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The Digital Economy in Thailand: Potential and Policies

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The Digital Economy in Thailand: Potential and Policies

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Abstract: This paper aims to examine potential of digital economy in Thailand and review key policies in four prospects, including industrial transformation, investment policy, digital plans, and digital rules and regulations and international cooperation. The research shows that the digital economy in Thailand grew substantially and faster than GDP growth in 2017-2020. Investment has gained momentum in driving the digital economy in Thailand since 2021. Digital infrastructure has been improved in the country over the past decade, but comparing to other countries in Asia, like China, Singapore, Malaysia and Vietnam in some respects, infrastructure development and accessibility of population in the country are still lacked behind, particularly in terms of ICT skills and prices. Various rules and regulations were amended and introduced to support digital development in the country. Such establishments together with some programs have implications in improving Political-Security and Socio-Cultural, in addition to Economic pillars. Various international cooperation concerning digital provisions has been initiated but based on the Regional Digital Trade Integration Index (RDTII), Thailand's digital trade integration lacks behind other Asian countries, mainly due to restricted rules and regulations especially those connecting to telecommunication policy and competition, internet intermediary liability and content access.

JEL code: L60, L86, O53

Keywords: Digital Economy, Policy Analysis, Thailand, Developing Asian Countries

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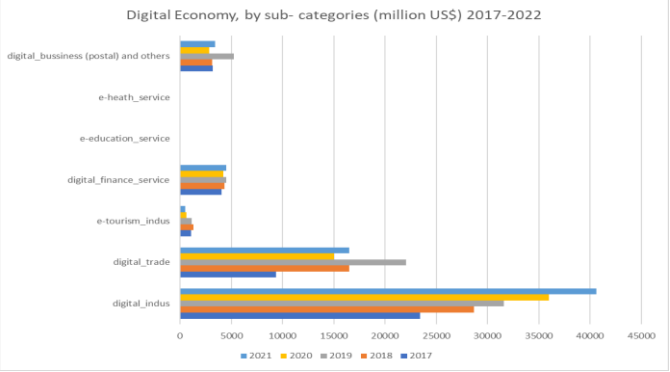
1. Introduction

Importance of digital economy has been observed in Thailand over the past five years. The digital economy, according to a broad definition by OECD (2020), grew noticeably in Thailand during 2017-21, i.e., from US$41 billion in 2017 to US$66 billion in 2021 or around 12 percent growth on average during this period, and its contribution to GDP increased to 13 percent in 2021 up from 9.0 percent in 2017 (Table 1). Digital industry, especially activities involved with hardware; communications, software; digital services; digital contents and smart devices, followed by digital trade, digital finance, and digital tourism, contributed significantly to the Thai digital economy (Figure 1). Digital technology has been so far concentrated more on service sector, while utilization of digital technology in manufacturing and agriculture sector has been relatively limited. By using expenditure approach, trade in digital goods and services played a crucial role in contributing to development in the digital economy in Thailand, in line with trade in traditional products where the share of exports and imports in GDP was around 60 and 50 percent, respectively.

Table 1: Digital Contributions to GDP in Thailand (constant prices at 2017)

year	Value* (Million US$)		Exchange rate (baht/US$)	Growth		Contribution of digital to GDP
	Digital related activities	GDP		Digital industries	GDP	
2017	41,107	302,310	33.9		4.2	9.0
2018	54,097	330,847	32.3	25.3	4.2	10.7
2019	64,655	351,831	31.0	14.8	2.3	11.9
2020	59,023	327,412	31.3	-8.0	-4.2	11.8
2021	66,051	325,416	32.0	14.4	1.6	13.0

Figure 1: Digital Economy, by sub-categories



Source: Office of the National Digital Economy and Society Commission (ONDE)

Like other countries, Thailand puts great policy emphases to harness advantage of the new and emerging economic opportunity brought about by the digital economy. Policy responses so far have been changed at both national level and action plans for all government agencies. For example, Thailand 4.0 Policy was launched in 2018 in order to transform Thai economy to be value-based/digital economy; the Ministry of Digital Economy and Society (MDES) launched 20

year-National Master Plan for Digital Development (2018-2037) and Thailand Strategic Digital Plan for Economic and Social Development (2020-2024) while other organizations such as Digital Economy Promotion Agency (DEPA) announced Thailand Digital Plan, DEPA for 2018-2022. Not only have policies directly related to digital economy (e.g., investment strategy, digital infrastructure, rules and regulations) been launched, strategic investment plans and various decrees have been introduced to induce economic transformation.

With importance of digital economy and several changes in policy responses, this research project aims to examine potential of digital economy in Thailand and review key policies, which have been introduced/altered to revolutionize the country towards the digital economy. There are four sections in the paper. Section 2 presents potential in development of digital economy in Thailand while four policy aspects are discussed in Section 3. Conclusions and policy inferences are provided in the final section.

2. Potential in Development of Digital Economy in Thailand

In Thailand, there have been two official data sources providing data concerning digital economy, i.e., (1) The Digital Contribution to GDP conducted by Office of the National Digital Economy and Society Commission (ONDE); and (2) the Digital Market Survey and Forecast conducted by the Digital Economy Promotion Agency (Depa) under Ministry of Digital Economy and Society (MDES), in partner with the IMC Institute (Jongwanich, 2023). For the former, the broader definition of OECD is applied OECD (2020). The system of national account is utilized to measure digital contributions with three approaches, including production, income and expenditure. For the latter, the definition of Digital Economy is close to the narrow definition proposed by OECD (2020) and UNCTAD (2019). The survey concentrates on the supply side of digital market where only firms directly involved with digital industry, e.g., firms providing system integrator, maintenance or ones producing hardware or smart devices, are included in the survey. Other firms who employ/demand digital activities/services, such as firms in automotive setting up IT services, are not included in the survey. In the survey, there are five components, including software, hardware & smart device, digital content, digital services and big data.

As mentioned in the Introduction, the digital economy in Thailand grew substantially and faster than GDP growth during 2018-2021. In 2018, GDP growth increased by 4.2 percent while growth of digital economy grew almost 26 percent and in 2019, and in 2021, GDP growth dropped to 1.6 percent, but the digital industry growth still grew by two-digit level, i.e., almost 15 percent. From the expenditure side, in 2017-2020, consumption tended to grow faster than other components, but in 2021, after subdued pandemic situation, investment and export grew markedly, which to a certain extent shows a good prospect of digital development in the country in the medium to long-term (Table 2). However, when subcategories are considered, high growth was concentrated in the digital hardware such as electronics and computer parts, medical electronics equipment, and sonar and control equipment, while investment in software slightly declined by 0.82 percent in 2021 (Figure 3). In addition, the proportion of smart devices remained relatively low at around 20 percent of total investment while traditional hardware investment accounted for more than 70 percent of total investment (Figure 4). Stimulating more investment in software and smart device investment would probably help balance the digital development path in the country. Digital technology has been so far concentrated more on service sector, followed by manufacturing sector, while utilization of digital technology in agriculture sector has been relatively limited so that utilizing technology more in agriculture as well as manufacturing should be prioritized.

Table 2: Components of Digital GDP at 2017 prices (Million US$) and Growth Rate (percent)

	Consumption	Government	Investment	Export	Import	C_growth	G_growth	I_growth	X_growth	M_growth
2017	10,516	483	3,919	70,165	55,066					
2018	12,155	476	4,357	71,518	59,672	10.0	-6.2	5.8	-3.0	3.2
2019	12,946	573	4,484	70,121	56,590	2.4	15.5	-1.1	-5.8	-8.9
2020	13,672	517	4,527	60,811	48,642	6.5	-9.0	1.8	-12.6	-13.4
2021	13,818	501	5,432	63,393	53,410	3.3	-1.0	22.6	6.5	12.2

Note: Investment refers to Gross Fixed Capital Formation
Source: Office of the National Digital Economy and Society Commission (ONDE)

Figure 2: Proportion of Investment (percent)

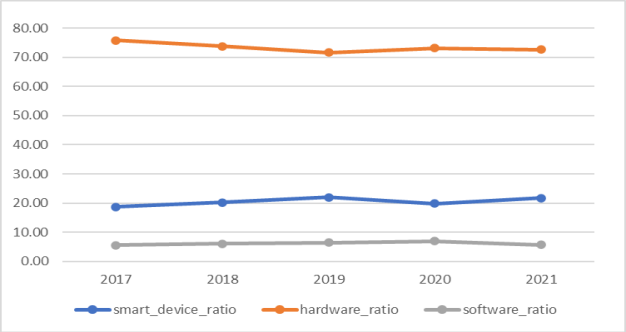
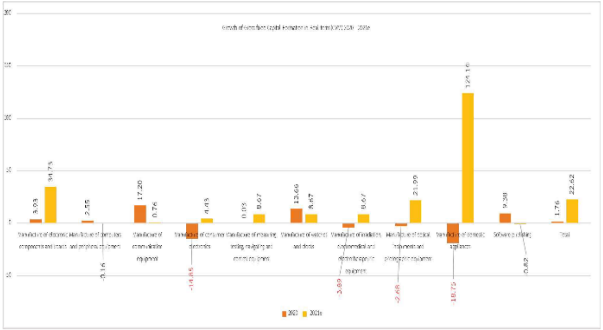


Figure 3: Investment Growth (at 2017 prices)



Source: Office of the National Digital Economy and Society Commission (ONDE)

Importance of digital economy is also revealed when the narrow definition is applied. Table 3 shows that the growth rate of hardware and smart devices; digital services, and software and software services increased substantially in 2021-22 and is expected to keep growing relatively at the same pace in the next three years, though the value of hardware (and smart devices) considerably dominates the digital industry, i.e., about 70 percent and growth of software and digital services is expected to be lower than those of hardware and smart devices.[1] From the survey, imports of software in Thailand grew substantially by 23 percent in 2022, and outpaced exports, which grew by about 9 percent during the same period. Investing more software and software services has a potential to help balance the development path of digital industry in the country. It is noteworthy that employment in the digital industry continued to grow in 2022, except digital services where a significant growth was shown in 2021 (Table 4). However, in the survey, the report revealed that the number of students enrolled in the relevant faculties to digital industry continuously increased, but the number of graduated students declined (Figure 4). This trend needs attention since if this trend is prolonged, an adverse implication to human capital and digital industry's development could be evident.

Table 3: The Value of Digital Industry (Million baht) and Growth Rate (percent), from IMC Survey

	Value (million baht)						Growth (percent)				
	2020	2021	2022	2023e	2024e	2025e	2021	2022	2023e	2024e	2025e
1. Software and software services	144,978	160,872	190,766	218,999	241,775	265,469	11.0	18.6	14.8	10.4	9.8
2. Hardware and smart devices	1,021,442	1,218,588	1,431,980	1,472,075	1,744,409	2,065,381	19.3	17.5	2.8	18.5	18.4
3. Digital Services	162,357	233,088	281,515	341,283	403,397	454,628	43.6	20.8	21.2	18.2	12.7
4. Digital content	39,332	42,065	40,518	41,143	42,710	44,983	6.9	-3.7	1.5	3.8	5.3
5. Telecommunication	630,250	647,654	669,330				2.8	3.3			

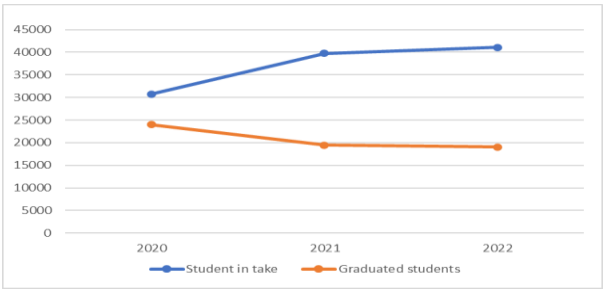
Note: Software includes system integration, software maintenance, software customizes, consultant/training while digital services include e-content, e-entertainment, e-retail, e-advertise, e-transaction and fintech.
Source: Author complies from the Digital Economy Promotion Agency (depa) under Ministry of Digital Economy and Society (MDES) and the IMC Institute.

[1] Note that value of e-commerce in Thailand increased from 2.76 trillion baht in 2017 to 4.01 trillion baht in 2021 or grew at an average rate about 10 percent per year during this period. Note that the value of e-commerce declined by around 6 percent in 2020 amid the pandemic, from 4.05 trillion baht in 2019 to 3.78 trillion baht in 2020. B2C dominates the e-commerce value, accounting for 51 percent, followed by B2B (27 percent) and B2G (around 22 percent). Consumer to consumer (C2C) transactions tend to be increasing in Thailand, reflected by monthly web visits in leading C2C e-commerce sites in Thailand jumped from 49.6 million in 2020Q2 visits to 90 million visits in 2021Q2 and 103 million visits in 2021Q3. Information from Statista and EDTA (https://www.etda.or.th/th/Useful-Resource/publications/Value-of-e-Commerce-Survey-in-Thailand-2021-Slides.aspx)

Table 4: Persons in Digital Industry (persons)

	2020	2021	2022	2021	2022
1. Software and software services	132761	138917	144,672	4.6	4.1
2. Hardware and smart devices	312,460	311,051	324,760	-0.5	4.4
3. Digital Services	60,008	79,115	73,782	31.8	-6.7
4. Digital content	6,614	5,397	6,225	-18.4	15.3

Figure 4: Number of Enrolled and Graduated Students



Source: Author complies from the Digital Economy Promotion Agency (depa) under Ministry of Digital Economy and Society (MDES) and the IMC Institute.

3. Policies towards the Digital Economy in Thailand

This section reviews key policies relevant to the Digital Economy in Thailand. Based on broad definition of the Digital Economy (OECD, 2020), four key policies are reviewed in this study, including industrial transformation, investment policy, digital plans, and rules and regulations. Some of these policies such as industrial transformation policy and investment policy are amended to support digital economy while some rules and regulations are designed specifically for digital economy such as PDPA and Cyber Security Act.

3.1 Industrial Transformation

Thailand 4.0 Policy was launched in 2018 in order to transform Thai economy to be value-based economy. In the recent plan, 12 industries are selected as new engines of growth, including digital industries.[2] The Eastern Economic Corridor (EEC), straddling three eastern provinces of Thailand – Chonburi, Rayong, and Chachoengsao, the newest special economic zone, is established in 2018. In addition to the twelve targeted industries, according to an announcement of the Board of Investment No. 6/2561 (2018) Investment Promotion Measures in Eastern Economic Corridor (EEC), the promoted zone for specific industries, especially EEC-D (Digital

[2] Note that twelve industries are new-generation automotive, smart electronics, affluent, medical and wellness tourism, agriculture and biotechnology, food for the future, robotics for industry, medical hub, aviation and logistics, biofuels and biochemicals, digital industries, defense and education development. Interestingly, the COVID-19 tends to cause Thai government, under the Gen Prayuth Administration, to rethink about the ten targeted industries. The Bio-Circular-Green Economy (BCG) Model has been emphasized, instead of all ten targeted industries. Thailand's four strategic areas for the BCG model are emphasized, including (1) food and agriculture; (2) medical and wellness; (3) energy, material, and biochemicals; and (4) tourism and creative economy. It is claimed that focusing on these areas, Thailand would achieve comprehensive security in food, health, energy, employment and sustainable natural resources and environment.

Park) in Sriracha, Chonburi province establishing to support digital business innovators[3] among EEC-A (Airport City) located near U-Tapao International Airport, Rayong province, EEC-I (Corridor of Innovation) in Wangchan Valley, Rayong province, EEC-MD (Medical Hub) in Bang Lamung District, Chonburi province, and EEC-H (High-Speed Rail) which is designed to connect Don Mueang, Suvarnabhumi, and U-Tapao International Airports and the genomics promotion zone, at Burapha University (Bang Saen). True Digital Park is another crucial location, which serves as a centre for digital innovations and startup operations, managed by the National Innovation Agency (NIA) and the corporate sector.

Thai government also invests heavily on infrastructure to enhance connectivity of these three provinces with the world. In particular, the five projects include the high-speed train route linking Suvarnabhumi, Don Mueang and U-Tapao airports; U-tapao airport; the third phase of Map Ta Phut port; the third phase of Laem Chabang port; and a centre to handle the maintenance, repair and overhaul of planes. A double-track railway and expansion of the inter-city motorway were also emphasized.

Regarding infrastructure towards the digital economy, so far Thailand has been preparing digital infrastructure in various aspects, both in terms of hard and soft infrastructure. For example, in 2018, the government also launched the country-wide village broadband network called 'Connected Netpacharat' and tried to offer affordable high-speed internet to poor households in more than 24,000 villages.[4] The government established a Digital Park in Chonburi province,

[3] Regarding, the Digital Park (EEC-D), aimed to be established as Thailand's innovation hub and destination for digital global players and digital biz innovators, the key participants in the park include hardware and software producers/service providers, such as Cloud Computing, Intelligent System, Pervasive Software, Cognitive Platform IoT Platform Machine Learning; digital content providers such as Data Center, Big Data Analytic, Streaming Content, Content Delivery Platform, VR Movie, Hologram, Immersive Animation; Digital Tech Startup. The EEC-D is equipped with ultra-high-speed broadband infrastructure, including but not limited to, an international submarine cable station, satellite earth station, and data management center. It is also crucial to note that in ASEAN, there are another two digital parks, namely Hoa Lac Hi-Tech Park of Vietnam and Punggol Digital District of Singapore, which are likely to compete in attracting foreign investor in this area. In particular, the Punggol Digital District would bring together global digital players, investors, innovators, startups and professional researchers. The new campus of Singapore Institute of Technology (SIT), which is planned to include the entire education system relating to digital technology, is set up in this district.

[4] In details, Ministry of Information and Communication Technology and Office of the Non-formal and Informal Education signed MOU in May 2018 for 3 years to provide public internet services to remote areas about 10,000 places and in 2019, another 10,000 places were included with duration 6 months. In 2021 and 2022, about 8,300 places for 12 months and 6 months process, respectively were included, with the higher quality of internet. In addition, public internet was provided to under privileged groups, including non-formal education centers, public libraries,

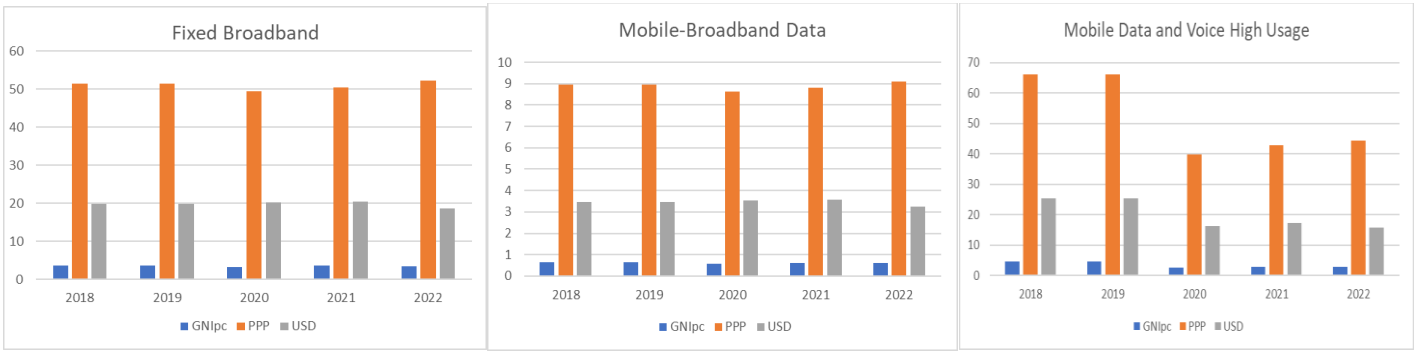
which supports the country's digital development by introducing submarine cable system, cable landing station and data center. In May, 2020, A national 5G committee was formed by Thailand Prime Minister Prayut Chan-o-cha to clearly develop roadmap for 5G adoption and enhance cooperation among relevant agencies for 5G development. The Bank of Thailand (BOT) also helps accelerate the digital transformation of financial sector, for example, introducing the central bank's e-payment platform called 'PromptPay', which ties user account with ID or phone number; establishing the new financial transaction report standard (ISO 20022) for facilitating e-invoicing and e-factoring; encouraging banking services to incorporate biometrics and facial recognition systems for identification. In addition, a peer-to-peer lending platform was created by the central bank in cooperation with the Ministry of Finance to allow individual lenders to be matched with individual borrowers.

By considering infrastructure and accessibility indicators, various indicators show digital infrastructure has been improved in the country substantially over the past decade. Ninety-nine percent of population were covered by mobile cellular network and ninety-eight are covered by at least a 4G mobile. Household with internet access at home increased from 64 percent in 2017 to 90 percent in 2022, with a high acceleration observed during the COVID-19. The parity between rural and urban areas concerning the internet access improved, i.e., the gap was 12 percentage points in 2020 (69 percent for rural and 89 percent for urban area) but declined to 6 percentage points in 2022 (86 percent for the former and 92 percent for the later). Fixed broadband subscription per 100 inhabitants and active mobile-broadband subscription significantly increased after 2015. International bandwidth has been also improving, from 53 kbit/s in 2015 to 178 kbit/s in 2022. However, comparing to other countries in Asia, like China, Singapore, Malaysia and Vietnam in some respects, infrastructure development and accessibility of population in the country are still lacked behind, particularly, in terms of prices, and ICT skills. In 2022, basing on ITU statistics, household with a computer at home was only 24 percent. In terms of ICT skills, though it has shown an increasing trend, only 1 percent of population would be classified as advanced ICT skills while around 21 percent tended to have basic skills for ICT. For prices, prices of fixed broadband, mobile broadband and mobile cellular in Thailand over the past decade have

digital community centers and border patrol police school. However, how to ensure continued access to the internet after the projects and scaling-up public internet to under privileged groups had not been addressed in the plan.

been declined noticeably, especially when the price is measured in % of gross national income (see Jongwanich 2023). However, after 2017, those prices remain unchanged and when the price is measured by purchasing power parity (PPP) of population in a country (or taking into account prices of other products), it seems ICT prices in Thailand, especially in terms of fixed broadband and mobile broadband, have not yet declined as expected (Figure 5). Comparing to selected countries in Asia, prices in Thailand are still more expensive in some types of technology (Table 5).

Figure 5: Prices of fixed broadband, mobile broadband and mobile cellular in Thailand, 2018-2022



Source: Author's compilation from ITU, https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

3.2 Investment Promotion Policy

Thailand altered investment incentives in 2017 and subsequent years to attract more quality FDI and promote digital economy. The incentives provided by the BOI for the newly targeted industries comprise a combination of two sub-incentive schemes, one involves activity-based incentives and the other is merit-based. In terms of the former, the list of activities is divided into six categories (A*, A1-A4 and B), according to their involvement in technology and innovation from the highest (A*) to the lowest (B). For the merit-based incentives, additional incentives are stipulated when activities add additional value to the economy in indicated areas, for example competitiveness enhancements, decentralization, and industrial area developments etc. (Jongwanich, 2023). The adjusted incentive package provided by the Thai BOI tends to be the most generous in Southeast Asia (Jongwanich, 2022).

Table 5: Prices of fixed broadband, mobile broadband and mobile cellular in selected Asia, 2022

	currency applied	Fixed broadband 5GB	Mobile broadband data only 1.5 GB	Mobile Data and Voice High Usage
China	as % of GNIpc	0.45	0.31	0.99
	PPP	7.36	5.15	16.2
	USD	4.53	3.17	9.98
Indonesia	as % of GNIpc	6.13	1.47	1.71
	PPP	60.24	14.41	16.77
	USD	20.97	5.02	5.84
Malaysia	as % of GNIpc	2.48	0.63	1.05
	PPP	58.7	14.93	24.89
	USD	21.68	5.52	9.19
Philippines	as % of GNIpc	11.26	2.32	2.32
	PPP	84.41	17.39	17.39
	USD	32.28	6.65	6.65
Singapore	as % of GNIpc	0.64	0.25	0.25
	PPP	45.53	17.85	17.85
	USD	33.34	13.07	13.07
Thailand	as % of GNIpc	3.45	0.6	2.92
	PPP	52.2	9.1	44.26
	USD	18.63	3.25	15.8
Viet Nam	as % of GNIpc	2.64	1.41	0.94
	PPP	22.78	12.13	8.1
	USD	7.79	4.15	2.77

Source: Author's compilation from ITU, https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

Regarding digital activities, only digital infrastructure in terms of data centre and cloud services and digital ecosystem supported business in terms of innovation park do receive the activity-based incentives at A1 while development of software, digital platform or digital content received incentives at A2, and co-working space receives incentives at B. Smart city area development receives incentives at A2.

Further supporting the escalating digital technology and the strong Thai entrepreneur environment, the Thai government has rolled out numerous measures to create a vibrant startup ecosystem, through funding, incubating and accelerator programs along with tax and non-tax incentives. In January 2022, startups and SMEs can list their shares to be traded on a new secondary market called LiVE Exchange, with slightly loosen requirement than usual such as no requirement to have a licensed financial advisor to certify the filling documents. In addition, several agencies have rolled out numerous measures to create a vibrant startup ecosystem, through funding, incubating and accelerator programs along with tax (e.g., The 5-year income tax exemption for startup and capital gain tax waiver for ventures) and non-tax incentives.[5]

[5] For example, National Science and Technology Development Agency (NSTDA) creates Startup Voucher Program, which provided fund for Thai startups (51 percent of Thai shareholders). National Electronics and Computer Technology Center (NECTEC) and National Innovation Agency (NIA) also have research units and program to

3.3 Digital Plans

Thai government has long addressed the relative importance of ICT, since the mid-1990s as it could potentially enhance productivity and promote long-term growth. The first plan at the national level, *Thailand National IT policy (1996-2000)*, was introduced in the mid-1990s. Since then, a number of national level plans were followed, including for example Thailand Information and Communication Technology (ICT) Policy Framework (2001-10), Thailand Information and Communication Technology (ICT) Master Plan (2002-2006 and extended to cover 2007-08); National Broadband Policy (2010), Information and Communication Technology Policy Framework (2011-2020), Universal Service Obligation (USO) Master Plan for Provision of Basic Telecommunication Services (2012-14).

The Ministry of Information and Communication Technology (MICT) was established in 2002 to be the sole unit for implementing all relevant plans and measures and governing all related government agencies. The ministry was renamed to Ministry of Digital Economy and Society (MDES) in 2016 with a broader scope by incorporating state-owned enterprises and public organizations related to ICT activities such as Telephone Organization of Thailand (TOT), The Communications Authority of Thailand (CAT), Electronic Government Agency (Public Organization) (EGA), Electronic Transactions Development Agency (Public Organization) (ETDA). More importantly, Software Industry Promotion Agency (SIPA) was replaced by Digital Economy Promotion Agency (DEPA) which becomes a workhorse to promote and support the development of digital industry and innovation and the digital technology adoption.[6]

MDES launched 20 year-National Master Plan for Digital Development (2018-2037), which have four key goals, including (1) increasing the country's competitiveness; (2) equalling opportunity; all Thais will have access to broadband internet, as a basic utility; (3) human capital; all Thais will be digital literate; (4) government reform. There are four phases in the plan and six strategies to reach such four goals have been proposed, including (1) building the country's digital infrastructure with affordable prices; (2) driving the economy with digital technology, especially

support SMEs in engaging with digital technology, including Artificial Intelligence Research Unit (AINRU); Communications and Networks Research Unit (CNWRU) and Bangkok Cyber Tech District.

[6] Noted that National Disaster Warning Center, which was formerly under MICT, is to be transferred to the Interior Ministry. In addition, MDES set up a cybersecurity agency and hacker training centre.

New S-curve; (3) building a quality and equitable society through digital technology; (4) transforming the economy by using digital government; (5) developing workforce for the digital era; (6) building trust and confidence in the use of digital technology. The government sets key indicators for the next ten years as follows: 1) Thailand is ranked one of the 15 most developed countries by World Competitiveness Scoreboard; 2) digital industries contribute to 25 per cent of GDP; 3) every citizen must have access to broadband as a public utility; 4) Thailand is ranked one of the 40 most developed countries by the ICT Development Index (IDI); 5) Every citizen is aware of and knowledgeable in digital literacy; and 6) Thailand is ranked one of the 50 most developed countries in terms of e-government by the UN E-Government Survey.

Various units in the government set up their own plans, trying to be in line with 20 year-National Master Plan for Digital Development. For example, the Ministry of Digital Economy and Society (MDES) set up its Strategic Digital Plan for Economic and Social Development for 2018-2021 and 2020-24; the Office of the Permanent Secretary launched the strategic plan for 2020-24; and Digital Economy Promotion Agency (DEPA) launched Thailand digital plan for 2018-2022. Each government unit set their own goals, strategies and indicators to measure the success so that complication regarding strategies and measures to indicate the accomplishment of the plan was observed.[7]

3.4. Rules and Regulations to Digital Activities and International Cooperation

Rules and regulations relating to digital economy in Thailand have been established and tend be in line with other Asian countries and international practices, e.g., United Nations Convention on the Use of Electronic Communications in International Contracts (UNCITRAL), Recommendation of the Council concerning Guidelines governing the Protection of Privacy and Transborder Flows of Personal Data by OECD, APEC Privacy Framework and EU's General Data Protection Regulation (GDPR) etc. Digital laws in Thailand could be divided into 3 groups, (1)

[7] For example, the indicators are to a certain extent different from those set by MDES and the Office of the Permanent Secretary. For example, under 2018-2022 plan under DEPA, indicators of strategy 2 are (1) Value of digital industry (Hardware, Software, digital services, communication, digital content) should be 10 percent per year and (2) 1,000 Digital SMEs, digital transformation, and digital start up should be added into a market during 2018-2022. For 2018-2021 and 2020-24 plans of MDES, the indicators relating to promoting digitalized economy are value of e-commerce (measured in terms of total sales (2 percent of total sale) in the former and percent growth (10 percent per year) in the latter and in both plans, digital start up were set to increase by 300 firms per year.

laws relating digital infrastructure and business facilitation such as E-transaction law, Digital ID and the Panal Code; (2) laws relating to consumer protection and business trust such as Consumer Protection Act, Copy Right Act, the Direct Sales and Direct Marketing Act; (3) laws relating to securing ecosystem such as the Personal Data Protection Act, Cyber Security Act.

For the first group, Thailand introduced The Electronic Transactions Act of B.E. 2544 (2001) in 2001. This Act is to provide legal acknowledgement of electronic transactions to have the same effect as transactions conducted by traditional paper means. The Electronic Transactions Act was amended in 2019 [the Electronic Transactions Act (No. 3) B.E. 2562 (A.D. 2019)] by strengthening evidence relating to transactions and providing conditions to ensure a legal consequence when no signature is signed in documents. The Digital ID Bill was in principle approved by the Cabinet in 2018. The digital ID system is aimed to facilitate and expedite the processes of identity verification via online platform. The system is intended to eliminate the need to repeatedly undertake traditional Know-Your-Customer (KYC) of end-users held by other members of the systems.[8] The Royal Decree of B.E.2551(2008) was enacted in 2008 to monitor the business operation of electronic payment services. The Panel Codes B.E.2547 (2004) was also legislated to ensure electronic card payment is properly treated and to insist on violations relating to e-card forgery.

Regarding the second group, various Acts have been enacted to protect consumers and create business trust. These Acts are not directly related to but are involved in electronic commerce promoting. For example, Consumer Protection Act of B.E. 2522 (1979) was introduced in 1979 and amened in 2019 [The Consumer Protection Act (No. 4) B.E. 2562 (2019)]. This Act gives consumers protection against false, misleading and unfair advertising of goods and services and guarantees that consumers shall have the same rights regardless of whether the transaction is carried out electronically or by traditional means. The amended consumer Act in 2019 tried to strengthen consumer protection in an aspect of products/service safety. The Goods and Services Safety Committee was established with powers to examine the safety of enterprises' goods and services. The maximum amounts of fines for violations have been increased in the new

[8] Under the digital ID legislation, an organization applying the National Digital Identification (NDID) will develop an "NDID Platform", which will issue licenses to identify digital IDs and to verify the citizens' digital ID. However, it's not mandatory and other means for checking individuals' identities will still be in use in Thailand.

Act. Direct Selling and Direct Marketing Act of B.E. 2545 (2002), which allows customers to have the right to terminate the contract within an agreed period and Thai statement, which is easy to understand, is required to provide to e-transaction customers; and The Copyright Act 2558 amending from the Act B.E. 2537 (A.D. 1994) [9] in which a copyright owner can send a notice to the service provider to remove violated copyright works from computer systems and the vice versa are also in these groups.

It is noteworthy that in 2021 Thailand's online dispute resolution platform (Talk DD), which is a cooperation between department of Intellectual Property (DIP) and Thailand Arbitration Center (THAC) was introduced to support and facilitate out-of-court dispute resolutions.[10] The platform can be used for cases relating to copyright, patents and trademark contraventions. Another noteworthy point is on 15th July 2021 the MDES (Ministry of Digital Economy and Society) and the ETDA (Electronic Transactions Development Agency) held the second public hearing on the draft of the Royal Decree on Digital Platform Service Businesses (DPSB Law), which is planned to be enacted under the Electronic Transactions Act. The objectives of this decree are to protect consumers and enhance digital platform's credibility. In this version of the law, a digital platform services provider, who locates outside Thailand but provides services to Thai consumer, is subject to the DPSB law and is required to appoint a local representative in Thailand. In addition, ETDA has power to determine terms and conditions of services for the large-scale Digital Platform Service providers such as the system of consumer's feedback and the dispute

[9] The new ACT is similar to some sections in the Digital Millennium Copyright Act ("DMCA"), a United States, which is implemented under the World Intellectual Property Organization ("WIPO"), EU Directive 2000/31/EC and Australia Copyright Law.

[10] THAC allows cases to be filed online and settled through online formal settlement processes resulting in less confrontation, lower costs and faster settlement process. There has been no publicly settlement case available but based on Thailand Arbitration Center (THAC), examples of cases are different quality of online products from store state; another person using products, image, or logo to modify the design or commercial use of intellectual property without any permission; no compensation from unexpected cancelation of a plan ticket or hotel booking. Based on NISHIMURA&ASAHI (2021), the first disputed request was submitted on the Talk DD platform on 8 January 2021 and used only 2 days for the settlement (see Thailand's Online Dispute Resolution Platform for Intellectual Property | Publications | Knowledge | Nishimura & Asahi). Note that there are four steps for applying the Talk DD, i.e., (1) register (at odr.thac.or.th (2) submit request with 4 steps: resolution choice, case category, case discription, invited parties and (3) pay fees, staring from 2,000 baht ($60) see more information from TalkDD (thac.or.th)

resolution and has power to exclude SMEs, who hire employees less than 5 and annual turnover of not more than 1.8 million baht from the terms and conditions.

For the third group, Thailand has paid more attention to building securing ecosystem. The Personal Data Protection Act B.E. 2562 ("PDPA") and Cyber Security Act B.E. 2562 ("CSA") were introduced in 2019 in addition to The Computer Crime Act of B.E. 2550 (2007) amended in 2017, explicitly addressing the issues of spam emails and imposing penalty regarding sending disturbed computer data or an email to a recipient. The Cyber Security Act B.E. 2562 ("CSA") has been enacted and effective since 28 May 2019. This act aims to provide national security in cyber-space and safety of the underlying infrastructure relevant to Digital Economy.[11] Under the Act, infrastructure service providers must comply with four key obligations, including (1) regularly (at least once a year) conducting cyber security risk assessments; (2) creating and implementing sector specific mechanisms, procedures and code of conduct to monitor and solve cyber security threats; (3) notify the Office of the National Cyber Security Committee (ONCSC) the names and contact information of owners, processors of the computers and administrators; and (4) reporting cyber security threats to the ONCSC.

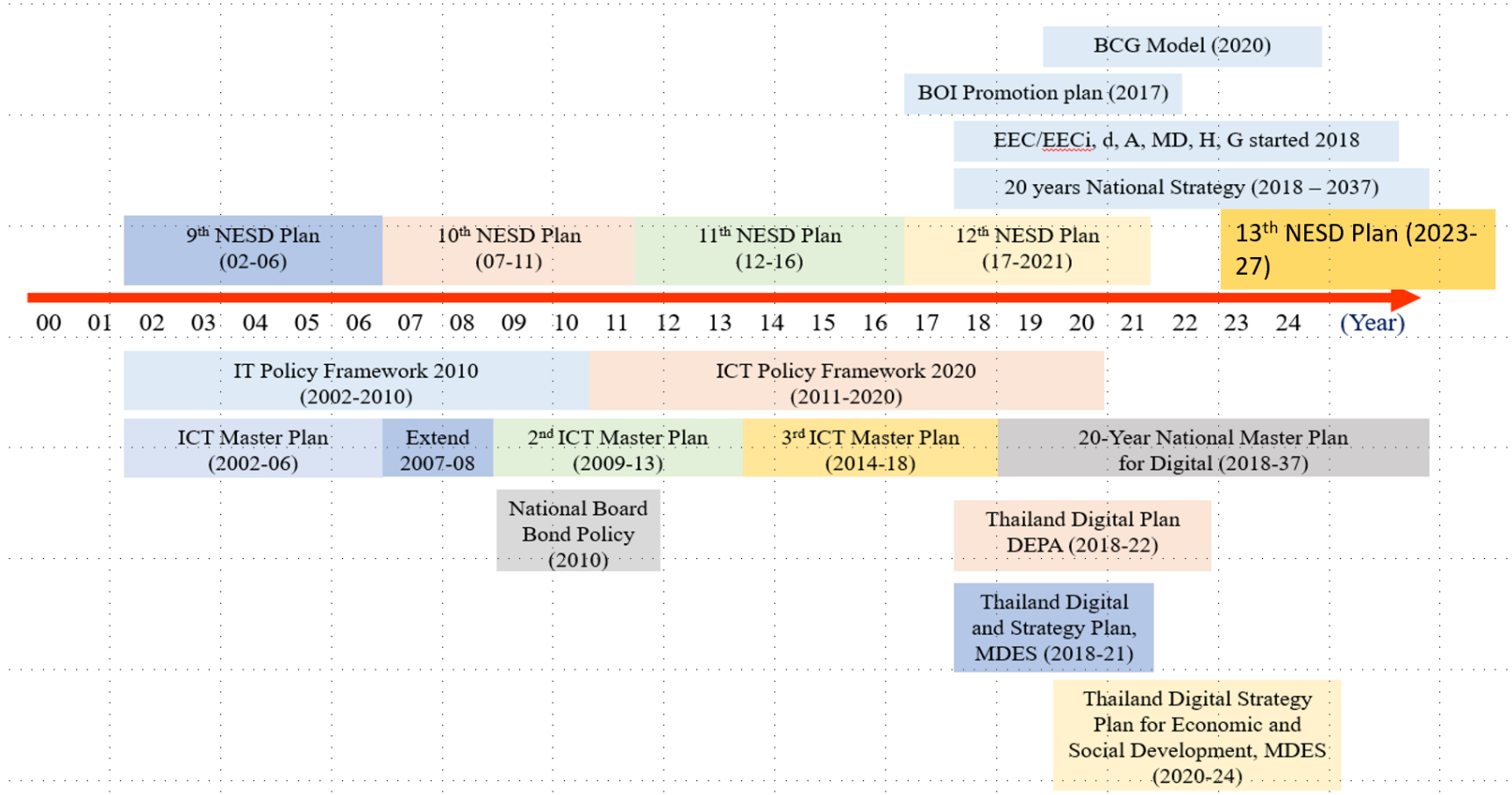
The Personal Data Protection Act B.E. 2562 (PDPA), in which several principles are drawn from the European Union's General Data Protection Regulation 2016/679 (GDPR), was established in 2019. The PDPA applies to (1) controllers and processors located in Thailand regardless how personal data is taken place; (2) controllers and processors located outside Thailand when their data subjects involving with goods and services are offered and when data subjects' monitoring is taken place in the country. Under the PDPA, consent for the collection, usage and disclosure of the personal data from the data subject is required and a data controller has an obligation to keep personal data secure, particularly ensuring a system to destroy the personal data once the maintenance period expires. Regarding cross-border data transfer, a data controller can transfer Personal Data to a foreign country only

[11] The underlying infrastructure includes, but is not limited to, the provision of information infrastructure services in the following sectors: banking, IT/telecoms, energy and public utilities, transportation/logistics, and public health. See more information at https://www.lawplusltd.com/2018/02/draft-amendment-copyright-act-thailand/.

when the foreign country has adequate data protection standards. Otherwise, an exemption should be met. However, the guideline regarding this issue has yet to be established in Thailand.

Note that in terms of international cooperation concerning digital provisions, Thailand has participated WTO, the Joint Initiative on Electronic Commerce (JIEC), in 2019. The progress under JIEC involved mostly in laws relating digital infrastructure and business facilitation and laws relating to consumer protection and business trust such as electronic signature, electronic contract, paperless commerce, and online consumer protection. Concerning bilateral cooperation, recently there are two FTAs including digital provisions, i.e., Thailand-Australia (TAFTA) and Thailand–New Zealand FTA (TNFTA) in which most of the provisions tend to be in line with WTO's JIEC but only the former includes provisions relating to a moratorium on digital-goods tariffs. For regional FTAs, only ASEAN-Australia-New Zealand (AANZFTA) does include a digital chapter, including for example consumer protection, online-personal data protection, and paperless trade (see UN 2022 and Postigo 2023). RCEP is another regional FTA, which has digital chapter, but the provisions tend to be less restricted than CTPPP, which Thailand has not yet been a member of the agreement. In CTPPP, non-discrimination of digital products, prohibition of source code access, prohibition of localization requirements and cross-border data transfer restrictions. Thailand is a part of ASEAN Digital Economic Framework Agreement (DEFA), which is expected to be completed by 2025. The agreement covers issues relating to digital talents, digital IDs, cyber security, retaining, upskilling, digital infrastructure, and inter-openability in ASEAN. In June 2022, Thailand signed a memorandum of understanding (MOU) on Digital Economy Partnership Agreement (DEPA), which was initiated by Singapore, Chile, and New Zealand in 2020 and the MOU aims to promote eight issues, including digital transformation, e-commerce, setting up centres to fight fake news, setting up government data centre and providing cloud services, personal data protection, cyber security, investment in Thailand's Digital Valley and IoT Institute in the Eastern Economic Corridor and development of digital skills and literacy.

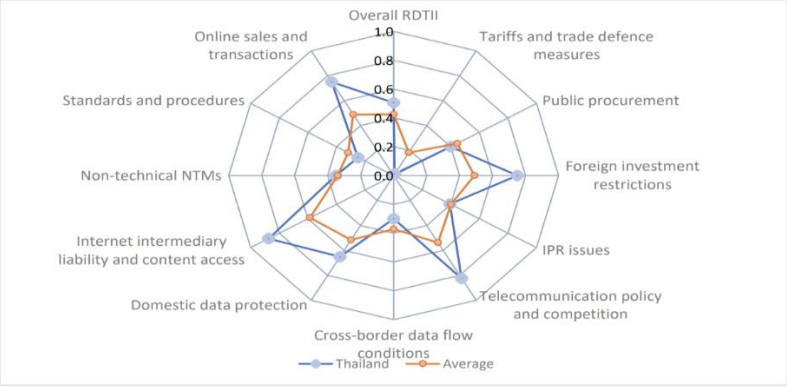
Figure 7: Key plans relevant to Digital Development in Thailand



Source: Author's compilations.

Interestingly, UN-ESCAP (2022) introduced the Regional Digital Trade Integration Index (RDTII), which covers eleven areas. The higher the score, the greater the restrictiveness is revealed. Figure 8 reveals that overall, the score of Thailand's RDTII was higher than that of regional value. Among eleven indicators, there were four areas, showing much higher restrictive scores than the regional average value, namely foreign investment restrictions, telecommunication policy and competition, internet intermediary liability and content access, and online sales and transactions (Figure 8). In Thailand, foreign investors have to comply with Foreign Business Act (FBA) in which activities are categorized into three lists with different equity limits and approval procedures (Jongwanich, 2022). Besides the FBA, the investors must comply with sector specific laws such as telecommunications, requiring investors to obtain licenses with caps on foreign equity. In addition, foreign investors cannot acquire any companies owning the network for telecommunication operation and frequency spectrum business. Television broadcasting, digital TV and cloud computing also require having a license. Regarding internet and content access, it seems that since 2017, in which the Commission of Computer-Related offences Act (CCA) was established, the government has systematically censored international and domestic news media (UN-ESCAP, 2022). The Minister of Digital Economy and Society (MDES) prosecuted the social media such as Facebook, Google, Twitter, YouTube for failing to remove illegal posts (UN-ESCAP, 2022). It was questionable whether it would help improve the Political-security dimension, one of the key pillars for digital development, or reflect digital authoritarian in the country.

Figure 8: The Regional Digital Trade Integration Index, Thailand 2022



Source: UN-ESCAP(2022)

5. Conclusions and Policy Inferences

This paper aims to examine potential of digital economy in Thailand and review key policies in four prospects, including industrial transformation, investment policy, digital plans, and digital rules and regulations, including international cooperation. The digital economy in Thailand grew substantially and faster than GDP growth in 2017-2020. Consumption tended to grow faster than other components before 2021, but after subdued pandemic situation, in 2021 investment in digital and export grew markedly, which to a certain extent shows a good prospect of digital development in the country. However, when subcategories are considered, high growth was concentrated in the digital hardware such as electronics and computer parts, medical electronics equipment, and sonar and control equipment, while investment in software slightly declined in 2021. The proportion of smart devices' investment remained relatively far smaller than that of traditional hardware investment. In addition, the number of graduated students relevant to digital industry has not been improving over the past few years, though the number of students enrolled in the relevant faculties continuously increased. This trend needs attention since if this trend is prolonged, a severe implication to human capital and digital industry's development could be evident.

Digital infrastructure has been improved in the country over the past decade, but comparing to other countries in Asia, like China, Singapore, Malaysia and Vietnam in some respects, infrastructure development and accessibility of population in the country are still lacked behind, particularly, in terms of ICT skills and prices. Various rules and regulations were amended and introduced to support digital development in the country, though unclear regulation such as transfer Personal Data to a foreign country has not yet been established. Such establishments together with some programs have implications in improving Political-Security and Socio-Cultural aspects, in addition to Economic pillar. International cooperation concerning digital provisions has been initiated, both bilateral, regional, and multilateral, but based on the Regional Digital Trade Integration Index (RDTII), developed by UN-ESCAP, Thailand's digital trade integration lacks behind other Asian countries, mainly due to restricted rules and regulations especially those connecting to telecommunication policy and competition, internet intermediary liability and content access.

To well transform Thailand into the digital economy, four key policy recommendations are proposed in this study. First, digital transformation plans need to be strengthened. Continuity of policy framework as well as clear policy coordination among government agencies should be prioritized. The Ministry of Digital Economy and Society (MDES) could play a key and active role in coordinating digital transformation plans across institutions to possibly avoid unnecessary policy overlapping as well as failures in policy coordination and enforcement. Adequate budget allocations for building hard and soft digital infrastructure as well as promoting digital industry should also be considered. The lack of policy framework continuity, policy overlapping and coordination failures among government agencies causes inefficient budget utilization, which possibly delay digital development outcomes and generate difficulties in following up progress of the country's digital development. Due to the domination of the digital hardware, stimulating more investment in software and smart device would help balance the digital development path in the country. In addition, digital technology has been so far concentrated more on service sector, followed by manufacturing sector, while utilization of digital technology in agriculture sector has been relatively limited so that utilizing technology more in the latter two sectors should be prioritized.

Second, human capital, particularly ICT skills, needs to be further developed in the climate of digital transformation. Thai government has plans to improve human capital development, but policy overlapping and coordination failures across institutions are still the key obstacles in pushing Thailand forward. The government should have a clear evaluation criterion in each project/policy and should ensure an effective whole-of-government approach, particularly establishing coordination processes and communication channels across institutions. In addition, public-private partnership in enhancing human capital development should be continued, especially encouraging large companies to support medium and small enterprises to develop workers' skills.

Third, ICT infrastructure needs to be further developed to ensure better digital development, particularly in terms of accessibility and affordability of population in the country. Infrastructure investment, public-private partnership in scaling up potential infrastructure projects in remote areas, as well as modernized rules and regulations to support infrastructure development should be encouraged. This would help not only improve economic aspects enhanced by digital

development, but also promote another two pillars, i.e., Political-Security and Socio-Cultural, in the country.

Fourth, with the rapid pace of digitalization in the economy, established rules and regulations (e.g., data security, privacy, consumer protection, competition policy, cross-border data flows restrictions, Data Localization Requirement (DLR)) need to be monitored and modernized to address public concerns. Deepening the regional cooperation in terms of compatible regulations should also be encouraged to facilitate business in the region as well as to protect consumers from both privacy and security concerns. As possible negative impacts of digital transformation could arise (Jongwanich, Kohpaiboon and Ayako, 2022 and works cited therein, Jongwanich, 2022), especially in traditional sectors, government should develop a systematic evaluation process, including employment generation, potential job and business losses, technology adoption as well as technology transfer, to clearly monitor, evaluate and mitigate potential negative economic and social impacts of digital transformation in the country.

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