ERIA Research Project Report FY2025, No. 15

ASEAN Digital Community 2045 Global Insights

Edited by
Lili Yan Ing

Economic Research Institute for ASEAN and East Asia

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Economic Research Institute for ASEAN and East Asia (ERIA)
Sentral Senayan II 6th Floor
Jalan Asia Afrika No. 8, Gelora Bung Karno
Senayan, Jakarta Pusat 10270
Indonesia

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List of Authors

Lili Yan Ing
ERIA

Anthony Larsson
Stockholm Chamber of Commerce, Sweden

Oliver Falck
Center for Industrial Organization and New Technologies, Ifo Institute, University of Munich, Germany

Nina Czernich
Center for Industrial Organization and New Technologies, Ifo Institute, University of Munich, Germany

Jae-Yun Ho
Underwood International College (UIC), Yonsei University, Republic of Korea

Sherry Tao Kong
Institute of Social Science Survey, Peking University, China

Yasuhiko Taniwaki
Executive Vice President of Internet Initiative Japan Inc, Japan

Mira Burri
Faculty of Law, University of Lucerne, Switzerland

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Chapter 1
The Digital Economy in Sweden: A Lodestar or a Cautionary Tale?

Anthony Larsson

1. Introduction: Development of the Digital Economy in Sweden – The 'Cashless' Society

A 'cashless' society refers to a society where cash is replaced by digital transactions (Nayan, 2022). This concept dates back to Edward Bellamy's (1888) utopian novel *Looking Backward: 2000–1887* and was discussed as a future reality in the 1960s (Reistad, 1967). Sweden serves as a significant case study for this development.

Central to the cashless society is the 'War on Cash' (WOC), an idea introduced by economist Kenneth S. Rogoff (1998) to combat tax evasion and the uneven cash supply. Whilst not unique to Sweden, the country has rapidly progressed towards becoming a cashless economy. Sweden, long seen as a digital pioneer (Petersén, 2019), aims to fully digitise its economy (Eriksson and Sandhill, 2020). As of 2022, Sweden ranked fourth amongst the European Union (EU) countries on the Digital Economy and Society Index (DESI), trailing Finland, Denmark, and Norway, primarily due to its lower 5G connectivity score (18% vs. the EU average of 66%) (European Commission, 2022).

Many countries have adopted a 'cash-lite' strategy for a gradual transition to a cashless society, reducing cash use in local transactions (BFA Global, 2015). In contrast, Sweden is aggressively moving towards a cashless nation, using various digital payment methods. Experts predict Sweden could become completely cashless by 2030 (Arvidsson, 2018; Jalkebro and Vlcek, 2023). In 2022, Sweden was third amongst Scandinavian countries in approaching a cashless society, after Norway and Denmark (Table 1.1) (Wright, 2023):

Table 1.1. Top-5 European Countries Closest to a Cashless Society in 2022

Rank	Country	People with Internet Access	Credit Card Owners	No. of ATMs (per 100,000 adults)	Cash-based Payments	Unbanked Population
1	Norway	97%	71%	32	2%	0%
2	Finland	92%	63%	37	2%	0%
3	**Sweden**	**95%**	**45%**	**28**	**1%**	**0%**
4	Denmark	97%	45%	43	1%	0%
5	Switzerland	94%	66%	94	2%	2%

ATM = automated teller machine.

Source: Wright (2023).

However, Sweden's approach differs from other Scandinavian countries. Swedish retailers can refuse cash despite it being legal tender, unlike in Denmark, where retailers must accept cash. This is due to Sweden's contract laws taking precedence over banking and payment laws (Knowledge at Wharton Staff, 2018).

The cashless trend in Sweden is supported by major banks, citing cost savings, transparency, and crime prevention (Fabris, 2019; Gupta, 2020; Rayabharam, 2021). In 1990, 70% of Sweden's payments were made with cash (Guibourg and Segendorf, 2007b). By 2020, this had dropped to 8% (Raya and Vargas, 2022). Although cash remains legal tender, its use is expected to continue declining (Arvidsson, 2019). This shift, however, is controversial. Critics call the cashless society a 'creepy fantasy' (Ou, 2016). Additionally, a report by Sveriges Riksbank (2024) showed that opposition to abolishing cash rose from 36% in 2022 to 44% in 2023, likely due to an increased awareness of the role of cash as a backup during crises like the war in Ukraine.

Thus, the key question is what the impact is of moving towards a cashless economy and whether or not it is a desirable evolution. This chapter explores Sweden's digital economic revolution and draws lessons for the future development of its digital economy up to 2045 and beyond.

2. The Processes Involved in Building a Cashless Society

A cashless society means eliminating physical cash and using technological advancements to dematerialise money (Baubeau, 2016). This transformation involves four stages: 1) inception, 2) transitioning, 3) tipping point, and 4) advanced (Thomas, 2013).

Inception
Predominantly seen in developing economies where over 90% of transactions are cash-based due to limited financial infrastructure and social attributes. These countries might benefit from innovative shortcuts to progress towards cashlessness.

Transitioning
Present in both developing and developed economies, this stage features mixed paper and electronic payments. In developing economies, the emerging middle-class drives cashless transactions, whilst in developed economies, cultural factors are the main drivers.

Tipping Point
Occurs when 29%–45% of transactions are cashless, but cash still holds significant cultural/traditional value.

Advanced
Characterised by developed infrastructure and high financial inclusion, where citizens widely accept and use cashless payment methods.

The first shift from inception to transitioning happens when governments, large employers, and aid distributors start issuing large payments electronically, altering cash flow patterns and necessitating financial infrastructure development (BFA Global, 2015). Challenges at this stage include payment system infrastructure, regulatory frameworks, reliable digital payment experiences, and recipient education (Klapper and Singer, 2017; Raya and Vargas, 2022).

The second shift from transitioning to the tipping point is driven by increased opportunities for digital transfers and spending (BFA Global, 2015; Klapper and Singer, 2017). Regulatory issues, licensing requirements, infrastructure deficiencies, and underdeveloped distribution channels stymie the abandonment of cash (Raya and Vargas, 2022; World Economic Forum, 2018).

The third shift to the advanced stage sees most purchases made electronically, with accessible and cost-efficient alternative payment methods. Challenges include fraud and control over payments (Raya and Vargas, 2022).

The first two shifts can be considered as chiefly being driven by the need for secure and transparent payments. By the same token, the third and last shift can be considered as being generally driven by the community to enhance convenience and lower costs of transactions (Raya and Vargas, 2022).

The Swedish payment system began around AD 995 (or rather in what would much later be known as the 'Swedish state') (Edvinsson, Franzén, and Söderberg, 2010). It is difficult to give an exact point in time when the transition into the second stage, 'transitioning', occurred, but it likely occurred in the 1960s with automated processes in banks (Arvidsson, 2019). The third stage, tipping point, was reached in the 1980s and 1990s with the rise of card payments (Arvidsson, 2019). The advanced stage began in the mid-2000s, driven by increased robbery-related crime against cash-handling institutions. For instance, the number of reported robberies in Sweden jumped from 8,590 in 2004 to 9,398 in 2005, a 9% increase in 1 year (Arvidsson, 2019; Swedish National Council for Crime Prevention, 2023). This would become *casus belli*, i.e. the happenings used as justification for an extensive lobbying campaign against the use of cash. For instance, several interest groups would form, which, along with several labour unions, targeting the use of cash with demands that it be substituted for other means of payment, especially in places such as public transport, banking, and in the common retail industry etc. (Arvidsson, 2019; Peebles, 2021).

Various digital solutions have been introduced to help facilitate the transformation to a digital economy. BankID (2024b), an electronic identification system for Swedish citizens and permanent residents, was introduced in 2003. It is owned jointly by seven of the largest Swedish and Scandinavian banks (BankID, 2024b; Essén and Ekholm, 2020). Most services requiring online identification, such as government, municipality, bank, and retail actors support BankID.

This also encompasses signing transactions and documents. This can range from online and mobile banking to tax declaration and e-trading. In this way, BankID has a twofold purpose, one for identification and one for signing, since digital signatures made via BankID are legally binding (Zefferer and Teufl, 2015). In later years, BankID also implemented a quick response (QR) code, which has proven effective against the number of reported BankID fraud attempts (Dobos, 2019). As of 2023, BankID had 8.5 million users (from a population of roughly 10.6 million) and has been used no less than 7.1 billion times, with approximately 99.4% of the Swedish population between the ages of 18 to 67 possessing a BankID account (BankID, 2024a; Statistics Sweden, 2024).

Another important tool that helped facilitate the digitalisation of the Swedish economy was the introduction of Swish, a mobile payment system. Launched in 2012, it was the fruition of cooperation between six large Swedish banks, *Bankgirot* (a proprietary clearing system in Sweden owned by multiple Swedish banking conglomerates and used for transactions such as bill payments) and *Sveriges Riksbank* (the Central Bank of Sweden) (Erlandsson, et al., 2022; Omarini, 2018; *Sveriges Riksbank*, 2017). As of May 2022, Swish had 8.6 million users, of which 8.3 million were private accounts (International Monetary Fund, 2023). The aforementioned BankID is mandatory when using Swish since the former app is used to identify the user and thus sanction the use of the latter app's transfers.

Electronic identification systems like BankID are crucial for a cashless society, although alternatives such as biometric authentication, QR codes, near-field communication, and radio-frequency identification could be considered. However, a cashless transition without electronic identification systems would be challenging on a national scale.

Zettle (previously iZettle), a Swedish-founded financial technology (fintech) company, developed the first chip-card reader and app for smartphone-based mobile commerce, making it easier for small businesses to accept card payments (Ashta and Herrmann, 2021).

Crime prevention is another reason for transitioning to cashless. Gang violence and crimes involving cash transactions have increased in Sweden, prompting calls to reduce cash use (Brooke, 2023; Bryant, 2023). Government control and surveillance, tax evasion prevention, and enhanced monetary policy implementation are additional motivations (Duemmler and Kienle, 2012; Immordino and Russo, 2018). Banks and card companies support a cashless society for profitability reasons through account and processing fees (Clark, 2017; Garcia-Swartz, Hahn, and Layne-Farrar, 2006; Krueger and Seitz, 2017; Statham, 2020) . However, as long as cash remains an option, its complete elimination faces resistance (Dowd, 2019). In fact, in a 2016 interview in the New Yorker, Mats Torstendahl, the deputy president at *Skandinaviska Enskilda Banken* (SEB), one of Sweden's leading banks, admitted that 'We don't add any value by handing over cash over the counter' with Per Långsved, the then head of personal banking at SEB, adding that 'cash is actually one of the main carriers of diseases in the world' (Heller, 2016). Torstendahl referred to the conflict between banks wanting to eliminate cash and citizens not using cash but still opposing its removal as a '*cash* twenty-two situation' (Heller, 2016). Furthermore, in 2017, the then (2016–2023) Visa Inc. chief executive Alfred F. Kelly Jr. was quoted as saying that he wanted

to 'put cash out of business' (Baird, 2017). To this end, banks, credit institutes, card companies, and much of the retail industry have been lobbying for a cashless society for a long time since the handling of cash is considered costly (Arvidsson, Hedman, and Segendorf, 2017; Bergman, Guibourg, and Segendorf, 2008; Guibourg and Segendorf, 2007a).

Handling cash involves various costs: theft prevention, time-consuming transactions, counterfeit notes, cash counting, and banking (Sorensen, 2023; Sveriges Riksbank, 2019). Cash also carries the highest social unit cost compared to card payments and Swish (Sveriges Riksbank, 2023). This entails the sum of private costs (those pertaining to the direct costs of the good and/or service covered by the transaction) and external costs (those pertaining to additional costs associated with the production of the good and/or service that is not accounted for, or compensated, by the free market, such as the depositing of cash and card payment clearing and settlement and so forth, which all consume resources in the shape of labour and capital) (Schmidtchen et al., 2009; Sveriges Riksbank, 2023).

There is, however, a push-and-pull effect to the introduction of a cashless society. Whilst the use of electronic cashless options has been sophisticated and encouraged, there have been other WOC-measures introduced that have rendered the use of cash increasingly more difficult (Armelius, Claussen, and Reslow, 2022). The most ostensible example is the fact that many retailers have gone completely cash-free and will not accept payment in cash (Clark, 2017; Laurent, 2023). Another factor is that none of the large banks handle cash anymore, meaning that automated teller machines (ATMs) are the main mode of making cash deposits and withdrawals in Sweden (Bautista-González, 2023; Visit Sweden, 2023). Unlike in the United States (US), the banks in Sweden do not run proprietary ATMs, but instead, and much like the case with BankID, the five largest banks jointly own an ATM company named *Bankomat* (Heller, 2016). Also, ATMs have limits on deposits and withdrawals, further complicating cash use. In Sweden, this cap is, as of 2024, generally placed at SEK15,000 (USD$1,389) per month for deposits and SEK15,000 (USD1,389) for withdrawals per week, which may only be made by a maximum of SEK5,000 (USD463) on each withdrawal occasion (i.e. one would need to make at least three withdrawals at SEK5,000 (USD463) in 1 week to reach the cap) (Mizzell, 2021). Also, ATMs will only accept banknotes, and not coins, and much like the case of the €500 banknote, the largest Swedish banknote, the SEK1,000 bill, is becoming increasingly rare (Jalkebro and Vlcek, 2023; Johansson, 2016). Making cash payments and transfers even more difficult is the fact that banks in Sweden will no longer cash cheques (Malm, 2020; KTH Royal Institute of Technology, 2024). This is a trend that even other countries are starting to implement, such as Lithuania, which has discontinued the possibility of cashing cheques as of 2020 (Bank of Lithuania, 2020). In addition, there has also been a decline in the number of banks in Sweden in recent years, from 173 in 2010 to 157 in 2022 (Shirota, 2023).

3. The Price of Going Cashless – The Swedish Example

Will going completely cashless save Sweden? The short answer is no. There are many complications with going fully cashless, as noted by Sveriges Riksbank (2018), which advises banks and credit institutions to continue offering cash. The main challenge is gaining customers' trust in digital payments, a global issue with varying progress (Madden et al., 2017; Xin, Techatassanasoontorn, and Tan, 2015). Children, for instance, would struggle without cash unless parental apps or pre-paid cards are used, although these solutions come with their own limitations (Chandra and Chowdhary, 2020; Earl, 2018; Gupta, Kapoor, and Yadav, 2020; Talib and Salman, 2022).

A cashless society also discriminates against those lacking technological means or skills (Larsson and Hatzigeorgiou, 2023). This prompted the 'cash rebellion' to support the continued use of cash (Kontantupproret, 2015). The shift to digital payments could also concentrate power in the hands of global private actors rather than with the individual (Eriksson and Sandhill, 2020).

Using BankID, essential for many digital payments in Sweden, requires a Swedish personal identity number and membership with a major Swedish bank (BankID, 2024c). This raises social inclusion issues and complicates customer due diligence requirements, affecting expatriates (Hellberg, 2023). Alternatives like Freja+ and AB Svenska Pass are less widespread (Agency for Digital Government, 2023).

The inability to cash cheques has also been known to cause 'catch-22' situations. This was particularly experienced by expatriates from the US receiving COVID-19 stimulus checks (Malm, 2020; Nilsson, 2020). Swedish banks suggested using international transfers, but the US Internal Revenue Service does not make deposits to non-US bank accounts and only issues cheques to non-US residents without a US bank account (1040 Abroad, 2022; Internal Revenue Service, 2023). In these cases, these individuals were often at the mercy of the goodwill of friends or family members in the US who would cash the cheques on their behalf (Nilsson, 2020).

The introduction of new banknotes and coins from 2015 to 2017 led many machines to go cashless rather than shouldering the cost of replacing the coin slots, limiting cash use further (Kjellström, 2017; Wimmerberg, 2019). Many companies have opted for pay-by-phone parking, resulting not only in a confusing plethora of different parking apps but also rendering it impossible to purchase a ticket should a person's phone run out of battery, break, or be misplaced (Lindgren, 2019; Norberg, Thyrén, and Isaksson, 2019).

The aforementioned examples serve as a few illustrations to highlight the absurdity of an unmitigated digital transformation of the payment system and its effects on an individual level. Moreover, an unmitigated digital transformation exposes society to significant risks. The 2021 ransomware-as-a-service operation 'REvil' highlighted the vulnerability of digital payment systems, forcing many businesses to shut down for lack of cash alternatives (Backman, 2023; Szücs, Arányi, and Dávid, 2021). The Swedish Civil Contingencies Agency (2018) and a study by Van Laere et al. (2021) recommended keeping cash at home for crises, emphasising that non-digital technology is the most robust. In this way, the Swedish example should serve as a cautionary tale of what perils to expect should one allow an unmitigated and unchecked digital transformation towards a totally cashless society (Larsson and Hatzigeorgiou, 2023).

4. Conclusion: Policy Recommendations

This chapter explores the digital economic revolution in Sweden and what lessons can be learnt whilst bringing the Swedish digital economy up to 2045 and beyond. The answer to the question as to whether Sweden will be totally cashless by 2045 is that it very well could be, at least in principle. However, is this development one that should be welcomed?

The answer is no. Technological advancements and additional payment options represent progress, and digital money has many benefits. However, the WOC aims to eliminate cash, not just provide digital options. Cash offers several advantages that digital currency cannot match. The Swedish example, where powerful actors have pushed the country towards an exclusively digital economy, should be seen as a cautionary tale, not a lodestar. The WOC has several issues. It deprives citizens of the convenience of cash, making simple tasks like paying for parking or cashing cheques difficult. It also threatens privacy, as all transactions can be traced and logged, and exposes society to the risks of unreliable digital systems. Governments must require banks and credit institutions to maintain an adequate cash supply and enact laws ensuring certain essential services accept cash for those who prefer it or when digital payments are not possible.

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Chapter 2
The Digital Economy in Germany

Oliver Falck and Nina Czernich

1. Introduction

Digitalisation is transforming the economy. It is driving innovation, entrepreneurship, new business models, and economic growth. It also has an impact on the labour market and places new demands on education and training. It is of central interest for Germany and every other economy how this will change productivity, employment, the competitiveness of companies and industries and the public sector, and how best to reap the benefits of digitalisation whilst ensuring the participation of all parts of society.

The basis of any digital economy is a physical communications infrastructure, i.e. (mobile) broadband networks. In Germany, coverage and bandwidth, and the alleged deficits in both, are regularly and hotly debated by the media and the public. Whilst there is room for improvement and the rollout is lagging in some areas, an important point is often overlooked in the debate: the lack of demand for very high-speed internet connections. Households and businesses often do not see the benefit of faster connections. Even where very high-speed internet is available, only a proportion of households and businesses subscribe to very high-speed connections. Network providers have no incentive to invest in infrastructure as long as demand for the fastest connections available today is significantly lower than supply. Therefore, this chapter does not discuss the quality of infrastructure for digitalisation but focuses on the digital economy, such as applications and business models, for which infrastructure is a prerequisite.

In this chapter, we take a closer look at four different aspects of digitalisation in Germany.[1] First, we give a brief overview of the size of the digital economy in Germany. Second, we take a closer look at the digital skills of the German population. Third, we describe Germans' attitudes towards new technologies and data protection. Fourth, we analyse the state of e-government in Germany. Wherever data availability allows, we place the status in an international context. Finally, we conclude with policy recommendations for the four areas and describe what lessons can be learned from the German digital economy for other countries.

[1] This chapter is partly based on Falck et al. (2021).

2. Size and Development of the Digital Economy – Room for Augmentation

The information and communication technology (ICT) sector is often used as a proxy for the digital economy. In Germany, ICT-related industries account for about 5% of total value added, with ICT services playing the leading role. In terms of employment, ICT-related industries account for about 3% of total employment. This puts Germany fairly close to where Organisation for Economic Co-operation and Development (OECD) countries are averaging. It is also noteworthy that the contribution of the ICT sector in Germany has remained relatively constant on average over the last 10 years, whilst in the United Kingdom and the United States, for example, it has increased quite strongly (OECD STAN Database in Falck et al., 2021).

Entrepreneurship is an important channel for the expansion of the ICT sector. New firms drive digital transformation as they often implement new business models based on new digital technologies. They also increase competition for incumbents, forcing them to rethink and digitise their business models. An active start-up sector is therefore crucial for Germany to expand the ICT sector and increase the competitiveness of companies.

According to Sternberg et al. (2023), the entrepreneurship rate in Germany increased by 2.2 percentage points between 2021 and 2022, reaching 9.1% in 2022, the highest level since 1999, the first year of the survey. However, compared to the group of high-income countries, Germany is still in the lower middle range. Further, the share of technology-oriented new companies was 3% in 2022, a decrease compared to 4% in 2021. This puts Germany at the bottom of the league in an international comparison with, e.g. France or the United Kingdom, which have about four times more technology and growth-oriented start-ups than Germany.

However, German firms are quite successful in the young market of digital platforms for business-to-business (B2B) (Pelino and Miller, 2019). Digital B2B platforms provide marketplaces or intelligent infrastructure for the exchange of data and information (e.g. from machines and devices). They enable the creation of added value through the interaction of their users, e.g., through transactions on marketplaces or through data-driven services that increase the efficiency of business processes, such as the use of machines or industrial Internet of Things (IoT) applications. B2B-platforms often originate from within the industry itself as a new line of business or as a spin-off of an incumbent firm (e.g. Telekom Data Intelligence Hub, Siemens MindSphere, Wucato Marketplace by Würth, SAP Asset Intelligence Network). It is exactly this industry expertise that is so important for the success of B2B platforms. Each industry has its own requirements for products and processes, resulting from regulations, norms, standards, and supply chain and demand characteristics. Specialised services focused on specific industries or functions are therefore essential for B2B platforms.

In contrast to B2C platforms such as Amazon, positive network effects and economies of scale do not play a dominant role for B2B platforms, and new platforms that offer better services than the incumbents can successfully enter the market. The current advantageous position of German B2B platforms is, therefore not a position on which industry and politics can rest. The focus must be on shaping the environment in Germany and Europe in such a way that the competitiveness of German industrial IoT platforms is maintained and promoted (Falck and Koenen, 2020).

3. Digital Literacy – Shortcomings in Advanced Digital Skills and Digital Skills of the Older Workforce

Digital literacy is a prerequisite for participating in the opportunities and possibilities of digitalisation in all areas of society and the economy. It includes basic skills that enable people, for example, to make bookings and purchases through platforms and online shops, to communicate by email, or to use MS Office programmes. In addition, more advanced digital skills, such as programming or developing and implementing digital business processes, are needed, at least for some parts of the population. Companies need to evolve their processes and business models, adapting them to the realities of digitalisation and offering new digital products and services. To do this, they need people with a sound knowledge of the latest digital technologies and the opportunities they offer. Only in this way they can remain successful in rapidly changing markets. Recent research has shown that a STEM-rich[2] workforce increases innovation, technology adoption, management, diffusion, and productivity within firms (Harrigan, Reshef, and Toubal, 2023).

To get a picture of the level of digital literacy of the German population compared to other Europeans, we explore the European survey on the use of ICT in households and by individuals.[3] The overall digital skills indicator is composed of five indicators: information and data literacy, communication and collaboration skills, digital content creation skills, safety skills, and problem-solving skills. The survey distinguishes between different levels of digital skills: individuals with limited, narrow, low, basic, or above basic digital skills. Compared to other European Union (EU) countries, Germany is in the middle and above average. However, this position is only achieved because of Germany's relatively 'good' rank in terms of limited to basic overall digital skills. In terms of above-average digital skills, Germany ranks third from the bottom, ahead only of Bulgaria and Romania.

[2] STEM is a term to group together the disciplines of science, technology, engineering, and mathematics.

[3] This survey is included in the 'Digital Economy and Society' database provided by Eurostat, the statistical office of the European Union.

What about the employment of ICT specialists in firms? The EU survey on ICT usage and e-commerce in enterprises includes an indicator of the share of enterprises employing ICT specialists. With a share of 22%, Germany is just above the EU average of 21% and lags behind the frontrunners by 12 percentage points. A more detailed analysis of the different industries reveals a heterogeneous picture. The German manufacturing sector, and in particular its flagship industries, machinery and automotive, have a higher share of enterprises employing ICT specialists (24%, 38%, and 41%, respectively) than the German economy as a whole and also rank amongst the leaders in the EU.[4] In contrast, the situation in the service sector is less positive. Across the various service sectors, Germany is in the middle to lower end of the field.

Overall, Germany cannot be satisfied with the level of digital literacy of its population and the level of ICT specialists in the economy. As a developed industrial country, Germany's prosperity is largely based on technological progress and innovation. The new growth theory (Aghion and Howitt, 1997) distinguishes between countries at the global technological frontier and countries behind it. The former, which includes the developed industrial countries like Germany, can only grow by generating innovations and thus advancing the global technological frontier. Most innovations today are related to digitalisation in one way or another. An above-average level of digital literacy amongst the population is therefore essential for success in international competition at the technological frontier.

What are the reasons for the relatively low level of digital literacy amongst the German population? Vocational education and training are important in Germany: more than half of the workforce has received vocational education. Comparing the digital skills of young professionals with different educational backgrounds reveals significant differences.[5] In Germany, young professionals who have completed vocational education have the lowest level of digital literacy, whilst university graduates have by far the highest. German university graduates can keep up with the international leaders: their average test score for digital skills is just below that of the leading country. However, young professionals in occupations typically perform after a vocational education lag far behind their international counterparts in the same occupation. This may be because, in other countries, digital skills are better taught during vocational education or because the education for those occupations takes place in universities (Hampf and Heimisch, 2018).

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[4] A study on the skills of employees in the German and global automotive industry (Czernich et al., 2021) shows that Germany is clearly ahead in terms of digital skills. Companies in the automotive industry acquire skills in the latest digital technologies mainly through new hires.

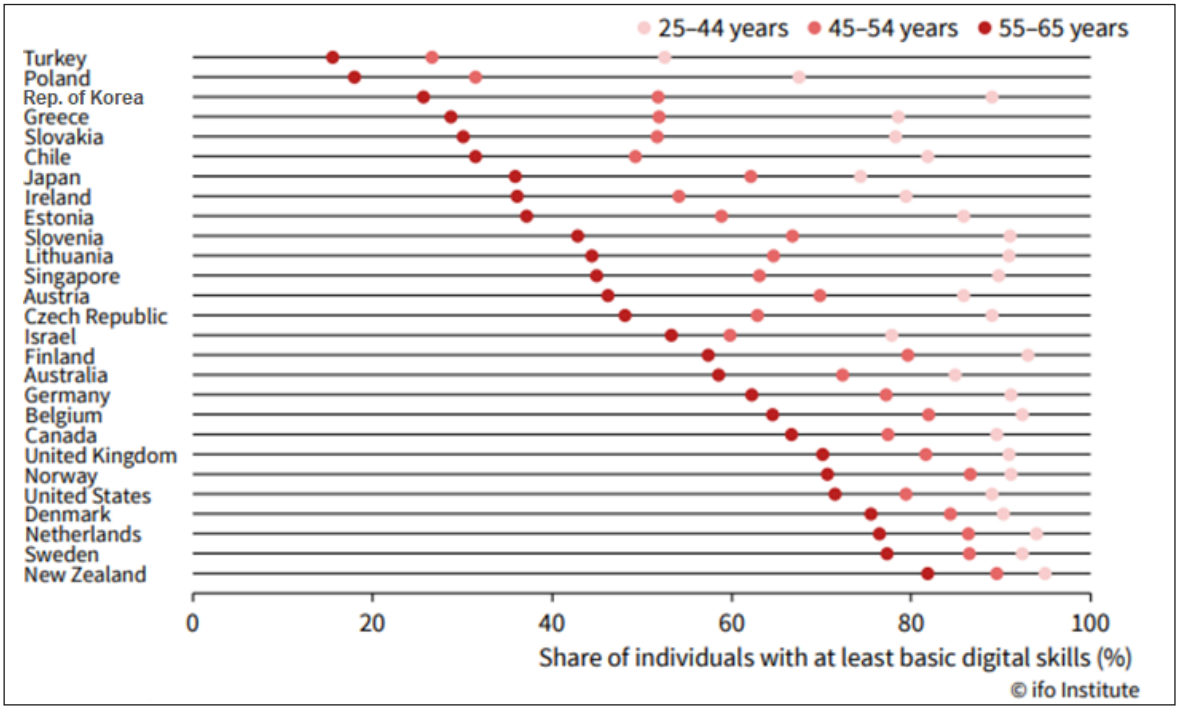
[5] The analysis is based on data from the Programme for the International Assessment of Adult Competencies (PIAAC) survey, which was carried out under the responsibility of the OECD in 2011 and 2012. Within PIAAC, different skills are tested, amongst them problem-solving in technology-rich environments, i.e. digital skills (https://www.oecd.org/skills/piaac/). The 2nd PIAAC survey was delayed due to the COVID-19 pandemic. Results are expected on 10 December 2024.

A recent study by Langer and Wiederhold (2023) took a close look at apprenticeship plans. In Germany, apprenticeships are codified in state-approved, nationally standardised apprenticeship plans. The authors identified more than 13,000 narrowly defined skills taught in apprenticeships, which they then grouped into broader categories. The average apprenticeship imparts 13.5 months of cognitive skills, 3.3 months of social skills, and 2.1 months of digital skills. The authors show that these skills lead to significantly higher wages over long-run horizons. However, returns to these skills vary: 16–20 years after apprenticeship completion, one additional month of learning a skill during apprenticeship is associated with 1.3% higher wages for cognitive skills, 1.5% for social skills, and 2.1% for digital skills. This relatively higher return to digital skills indicates that these skills are in demand in the labour market. In particular, the value of digital skills has risen sharply since 1990, indicating a greater importance of new technologies in the labour market.

However, digital skills are not only essential for young professionals. As computers and new technologies become increasingly important, older workers also need sound digital skills. In a rapidly changing technological world, a lack of digital skills limits older workers' opportunities in the labour market. With ageing societies and associated skilled labour shortages, it has become crucial to equip older workers with the skills they need to participate in the labour market.

Falck, Lindlacher, and Wiederhold (2022) also used PIAAC data[4] to analyse the digital skills of older workers. Figure 2.1 shows the distribution of basic digital skills by country and age group. There is a clear pattern across countries: The share of individuals with basic digital skills is always highest in the youngest group and lowest in the oldest group. The average digital skills gap between the youngest and oldest age groups is 35 percentage points, but countries differ considerably in the size of the digital skills gap. The countries with the lowest skills gaps succeed in equipping younger as well as older workers with basic digital skills (Denmark, Netherlands, Sweden, New Zealand). However, there is also a considerable number of countries where a high share of basic digital skills in the young group does not go hand in hand with a high share of basic digital skills amongst the older group. These countries include the Republic of Korea, Japan, Singapore, and several countries in Central and Eastern Europe.

Figure 2.1. Basic Digital Skills by Country and Age Group



Source: Programme for the International Assessment of Adult Competencies.

Falck, Lindlacher, and Wiederhold (2022) then look at the relationship between basic digital skills and the labour market success of older workers. They find a strong positive association between the share of individuals with basic digital skills in the group of older workers with employment prospects and with average wages. When investigating the channels of this finding, the authors suggest that occupation explains a large part of these returns. The higher share of older workers with basic digital skills is associated with higher levels of abstract tasks that older workers perform in their occupations. Thus, having basic digital skills seems to be a prerequisite for reaping the wage premia of abstract jobs. The good news is that digital skills can be acquired and improved at all ages. The basic digital skills of older workers are higher in countries with a higher share of older workers participating in job training.

4. Attitudes Towards Digitalisation and Use of Data – A Heterogeneous Picture

Digital skills are not only a prerequisite for labour market success but also for participation in society in general. Without digital skills and devices, it is increasingly difficult to take part in everyday life, such as buying tickets for events or transportation, communicating or looking at the menu in a restaurant. In addition to digital skills, the general readiness and openness of the population to new technologies and digital solutions is important. This section, therefore, provides an insight into the attitudes of citizens in Germany and the EU towards new technologies and digitalisation. The European Commission surveys public opinion in the EU with the Eurobarometer.[6] The survey regularly includes special questions, e.g. on citizens' attitudes to new technologies and digitalisation.

Overall, Germans see benefits from digital technologies. When it comes to the impact on the economy, Germans are more optimistic than Europeans overall. In 2017, 82% of Germans and 75% of EU citizens said that the latest digital technologies have a positive impact on the economy. The situation is different when it comes to the impact on the quality of life and society. Here, Germans are less optimistic than Europeans overall. However, more than 50% expect a positive impact in all categories (EC, 2017).

Data are becoming an increasingly valuable asset on which many business models are based. Public services can also be improved through better data access. However, Germans are reluctant to share their data to improve various public services, even if the data is anonymised. In this respect, Germans are close to the EU average; however, there is a wide range amongst the EU countries. The greatest willingness to share personal data is shown for the improvement of medical research: 44% of Germans indicated that they would share their data for this purpose – in the country with the highest share, Sweden, the proportion is almost twice as high at 82%. For the other purposes mentioned (disaster prevention, public transport, air pollution, energy efficiency), Germany is also closer to the most reluctant than to the most open countries. This also applies to the statement 'I would not share my personal data for any purpose', with which a good third of Germans agree. Citizens in Sweden, Denmark, and the Netherlands are most willing to share personal data to improve public services (EC, 2020).

Germany has set itself the goal of switching completely to renewable energy sources. With an increasing share of electricity from renewable sources, more decentralised electricity generation and rising electricity demand from electric cars and heat pumps, the energy transition can only work if the distribution networks are modernised and, in particular, digitised. Incentives to shift electricity consumption can only be created through load-based electricity prices. However, this means that all households need smart meters. The aforementioned scepticism amongst Germans about data sharing

[6] https://europa.eu/eurobarometer/screen/home (accessed 25 February 2024).

is also reflected in the low number of smart meters in Germany. Out of a total of more than 50 million metering points, only about 160,000 were equipped with smart meters in 2021. At the same time, in Denmark and Sweden, 100% of metering points were equipped with smart meters; in Estonia, Spain, Finland, Italy, Luxembourg, and Norway, the shares were at least 98% and in France, Lithuania, Latvia, Malta, the Netherlands, and Slovenia 80% (FFE, 2023).

It is noteworthy that the EU countries whose citizens are willing to share their data to improve public services also often rank amongst the top countries in terms of information and data literacy of their population. Information and data literacy are part of the overall digital skills measures mentioned above. They include articulating information needs, locating and retrieving digital data, information, and content, judging the source's relevance, and storing, managing, and organising digital data, information, and content. Germany is one of the countries with the lowest percentages. Again, this position is mainly due to relatively low scores for the above basic skills.

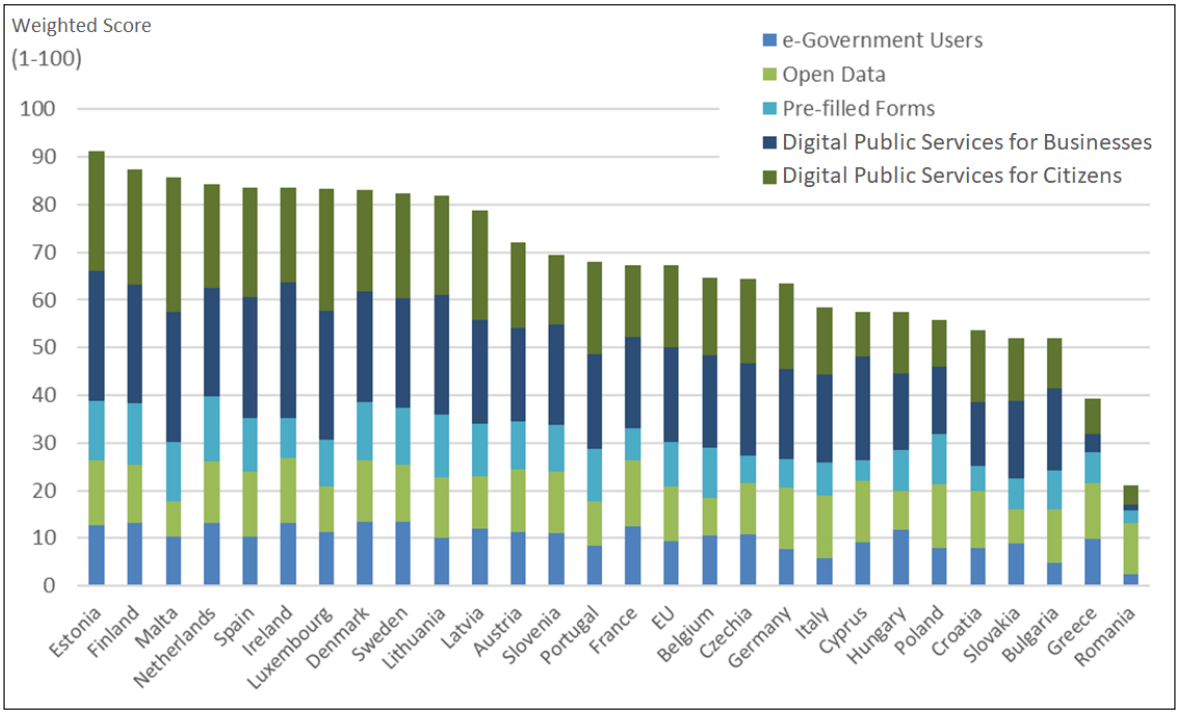
5. E-government – Scarcely Existing

A quick look at international aggregate indicators on e-government could lead one to believe that Germany is doing well. Unfortunately, this is not the case. The aggregate indicators often include sub-indicators that reflect more general characteristics of digitalisation, like communication infrastructure, human capital, or internet use. Looking only at sub-indicators that measure a country's e-government activities, a different picture emerges. In an international comparison, Germany is clearly below average in terms of e-government activities.

Figure 2.2 provides an overview of the status of e-government activities in the EU countries based on the European Commission's Digital Economy and Society Index (DESI) indicator for e-government.[7] This e-government indicator only includes sub-indicators directly related to e-government activities: e-government users, pre-filled forms, digital public services for citizens and businesses, and open data. Germany ranks 18th out of the 27 EU countries, below the EU average. It performs particularly badly in the sub-indicator of pre-filled forms (less than half the points of the leading countries). A prerequisite for providing pre-filled forms is linking data between different public authorities. Germany has created the legal basis for this in recent years, but implementation has been slow.

[7] Digital Economy and Society Index. https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi-2022/charts (accessed 25 February 2024).

Figure 2.2. E-government in European Union Countries, 2022



Source: European Commission Digital Economy and Society Index (accessed 25 February 2024).

In 2021, the German federal government passed a law to establish a citizen number that can be used across all public authorities, the 'citizen ID'. It aims to provide access for public authorities to data already held by other authorities. In this way, administrative procedures requiring personal data can be simplified and accelerated, e.g. identical information or documents do not have to be submitted repeatedly to different authorities. The transparent citizen, additional surveillance, and a data collection frenzy by state institutions. The project was also heavily criticised by the two opposition parties at the time, the Liberals and the Greens, who are now part of the ruling coalition. It is not surprising, therefore, that there has been little progress in implementing the citizen ID and creating interfaces for data exchange between public authorities.[8]

The citizen ID is often seen as an enabler for the Online Access Act, which came into force in 2017. The Online Access Act obliges the federal government, the federal states, and the municipalities to also provide their administrative services online via administrative portals by the end of 2022 at the latest. In addition, it was decided to establish a portal network in which the federal government and

[8] A similar project for companies is in the making. A single 'company account' shall enable contact and services between a company and all relevant public authorities. Similarly to the citizen ID, progress is slow.

the federal states would link their administrative portals to provide seamless access to electronic administrative services. A total of 575 services were identified under the Online Access Act, which were to be made available online by the end of 2022. In reality, a mere 105 had been implemented by the end of 2022.

The question is why is e-government progressing so slowly in Germany. One reason is certainly the aforementioned scepticism about data sharing amongst citizens and politicians alike. But this is not the only reason. Federal structures go hand in hand with limited decision-making powers, which prevent a uniform approach to digital transformation processes. The portal network is a very good and ambitious project, but the many different software solutions of the federal government and the 16 federal states make the linking cumbersome and slow. The potential for horizontal (across ministries) or vertical (across local authorities) collaboration often remains untapped. In particular, coordination and joint investment in software infrastructure could reduce costs and facilitate data exchange (Falck et al., 2021). Originally, the 'one for all' principle was adopted for this purpose. This means that individual states or municipalities take the lead in developing certain services and then make them available to all other authorities. However, a lack of digital capacity in terms of technology or human resources, wrong priorities, or simply a lack of interest on the part of the relevant authorities continues to act as stumbling blocks to the implementation of the one for all principle. Even where solutions have been developed, they are often not adopted by other municipalities (Röhl, 2023).

6. Conclusion and Policy Recommendations

The previous sections have provided a brief overview of several aspects of the digital economy in Germany. In this section, we summarise the findings and explain where we see a need for action and which measures policymakers should implement. Further, we describe what lessons other countries could draw from the development of the digital economy in Germany.

6.1. ICT Sector and Entrepreneurship

In terms of total value added and employment, the contribution of the German ICT sector is fairly close to the OECD average. However, it has remained relatively constant on average over the last 10 years. To increase this contribution, Germany needs to foster innovative new companies, but currently, **the entrepreneurship rate of technology-oriented new companies is relatively low**. As a result, Germany does not make sufficient use of the benefits that young firms bring to innovation, productivity, and competition.

Policymakers should **focus on building on existing strengths** by improving the framework conditions for existing successful business models in Germany, such as B2B platforms. Policymakers should not single out specific business models or industries but should create a regulatory framework that is conducive to entrepreneurship.

To increase start-up activity in the long term, it is necessary to **create a start-up mentality**. The latest Global Entrepreneurship Monitor expert survey indicates that **entrepreneurial education in schools** in Germany is poor (GEM, 2023). This is an important starting point. In addition, framework conditions need to be improved; in particular, bureaucracy and regulation of start-ups have to be reduced. **Reducing bureaucracy** can, in turn, be driven by the **digitalisation of public services**. Another important lever is better access to **venture capital,** especially for the growth phase.

6.2. Digital Literacy

Digital literacy of the workforce is crucial for the implementation of digitalisation. Whilst Germany performs quite well in terms of basic digital skills; it lags behind leading countries in terms of **advanced digital skills**. Upskilling of the workforce is essential to prevent a rift and to enable everyone to benefit from the positive effects of digitalisation.

The majority of the German labour force has received vocational education. Unfortunately, the **time devoted to digital skills in apprenticeship curricula** is rather short. On average, only 2 out of 36 months of an apprenticeship are dedicated to digital skills, including both basic computer skills and more advanced skills such as data analysis. As digital skills are in high demand in the labour market, they should be given **more importance** in the curricula for vocational and secondary education. Moreover, the process of **updating and adapting apprenticeship curricula** to the latest technological developments currently takes several years. Given the current pace of technological progress, this needs to be accelerated.

Digital skills are not only essential for young professionals. Older workers with digital skills have substantially better employment chances and earn higher wages. **Equipping older workers with digital skills** is, therefore, key to enhancing their opportunities in the labour market. On average, older groups of the workforce have lower digital skills than younger ones. But the good news is that digital skills can be acquired and improved at all ages. Training and lifelong learning opportunities should thus be promoted in a rapidly changing technological world, especially for older age groups.

6.3. Data Protection

Germans are concerned about their personal data and are less willing to share data than most other Europeans. However, through the use of data, for example, to optimise production and administrative processes or for new business models, digitalisation creates growth potential. However, there are not only economic **benefits from data sharing**. A less restrictive data protection regime could improve medical research, public transport, energy efficiency, and the energy transition to renewable energy to name but a few. Therefore, when deciding how restrictive data protection should be, the opportunities costs should also be considered.

The General EU Data Protection Regulation is often cited as the reason for the restrictive data protection regime in Germany. However, all EU countries operate under this regulation, and other countries are less restrictive when it comes to personal data. Indeed, the regulation states that the right to the protection of personal data must be considered in relation to its function in society and be balanced against other fundamental rights in accordance with the principle of proportionality.[9] So far, Germany has placed a very high value on the protection of personal data compared to other rights and goods. Germany needs **a public debate on the potential benefits of data sharing** and what a **balanced data protection regime** could look like.

Positive experiences are needed to build trust and reduce scepticism and fear about sharing of personal data. The **government has a key role to play** here. It should provide secure and user-friendly e-government tools and services that demonstrate the potential benefits of sharing and linking data.

6.4. E-government

In recent years, Germany has created a legal basis for **data linkages between different public authorities** to push e-government forward. Nevertheless, progress is slow. Besides the German scepticism regarding data sharing, another obstacle is the lack of decision-making competencies in the federal structures. To accelerate the transition to a modern digital administration, **clear decision-making competencies** and the **power to enforce decisions** must be established, the **'one-for-all' principle** has to be implemented, and a **binding timeline** is needed. By providing a fast and efficient bureaucracy for companies and start-ups and by making public data available in a timely and easy manner, the government can promote entrepreneurship and innovation.

[9] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0679 (accessed 25 February 2024).

6.5. Lessons for Other Countries

What can other countries learn from Germany's experience of their digital economy?

In promoting the digital economy, policymakers should **not focus too narrowly on infrastructure rollout** but also take-up. Individuals and businesses will subscribe to high-speed connections if they see a benefit, e.g. in enabling the implementation of new digital business models or the use of new applications.

Many new business models are based on data; therefore, data protection and regulation should not be too restrictive but **balance data protection and data sharing**.

Citizens will only feel confident and secure in the digital world if they know what they are doing and understand the consequences and implications of their online activities. Thus, it is important to equip all citizens with **adequate digital skills**. Positive examples are needed to build trust in online services. The public sector has an important role to play in **secure and user-friendly e-government services** that build trust and demonstrate the use of online services.

To develop the digital economy, it is not sensible to simply follow suit and copy existing scalable business models. Rather than pushing for specific business models, e.g. creating another Amazon, **policymakers should create an entrepreneurial ecosystem and framework** that **allows companies to develop business models based on the specific characteristics and endowments** of a region or industry.

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Chapter 3
The Digital Economy in the Republic of Korea

Jae-Yun Ho

1. Introduction

Digital transformation (DX) and digital economy (DE) are two pivotal concepts that encapsulate the profound societal and economic changes driven by the extensive application of digital technologies. Leveraging technologies such as the Internet of Things (IoT), artificial intelligence (AI), cloud computing, and big data; they change the way we interact, work, and conduct business in today's digital age.

DX represents the innovative application of these digital technologies to revamp traditional societal and economic models. In a business context, DX leverages digital technologies to not only revolutionise operational methods and services (KIAT, 2022) but also transform business models and set new directions for the industry (IBM, 2011). Further, the Organisation for Economic Co-operation and Development (2019) extends this concept to include the diffusion of business models facilitated by digital technologies, culminating in productivity enhancements.

The rise of the term DE aligns with corporate DX efforts aimed at profit, signifying a shift in economic practices (KDI, 2021). Initially referred to 'e-commerce economy', where the trade of goods and services occurs via the internet, the concept of the DE is extended to the entire set of economic activities based on digital technologies, incorporating various business models and industries (KDI, 2020). The DE now refers to not only a wide variety of digital products and services (e.g. information and communication technology (ICT) and network devices, software and content, search platforms, social network sites, and over-the-top media services) but also digitalisation of business and economic activities induced by digital technologies (KDI, 2020). This shift is expected to bring many substantial changes to our social and economic landscapes, as discussed in the following section.

Since the novel coronavirus disease (COVID-19) pandemic, DX and the DE have rapidly transformed the Republic of Korea's societal and economic realms. The pandemic propelled a digital-centric shift, embedding digital technology into everyday innovations, from remote work to daily life activities. Technologies such as XR/VR and Digital Twin amplify the burgeoning metaverse, illustrated by events including Travis Scott's Fortnite concert and Blackpink's Zepeto fan meet, drawing global audiences in the millions. However, this goes beyond pure entertainment as in this digitally-driven landscape, companies deeply rooted in the digital sphere gain an international advantage. The blending of digital technologies has led platform companies to reshape traditional business lines, forming powerful economic and industry ecosystems (NIA, 2022c).

Looking forward, there are predictions suggesting digital platforms could govern 50%–80% of all societal systems by 2035 (NIA, 2022d). This digital metamorphosis can address economic and societal concerns by driving technological growth, optimising labour, and maximising individual potential. Moreover, it can counter societal issues, particularly environmental threats, crimes, and rising social costs, with predictive services (NIA, 2022c). However, the post-COVID-19 DX and social change highlight the dual-faced nature of this digital shift, presenting both opportunities and risks (NIA, 2022b).

Whilst digitalisation was once an optional trajectory, DX has become a vital trend for societal adaptation in the post-pandemic era. As the Republic of Korea continues to seize these opportunities and tackle associated challenges, it fortifies its position as a key player in the global DE.

2. Current Status of the Digital Economy and Digital Transformation in the Republic of Korea

The Republic of Korea stands at the forefront of DX, consistently pushing the boundaries of technological innovation and adaptation. This section delves into the nation's current standing in DE and DX, evaluating its digital competitiveness, digital governance initiatives, and the preparedness of domestic economic and social actors for digital change. Through a comprehensive lens, the strengths, challenges, and potential of the Republic of Korea's digital landscape are explored.

2.1. Digital Competitiveness

According to the International Institute for Management Development (IMD, 2021), the Republic of Korea's digital competitiveness ranked 12th (out of 64 countries) in 2021, which is an indication of its forward-looking approach to DX. This evaluation considers three primary dimensions: knowledge, technology, and future preparedness, each comprising several subfactors (see Table 3.1 for details).

Table 3.1. The Republic of Korea's Digital Competitiveness Performance

Overall Ranking	Ranking for Individual Factors	Ranking for Individual Subfactors		
12	15 (knowledge)	26 (talent)	16 (training and education)	3 (scientific concentration)
	13 (technology)	23 (regulatory framework)	16 (capital)	7 (technological framework)
	5 (future readiness)	2 (adaptive attitudes)	5 (business agility)	16 (IT integration)

Source: Adapted by the author from IMD (2021).

In the knowledge category, which encompasses talent, training and education, and scientific concentration, the Republic of Korea has a varied performance. The nation excels in scientific concentration, reflecting the country's strong emphasis on and successful integration of science in its digital initiatives. This is also evident in the country's superior patent activities at the global level, demonstrating the nation's potential for digital transition (NIA, 2022b). However, the country ranks low in the talent and training and education subfactors, suggesting there is room for improvement in developing and attracting digital talents (IMD, 2021).

The Republic of Korea presents a mixed picture in the technology category comprising the regulatory framework, capital, and the technological framework. The country ranks high in the technological framework, showing a strong technological infrastructure conducive to digital innovation. However, the regulatory framework for DX is placed low, suggesting a need for further enhancements in policy and regulations to facilitate DX (IMD, 2021).

Finally, the Republic of Korea stands strong in the future readiness category, which includes adaptive attitudes, business agility, and information technology (IT) integration. The country ranks 2nd in adaptive attitudes, reflecting the high level of societal openness to technology-driven changes, and 5th in business agility, suggesting that businesses are capable of quickly adapting to changes in the digital environment. However, IT integration ranks lower at 16th, implying a need for greater integration of IT into businesses and services to enhance digital competitiveness (IMD, 2021).

2.2. Digital Governance

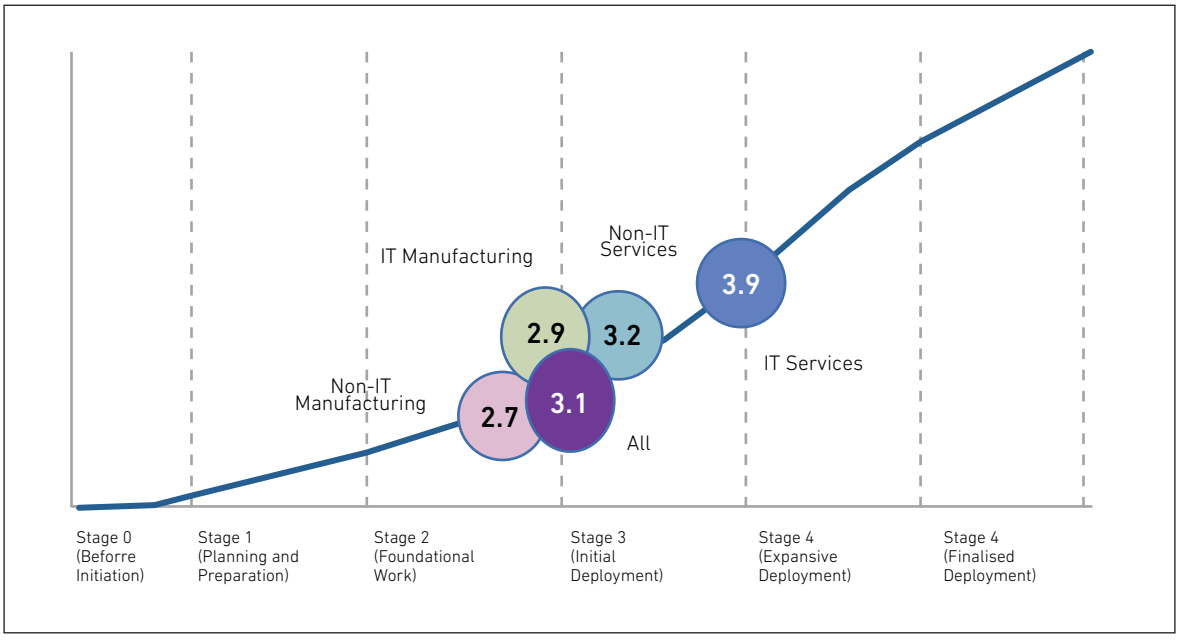
The Republic of Korea is also a global leader in digital governance, consistently earning high marks in the United Nations' e-government survey, underscoring its commitment to digital innovation in governance (UN, 2018, 2020). The nation excels in online government services, as reflected in its world-leading position for the delivery of digital public services, based on the evaluation of national government websites (UN, 2020). This achievement indicates an effective, user-centric approach, enhancing transparency and accountability. Furthermore, the country ranks 4th globally for its telecommunications infrastructure, backed by extensive broadband and ultra-fast internet (UN, 2020). The combination of advanced online services and top-notch telecommunications infrastructure underpins the success of the Republic of Korea's digital governance, setting a benchmark for many other countries. Yet, according to statistics from the OECD (2021), the Republic of Korea ranked 12th (out of 30) in the proactiveness dimension, which assesses the ability to anticipate citizen needs and deliver services quickly. This signifies that there is room for improvement, and the country's ongoing efforts to advance in this area will further solidify its position as a global leader in digital governance.

2.3. Industry Readiness for Digital Transformation

In terms of the Republic of Korea's industry readiness for DX, it varies between small and medium-sized enterprises (SMEs) and larger enterprises. A 2021 study by the Ministry of Trade, Industry and Energy revealed that whilst 93.1% of medium-sized enterprises acknowledged the importance of DX, just 19.5% had begun such initiatives. In contrast, larger corporations exhibited a more favourable digital transition rate at 48.9% compared to SMEs at 29.9% (KIAT, 2022).

As shown in Figure 3.1, a survey conducted by the Korea Institute for Advancement of Technology in 2021 showed that, on average, domestic companies were at the Initial Deployment (Level 3) phase of DX. Notably, IT services are near the Expansive Deployment (Level 4) phase with a score of 3.9 out of 5, implying that industries intertwined with digital technologies adapt faster to DX. However, the manufacturing sector trailed due to the substantial costs and intricacies of digitising manufacturing infrastructure and processes (KIAT, 2022).

Figure 3.1. Digital Transformation Readiness of Key Industries in the Republic of Korea



IT = information technology.

Source: Adapted from KIAT (2022).

In assessing digital readiness facets – planning, infrastructure, technology, and organisational culture – all sectors fell below the average score of 3 points. Planning, encompassing roadmaps and DX strategies, scored the lowest at 2.7 points, pointing to a strategic planning deficit. Infrastructure, particularly concerning DX personnel, fared better at 3.6 points, but ownership of specific DX units was lacking at 2.5 points. Overall, companies displayed a modest grasp of digital technology yet lagged in organisational culture adaptation, suggesting a need for a deeper cultural shift towards DX (KIAT, 2022).

2.4. Citizen Readiness for Digital Transformation

The Republic of Korea's swift post-COVID-19 move towards digitalisation has intensified the existing digital divides, especially amongst vulnerable groups such as the elderly, the disabled, farmers, fishers, and low-income individuals. This illuminates the Republic of Korea's unpreparedness of DX amongst certain demographics and their struggle to adapt and benefit from the digital revolution, which is a critical challenge that needs addressing to ensure an inclusive DE and DX (NIA, 2022b).

Despite the broader population's adoption and utilisation of online economic activities such as shopping, banking, and the use of new technologies, including 5G and wearable devices, these trends have not extended evenly to all societal segments. According to the 2021 Digital Information Gap Survey, using the digital literacy of the general population as a benchmark at 100, vulnerable segments only score 75.4% (NIA, 2021). Although they possess considerable digital access (94.4%), there is a concerning decline in their utilisation (77.6%) and capability (63.8%). Specifically, the elderly's digital literacy stands at just 69.1% (NIA, 2022b). Similarly, whilst non-face-to-face interactions, pivotal for DE expansion, have surged by 50.5% for the general populace, they remain at approximately 20% for these marginalised groups (NIA, 2022b). Hence, for the Republic of Korea to truly harness its DE potential and preserve its global image, the emphasis must be on creating an inclusive DE and DX, particularly focusing on SMEs' productivity and bridging the digital gap amongst vulnerable groups.

3. Efforts and Progress at the Policy Level

The Republic of Korea's rise as a digital powerhouse has been anchored by visionary policy decisions since the 1980s. Charting its proactive approach to the digital era, this section highlights key policy milestones and strategic endeavours that have positioned the nation at the forefront of global digital innovation and transformation.

3.1. Early Policy Efforts

Recognising the promise and potential of the information era, the Republic of Korea initiated a series of policy efforts beginning in the 1980s. Notably, the 1980s saw the groundwork for DX with the National Basic Computing Network project, laying the foundations for the country's leap into the information age. As the 1990s dawned, the Republic of Korea's response to the global IT wave became evident. The establishment of the Ministry of Information and Communication in 1994 and the comprehensive Cyber Korea 21 strategy unveiled in 1999 signalled the country's commitment to becoming an internet powerhouse. These earlier policy endeavours underscore the nation's vision, paving the way for subsequent digital economic strategies and frameworks in the context of the 4th Industrial Revolution and digital transition (KDI, 2020).

In response to the 4th Industrial Revolution, characterised by significant intelligent technology advancements, the Republic of Korea introduced the I-KOREA 4.0 plan in 2017 (NIA, 2022b). This strategy aimed to foster innovation-led growth using intelligent technologies to address socioeconomic challenges. By 2018, the 6th National Informatization Basic Plan was rolled out, highlighting the country's vision in the digital sphere. In 2019, a national AI strategy was crafted, spotlighting AI's potential in industry and societal problem-solving. A pivotal change in 2021 was the transition from the Act on Informatization to the Act on Intelligent Informatization, forming a blueprint for innovations in super connectivity and intelligence towards an intelligent information society (NIA, 2022b). These policy initiatives underscore the Republic of Korea's dedication to the digital epoch, paving the way for its future DX strategies amidst global challenges such as the COVID-19 pandemic (NIA, 2022b).

3.2. Recent Policy Efforts Towards Digital Transformation

Efforts and progress at the policy level have been substantial, reflecting the forward-thinking attitude of authorities towards DX. One such noteworthy achievement is the declaration of the New York Initiative on 21 September 2022. In a keynote speech delivered at the Digital Vision Forum, hosted by New York University, President Yoon Seok Yoel announced the Republic of Korea's vision for DX to the world. This vision emphasised the role of the Republic of Korea as a global model in the digital age and highlighted its commitment to continue striving for a responsible role in the international community (NIA, 2022a).

On 28 September 2022, following the New York Vision declaration, the Republic of Korea unveiled its Digital Strategy (summarised in Table 3.2). This roadmap recognises digital technology's capacity to tackle domestic and global challenges, including low growth, polarisation, and the COVID-19 pandemic. It aspires to transform the country into a top-tier digital powerhouse by setting out five strategic goals and 19 tasks. Central to the strategy is the drive for rapid innovation, world-leading digital capabilities, and a private sector-led digital innovation culture, all aiming for a holistic DE and society (NIA, 2022a).

In tandem with these endeavours, on 22 September 2022, the Republic of Korea further demonstrated its commitment by establishing the Digital Platform Government Committee (DPGC). Created in response to the needs of the Intelligent Information Society, the DPGC consists of 23 members from civil and government representatives and is split into six specialised subcommittees: AI and data, infrastructure, services, work style innovation, industry ecosystem, and information protection. Central to its operation are the principles of data and platform, signalling the government's intent to foster collaboration and innovation (NIA, 2022a).

Table 3.2. Strategies and Tasks Identified in the Republic of Korea's Digital Strategy

Strategies	Tasks
I. World-leading Digital capabilities	• Secure the six DX technologies to counter tech hegemony • Ensure sufficient digital resources • Build a faster, more secure network • Achieving a digital talent wealth by training 1 million people • Fostering a digital platform industry that crosses boundaries • Enabling K-digital to drive global markets
II. Expanding DE	• Make hospitality business more competitive • Advancing to the future of manufacturing • New growth engines for agriculture, livestock, and fisheries
III. An Inclusive Digital Society	• Creating safer, more comfortable places to live • Digital coverage for all citizens • Digitally reimagining communities
IV. Digital Platform Government Together	• Implementing innovation infrastructure and promoting full openness and utilisation of data • Transforming the way government works with AI and data technologies • Ensuring a safe and reliable experience
V. Innovative Digital Culture	• Establish a culture of civilian-led DX • Regulations to avoid stifling innovation and conflict resolution • Establish basic laws for the DE and society • Going global with DX

DE = digital economy, DX = digital transformation.

Source: Adapted by the author from NIA (2022a).

Nevertheless, the DPGC's principal objective goes beyond just collaboration; it seeks a transformation in public services through a holistic digital platform integrating data from various governmental entities. This consolidated methodology aspires to provide streamlined, anticipatory, and customised services to citizens. Amongst its offerings are the MyAI portal tailored for personalised welfare needs and the 'one-site total service' consolidating various administrative functions. Given its pivotal role, three key ministries – the Ministry of Science and ICT, the Ministry of the Interior and Safety, and the Personal Information Protection Commission –supervise the DPGC's operations, signalling the regime's unwavering commitment to a unified and digital-first governance model (NIA, 2022a).

3.3. Policy Efforts at Ministry Level

Various ministries in the Republic of Korea have also implemented strategies to reinforce digital competitiveness. In July 2020, the Ministry of SMEs and Startups prioritised AI, initiating smart factories and leveraging the consequential data. Similarly, the Ministry of Trade, Industry, and Energy unveiled a strategy in August 2020, targeting 17 tasks to amplify the digital capability of industries through its Industry DX Series, which emphasises support policies and significant research and development ventures. Moreover, the Ministry of Employment and Labor has been pivotal in introducing programmes such as K-Digital Credit and K-Digital Training. These initiatives, especially the K-Digital Platform, have been instrumental in fostering digital acumen amongst SME employees, offering them tailored training and access to shared resources. Such concerted efforts across the ministries underscore the Republic of Korea's commitment to advancing its digital infrastructure and education, laying the foundation for a digitally advanced future (KDI, 2021).

Policy efforts across multiple ministries are also evident, as shown in the Comprehensive Plan for Nurturing Digital Talent launched in August 2022. This initiative primarily aims to cultivate digital expertise across all educational levels and targets the development of 1 million talents in areas particularly in AI, software, and cybersecurity by 2026. Two main objectives underpin this plan: first, the enhancement of digital professionals through measures such as the establishment of new departments and expansion of digital universities, and second, the transition to an all-encompassing digital education system, ensuring equitable digital knowledge access for all. Furthermore, to streamline these efforts, the Digital Talent Alliance, an extensive collaboration of 257 organisations, was inaugurated in October 2022, serving as a platform for strategic discussions on nurturing digital talent (NIA, 2022a). As a result, the Ministry of Education collaborates with not only conventional partners (e.g. local governments and local communities of teachers) but also other stakeholders (e.g. the Ministry of Science and ICT, the Ministry of Trade, Industry, and Energy, the Ministry of the Interior and Safety, and academia), to facilitate the transition towards digital-based educational systems, including the development of AI digital textbooks, training and education of digital skills for teachers, and the development of digital infrastructure (MOE, 2023).

3.4. ICT Regulatory Sandbox to Confront Regulatory Lag

In the contemporary digital landscape, where technological advancements consistently outpace established regulatory frameworks, the Republic of Korea grapples with the challenge of 'regulatory lag,' especially pronounced in convergence industries with digital technologies (KDI, 2021). There is thus a pressing need to recalibrate the nation's regulatory blueprint. The prevailing regulatory mechanism, rooted in the Industrial Convergence Promotion Act, follows a pre-emptive approval strategy, subsequently trailed by regulation. However, this methodology is clouded with ambiguities that can impede technological progression (KDI, 2021).

To address these issues of regulatory lag, the government has implemented the ICT Regulatory Sandbox. This is a pioneering initiative managed by the Ministry of Science and ICT and the National IT Industry Promotion Agency. It serves as a controlled environment where emerging technologies and services can be tested without the usual regulatory constraints. By granting temporary permissions for a specified period, innovators can experiment and refine their offerings, ensuring they meet safety and efficiency standards before a full-scale launch. The sandbox provides expedited reviews, temporary permits, and experimental regulation exemptions to test innovative new technologies and services for a limited time. Since its implementation in 2018, the sandbox has enabled market pilots of diverse, innovative services ranging from IoT-based electrical outlets to mobile drivers' licenses. By providing legal certainty and opportunities to demonstrate safety, this controlled regulatory environment facilitates the development and integration of innovative products and business models which may be prohibited under current regulations (MSIT and NIPA, 2021).

However, the pace of government processes can still prove limiting, especially when juxtaposed against the rapid advances in digital technologies. An emerging perspective proposes leveraging the agility of the private sector through an independent convergence certification system. By shifting towards private sector certifications, the Republic of Korea could harmonise the swift adaptability of the private sector with the state's strong emphasis on safety. Such a collaborative model would be particularly beneficial for high-risk products, ensuring that they meet both safety and innovation standards (KDI, 2021).

4. Remaining Issues and Challenges for a Successful Digital Economy and Digital Transformation

As the Republic of Korea continues to establish itself as a global leader in the DE and DX, the nation faces pressing challenges that must be addressed. This chapter examines key issues that are critical for the successful digital future, spanning technological, ethical, labour-related, democratic, and privacy dimensions. By spotlighting these multidimensional challenges, this chapter sets the stage for insightful discourse on establishing policies and frameworks for an inclusive, ethical, and thriving digital country.

4.1. Digital Transformation and the Emerging Divide

As discussed before, the Republic of Korea faces two distinct challenges regarding the digital divide. Within the business realm, there is a pronounced disparity in the digital readiness of SMEs and mid-sized companies. According to KIAT (2022), only 25.5% of these entities are prepared for DX, and this number reduces to 19.5% for the smaller establishments. These figures underscore several barriers, including a deficit in digital expertise, a nascent understanding of DX, and an absence of strategic direction. Whilst the significance of networking, fostering internal innovations, and cross-industry collaboration is increasingly recognised, the requisite policy support remains elusive. Alarmingly, only 7.5% of companies have tapped into this support, mainly in the financial, technological, and workforce training domains (KIAT, 2022). Feedback from these SMEs accentuates an urgent call for more lucid DX-oriented guidance, amplified financial backing, environments that invigorate market dynamics, and dedicated digital proficiency training programs.

The societal context reveals another pressing concern: the deepening digital divide amongst individuals. As highlighted by NIA (2022b), marginalised groups, especially the elderly, grapple with accessing and manoeuvring digital tools. This discrepancy risks sidelining these communities from the multifaceted advantages of the digital epoch. And with the ascension of AI-centric digitalisation, this chasm could further intensify. The swift evolution of digital technology, supplemented by novel technological breakthroughs, can compound this isolation. Whilst past policy initiatives aiming to bridge this digital gap have garnered accolades, leveraging these successes to blueprint future strategies is imperative (NIA, 2022b). The vision should be clear: an inclusive digital metamorphosis where every individual and enterprise, irrespective of their origins or scale, can seamlessly transition into the AI-infused digital frontier.

4.2. Labour Issues

The shifting labour dynamics also pose challenges to the Republic of Korea's DX journey. A notable study by the World Economic Forum in 2018 offers a profound perspective into the evolving global labour landscape. This report unveiled a 71:29 ratio of human to machine labour in 2018, but a proportion projected to shift towards 3:7 by 2030 and a potential 1:9 split by 2040 (WEF, 2018).

Such projections raise compelling questions about the quantity of jobs available for humans. As DX gains momentum and AI expands its influence, there is a tangible risk of diminishing human roles. Whilst reduced human labour might appear advantageous at a glance, the intrinsic fulfilment and societal benefits derived from work cannot be neglected. Therefore, as AI ascends in its significance, identifying and nurturing roles that align with human capabilities and potential become paramount (NIA, 2022b).

4.3. Ethical Issues from the Coexistence of Humans and Robots

With the changing landscape of labour, challenges arise regarding societal norms. Traditionally, our legal and ethical systems emphasised human accountability. However, in the digital era, with the rise of AI and robotics, accountability lines are blurring. Whilst once centred on individual agency, the responsibility now extends to technology creators. This raises pressing questions, such as 'should robots with human-like cognition and emotions have rights?' and 'when AI-driven entities make impactful decisions, who is accountable?' relying solely on human owners for responsibility is becoming outdated. As the Republic of Korea rapidly advances technologically, it is imperative to adapt not only technologically but also ethically and legally. A legal system balancing personal freedoms with technological growth is needed. Through foresight and adaptability, the Republic of Korea can foster a harmonious coexistence between humans and robots, ensuring mutual advancement (NIA, 2022b).

4.4. A Democratic Digital Economy

As the digital domain continues to expand, the unchecked power of tech giants is prompting global calls for transparent and democratic management of digital resources, highlighting the urgency for protective measures against monopolistic behaviours to ensure a competitive market and uphold digital democracy.

Democratising the entire process of production, utilisation, distribution, and allocation of digital resources, including data and information, has become imperative. It is not just about adhering to economic norms but also fostering a sharing economy that aligns with these democratic principles. Recent legal actions against digital behemoths like Google and Facebook in regions like the United States, the United Kingdom, and the European Union emphasise the growing concerns over their monopolisation of data and potential unfair trade practices (KDI, 2020). Their staggering economic influence and societal reach present significant challenges to maintaining a level playing field in the digital arena, a sentiment mirrored by global governmental responses.

The Republic of Korea's imposition of a KRW6.7 billion fine on Facebook, enforced by the Personal Information Protection Commission, is indicative of this broader movement. However, there remains a discernible gap in understanding the depth of these tech giants' revenue streams and operational activities within the Republic of Korea. Equally concerning is the nation's currently insufficient legal framework that falls short of adequately safeguarding its data sovereignty and the privacy of its citizens (KDI, 2020).

In advancing the democratisation of the DE, proactive steps from both the citizenry and the government are essential. The monopolistic behaviours and dominance of domestic and foreign platform companies, digital companies, and data companies can no longer be ignored. It is imperative that our government establish robust antimonopoly regulations and lead the way in global antimonopoly governance (KDI, 2020).

4.5. Privacy in the Digital Age

In today's digital age, vast amounts of information and data on private individuals are exposed to service providers. This has led to escalating concerns about the use and potential misuse of personal data. As the Republic of Korea embarks on its DX, the challenge of safeguarding individual privacy whilst promoting innovation becomes paramount. One of the pivotal strategies adopted to address this challenge is 'pseudonymisation'.

Pseudonymisation is the process of replacing private identifiers with fabricated ones, ensuring data subject privacy. Whilst this approach aims to strike a balance, permitting broader data use whilst substantially reducing privacy violation risks, it also presents a dilemma: although pseudonymised information provides a more accessible pathway to harness data, it simultaneously poses re-identification threats, potentially jeopardising individual privacy. In January 2020, the Republic of Korea took significant steps in data utilisation by amending the Personal Information Protection Act and the Credit Information Act. A key enhancement was the augmented potential for using data, yet the acts introduced an obligation to discard pseudonymised data (KDI, 2021).

Rather than focusing solely on data disposal, it is vital to fortify technical safeguards, ensuring pseudonymised data remains untraceable. Given that limited institutions can merge this data, measures against internal leaks are essential for security. A comprehensive regulatory approach is needed, integrating pseudonymisation, countermeasures against re-identification, and data disposal during redundancy. As technology evolves, enhancing safety mechanisms and ensuring only authorised entities handle pseudonymised data is paramount for robust protection.

4.6. Cybersecurity

Cybersecurity remains a pivotal concern in the journey towards a successful DE and DX, as the importance of securing digital technologies and bridging the technology gap cannot be overstated. The government has thus identified strengthening the national cybersecurity response as a top priority in its digital strategy (NIA, 2022a).

The rapid pace of DX has brought about a surge in services reliant on user data. However, efforts to safeguard this data have not kept pace, particularly evident in emerging environments like smart homes, where the demand for services is rising. Whilst the Republic of Korea has taken steps to address this, such as the establishment of security standards like the Korea Internet & Security Agency's Home and Appliance IoT Security Guide, there is a pressing need for a more comprehensive and systematic institutionalisation to address the challenges. Smart homes, which include appliances and electronics with physical security measures, present a unique challenge. Any compromise in their security could lead to severe consequences, including privacy breaches, fires, and thefts. Thus, proactive support projects, encompassing research and development and system improvements, are essential to strike a balance between data security and service provision in such environments (KIET, 2021).

Moreover, a significant portion of the country's SMEs appear underprepared in the cybersecurity domain. Over half of these enterprises have reported inadequate security systems, emphasising the urgency for more robust measures (KIAT, 2022). Addressing these gaps is essential to foster a DE that ensures prosperity without compromising the safety and privacy of its populace.

5. Conclusion

This chapter provides a comprehensive examination of the Republic of Korea's DE and DX trajectory, emphasising the nation's unwavering commitment to digital excellence. Starting from its roots in the 1990s with the establishment of high-speed ICT networks to its contemporary position as one of the world's top five intellectual property powerhouses, the nation's digital evolution is commendable.

The nation's current status, characterised by strengths in scientific concentration, adaptive attitudes, and infrastructure, is not without challenges. Particularly evident are the obstacles related to talent development, regulations, and the readiness of SMEs to embrace the digital wave. The government's proactive strategies, including the I-Korea 4.0 and the Digital Platform Government Committee, underscore a clear vision for the future and a dedication to achieving an integrated, intelligent digital government. However, key concerns still loom around inclusivity, ethics, labour, privacy, and security, as well as maintaining democratic principles in this digital age.

The past offers us lessons and blueprints for the future. Reflecting on the Republic of Korea's proactive approach 3 decades ago, it becomes imperative today to formulate bold strategies to harness the potential of AI and new digital technologies. The proposed AI-driven Digital Societal System Construction suggests a leap beyond traditional informational systems, emphasising the introduction of AI-based digital societal systems whilst also ensuring safeguard mechanisms against potential adversities (NIA, 2022d). In the digital age, it is essential to be visionary and proactive, shaping and designing the future rather than just predicting it.

To harness the full potential of this digital age, the Republic of Korea must prioritise a few pivotal directions. It is crucial to bridge the existing digital divide by endorsing multidimensional policies that ensure inclusivity. Furthermore, support for SMEs, educational reforms targeting the workforce, and robust ethical and legal frameworks become paramount. The country's ethos should focus on promoting digital democracy and data sovereignty, safeguarding individual privacy.

In conclusion, whilst the Republic of Korea's achievements in DE and DX are noteworthy, the journey is ongoing. With a vision that draws inspiration from the past with strategies for the future, a bright digital horizon awaits the nation. As the nation continues its dedication to strategic planning and visionary action, it not only aspires to maintain its global digital standing but to elevate it, setting a global benchmark for others to follow.

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Chapter 4
China's Digital Economy

Sherry Tao Kong

1. Introduction

As a general concept, the digital economy refers to economic activities that are driven by digital technologies and the internet. As an economic form, the digital economy builds upon digitised knowledge and information to innovate and promote economic progress in general. Over the course of the past 2 decades, China has embraced the advancement and application of digital technology, which has led to rapid development across a wide range of sectors, from e-commerce and online payments to digital media and the sharing economy. The Chinese authorities recognise the digital economy as a form of economy that has succeeded the agricultural economy and the industrial economy. In the era of the digital economy, data resources are considered the key productive factor, and modern information networks are the fundamental basis.

In the context of China, the digital economy essentially refers to the use of digital information and network technology to promote economic development, involving e-commerce, digital payment, the Internet of Things (IoT), big data, and other fields of economic activities. In line with this conceptualisation, the integrated application of information and communication technology, as well as the digital transformation of all elements, are seen as the driving force that propels the advancement of China's digital economy.

The key areas of China's digital economy include e-commerce (e.g. online shopping, e-commerce platforms, and cross-border e-commerce), digital payment (mobile payment and e-payment), digital financial services other than payment (digital lending, digital investment and wealth management, digital currency and other digital financial services), digital content (online entertainment, digital reading, digital music, online video and other digital content services), big data and artificial intelligence (AI) (big data analytics and AI applications), the IoT (where the development of IoT technology has driven the development of smart homes, smart cities and other fields), and cloud computing and cloud services (where the application of cloud computing technology promotes the digital transformation of enterprises and the digital upgrading of services).

The platform economy is a special form of digital economy, which refers to a new economic model that relies on network infrastructure such as cloud, network, and mobile terminals and makes use of digital technological tools such as AI, big data analytics, blockchain and other tools to facilitate transactions, transmit content, and manage processes. Numerous well-established digital platforms have emerged in the fields of e-commerce, online car rental, entertainment, social media, search and digital finance. Some of these platforms have grown to become top performers internationally.

From a micro perspective, on the one hand, the digital economy can drive enterprises to adopt digital technology, such as big data, cloud computing, AI, the IoT, blockchain, etc., to improve their efficiency, management, and market promotion and create new business opportunities. On the other hand, the digital economy can help individuals utilise digital technology to enhance the quality of their lives and meet various needs, such as making cross-border transactions with convenience through digital payment methods, using smartphones to obtain information, communicate, entertain, and go shopping, and enhancing skills and knowledge through online education. In addition, the digital economy can encourage financial innovation, including digital payments, virtual currencies, and financial technology (fintech).

2. Growth

The global digital economy is expanding fast, and China is playing a significant role. According to the Global Digital Economy White Paper, the total scale of the digital economy of five major countries in the world, including the United States, China, Germany, Japan, and the Republic of Korea, reached US$31 trillion in 2022, with a nominal year-on-year growth of 7.6%, accounting for 58% of gross domestic product (GDP). As a key player, China's digital economy ranked the second largest in the world, with a value of US$6.86 trillion and the world's most rapid year-on-year growth of 10.3 % (Ren, Xu, and Hu, 2023). To this end, the growth rate of China's digital economy has been consistently high, with an average annual growth rate of 14.2% from 2016 to 2022, and it has served as an engine of growth. According to research findings produced by scholars at Peking University, the contribution of the digital economy to GDP growth reached 15.92 % between 2012 and 2022 (Li et al., 2023).

China's digital economy has reached a substantial size, and it has become a prominent part of China's overall GDP. According to the China Internet Network Information Center, China's digital economy reached CNY35.8 trillion (approximately US$5.5 trillion) in 2019, accounting for 36.2% of the country's GDP (National Internet Information Office, 2022). Subsequently, in July 2021, the Internet Society of China released the China Internet Development Report (2021), in which the market size of China's is shown to have reached CNY39.2 trillion in 2020, an increase of CNY3.3 trillion from the previous year and the share of the digital economy in the GDP increased to 38.6% (Renrui HR and Deloitte, 2023). By then, the country's total value of digital economy has jumped to be the second largest in the world. According to an estimate by the China Academy of Information and Communications Technology, the breakdown of China's digital economy indicates that in 2021, the scale of digital industrialisation in China was CNY8.35 trillion, accounting for 7.3% of GDP, whilst the scale of industrial digitisation reached CNY37.18 trillion, accounting for 32.5% of GDP (National Internet Information Office, 2022; Xiong et al., 2023).[1] In the same year, the United States' digital economy reigned as the world's largest, at the value of US$15.3 trillion. China maintained second place with a total size of US$7.1 trillion.

[1] In the Chinese context, the digital economy consists of five categories of industries: digital product manufacturing, digital product services, digital technology application, digital factor-driven industries, and digital efficiency enhancement industries. Together, the first four categories constitute 'digital industrialisation', which refers to the provision of digital technologies, products, services, infrastructure, and solutions for industrial digitisation, as well as other kinds of economic activities that rely entirely on digital technologies and data as a productive factor. Digital industrialisation is also considered the core industries of the digital economy. The fifth category is industrial digitalisation, which refers to the process of upgrading, transforming, and reengineering traditional industries using data and digital technologies.

More recently, based on the State Internet Information Office report, the Digital China Development Report released in 2023, the scale of China's digital economy in 2022 has exceeded CNY50 trillion, and the proportion of GDP increased to 41.5%, more than 40%.

Whilst China boasts the world's largest market, a staggering number of internet users (1.06 billion as of 2022) and enterprises, it is believed that there remains a long way for China to build high-quality and technological advantages and strengthen its innovation capacity in key areas. In addition, the development of the digital economy has demonstrated an uneven pattern, with top performers concentrated in a number of sectors and localities. For example, data from the Ministry of Industry and Information Technology (MIIT) showed that in 2022, the pace of construction of China's advanced manufacturing industry clusters was further accelerated, with the output value of 45 national-level clusters exceeding CNY20 trillion, accounting for nearly 20% of GDP. From a spatial perspective, the concentration of the digital economy is self-evident. In 2021, the added value of Beijing's digital economy amounted to CNY1,625.19 billion, accounting for 40.4% of the local GDP, a proportion that ranked first in the country, and the core industries of the digital economy achieved an added value of CNY8,918.1 billion, accounting for 54.87% of the digital economy. Over the past 3 years, the number of newly established enterprises in the core industries of digital economy has increased by 10,000 per year on average, and more than 8,000 above-scale enterprises (with annual revenue greater than CNY20 million or approximately US$2.8 million) in the core industries of digital economy in the city, accounting for 19% of the total number of above-scale enterprises in the city. The number of large enterprises in the digital economy has been increasing over time. In specific terms, the number of enterprises with revenues of CNY100 billion grew from two in 2018 to five in 2021.

3. Development Stages

The digital economy in China has experienced significant growth over the past 2 decades. Since the 1990s, China's digital economy has gone through a number of development stages, including the early stage of internet adoption, the emergence of e-commerce and online payments, and the rise of the sharing economy and digital innovation (Ren, Xu and Hu, 2023).

- Beginning stage (1990s to early 2000s): China began to introduce and explore the development of the digital economy. In 1994, China had its first access to the Internet, and the earliest Internet companies, such as China Online and Sohu, were established. The scale and penetration of the digital economy were minimal.

- Preliminary development stage (early 2000s to early 2010s): With the rapid growth of China's economy and the advancement of internet technology, e-commerce gradually emerged. With the founding of Alibaba in 2003, China's e-commerce experienced a transformation that paved the way for subsequent phenomenal advancement. In the meantime, digital payments began to gain popularity, and Alipay was established in 2004, becoming the leading mobile payment platform.

- High-speed growth stage (early to mid-2010s): E-commerce developed rapidly, and China became the world's largest e-commerce market. The popularity of mobile networks, smartphones, and mobile applications drove the rapid growth of the digital economy. Online payment, online entertainment, social media, and other areas of digital economy flourished (Wu and Yang, 2022).

- Intelligence- and innovation-led stage (mid-2010s to present): China's digital economy has gradually shifted to be driven by intelligence and innovation. The increasingly widespread application of AI, big data, the IoT, and other technologies has fuelled new developments in the digital economy. Emerging fields such as digital financial services, smart manufacturing, and intelligent transport have flourished (Guo et al., 2023).

China's digital economy development journey continues to evolve, and government support and investment in the digital economy continue to grow, making China one of the key drivers of the global digital economy development.

4 . Impacts

The digital economy has transformed how people produce, live, and how society is governed. The application of digital technologies has also reshaped the ways in which the economy operates (Bai et al., 2023). The economy was scaled up and has become more efficient and innovative. With better user experience and lower costs, risks are better managed and direct contact has become largely unnecessary. Many new digital economy businesses were allowed to emerge, and employing digital technology has contributed to the transformation of traditional industries and enabled the improvement of quality and efficiency.

China's digital financial innovation provides a remarkable example of a financial revolution that is both rooted in China and at the forefront of international financial transformation. The two biggest Chinese mobile payment service providers (WeChat Pay and Alipay) are global leaders, given their size of active users and more importantly, in terms of payment efficiency and security. A number of Chinese digital banks (notably, WeBank and MYbank) took advantage of the digital platforms and built up a massive customer base within a short period and at a relatively low cost. Using big data and machine learning technology for credit risk assessment, an innovative business model called 'big tech credit' now serves a large number of households and small and micro businesses who were formerly under-served due to the absence of credit profiles or lack of collaterals.

Taking the digital economy as a whole, its impact is multi-faceted and substantial. First, the rapid development of the digital economy has fuelled China's economic growth. In addition to enhancing production efficiency, the booming development of e-commerce, digital payment, digital finance, and other fields provides more business opportunities for enterprises, promotes the growth of consumption and investment, and fuels new growth of the national economy (Li, Li, and Tao, 2023). Second, the digital economy has created employment opportunities for hundreds of millions of people, including new professions, from managerial positions on e-commerce platforms, research and development positions of digital technologies, and data analysis, which promote employment stability and people's income growth. Third, the digital economy has given consumers a more convenient and efficient experience. Digital services such as online shopping and mobile payment improved consumer satisfaction greatly whilst promoting consumption upgrading. Fourth, the digital economy has encouraged the digital transformation and intelligent upgrading of traditional industries. The application of technologies such as big data, AI, and the IoT has improved production efficiency and product quality and promoted industrial innovation and upgrading. Fifth, the digital economy accelerated the integration of urban and rural development. The popularisation of the internet and the application of digital technologies have enabled the integration of urban and rural 'informationalisation.' It is manifested in a process in which information and communication technologies are integrated into all aspects of society, economy, or organisation and thereby significantly influence economic, social, and cultural development. Sixth, the rise of the digital economy has made China a key player in the global digital industry, with enhanced international competitiveness. Chinese digital technology companies and e-commerce platforms are playing an important role in the global market.

5 . Underlying Determinants

A host of underlying factors has driven the development of China's digital economy. Amongst these factors, the key is to allow the government and the market to serve its designated roles. The government is to provide a conducive business environment and lay the groundwork for digital economic development by building digital infrastructure. For instance, due to the government's 'moderately ahead of the schedule' approach, China has built the world's largest and most technologically advanced network infrastructure. By the end of 2021, 1.425 million 5G base stations had been built, accounting for more than 60% of the world's total, the number of 5G subscribers is over 355 million, and every administrative village in the country has been connected to broadband (National Internet Information Office, 2022). On the other hand, what is equally crucial is that the market is given the 'driver's seat' for resource allocation with minimal Intervention.

Both the Chinese government and various institutions and enterprises have maintained an encouraging attitude towards innovation, especially in the fields of AI, big data, cloud computing, and blockchain, as well as at the earlier stage of fintech development.

A large number of universities, research institutions, and start-ups are committed to cultivating a stock of talent with digital skills (see Box), and the research and development of digital technology and the government's policy and financial support have also provided strong impetus for digital innovation.

Data governance: China implemented three major laws, established its data localisation and transfer regime, and rigorously enforced data rules, mainly through cybersecurity reviews. In content moderation, China imposed rules on various content types, focusing on minor protection and live streaming, and enforced rules with dedicated moderation campaigns. Lastly, with regard to competition, China amended its anti-monopoly law, advanced a substantial body of secondary legislation, and pursued a domestic 'tech crackdown' in enforcement.

Scientific and technological development and innovation: China has made great progress in the fields of information technology, the internet and communications, providing a solid foundation for the development of the digital economy. Scientific and technological innovation has promoted the application of AI, big data, the IoT, and other technologies, facilitating the continuous growth of the digital economy.

Box 4.1. China's Digital Talent

To advance the development of the digital economy, scientific and technological development and innovation activities need to be conducted by trained personnel. According to official data 'National Statistical Communiqué on the Development of Education', 4.72 million students graduated from college in China in 2022, with a compound annual growth rate of 5.08% for the past 5 years. Amongst them, approximately 80,000 are digital technology talents according to the Ministry of Human Resources and Social Security (https://www.gov.cn/zhengce/202404/content_6945917.htm). As suggested by employment data from Liepin Data, information technology, communication, and scientific research industries accounted for 38.6% of the new positions in 2022, and the average annual salary increased by 7.40%, 13.32%, and 8.00%, respectively from 2021. Whilst the number of trained digital talents is substantial, with the presence of the increasing demand for their service, the digital talent gap in China is widening, now reaching 25 million to 30 million based on the Report on Research and Development of Industrial Digital Talents (Renrui HR and Deloitte, 2023).

Source: Author.

Internet penetration: China has a large base of Internet users, and the increase in Internet penetration has promoted the rapid development of the digital economy. The large number of online users provides a huge market for innovation and experimentation with new products and business models. The large-scale coverage of 4G and 5G networks, as well as high-speed broadband internet connections, have provided a firm foundation for the development of the digital economy, enabling China to support large-scale data transmission, cloud computing, the IoT, and other digital technologies.

Mobile internet penetration: With the popularity of smartphones and the development of mobile internet, digital economic activities such as mobile payment and mobile shopping have been able to grow rapidly. The popularisation of mobile internet has improved the convenience and user experience of the digital economy.

E-commerce development and the rise of fintech: China has the world's second-largest population, which provides a huge domestic demand market for China's digital economy. The wide application in fields such as e-commerce and online payments provides broad opportunities for emerging technologies and digital innovation. China is one of the largest e-commerce markets in the world, and the rapid development of e-commerce has fuelled the growth of the digital economy.

Changes in consumer behaviour and demand: As the economy develops and society changes, consumer demand for digital services and convenience increases, leading to innovation and development in the digital economy sector.

Segregation of domestic and international markets: The domestic digital economy industry has so far been segregated from the international market, which has allowed critical time and breathing space for domestic companies to grow, but it can be expected that the situation of segregation between domestic and international markets is unlikely to last forever.

6 . Future Outlook and Challenges

The development of China's digital economy has entered a new phase with promising growth prospects whilst facing critical challenges. On the one hand, China is expected to continue innovating and investing in digital technologies and infrastructure. On the other hand, policies and regulations that govern China's digital economy need to address urgent issues such as data privacy, cybersecurity, intellectual property protection, and the digital divide. With the continuous development of technology and the support of government policies, China's digital economy is expected to continue to grow at a rapid pace. The application of new technologies and digital transformation will further drive industrial upgrading and innovation.

The rapid development of emerging technologies such as AI, big data, and the IoT will bring new opportunities for the digital economy. Intelligence, automation, and smart manufacturing will become an important development direction.

China actively promotes international cooperation in the realm of the digital economy. China strengthens digital economy cooperation with other countries and facilitates cross-border digital trade and digital technology exchanges (Okpalaoka, 2023).

First, from the private sector, a series of cross-border e-commerce platforms has paved the way for cross-border trade to reach international markets, such as Alibaba's Tmall Global and JD Global. Second, the Chinese government has issued a series of policies to support digital trade, including reducing tariffs, improving customs clearance efficiency, and reducing trade barriers (Zhang et al., 2023). In addition, China's leading digital payment platform provides convenient payment solutions for international trade and also attracts international merchants to accept these payment methods, including Alipay, WeChat payment, etc. Meanwhile, China actively engages in technological cooperation with other countries. In addition, China has made substantial efforts aimed at the standardisation of various key technologies and products, including information technology, electronics and communications products, advanced manufacturing technology, energy and energy efficiency, as well as information security.

In the meantime, challenges facing further development of fintech are numerous.

1. Data security and privacy protection: As the digital economy continues to develop, ensuring data security and privacy compliance have become key issues in the development of the digital economy (Chen, Teng, and Chen, 2022).

2. Shortage of talents and skills: The rapid development of the digital economy requires a large number of talents with relevant skills, and the imbalance between the supply and demand of talent may become a constraint.

3. Regulatory and policy adjustments: The rapid development of the digital economy may exceed the existing regulatory framework and policies, and timely policy adjustments are needed to ensure the healthy development of the digital economy.

4. Digital divide: The digital divide between urban and rural areas and regions may increase in the development of the digital economy, and measures need to be taken to ensure that digital opportunities are more inclusive (Chen et al., 2023).

7 . Policy Directions

As China's economy embarks on a new journey in a new era, the development of the digital economy is also entering a new phase. On the one hand, given its formidable scale, China's digital economy is expected to make a great contribution to high-quality development. Whilst China's digital economy is rapidly moving ahead in a range of technological fields, more attention should be paid to the innovation capacity in key fields on the basis of business model innovation so as to improve the quality of digital economic development.

To further develop China's digital economy, the official roadmap outlined by the State Council for the promotion of digital economy states that the integration of digital technology and the real economy is the main approach (State Council, '14th Five-Year Plan for the Development of the Digital Economy', National Agency [2021] No. 29, 12 December 2021). To this end, the Five-Year Plan for the Development of the Digital Economy identifies five areas of importance to promote and strengthen the development of China's digital economy: (i) construction of digital infrastructure; (ii) improvement of the governance system of the digital economy; (iii) collaboration in promoting the industrialisation of digital industries and the digitisation of industries; (iv) enabling the transformation and upgrading of traditional industries, and cultivate new industries; and (v) fostering new business forms and new models (Xin et al., 2023). Together, the promotion of the digital economy is considered an integral part of the national development strategy to achieve China's aspiration for growth and prosperity. The related key policy strategies include:

1. Made in China 2025: Released in 2015, the policy aims to promote the development of digital technologies and smart manufacturing and to strengthen the application of the industrial internet and the integration of the digital economy in order to improve the innovation capacity and competitiveness of China's manufacturing sector.

2. National Big Data Strategy: Released in 2015, the strategy emphasises strengthening the application and security of big data, promoting the opening and sharing of data resources, and facilitating the integration of big data and the digital economy.

3. The Internet Plus Action Plan: Launched in 2015, the plan aims to promote the deep integration of the digital economy and the real economy, facilitate the development of new technologies, new business forms and new modes, and promote economic upgrading and transformation.

4. The Development Plan for a New Generation of Artificial Intelligence: Released in 2017, the plan focuses on the development of AI technology, promoting the deep integration of AI and the digital economy, and enhancing China's international competitiveness in the field of AI.

5. Development Strategy for the Construction of Digital China: Released in 2018, the strategy aims to promote the innovative development of the digital economy, emphasises the construction of a digital China and smart society, and promotes the synergistic development of digital industries.

Data Security Law: The law came into force on 1 September 2021, with the aim of regulating cross-border data flows, regulating the digital economy, and protecting the reasonable demands of Chinese netizens to safeguard their data security.

On the other hand, the role of economic regulation is mainly to maintain the effective functioning of the market, including safeguarding fair competition and protecting consumer interests. Given that the digital economy is highly innovative in nature, it is recommended that a 'responsive' regulatory approach be adopted, whereby daily communication is maintained between the regulator and the enterprises so as to identify and resolve problems in a timely manner whilst allowing the subjects of regulation to provide feedback and to lodge complaints. For example, a regulatory sandbox is a commonly used approach in the digital finance sector, whereby the digital economy enterprises propose innovative programmes and then operate new businesses on a trial basis under full regulatory monitoring.

The purpose of the digital economy governance system is to create a favourable policy environment and form stable policy expectations. Ultimately, the goal is to achieve a 'stronger, bigger and better' digital economy through 'development in the midst of regulation and regulation in the midst of development'. In accordance with this approach, The Central Economic Work Conference at the end of 2022 clearly stated that 'we should vigorously develop the digital economy, enhance the level of normalised regulation, and support platform enterprises to make their presence felt in leading development, job creation, and international competition.' As China moves from specialised regulation to normalised regulation, the governance system can become clearer and more stable, which will be conducive to the high-quality development of the digital economy.

An option worth considering for domestic policymakers is to set up a high-profile digital economy governance body to coordinate policy formulation and policy implementation (Oloyede et al., 2023). The recently established National Bureau of Data has reflected such an intention. Officially unveiled on 25 October 2023, the organisation is the regulator of China's data regulation and data governance. It is managed by the National Development and Reform Commission, with its main responsibilities being to coordinate and promote the construction of data infrastructure systems, coordinate the integration, sharing, and development of data resources, and coordinate the planning and construction of digital China, the digital economy, and digital society.

Aside from a top national regulator, the relevant legal framework of the digital economy, such as the Digital Economy Law, also needs to be defined. In addition, at the implementation and practical level, industry regulators such as the People's Bank of China and the Ministry of Industry and Information Technology, as well as general regulators such as the General Administration of Market Supervision and the Office of Internet Information, should be involved. Furthermore, the digital economy needs to be incorporated into the country's fiscal and taxation system to improve the rules for the distribution of income from the digital economy, amongst other factors, to ensure a health and balanced income distribution, to regulate the mechanism for accumulating wealth, and promote the common good.

On the international front, China should actively participate in the establishment of the international digital economy and digital trade rules, promoting the realisation of a high-level, institutional openness of China's digital economy and vigorously fostering the development of the digital economy. More specifically, to contribute to the Association of Southeast Asian Nations (ASEAN) Digital Community 2045, first, China needs to actively promote digital economic trade cooperation with ASEAN countries, including reciprocal trade in digital products and services and the elimination of trade barriers. Second, Chinese enterprises should be encouraged to invest in ASEAN countries to support digital infrastructure construction and digital innovation, including cloud computing data centres, 5G networks, digital payment solutions, etc. (Zhang and Li, 2023). It would also be useful for China to work with ASEAN countries and improve the level of digitalisation in ASEAN countries through training, collaborative research projects, and technical cooperation. At the same time, China can cooperate with ASEAN countries to cultivate talents in the digital economy field, such as providing scholarships, organising training courses, and collaborating on research projects in order to improve the level of digital technologies in ASEAN countries to foster greater development of the digital economy. In addition, China should cooperate with ASEAN countries to develop standards and norms so that digital products and services from different countries are compatible, improve interoperability, and promote cross-border cooperation. Lastly, China can cooperate with ASEAN countries to jointly build digital infrastructure, such as cross-border internet cables and data centres, to support the development of the digital economy.

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Chapter 5
Policy Issues in a Data-driven Society: A Perspective from Japan

Yasuhiko Taniwaki

1. Introduction

This chapter provides an overview of the state of digital policy, especially with regard to the contemporary data-driven society from the perspective of Japan. This is based on two recent digital strategy documents, the Priority Plan for the Realization of a Digital Society (approved by the Cabinet in June 2023),[1] and the Comprehensive Data Strategy formulated in June 2021, which is part of the priority plan.

The priority plan clarifies Japan's national data strategy, asserting that 'a consistent data strategy from data development to knowledge creation and AI [artificial intelligence] utilisation is necessary to realise an environment in which diverse, high-quality, and sufficient amounts of data can be easily, safely, and reliably used, and to maintain and improve Japan's international competitiveness whilst solving social issues and cooperating with the rest of the world.'

Based on this recognition, this chapter summarises the concept of a data-driven society and discusses a specific policy menu from the three perspectives of volume, quality, and speed of data flow as a policy agenda for realising a data-driven society.

2. The Data-driven Society

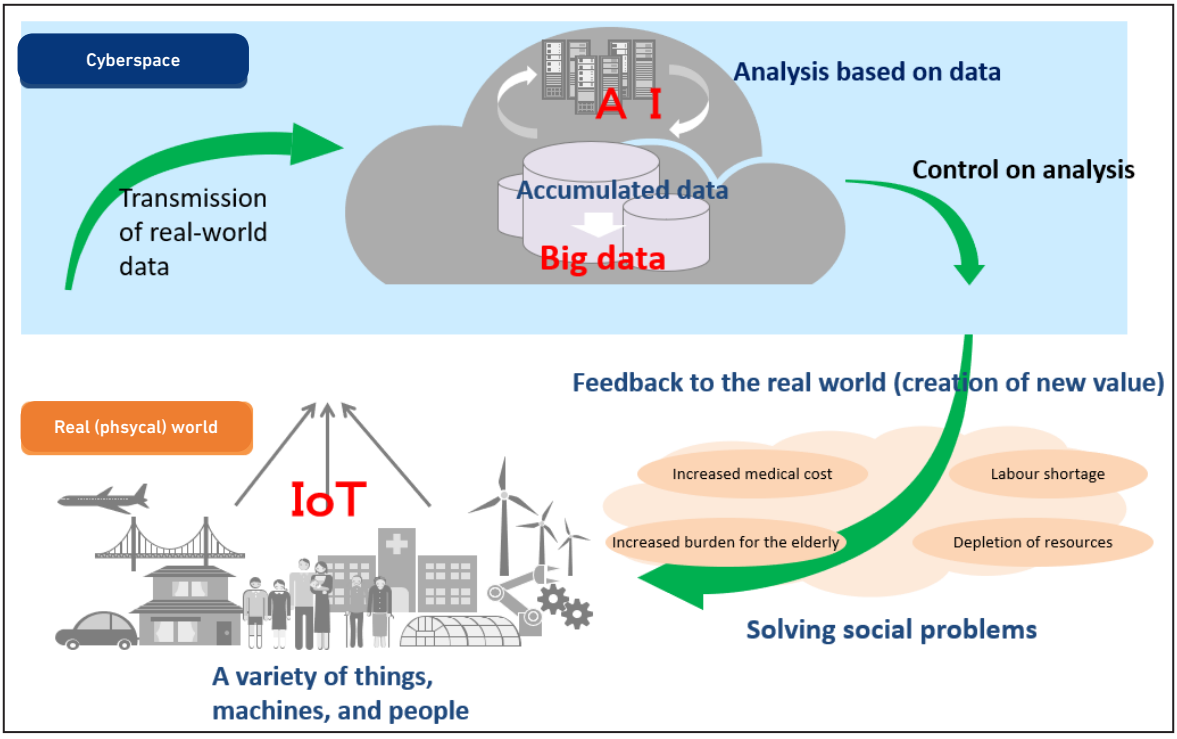
2.1. The Concept of a Data-driven Society

When implementing digital technologies into a socioeconomic system, it is first necessary to confirm the purpose. The greatest impact of digital technology on the socioeconomic system is that it enables collaboration beyond the boundaries of existing business categories because there are no physical constraints in cyberspace. Therefore, the use of digital technology is not simply 'digitisation' to improve efficiency and reduce costs of existing businesses, but 'digitalisation' to bring about reform of business models and the creation of new businesses.

[1] https://www.digital.go.jp/assets/contents/node/basic_page/field_ref_resources/bc5a569f-71d0-44d9-b5c9-cc9b59405507/47b4badd/20231228_en_priority_summary_01.pdf

The concept of a data-driven society is illustrated in Figure 5.1. The lower half of this figure shows the real world, and the upper half shows cyberspace. In the real world, a vast and diverse amount of data is collected via Internet of Things (IoT) devices etc. and stored as big data in cyberspace. This big data is analysed by maximising the use of AI, and the analysis results are fed back to society.

Figure 5.1. Data-driven Society



IoT = Internet of Things.

Source: Prepared by the author.

The results of data analysis will be utilised in the development of solutions to deal with various issues faced by society. The status of operation and areas for improvement of such solutions will also be monitored based on the results of data analysis, and the solutions will be upgraded.

Thus, a data-driven society aims to realise a cyber-physical system in which data constantly circulates between society and cyberspace, integrating them and leading to the resolution of issues and the creation of new value in the socioeconomic system.

2.2. Three Transformations Brought about by a Data-driven Society

We identify the following three factors (transformations) brought about by the advent of a data-driven society: individualisation, automation, and optimisation.

2.2.1. Individualisation

The traditional business model entails manufacturing and selling goods. In this case, the value of a good is at its maximum when it is sold, and then it decreases over time. This is the basic concept of 'goods-dominant logic.' With the rapid progress of digital technology, however, the value of digital goods is depleting faster than ever before, and investment costs cannot be recovered solely from the sale of goods. Therefore, it is necessary to shift to 'service-dominant logic', in which companies are in continuous contact with customers to obtain usage data and create added value by individualising services according to user preferences and other factors. As a result, subscription-type services based on 'X as a service,' which shift from 'owning' to 'using,' will account for a larger share of the market, and there will be an increasing tendency to provide individualised services to users by utilising data.

2.2.2. Automation

With the evolution of AI technology, automation, such as autonomous driving of cars and autonomous aviation of drones, is expected to spread rapidly in the future. In such cases, mechanisms such as smart contracts, which automatically execute the contents of contracts without human intervention, are expected to become common, as already implemented by Ethereum, a cryptographic asset that utilises blockchain technology. The automation of such transactions is expected to accelerate the realisation of a data-driven society, as it will enable the automation of data analysis, including the understanding of correlations between different data sets, as well as the linkage of different forms of data through AI.

2.2.3. Optimisation

Through the development of IoT technology and the technological evolution of communication networks, it will become possible to economically collect, store, and analyse data in areas where it has been difficult to collect data in the past. This is expected to make it possible to realise optimisation based on sufficient data analysis, whereas in the past, this was limited to partial optimisation.

For example, optimisation approaches are expected to increase in the future, such as using the IoT to quickly identify damaged areas of roads and bridges and then using more accurate data analysis to compare and consider the degree of damage to determine the priority of repair areas and optimise maintenance to minimise maintenance costs for social infrastructure.

2.3. Need for Policies based on Data Characteristics

In a data-driven society, where data plays a central role in the socioeconomic system, we must pay close attention to the characteristics of data when considering policies that should be pursued in the future. Three typical characteristics of data are zero marginal cost, non-rivalrous, and network effects.

Unlike physical goods, which incur additional cost or marginal cost when an additional unit of physical goods is produced, data has zero marginal cost because it is non-decreasingly used. This characteristic is called non-rivalrous. [2]

In the case of a platformer such as Google, Amazon, Facebook or Apple, for example, when a company that wants to sell something registers on the platform, users will be attracted to the platform by its product lineup. As the number of users increases, the platform becomes more attractive to companies, and the number of registered companies also increases. In this way, the number of users and the number of companies increase in a spiral, creating a snowball synergistic effect or network effect.

The characteristics of such data are very different from those of traditional goods and services and can easily increase the oligopoly of a small number of platform operators in the market, but on the other hand, the current system is not sufficiently equipped to counter the new oligopoly brought about by the intangible asset of data,[3] and there are no institutional arrangements to encourage data distribution. Therefore, for the realisation of a data-driven society, it will be necessary to conduct an agile review of competition laws or antimonopoly acts and improve the data distribution environment simultaneously.

Furthermore, as we move towards a data-driven society, it will be important to establish a mechanism for calculating the value of data as an intangible asset. In addition to analysing the impact of data generation and distribution on the macroeconomy (Cabinet Office, 2023), companies should reflect the value of their data assets in their corporate accounting in the same manner as intellectual property and other intangible assets. In addition, it is important to deepen international cooperation in this field, as such studies need to be conducted on an international scale.

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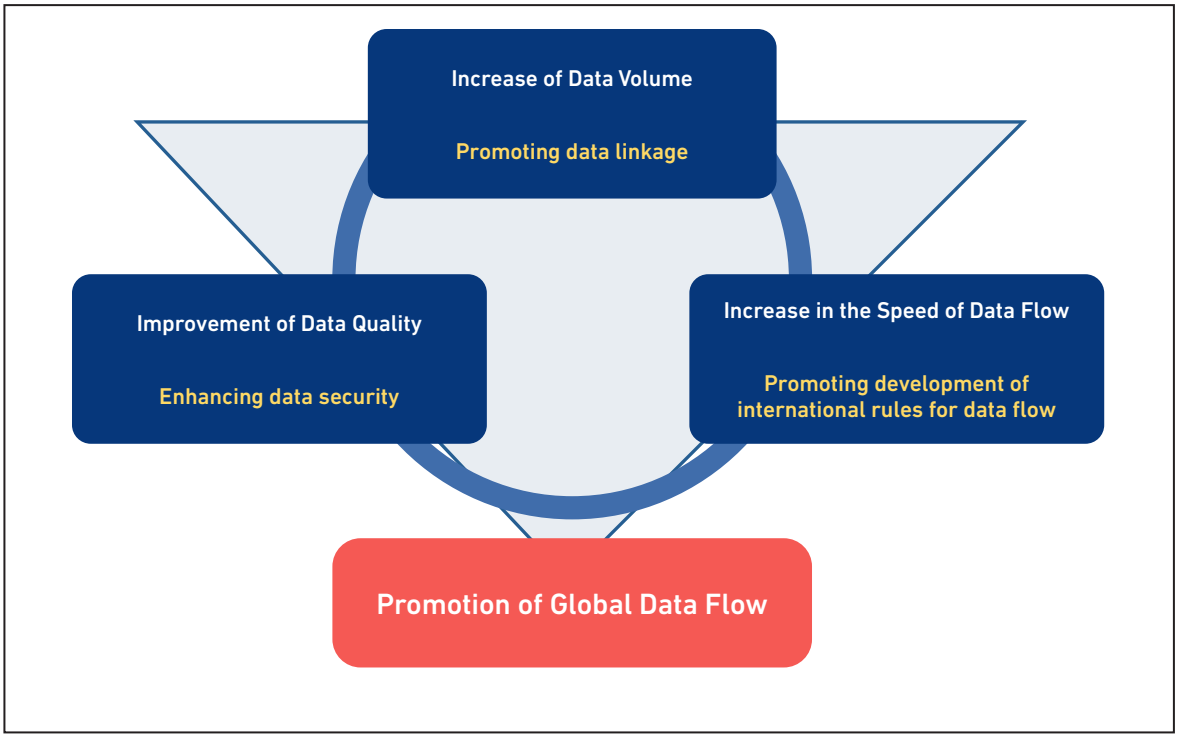
[2] In general, businesses with network effects have diminishing marginal costs, resulting in increased oligopoly in the market. When goods and services are non-rivalrous, meaning that multiple consumers can consume them simultaneously, the marginal cost is not diminishing, but is zero from the beginning, resulting in extremely high oligopoly in the market and a relatively high likelihood that a competitive market will not be established.

[3] It has been pointed out that the concept of 'modified capitalism,' which holds that there is rationality in a certain level of public involvement in the market based on the limitations of the market mechanism, rather than 'neoliberalism,' which maximally respects the functions performed by the conventional market mechanism, is gaining importance.

3 . Policy Agenda for a Data-driven Society

As policies to promote the generation, accumulation, and distribution of data for the realisation of a data-driven society, this chapter classifies data into three elements: data volume, data quality or granularity, and speed of data flow, and examines specific policies to expand the three elements, as shown in Figure 5.2. This chapter discusses specific policies to achieve the expansion of data volume, improve data quality, and increase the speed of data flow to realise a data-driven society.

Figure 5.2. Three Perspectives for Promoting Data Distribution



Source: Prepared by the author.

3.1. Increasing Data Volume

3.1.1. Strengthen data linkage

In order to increase the volume of data available to realise a data-driven society, it is necessary to not only increase the absolute amount of data but also expand the availability of data by promoting data linkage.

Japan's successive information technology (IT) strategies have promoted the introduction of digital technologies and the use of data within each domain or system, such as administration, healthcare, and education. One of the goals of data linkage, however, is to form a virtual 'system of systems' by linking data from each of these domains or systems and to organically link data that were not previously linked to each other to realise 'hidden relationships' and create new value.

One such initiative for data collaboration is Europe's GAIA-X. The European Commission's European Data Strategy, published in February 2020, states that 'the Commission will foster synergies between the work on European cloud federation and Member States' initiatives such as GAIA-X. This is necessary to avoid the multiplication of fragmented cloud federations and data-sharing initiatives (European Commission, 2020).

In Japan, a similar project to GAIA-X is DATA-EX, promoted by the Data Society Alliance (DSA). This project is building a platform to realise 'federated cross-disciplinary data collaboration' and is working to ensure interoperability with GAIA-X and other overseas data collaboration platforms.[4]

In Japan, a concrete and effective example of data linkage at the local level exists in a project called 'Digital Communication Notebook' (*Denshi Renraku-tyou*),[5] which is used to operate medical care services for the elderly at home. In order to realise seamless medical care support in the community, it is necessary for doctors and many other related parties to cooperate with each other, but in reality, information sharing has been limited to telephone calls, faxes, and notebooks. In the Digital Communication Notebook project, each person has a mobile device and uses software as a service-type system to input, view, and share patient information in the style of a social networking service. Of particular importance is that a team of professionals is set up for each patient to share information so that only those who need to can view the data.

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[4] As a recent initiative, the DSA announced the start of a demonstration experiment of 'data usage rights trading' (November 2023), in which the rights to use data will be converted into certificates of rights and made subject to trading, from the viewpoint of promoting data distribution. An overview of the DSA's activities can be found in *https://data-society-alliance.org/en/data-ex/*

[5] The Digital Communication Notebook service was launched by Internet Initiative Japan in 2017. It is currently used by 73 local governments (eight prefectures) and is the largest information sharing platform in the medical care field in Japan, with 23,000 registered medical care-related professional personnel and 41,000 registered support targets (data as at December 2023).

The system can also superimpose data, and various attempts are being made to maximise the effectiveness of data linkage, such as combining patient information with local disaster occurrence information to identify priorities for elderly people in need of assistance.

3.2. Facilitate Data Sharing

In order to expand the volume of data, it is necessary to make the data linkable and to develop an environment that allows more users to share data. Specifically, a review of competition laws and the development of systems to promote data distribution and sharing are required.

3.2.1. Review of competition law

First, with regard to the review of competition law, as mentioned earlier, data have characteristics not found in conventional goods, such as zero marginal cost, non-rivalrous, and network effects, which makes it an environment in which players with market dominance, such as platformers, can easily appear, and the economic losses caused by the abuse of market dominance are often enormous and difficult to repair.

Therefore, in addition to the traditional *ex post* regulation approach in competition law, in which the competition authority determines the market, finds the facts related to the abuse of market dominance, and tries to recover the economic loss of the market by issuing a cease and desist order, it is possible to introduce *ex ante* regulation, like the Digital Markets Act in Europe, in which a certain amount of preventative discipline[6] is applied to platform operators that exceed a certain threshold such as a certain number of monthly active users in advance even if there is no abuse of market dominance.

In Japan, the Act on Improving Transparency and Fairness of Digital Platforms came into effect in February 2021.[7]

[6] For example, in the European Digital Markets Act, there are regulations such as the prohibition of combining data collected from two different services belonging to the same company.

[7] *https://www.meti.go.jp/english/policy/mono_info_service/information_economy/digital_platforms/pdf/1012_001a.pdf*

The act designates platform providers specifically with a high need to enhance the transparency and fairness of transactions as specified digital platform providers and requires them to establish voluntary procedures and systems, including disclosure of information on transaction terms and conditions, prior notification to users when transaction terms are changed, and procedures for dispute resolution, and to submit a report with a self-evaluation of the measures implemented and an overview of their business to the Minister of Economy, Trade and Industry every year. In response, the minister is to conduct a review of the platform's operation status, publish a summary of the report and the results of the evaluation, and request the Fair Trade Commission to take action under the Antimonopoly Law if it becomes aware of a case that is deemed likely to violate the Antimonopoly Law.[8]

In addition to this, in April 2024, the government submitted new legislation to Parliament to designate and regulate larger platform operators that provide specific software (e.g. mobile operating systems, app stores, browsers, and search engines) for smartphone use. The bill will be under the jurisdiction of the Fair Trade Commission and will introduce pre-regulatory targets for the provision of certain apps for smartphones, such as prohibiting other operators from preventing similar provision, and will allow for fines and other measures to be taken if this provision is breached.

3.2.2. Promote data distribution and sharing

It would also be beneficial to promote the development of a market environment to facilitate data distribution. In Europe, the Data Governance Act, which came into effect in September 2023, has institutionalised data intermediary operators (see more details in the next section) and rules for promoting data sharing, such as the Data Act, which entered into force in January 2024.[9]

In Japan, there is currently no legal system in place to promote data distribution. However, efforts are being made as a private-sector-led measure. Specifically, a voluntary certification system for personal data trust banks, which serve as intermediaries between data providers and data users, is implemented under the rules developed by private-sector groups, following the discussion at a study group of the Ministry of Internal Affairs and Communications, and a guideline for personal data trust banks, the Guidelines on Certification of Information Trust Functions were formulated for the implementation (Version 2.0 of the guidelines was released in October 2020). Specifically, the certification service has been conducted by the IT Federation of Japan.

For data trading markets, the DSA has also developed Guidelines for Entry and Participation in Data Trading Markets, the latest version of which was published in January 2024. These guidelines summarise the functions that a data trading market should have and the requirements to realise these functions.

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[8] Based on this law, specified digital platform providers have been designated in three areas: online malls, app stores, and digital advertising. Specifically, Amazon, Rakuten, and Yahoo are designated for online malls, Apple and Google for app stores, and Google, Meta, and Yahoo for digital advertising.

[9] The Data Act will start to apply in September 2025.

3.3. Improvement of Data Quality

3.3.1. Realisation of reliable data

Efforts to ensure data quality are essential to promote data distribution. In a data-driven society, 'data integrity' must be ensured that data in circulation is not being falsified. If data is falsified whilst in circulation, it could cause social and economic confusion through malfunctions of various systems. In addition, there is concern that the deliberate falsification of training data for AI, which is rapidly being developed, could prevent AI from operating properly and cause widespread confusion. Therefore, it is necessary to establish a system to ensure the reliability of data.

Specifically, a system of trust services is required. Trust services consist of the following elements:
(a) electric signature related to the authenticity of the sender of the data;
(b) e-seal related to the authenticity of the sender's affiliation;
(c) timestamp to prove that the data content has not been tampered with; and,
(d) e-delivery, which proves that the data was correctly delivered.

In Japan, the institutionalisation of electronic signatures and time stamps has been completed, and studies are underway to institutionalise e-seals as well.[10] In addition, studies on e-delivery are also continuing within the government. Since data are distributed across national borders, international cooperation and coordination are extremely important in the development of trust services.[11]

3.3.2. Strengthen data security

To improve data quality, data security must be strengthened to reduce the risk of data falsification as much as possible. Falsification of data reduces the integrity of data for the entire country, including AI training data. In particular, there are concerns that the dissemination of disinformation in which the involvement of the state is suspected could seriously affect important decision-making in the country, concerned as cognitive warfare, and this is an important issue to consider from the perspective of national security. Strengthening data security and countermeasures against disinformation are addressed below.

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[10] The report of the Study Group on e-Seals was published in March 2024 by the Ministry of Internal Affairs and Communications (MIC). Based on this report, in April 2024, the MIC published guidelines for e-seals. The MIC also announced its plan to establish an e-seal accreditation system by the Minister of Internal Affairs and Communications by March 2025.

[11] In Japan, the Japan Digital Trust Forum conducts research and studies on trust services; international cooperation can be handled by this organisation.

3.3.3. Development of institutional frameworks for data intermediary services

In order to strengthen data security, it is first necessary to strengthen measures for data integrity in organisations that mediate data distribution. For example, the European Data Governance Act systematically defines data intermediation services that mediate between data owners and data users, requires that such services be notified to the supervisory authority and that advanced security measures be taken for data storage and transmission. The promotion of data utilisation and data security are to be promoted in an integrated manner. Thus, it is necessary to develop institutional frameworks to strengthen data security for data intermediary services also in other countries outside Europe.

3.3.4. Countermeasures against disinformation in Europe

Efforts to combat disinformation are also important. Here again, European efforts can serve as a certain reference. In Europe, in preparation for the European Parliamentary in May 2019, there were concerns about the possibility that certain countries could distort the results of the elections by spreading disinformation.

Therefore, in April 2018, the European Commission developed a Code of Practice on Disinformation (Code of Conduct) (European Commission, 2022). The Code of Practice includes efforts to ensure transparency in advertising serving, sponsored advertisements, etc. and to identify and close fake accounts. In addition, the European Commission called on relevant parties to comply with the Code of Practice on a voluntary basis. In response, Google and other related businesses and organisations agreed to comply with the Code of Conduct. The companies submitted monthly reports to the Commission on their compliance with this Code of Conduct from January to May 2019. In response, the European Commission verified the effectiveness of the Code of Conduct and published a report in June 2019, shortly after the European Parliament elections were concluded. The report stated, amongst other things, that approximately 1,000 cases of disinformation had been identified during the period in question.

In this way, companies voluntarily adopt the operation policy against disinformation established by the public sector, each company periodically reports on the status of its compliance with the operation policy, and the public sector considers whether the operation policy needs to be revised based on the evaluation results. This process is called co-regulation, in which the public and private sectors work together to achieve certain policy objectives.

Based on these achievements, Europe developed the Digital Services Act, which entered into force in August 2023. The new legislation implements the previous approach of co-regulation as a legal system. Specifically, very large online platform (VLOP) operators and very large online search engine (VLOSE) operators, which have more than 45 million users in the European Union, are required to clarify their policies on content moderation, provided the act obliges them to clarify their policies on content moderation, explain to users when content is deleted, and publish a transparency report on the operation status of the system. The specific details are, however, basically left to the voluntary judgement of the VLOP and VLOSE operators, taking an approach that combines the institutionalisation of co-regulation with the autonomy of specific measures to be taken.

3.3.5. Countermeasures against disinformation in Japan

Countermeasures against disinformation in Japan were discussed at an expert meeting held by the Ministry of Internal Affairs and Communications (MIC), and a report was published in February 2020. The government has been promoting countermeasures against disinformation in accordance with the contents of this report. Specifically, the government's basic policy on countermeasures against disinformation is to promote measures based on voluntary efforts by the private sector, taking into consideration the chilling effect on freedom of expression and the difficulty of determining the applicability of disinformation, etc. The government respects the voluntary efforts of the private sector and monitors the status of such efforts. In this way, the countermeasures against disinformation in Japan are based on voluntary measures by the private sector, whilst the government adopts an approach similar to co-regulation that monitors such measures, but from the viewpoint of the private sector, ensuring transparency of the measures and assuming accountability, the government also observes involvement to a certain extent.

Under these circumstances, the government submitted the bill to amend the Provider Limitation of Liability Law in March 2024. In May 2024, Parliament passed the law, which requires platform operators that meet certain requirements for illegal and harmful information, such as slander and libel, to establish and publish removal guidelines, provide explanations to the senders of such information, and publicise the status of removal operations.

3.4. Adoption of Appropriate Level of AI Regulation

The rapid development of AI-related technologies, including generative AI, has prompted debate in many countries on how to introduce regulations for AI. The reliability of AI functions is directly related to the maintenance of data quality.

In July 2023, the United States White House agreed with seven AI-related companies to comply with a voluntary commitment to generative AI (US White House, 2023a). This is the co-regulatory approach described above. In addition, an executive order on AI was issued in October of the same year, clarifying that government agencies should consider developing new standards for AI safety and security US White House, 2023b).

In addition, there have been moves to introduce legal regulations (hard law), such as China's Regulations for the Management of Generative AI Services (effective August 2023) and Europe's AI Act, which was adopted by the Council of the European Union and the European Parliament in May 2024,[12] and other countries are also considering the introduction of AI rules or regulations at an appropriate level. In Japan, the government has decided to start considering the introduction of a new legal system for AI at the AI Strategy Council.

3.5. Increase in the Speed of Data Flow

Increasing the speed of data flow is expected to hasten the matching of data demand and supply, thereby accelerating the realisation of a data-driven society. To this end, it is effective to take the aforementioned domestic measures to expand the volume of data and to improve the quality of data. Since cyberspace has no national borders, however, facilitating data distribution across borders will contribute to increasing the speed of international data flow.

To this end, this section summarises measures that Japan and the Association of Southeast Asian Nations (ASEAN), in particular, can promote cooperation towards the realisation of a data-driven society.

3.6. Knowledge Sharing for Data-driven Projects

In Japan, there are many data linkage projects, many of which are aimed at solving social issues and specifically address such issues as the structuring of wisdom and know-how in the fields of elderly care, traffic accident countermeasures, natural disaster response, disease countermeasures, and agriculture, amongst others.

For example, in March 2011, Japan experienced the Great East Japan Earthquake, and the northeastern region of Japan was devastated by the earthquake and ensuing tsunami. Immediately after the disaster, the probe data on which roads the vehicles were able to pass through were collected in collaboration with car manufacturing companies and a project to display this information on an open map was initiated by the organisation called ITS Japan (Figure 5.3).

[12] This Act is due to come into full force in 2026.

This data was utilised to examine routes for the delivery of relief supplies. In addition, the project provided basic data for relief efforts, such as identifying isolated areas (and villages) in need of emergency assistance where no tyre tracks were visible. Similar efforts were also carried out by ITS Japan for the Noto Peninsula earthquake that occurred in January 2024.[13] Thus, whilst the occurrence of a natural disaster requires urgency, it is difficult to grasp the actual situation in the affected area, and data collection and analysis can help to improve the efficiency and speed of relief efforts.

Figure 5.3. Use of Probe Data in the Event of Natural Disasters

Source: 'Vehicle Traffic Information' provided at the time of the Great East Japan Earthquake (Map: Google, Probe Information: Honda Motor, Pioneer, Toyota Motor, and Nissan Motor) included in Press Release 'Establishing a mechanism to quickly disclose traffic performance information in the event of a large-scale disaster' released by ITS Japan (June 2012).

The implications of these efforts include the possibility of dramatically increasing the potential for data utilisation through intermediary functions between data collectors and data users, the effectiveness of a phase-free data utilisation mechanism from normal times to emergencies, the importance of developing technologies to anonymise and prevent re-identification when utilising personal data, and the importance of building an independent and financially self-reliant business model from data collection to utilisation.

[13] Participating in the ITS Japan initiative are Honda Motor, Pioneer, Toyota Motor, Nissan Motor, Isuzu Motors, UD Trucks, and Hino Motors. https://disaster-system.its-jp.org/map4/map/#map=9/37.255473/137.079162&layer=gsi

Many of these social issues can be shared with the ASEAN countries, and it is conceivable that a data-driven project could be launched as a Japan–ASEAN joint project to promote efforts to share knowledge amongst the parties concerned.

3.7. Establishment of Global Data Distribution Rules

As knowledge sharing is promoted through data-driven projects under Japan–ASEAN collaboration, the next step is to promote linkage between Japan's DATA-EX and similar projects in ASEAN as a cross-disciplinary data collaboration project. In addition, data security is an important factor in promoting such linkage, and it is conceivable that the trust service, which is also being considered in Japan, will be in step with efforts in ASEAN. Furthermore, the most important element of data security is the protection of personal data, and it is appropriate to make efforts to promote and expand the Cross-Border Privacy Rules System, an international certification scheme for the protection of personal information based on the Privacy Framework established by the Asia-Pacific Economic Cooperation (APEC) forum in 2004.

3.8. Establish Digital Governance

As digital technology is increasingly implemented as a socioeconomic infrastructure, it becomes necessary to accelerate efforts to address digital governance issues in a data-driven society. In October 2023, the Internet Governance Forum was held in Kyoto by the United Nations, and the phrase 'From Internet Governance to Digital Governance' was positioned as one of the overall themes. Digital governance broadly sets the question of how to ensure the controllability of digital technologies, which includes three elements: AI governance, data governance, and security governance.

Of these, AI governance is, as already mentioned in this chapter, how to set the appropriate level of regulation between hard law and soft law regarding the controllability of AI. Second, data governance is how to set up a series of institutional arrangements to ensure data security. Third, security governance is how to facilitate the sharing of incident information across national borders and the consideration of a joint response system in the midst of increasingly intense cyber-attacks.

Therefore, as cyberspace becomes increasingly important towards a data-driven society, it would be beneficial for Japan and ASEAN to work together to promote a policy dialogue involving the public and private sectors on the state of digital governance over the controllability of such digital technologies.

3.9. Network Infrastructure Supporting a Data-driven Society

A data-driven society is built on a network infrastructure. Intelligence on the network has a history of repeated concentration and dispersion. For example, looking back at the history of computers, intelligence was dispersed with the spread of personal computers from the era of sharing large computers called mainframes, then intelligence was concentrated again with the emergence of cloud services along with the progress of parallel distributed processing and virtualisation technology. Here again, the importance of edge computing has been pointed out, and at present, the best mix of centralised and decentralised computing is being sought.

Cyberspace has no borders, and in light of the importance of economic collaboration between Japan and ASEAN, it is desirable to promote joint projects in terms of network infrastructure collaboration. In particular, it is significant for Japan and ASEAN to collaborate on projects using distributed ledger technology, as typified by blockchain technology. For example, Japan's ongoing digital currency project (Digital Currency Forum) (Decurret, 2022), which uses blockchain technology to automate the execution of contracts, is currently underway, and Japan–ASEAN collaboration may be considered in the near future.

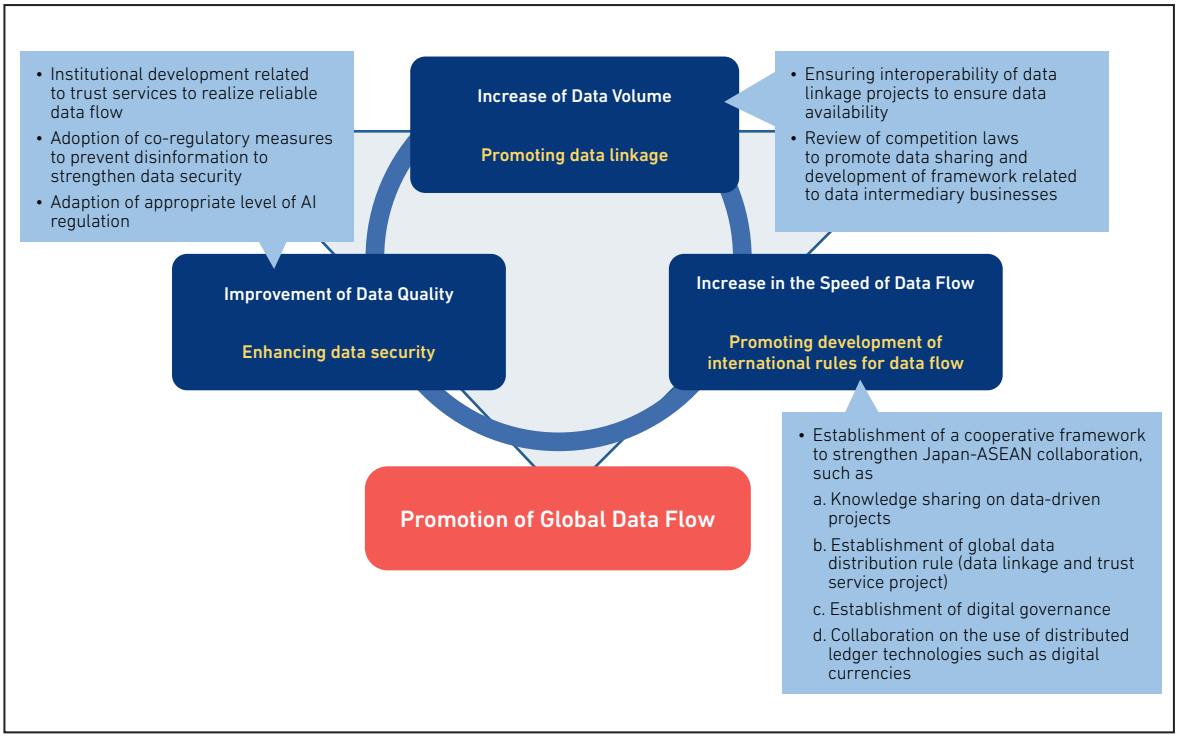
4 . Conclusion

This chapter summarises the policy issues that need addressing to realise a data-driven society. Specifically, it is necessary to shed light on the importance of the three elements of individualisation, automation, and optimisation in a data-driven society, where data is at the core of socioeconomic activities, keeping in mind the need to review institutions and mechanisms to adapt to the characteristics of data.

Based on this, as shown in Figure 5.4, this chapter proposed concrete measures organised from the three perspectives of (i) increasing the volume of data, (ii) improving the quality of data, and (iii) increasing the speed of data flow, as a policy agenda for the realisation of a data-driven society.

In order to build convincing trust in cyberspace, an appropriate balance amongst the three elements of convenience, security, and privacy related to digital technology is required. In particular, the three elements have mutually contradictory characteristics, making it difficult to strike a balance. Moreover, with the advent of generative AI, it is becoming even more difficult to ensure a balance amongst the three elements. Against this backdrop, there is a need to set a common agenda to realise a data-driven society and strategically promote specific initiatives in order to strengthen cooperation between Japan and ASEAN.

Figure 5.4. Policies for a Data-driven Society



AI = artificial intelligence, ASEAN = Association of Southeast Asian Nations.

Source: Prepared by the author.

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Chapter 6
Global Trade Governance in the Digital Era

Mira Burri

1. Introduction

'Electronic commerce'[1] or 'digital trade',[2] as it is now more frequently referred to, has been one of the few areas of international economic law where one can observe a pattern of regulatory cooperation and new rulemaking across different venues. It could be argued that electronic commerce is an old trade negotiation topic, and it is only natural that now, over 2 decades after the adoption of the 1998 Work Programme on Electronic Commerce by members of the World Trade Organization (WTO) (WTO, 1998), there is some actual progress. Such an assumption of a linear development would, however, be flawed, as not only the scope and the contents of the topic for negotiation but also how governments approach the digital economy as a set of regulatory questions that go beyond the mere liberalisation of pertinent services sectors and the reduction of tariff and non-tariff barriers to trade, have profoundly changed (see e.g. Evenett and Fritz, 2022).

This chapter delves into this new complexity and seeks to show the transformation of the regulatory topic from Trade Law 2.0 (as the mere trade in goods and services online) towards Trade Law 4.0 (as the regulation of the data-driven economy).[3] It further explores the dynamics of digital trade regulation in the past decade in a complex geopolitical setting by looking at some broader trends, as well as at distinct regulatory models endorsed by free trade agreements (FTAs) and the new templates of the digital economy agreements (DEAs) that also signal room for innovation in trade law. The chapter goes then back to the multilateral forum of the WTO and reveals how FTAs and DEAs have worked as regulatory laboratories and discusses whether and to what extent their results can be translated to the WTO.

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[1] The World Trade Organization (WTO) Work Programme on Electronic Commerce defined 'electronic commerce' to be 'understood to mean the production, distribution, marketing, sale or delivery of goods and services by electronic means'. See WTO, Work Programme on Electronic Commerce, WT/L/274, 30 September 1998, at para. 1.3. The WTO continues to use 'e-commerce' under the Joint Statement Initiative (see WTO, Joint Statement Initiative on Electronic Commerce, WT/L/1056, 25 January 2019) but in some later texts uses also 'digital trade' as alternative language.

[2] Whilst there is no single definition, a joint effort by the International Monetary Fund, the Organisation for Economic Co-operation and Development, the United Nations, and the World Trade Organization defines 'digital trade', for measurement purposes, as 'all international trade that is digitally ordered and/or digitally delivered'. See IMF et al. (2023), also Burri and Chander (2023).

[3] Trade Law 1.0 can be defined as analogue trade, whilst Trade Law 3.0 would correspond to the state of digital trade that already includes global value chains and advanced services trade but does not yet account for the important of data and data flows.

The chapter concludes with how the topic of digital trade, as linked to the underlying digitalisation processes, is transforming global trade law – with both strands of legal innovation and certain setbacks that are linked to geopolitical differences on the one hand and on the other hand, to the difficulties of interfacing domestic digital governance regimes with commitments in the domain of digital trade law. Understanding this broad picture, as well as the distinct trends of the last years, can be particularly helpful for ASEAN governments and trade negotiators to come up with a feasible yet future-oriented, agenda for the ASEAN Digital Community 2045.

2. From Trade 2.0 to Trade 4.0

The process of adapting trade law to digitalisation started early on, as the WTO members launched in 1998 a Work Programme on Electronic Commerce that sought to explore (without a negotiating mandate) the implications of the internet for trade in goods, trade in services, and the protection of intellectual property (IP) rights. In the 2 decades since the WTO initiative, much has changed, however. Policymakers now increasingly focus on a new set of issues, in particular around the data-driven economy (Burri, 2021a; Peng, Lin, and Streinz, 2021). There may be good reasons for this shift. First, it can well be justified by advanced digitalisation and, in particular, the critical importance of data to societies. In the context of trade policies, this has translated to ensuring data flows across borders, as data are embedded in a growing number of services and goods, and there is a critical interdependence between cross-border data flows and digital growth and innovation – for instance, in the development of artificial intelligence (AI) or the Internet of Things (IoT) (Chander, 2021). The second reason can be linked to a new set of regulatory questions that the use of data and its borderless nature have opened – in particular, those around data sovereignty and the protection of privacy, national security, and other domestic values and interests (Burri, 2021b; Chander and Schwartz, 2023). What is apparent in this context, as the chapter discusses below, is that the emerging digital trade law seeks to address these new regulatory issues that go beyond classic WTO topics – such as the reduction of tariffs or services liberalisation, and targets domestic regimes.

3. Digital Trade Rulemaking in Free Trade Agreements

3.1. Overview

The regulatory environment for digital trade has been shaped by FTAs. Of the 433 FTAs signed between January 2000 and November 2023, 214 contain provisions relevant to e-commerce/digital trade, and 122 have dedicated e-commerce/digital trade chapters,[4] with the significant jump in these commitments occurring in the past few years. Although the pertinent rules are still heterogeneous and differ as to issues covered, the level of commitments and their binding nature, it is overall evident that the trend towards more and more detailed provisions on digital trade has intensified significantly over the years.

The relevant aspects of digital trade governance are spread across the treaties and can be found in (i) the specifically dedicated electronic commerce chapters; (ii) the chapters on cross-border supply of services (with particular relevance the telecommunications, computer and related audiovisual and financial services sectors); as well as in (iii) the IP chapters.[5] This chapter's single focus is on the electronic commerce/digital trade chapters and the DEAs, which have become the source of progressive rulemaking reflecting the importance of the new data economy issues.

The electronic commerce chapters play a dual role in the landscape of trade rules in the digital era. On the one hand, they represent an attempt to compensate for the lack of progress in the WTO. In this sense, these chapters address many of the questions of the WTO Electronic Commerce Programme that have been discussed but only inconclusively so. For instance, most of the chapters recognise the applicability of WTO rules to electronic commerce[6] and establish an express and permanent duty-free moratorium on electronic transmissions.[7] The electronic commerce chapters also include rules that have not been treated in the context of the WTO negotiations – the so-called 'WTO-extra' issues. These rules can be grouped into two broader categories: (i) rules that seek to facilitate digital trade in general by tackling issues such as paperless trading and electronic authentication; and (ii) rules that address cross-border data, new digital trade barriers, and newer issues, which can encompass questions ranging from cybersecurity to open government data. Whilst in the first cluster of issues, the number of FTAs that contain such rules is substantial, there is a greater variety in the second cluster with fewer agreements with rules on data,[8] as well as various conditionalities attached to them.

3.2. Distinct Trends and Models in Digital Trade Rulemaking

There are different ways of mapping the landscape of digital trade rulemaking. Most of the existing enquiries follow a country-based approach and sketch the emergent models of the main stakeholders – the United States (US), the European Union (EU), and China, often looking in addition at the diffusion of these models across other agreements (Gao, 2018; Burri, 2021c, 2022a). This chapter adopts a slightly different method and starts with one basic model – that of the 2018 Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) – traces the rule frameworks, especially the most recent treaties, that are representative of the current actors' positioning. The templates may go beyond (CPTPP-plus) or diverge (CPTPP-minus).

[5] For analysis of all relevant chapters, see Burri (2017).
[6] See e.g. US–Singapore FTA, Article 14.1; US–Australia FTA, Article 16.1.
[7] See e.g. US–Singapore FTA, Article 14.3(1); US–Chile FTA, Article 15.3.
[8] Thus far only 45 FTAs have rules on data flows and 35 FTAs have rules on data localisation.

The CPTPP is a suitable starting point, as it is the first FTA with a sophisticated electronic commerce chapter;[9] it is a mega-regional treaty with multiple signatories,[10] whose impact has been augmented with the accession of the United Kingdom (UK) and pending applications by a number of countries, such as China, Taiwan, Ecuador, and Costa Rica (Schott, 2023); the final reason stems from the fact that the CPTPP digital trade model has diffused in a substantial number of subsequent agreements that bind countries to its implementation.[11]

The CPTPP contains important provisions that seek, on the one hand, to facilitate digital trade by providing a level of interoperability between domestic regulatory regimes and, on the other hand, to curb data protectionism. Illustrative of the first category are the rules on the domestic electronic transactions framework with binding obligations for the parties to follow the principles of the United Nations Commission on International Trade Law (UNCITRAL) Model Law on Electronic Commerce 1996 or the UN Convention on the Use of Electronic Communications in International Contracts.[12] The provisions on paperless trading and electronic authentication and electronic signatures complement this by securing equivalence of electronic and physical forms.[13] Furthermore, in terms of conditioning the domestic regulatory environment, the CPTTP e-commerce chapter includes provisions, albeit in a soft law form, on consumer protection,[14] spam control,[15] net neutrality,[16] as well as on cybersecurity.[17] The CPTPP also addresses the new importance attached to data protection – yet, there seems to be a prioritisation of trade over privacy rights, as there is no reference to benchmarks, and a weaker protection scheme would suffice.[18] This reflects the US stance, as the US has (at least thus far) a fragmented privacy protection regime with relatively low standards, which has also been problematic in securing transatlantic data flows (Burri, 2021b; Chander and Schwartz, 2023).

In the second category of data-relevant rules, the CPTPP includes a clear ban on localisation measures,[19] a ban on forced technology transfer of source code,[20] , as well as a hard rule on free data flows, explicitly including personal information.[21] This is critical and may limit domestic policy space.

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[9] The chapter is identical with the negotiated electronic commerce provisions under the Transpacific Partnership Agreement (TPP), so the influence of the US negotiation position on digital trade is clearly discernible.

[10] CPTPP parties are Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, and Viet Nam. The US withdrew from the TPP negotiations at the start of the Trump administration.

[11] See e.g. the 2016 Chile–Uruguay FTA, the 2016 updated Singapore–Australia FTA (SAFTA), the 2017 Argentina–Chile FTA, the 2018 Singapore–Sri Lanka FTA, the 2018 Australia–Peru FTA, the 2019 Brazil–Chile FTA, the 2019 Australia–Indonesia FTA, the 2018 USMCA, 2019 Japan–US DTA, and the 2020 DEPA between Chile, New Zealand, and Singapore.

[12] Article 14.5 CPTPP.

[13] Articles 14.9 and Article 14.6 CPTPP.

[14] Article 14.17 CPTPP.

[15] Article 14.14 CPTPP.

[16] Article 14.10 CPTPP.

[17] Article 14.16 CPTPP.

[18] Article 14.8 CPTPP.

[19] Article 14.13(2) prohibits the parties from requiring a 'covered person to use or locate computing facilities in that Party's territory as a condition for conducting business in that territory'.

[20] Article 14.17 CPTPP:

[21] Article 14.11(2) CPTPP: 'Each Party shall allow the cross-border transfer of information by electronic means, including personal information, when this activity is for the conduct of the business of a covered person'.

Whilst certain restrictions are permitted if they do not amount to 'arbitrary or unjustifiable discrimination or a disguised restriction on trade' and 'impose restrictions on transfers of information greater than are required to achieve the objective',[22] the scope of the exception is unclear.[23] This can be linked to legal uncertainty, as no specific objectives are listed. New Zealand's Waitangi Tribunal (2021) showed that such uncertainty may not be reconciled with the interests of local constituencies.

The CPTPP model has been replicated and expanded by subsequent US agreements, which also confirmed the liberal US approach to digital trade, as initiated by its 2001 Digital Agenda. The renegotiated North American Free Trade Agreement, which is now referred to as the 'United States–Mexico–Canada Agreement' (USMCA), follows all critical lines of the CPTPP with regard to both the facilitation of digital trade,[24] as well as with respect to ensuring unhindered data flows.[25] Beyond these similarities, the USMCA goes CPTPP-plus in some respects: first, by including algorithms in the ban on requirements for the transfer or access to source code;[26] second, by limiting the liability of interactive computer services providers for third-party content,[27] which secures the application of Section 230 of the US Communications Decency Act – a safe harbour that endorses the First Amendment for platforms but has been in recent times under attack in the face of fake news and other negative developments related to platforms' power (Burri, 2022b). The third and rather liberal commitment of the USMCA parties is with regard to open government data[28] and seeks to facilitate public access to and use of government information provided in a machine-readable and open format that can be searched, retrieved, used, reused, and redistributed.[29]

The US approach towards digital trade issues has been confirmed also by the 2019 US–Japan Digital Trade Agreement (DTA), signed alongside the US–Japan Trade Agreement. The treaty replicates almost all provisions of the USMCA and the CPTPP,[30] including the new USMCA rules on open government data,[31] source code,[32] and interactive computer services[33] but notably covering also financial and insurance services as part of its scope.

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[22] Article 14.11(3) CPTPP.

[23] Whilst this language appears familiar to trade lawyers in reference to the general exception clauses of Article XIV GATS and Article XX GATT 1994, the CPTPP does not, in contrast to the WTO provisions, provide an exhaustive list of public policy objectives and simply speaks of a 'legitimate public policy objective'. In addition, there is no GATT or GATS-like qualification of 'between countries where like conditions prevail'. For fully-fledged analysis, see Burri and Kugler (2024).

[24] The USMCA follows the same broad scope of application (Article 19.2), bans customs duties on electronic transmissions / Article 19.3) and binds the parties for non-discriminatory treatment of digital products (Article 19.4). Furthermore, it provides for a domestic regulatory framework that facilitates online trade by enabling electronic contracts (Article 19.5), electronic authentication and signatures (Article 19.6) and paperless trading (Article 19.9).

[25] Articles 19.11 and 19.12 USMCA.

[26] Article 19.16 USMCA. On the expansion of the scope of the source code provision, see New Zealand's Waitangi Tribunal (2021), at 104–112.

[27] Article 19.17(2) USMCA.

[28] Article 19.18 USMCA.

[29] Article 19.18(2) USMCA.

[30] Article 7: Customs Duties; Article 8: Non-Discriminatory Treatment of Digital Products; Article 9: Domestic Electronic Transactions Framework; Article 10: Electronic Authentication and Electronic Signatures; Article 14: Online Consumer Protection; Article 11: Cross-Border Transfer of Information; Article 12: Location of Computing Facilities; Article 16: Unsolicited Commercial Electronic Messages; Article 19: Cybersecurity US–Japan DTA.

[31] Article 20 US–Japan DTA.

[32] Article 17 US–Japan DTA.

[33] Article 18 US–Japan DTA.

It also adds a new provision regarding information and communication technology (ICT) goods that use cryptography, again in an effort to curb forced technology transfer.[34]

3.3. Digital Economy Agreements: Innovation in Digital Trade Rulemaking

Truly innovative in the landscape of digital trade rulemaking and going substantially, CPTPP-plus has been the new generation of DEAs. So far, five such agreements have been agreed on: the aforementioned 2019 Japan–US DTA; the 2020 Singapore–Australia DEA; the 2020 Digital Economy Partnership Agreement (DEPA) between Chile, New Zealand, and Singapore; and as of 2024, the Republic of Korea;[35] the 2021 Korea–Singapore DEA, and the 2022 UK–Singapore DEA.[36] Despite some variations, the DEAs can be said to share a common template. On the one hand, and taking here the example of the DEPA, the DEAs tend to include all rules of the CPTPP and some of the USMCA, such as the one on open government data[37] (but not source code); some of the US–Japan DTA provisions, such as the one on ICT goods using cryptography,[38] have been included too. On the other hand, there are many other rules previously unknown to trade agreements that try to facilitate the functioning of the digital economy and enhance cooperation on key issues.[39] So, for instance, the DEPA's Module 2 on business and trade facilitation includes, next to the standard CPTPP-like norms,[40] additional efforts 'to establish or maintain a seamless, trusted, high-availability and secure interconnection of each Party's single window to facilitate the exchange of data relating to trade administration documents'.[41] Parties have also touched upon other important issues around digital trade facilitation, such as electronic invoicing; express shipments and clearance times; logistics and electronic payments.[42] Module 8 of the DEPA on emerging trends and technologies is also interesting to mention, as it highlights a range of key topics that demand attention by policymakers, such as in the areas of financial technology and AI, and discusses the adoption of ethical and governance frameworks that support the trusted, safe, and responsible use of AI technologies.[43] Again, going beyond economic issues, the DEPA also deals with the importance of a rich and accessible public domain[44] and digital inclusion.[45] Above all, DEAs provide a flexible platform for cooperation on a number of issues pertinent to the data-driven economy, including also matters that are not necessarily treaty-ready.

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[34] Article 21 US–Japan DTA. This rule is similar to Annex 8-B, Section A.3 of the CPTPP Chapter on technical barriers to trade.
[35] With Canada and China seeking to join.
[36] It should be noted that the DEAs are in most cases linked to an existing or in parallel adopted trade agreement; only in the case of the DEPA, we have a stand-alone agreement.
[37] Article 9.4 DEPA.
[38] Article 3.4 DEPA.
[39] For a comparison of the DEPA with existing PTAs, see Soprana (2021).
[40] See e.g. Article 2.2: Paperless Trading; Article 2.3: Domestic Electronic Transactions Framework.
[41] Article 2.2(5) DEPA.
[42] Respectively Articles 2.5, 2.6, 2.4 and 2.7 DEPA.
[43] Article 8.2(2) and (3) DEPA.
[44] Article 9.2 DEPA.
[45] Article 11.2 DEPA.

The following provides a helpful overview of the common features of the main substantive provisions in all DEAs thus far:

- They substantially exclude government procurement and government data.[46]
- They have codified the WTO moratorium on customs duties on electronic transmissions, made it permanent, and provide a carve-out for the imposition of internal taxes.[47]
- The Parties have undertaken to adopt the UNCITRAL Model Law on Electronic Commerce 1996 in the provisions on domestic electronic transaction frameworks.[48]
- The Parties undertake not to prohibit cross-border data flows. However, the provisions include exceptions for legitimate public policy reasons and adopt the necessity test under Article XX of the GATT 1994 or Article XIV of the GATS.[49]
- They all prohibit data localisation requirements as a condition for market access or conducting business in the territory of the other party/parties.[50]
- They all require the adoption of laws protecting personal information.[51]
- They all have provisions requiring the adoption of consumer protection laws.[52]
- They all require the adoption of measures to control unsolicited commercial electronic messages (spam).[53]
- They all prohibit the disclosure of proprietary information relating to cryptography for ICT as a condition for market access or doing business in the territory of the other party/parties.[54]
- They all have cooperation undertakings to address cybersecurity threats.[55]
- They all have provisions on open government data, generally requiring that it is anonymised, has descriptive metadata, is machine-readable and is in an open format that allows it to be searched, retrieved, used, reused, and redistributed. [56]

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[46] Article 2 US–Japan DTA; Article 2 Singapore–Australia DEA; Article 1.1 DEPA; Article 8.58(4) UK–Singapore DEA; and Article 14.2 Korea–Singapore DEA.

[47] Articles 6 and 7 US–Japan DTA; Article 5 Singapore–Australia DEA; Article 3.2 DEPA; Article 8.59 UK–Singapore DEA; and Article 14.5 Korea–Singapore DEA.

[48] Article 9 US–Japan DTA; Article 8.2 Singapore–Australia DEA; Article 2.3 DEPA; Article 8.60 UK–Singapore DEA; and Article 14.7 Korea–Singapore DEA.

[49] This means that cross-border data restrictions must not be applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination or a disguised trade restriction. See Article 11 US–Japan DTA; Article 23 Singapore–Australia DEA; Article 4.3 DEPA; Article 8.61-F UK–Singapore DEA; and Article 14.14 Korea–Singapore DEA.

[50] Article 12 US–Japan DTA; Articles 24 and 25 Singapore–Australia DEA; Article 4.4 DEPA; Article 8.61-G UK–Singapore DEA; and Article 14.5 Korea–Singapore DEA.

[51] Article 15 US–Japan DTA; Article 17 Singapore–Australia DEA; Article 4.2 DEPA; Article 8.61-E UK–Singapore DEA; and Article 14.7 Korea–Singapore DEA.

[52] Article 14 US–Japan DTA; Article 15 of Singapore–Australia DEA; Article 6.3 of DEPA; Article 8.61-M UK–Singapore DEA; and Article 14.21 Korea–Singapore DEA.

[53] Article 16 US–Japan DTA; Article 19 Singapore–Australia DEA; Article 6.2 DEPA; Article 8.61-N UK–Singapore DEA; and Article 14.20 Korea–Singapore DEA.

[54] Article 21.3 US–Japan DTA; Article 7.3 Singapore–Australia DEA; Article 3.4 DEPA; Article 8.61-J UK–Singapore DEA; and Article 14.18 Korea–Singapore DEA.

[55] Article 19 US–Japan DTA; Article 34 Singapore–Australia DEA; Article 5.1 DEPA; Article 8.61-L UK–Singapore DEA; and Article 14.22 Korea–Singapore DEA.

[56] Article 20 US–Japan DTA; Article 27 Singapore–Australia DEA; Article 9.5 DEPA; Article 8.61-H UK–Singapore DEA; and Article 14.26 Korea–Singapore DEA.

3.4. A Look at the European Union

Whilst the above enquiries do point to substantial CPTPP-plus developments, this is not true for all stakeholders involved. The EU, for instance, and despite its proactive and comprehensive domestic rulemaking, has been a relatively late mover on digital trade issues,[57] and now that it has defined its template,[58] this differs in important aspects from the provisions described above. On the one hand, the EU digital trade chapters converge with the CPTPP/USMCA model to cover issues such as software source code,[59] facilitation of electronic commerce,[60] online consumer protection,[61] spam,[62] and open government data.[63] On the other hand, they do not include provisions on non-discrimination of digital products and, in reflection of the EU stance on trade and culture, consistently exclude audiovisual services from the scope of the application of the digital trade chapter.[64] Beyond this and critically for the regulation of the data-driven economy, the EU is willing to permit data flows only if coupled with the high data protection standards of its General Data Protection Regulation (GDPR).[65] So, whilst the EU and its partners subscribe to a ban on data localisation measures, these commitments are conditioned: first, by a dedicated article on data protection, which clearly states that: 'Each Party recognises that the protection of personal data and privacy is a *fundamental right* and that high standards in this regard contribute to trust in the digital economy and to the development of trade',[66] followed by a paragraph on data sovereignty, which would permit restrictions on data flows for the protection of personal data.[67] A number of other safeguards are included too – such as a review possibility that can be linked to new restrictions,[68] as well as a broadly defined 'right to regulate', which asserts the EU's leeway to restrict data flows 'to achieve legitimate policy objectives, such as the protection of public health, social services, public education, safety, the environment including climate change, public morals, social or consumer protection, privacy and data protection, or the promotion and protection of cultural diversity'.[69]

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[57] For overview of this development, see e.g. Burri, 2017, 2022).

[58] Representative of the new EU approach are the adopted agreements with the United Kingdom (Trade and Cooperation Agreement, TCA), the FTA with New Zealand, the updated EU–Japan FTA, as well as the draft digital trade chapters of the currently negotiated deals with Australia and Tunisia.

[59] See e.g. Article 207 EU–UK TCA. The commitment comes with a number of exceptions.

[60] See e.g. Articles 205 and 206 EU–UK TCA.

[61] See e.g. Article 208 EU–UK TCA.

[62] See e.g. Article 209 EU–UK TCA.

[63] See e.g. Article 210 EU–UK TCA. The FTA with New Zealand curiously has no provision on open government data.

[64] See e.g. Article 197(2) TCA.

[65] Regulation 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ 2016 L 119/1 [hereinafter GDPR].

[66] See e.g. Article 6(1) draft EU–Australia FTA (emphasis added). The same wording is found in the EU–New Zealand FTA. The EU–UK TCA does not however refer to privacy as fundamental right; this can be however presumed, since the UK incorporates the European Convention on Human Rights (ECHR) through the Human Rights Act of 1998 into its domestic law.

[67] See e.g. Article 6(2) draft EU–Australia FTA. The same wording is found in the EU–New Zealand FTA and the EU–UK TCA. The amended in 2023 EU–Japan FTA provides the most elaborate thus far text in the EU template, both with regard to privacy protection and the legitimate public policy objectives exceptions.

[68] See e.g. Article 5(2) draft EU–Australia FTA. The same wording is found in the EU–New Zealand FTA and the EU–UK TCA.

[69] See e.g. Article 2 draft EU-–Australia FTA. The same wording is found in the EU–New Zealand and the EU–UK TCA.

3.5. The Asian Regionalism Model of Digital Trade Rulemaking

Despite the fact that selected Asian countries are also members of Western-led initiatives, such as the CPTPP and, more recently, the Indo-Pacific Economic Framework, and that Singapore has become the most prominent legal entrepreneur in digital trade governance with the DEAs, the Asian regionalism model of digital trade rulemaking comes with some specificities. In particular, if one looks carefully at the Regional Comprehensive Economic Partnership (RCEP) and the ASEAN E-Commerce Agreement, one sees a more flexible and pragmatic framework that allows developments at different speeds that well reflect varieties and sensibilities across the different countries (Mishra and Palacio Valencia, 2023). For instance, whilst the RCEP includes many of the issues around the facilitation of digital trade, its language is more cautious on data governance issues. Whilst the RCEP electronic commerce chapter includes a ban on localisation measures,[70] as well as a commitment to free data flows,[71] there are clarifications that protect the RCEP parties' policy space. For instance, the necessity of the implementation of a legitimate public policy measure is to be decided by the implementing party.[72] In addition, a party can take 'any measure that it considers necessary for the protection of its essential security interests. Such measures shall not be disputed by other Parties.[73] In this sense, the RCEP reflects better domestic policy preferences whilst opening up for digital trade. It has been argued that this pragmatic and incremental approach should not be viewed as inferior but rather as one that addresses well the existing variations in digital development levels across countries, 'eventually leading to meaningful consensus-building and long-term engagement in complex areas of digital regulation' (Mishra and Palacio Valencia, 2023).

Keeping in mind these advanced FTA rule-frameworks, as well as their specificities, the following section asks whether we can go (back) to the multilateral forum of the WTO.

[70] Article 12.14 RCEP.
[71] Article 12.15 RCEP.
[72] Article 12.14.3(a) RCEP.
[73] Article 12.14.3(b) RCEP.

4. Can Digital Trade Law be Multilateralised?

Despite a long period of stalemate at the WTO, the Joint Statement Initiative (JSI) on Electronic Commerce [74] has been seen as a much-welcomed reinvigoration of the WTO negotiation arm in general and, in particular, of its effort to address contemporary digital trade issues.[75] The JSI negotiations can be directly linked to the advanced rulemaking on digital trade in FTAs. This comes with both advantages and a number of setbacks. In the former sense, it appears that FTAs, as well as the DEAs, have worked as regulatory laboratories – not only in terms of mapping the relevant issues but also in terms of treaty language. Yet, the stakeholder positioning, as reflected in the discussed treaties, has also been translated in the JSI negotiations. This has been helpful with regard to agreeing on multiple digital trade facilitation issues, and progress has been made in particular on open government data, electronic contracts, online consumer protection; e-invoicing; cybersecurity; open internet access and paperless trading, although with varying levels of normative value (Burri, 2023). Whilst these developments hint at some important lines of convergence as to the creation of an enabling environment for digital trade, there are also points of divergence, in particular on the critical issues of cross-border data flows. In the latter context, whilst a number of countries align with Japan's proposal for data flows with trust, [76] and members acknowledge the importance of the free flow of data across borders, the policy choices regarding data governance vary widely amongst the JSI participants. In October 2023, the United States rather surprisingly announced that it would not further pursue provisions on data flows, data localisation and source code so as to safeguard 'policy space' for a digital trade rethink (Dupont, 2023). Considering this shift in the negotiation position of one of the most proactive data flow supporters, the future plurilateral agreement on electronic commerce is unlikely to address these important issues of the data economy. On the positive side, removing these contentious issues from the scope of negotiations may allow speedier adoption of the agreement as well as reduce the threshold for more WTO members to join, in particular considering the inclusion of provisions on special and differential treatment, capacity building and extended implementation periods for developing and least developed countries. The current stabilised JSI treaty text[77] is a reflection of these developments and can be viewed both as a success but also as a failure to deliver. On the positive side, over the 5 years of JSI negotiations, the participation of WTO membership has increased and now covers 91 members, accounting for more than 90% of global trade, all major geographical regions, and levels of development.

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[74] See WTO, Joint Statement on Electronic Commerce, WT/MIN(17)/60, 13 December 2017; WTO, Joint Statement on Electronic Commerce, WT/L/1056, 25 January 2019. The JSI negotiations are co-convened by Australia, Japan, and Singapore.

[75] On the development of the JSI negotiations, see e.g. Burri (2023) and Ismail (2023).

[76] G20 Osaka Leaders' Declaration. https://www.gov.br/cgu/pt-br/assuntos/articulacao-internacional/arquivos/g20/declaracao-dos-lideres/2019_g20_declaracao-dos-lideres-cupula-de-osaka.pdfG7 Trade Ministers' Digital Trade Principles. https://www.gov.uk/government/news/g7-trade-ministers-digital-trade-principles.

[77] WTO, Joint Statement Initiative on Electronic Commerce, INF/ECOM/87, 26 July 2024.

5 .Concluding Remarks

This chapter reveals the critical importance of digital trade as a negotiation topic in both preferential and multilateral forums and the substantial efforts made, in particular in recent years, to create an adequate rule-framework. The achievements made in some FTAs and DEAs are remarkable, and there is a strand of legal innovation that seeks to tackle not only the 'old' issues raised under the WTO Electronic Commerce Programme but also the newer issues in the context of a global data-driven economy. Yet, although all major stakeholders have become active in digital trade rulemaking, there are different approaches across stakeholders. The issues around cross-border data flows remain especially contentious, as they impact states' policy space and the ability to adopt a variety of measures, particularly in the areas of national security and privacy protection. In this context, the venues of FTAs and, in particular, the more flexible model of the DEAs provide a good platform for experimentation and evidence-gathering on the economic but also, and perhaps more importantly, on the broader societal effects of such commitments. They also illustrate that there is a distinct need for enhanced regulatory cooperation in the striving to attain a seamless global data-driven economy and reap its economic benefits. As countries move at different speeds, there also ought to be, however, a consideration of the varying levels of development and regulatory capacities across countries. The ASEAN negotiations of a Digital Economy Framework Agreement (DEFA) can certainly benefit from the experience gathered across countries thus far and create a future-oriented agreement that reflects the specificities of the region whilst at the same time giving it a competitive regulatory edge.

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