not to directly intervene in the market. Alternatively, it will be more efficient for governments to promote the growth of e-commerce and make it work for development through its effort on improving the related economic, social and cultural conditions..

4.1. Enabling/supporting an e-commerce growth environment

E-commerce needs a suitable environment to grow. It appreciates the government's support in establishing and optimizing such environment, especially in areas where the market mechanism fails in allocating resources. The policy efforts, as far as they are in the right direction, can help market save 'reaction' time in response to changes and seize initiatives in global competition, which could be vital to success because timing is critical to success in the digital economy.

Value chains of e-commerce cover both the physical world and the virtual cyberspace. These two 'worlds' influence each other. For instance, the performance of fibre-optic cables will determine the speed of data flow on the Internet, whereas major cyberattacks may lead to chaos in the real world. In this regard, government's role is to set up rules, regulations, and legislation in both the physical and virtual parts of the market to ensure the security and stability of e-commerce growth.

When e-commerce goes international, it is subjected to almost all issues that apply to other forms of trade. E-commerce and cross-border ecommerce could be the same concept when those obstacles holding back cross-border e-commerce were removed because whether the transaction occurs domestically or cross border will no longer matter. It is worthwhile to re-emphasize that data protectionism may damage cross-border e-commerce as trade protectionism harms international trade. This is because cross-border data flows

stay at the core of cross-border e-commerce, Countries need cooperation to eliminate this potential threat to free trade.

In principle, Emerging Asian economies will benefit from collaboration in the region-wide e-commerce enabling environment. Thanks to the progress of regional integration, there are already mechanisms such as ASEAN Economic Ministers Meeting, East Asian Summit, and ASEAN plus One meetings/dialogues for leaders to talk about the issues.

4.2. Improving connectivity

Although it is less likely to totally eliminate digital divide, either among or within countries, improving connectivity will contribute to reduce such divide by increasing the supply of public goods, in both quantity and quality. The public sector should lead in building infrastructure. But involvement of the private sector is needed to make the development sustainable. PPPs and inter-governmental cooperation and foreign investment should be encouraged.

To some countries, one big obstacle comes from capacity and resource limits, either capital or technology or both. Enhancing regional cooperation will provide a solution. For instance, Japanese and Chinese construction companies are competitive in the infrastructure sector. Both governments are willing to provide low interest rate loans or other forms of financial assistance to the host country in support of infrastructure projects with their companies' participation. They both have raised funds aiming to help develop Asian infrastructure via mechanisms such as Asian Infrastructure Investment Bank, China's Belt and Road initiative, and Japan's \$110 billion proposal on infrastructure in ASEAN.

In addition to investment in physical infrastructure, improvement in the quality of services is directly linked to the quality of overall connectivity. This is important particularly in cross-border e-commerce. Typically, logistics integrators play a crucial role in the distribution network of cross-border e-commerce, as they stay at the stage that brings together online and offline supply chains of different countries. Despite well-constructed infrastructure, connectivity cannot function well without input of qualified services.

4.3. Encouraging value-added services

Support services of cross-border e-commerce tend to have extensive implications on regional development because of the externality of services to the economy. First,

development of the services sector can create more jobs to absorb labour. Second, service efficiency will save trade cost, increase reliability, and therefore promote e-commerce activities. Third, the resulting increase in government revenue will then provide additional resources to further improve connectivity.

New emerging service intermediaries can lead structural changes in commerce. The development of e-commerce generates more business opportunities for downstream companies in areas such as material suppliers, market investigation, software development, shipment and delivery, agency operation, search for key words, and optimization. As production network clustering around the upstream core e-commerce actor(s) starts to deepen and spread, it leads to a finer division of labour and therefore higher degree of specialization. With market segmentation, demand is more precisely identified and, therefore, more service activities will find space for expansion. In this way, the growth of services can be market driven.

This also generates opportunities for small and medium-sized enterprises (SMEs) to join GVCs. In Asia, SMEs account for over 95% of all enterprises in number and employ more than 80% of the workforce. Development of e-commerce and expansion of GVCs and related services help SMEs get involved in GVCs and benefit more from globalization. These facilitate SMEs' access to information, exploring new market, obtaining microfinance, and enhancing supplier–producer–consumer links.

4.4. Rule setting and regulatory harmonization

The online marketplace needs rules and regulations to ensure free data flows as well as fair play, competition, and security. Internationally, cross-border e-commerce development promotes formation of global governance on digital trade. These new rules and regulations will then greatly influence the development of cross-border e-commerce.

Cross-border e-commerce is a major development trend of international trade and globalization. Asian countries may hook up their development to this global trend to reduce poverty, narrow inequality, or get out of the middle-income trap. Accordingly, they should adopt policies in favour of globalization and trade facilitation by removing tariff or non-tariff barriers and simplifying customs, inspection, and taxation procedures, etc. Typically, cross-border e-commerce often finds difficulties in customs clearance, exchange

settlement, and tax reimbursement⁹, especially for small-volume trade flows. WEF (2017) estimates that lowering the supply chain barriers between countries, such as customs formalities, would increase cross-border e-commerce by 60% to 80%.

As for global trade governance, the current progress in multilateral trade negotiation can hardly catch up with the radical growth of e-commerce. The so-called 21st century free trade agreements (FTAs) (FTAs containing WTO plus and WTO extra provisions) tend to be pilots in new rule making. Developing countries in Asia represent the world most populous and fastest-growing market of e-commerce. They should keep active in new rule making. Moreover, it is better for the region to move as a group to ensure its voice is heard. Reaching region-wide harmonization on e-commerce-related regulations will be helpful to do so.

4.5. Breakthrough 1: Internet financial innovation

Relatively speaking, Asian countries' development in banking and finance sector still lags behind their achievement in other aspects of economic growth. Problems in the financial area may hold back the country's economic development, such as the low coverage of banking network, the premature personal/household credit system, and the lack of an efficient capital market.

Following the traditional approach to establish a modern banking system that developed countries have today will take long time. E-commerce deriving financial innovation, such as e-payment and Internet financing, provides alternative lower cost (and easier-to-use) solutions to the market. They can be either complementary or independent to the traditional banking and financial architecture. Indeed, they are so efficient that even traditional financial service providers become eager to adopt these new models.

These Internet financial innovations tend to be market changers and give developing countries opportunities to achieve leap-forward development. The process can be market driven and self-enforced as far as it does not encounter serious policy resistance. Policy efforts at the regional level, such as establishing industrial standards and harmonizing regulations, could help the industry realize the scale of economy and support its development.

4.6. Breakthrough 2: Smartphone economy

⁹ The lack of a Europe-wide value-added tax system is one of the greatest obstacles for cross-border e-commerce in Europe.

Smartphones and mobile apps provide a powerful new platform for e-commerce growth. Technical conditions on using smartphone in e-commerce have been mature – both in terms of functionality and affordability of phones, and the variety and reliability of applications to be installed. Technically, the smartphone has the capacity to replace many other devices and integrate their functions by simply adding apps to its memory chip. For example, it can work as a token to take e-signature, as a scanner to capture product code, and even as credit card readers.

Market conditions are in favour as well. Both the price of the device and the cost of mobile data use have been driven down dramatically. More people now use it as their daily companion, not just as a phone but a ‘personal assistant in the pocket’. More than half of smartphone owners have already turned to their phone to shop (Think with Google, 2016).

Therefore, cross-border e-commerce based on smartphone and related mobile devices have huge potential. It is more user friendly, more global in scope, more open and promising to sustainable growth. To accelerate cross-border e-commerce, Asian countries can think of prioritizing the development on smartphones and mobile apps. Accordingly, policy efforts should:

- (1) Emphasize the supporting infrastructure of smartphones, such as increasing wireless bandwidth and the number of IXP.
- (2) Keep driving down the cost of mobile data use, including roaming data use. In order to lower the price, governments may need intervene in the market of Internet service, which is normally monopolistic or oligopolistic.
- (3) Care about low-income people that cannot afford smartphones. Government will have to think of providing subsidy (or encouraging business donation) to help them obtain the device and, moreover, provide them necessary training.
- (4) Encourage creation and incremental innovation.

5. Concluding remarks

Economic digitalization, particularly the development of cross-border e-commerce, is changing the world economic landscape. Asian countries are getting involved in this global trend.

Opportunities and challenges come hand in hand. Fairly speaking, Asian countries are advantaged in their capacity in technology adoption and incremental innovation, gravitation of e-commerce activities, and readiness for e-commerce development. However, to better grasp the opportunities for growth, they will still need to make progress in connectivity, services, rules and regulations, and labour skills.

Although market mechanism should lead the transition, policy intervention can help the market take the advantage of information revolution, and save potential market failure. First all, policy efforts should establish an environment to enable e-commerce and support its growth. Second, improving connectivity is a continuous job. Third, services will contribute to the dynamics of the ecosystem of e-commerce. Fourth, cross-border e-commerce calls for new rules and regulations, and Asian countries should actively participate in rule settings. In particular, the region may think of ‘leap forward’ development in two areas: Internet financial innovation and smartphone economy. All these measures will be more effective when conducted in the regional scope.

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