Chapter 2

The Digital Economy in Germany

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This chapter should be cited as:

Falck, O. and N. Czernich (2025), 'The Digital Economy in Germany', in Ing, L.Y. (ed.), *ASEAN Digital Community 2045: Global Insights*. ERIA Research Project Report FY2025 No. 14, Jakarta: ERIA, pp.17-30.

Chapter 2
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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.

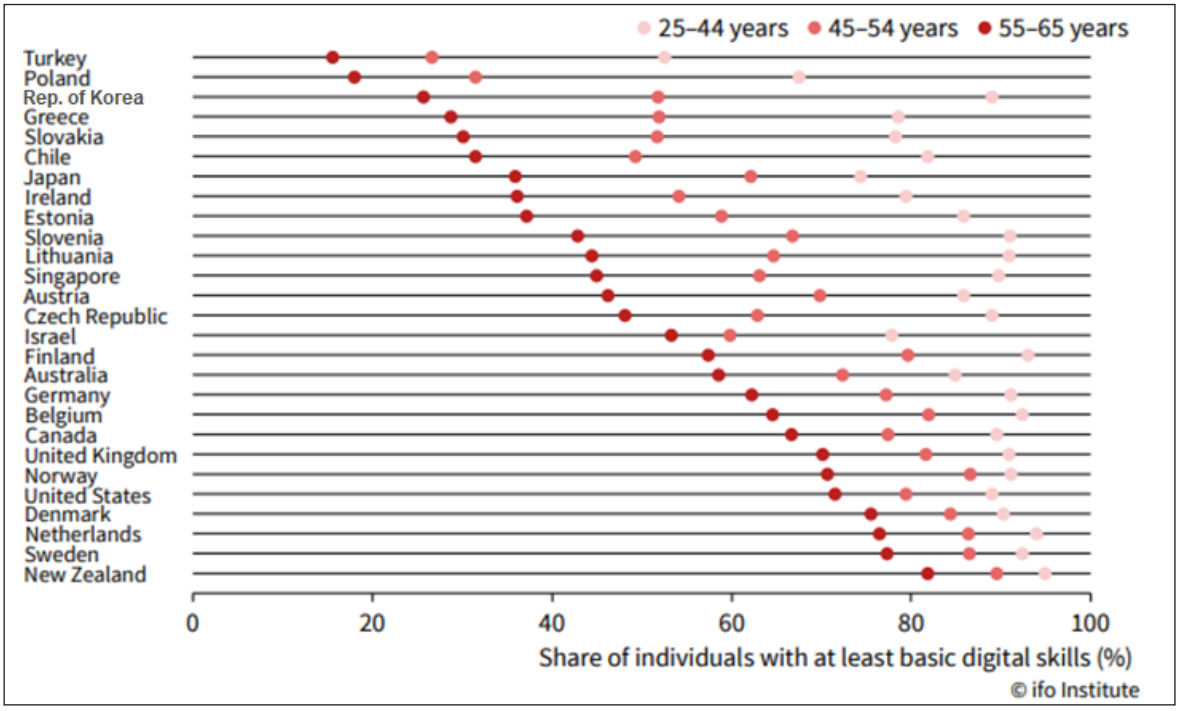
[5] The analysis is based on data from the Programme for the International Assessment of Adult Competencies (PIAAC) survey, which was carried out under the responsibility of the OECD in 2011 and 2012. Within PIAAC, different skills are tested, amongst them problem-solving in technology-rich environments, 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.

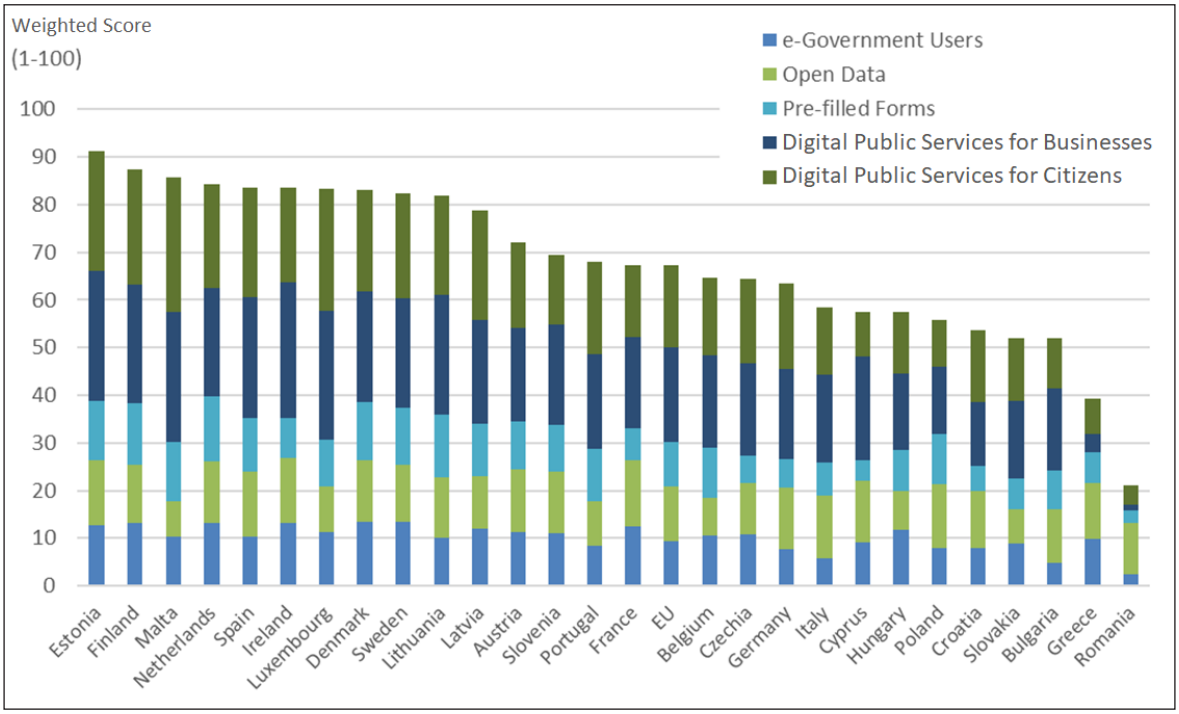
5. E-government – Scarcely Existing

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

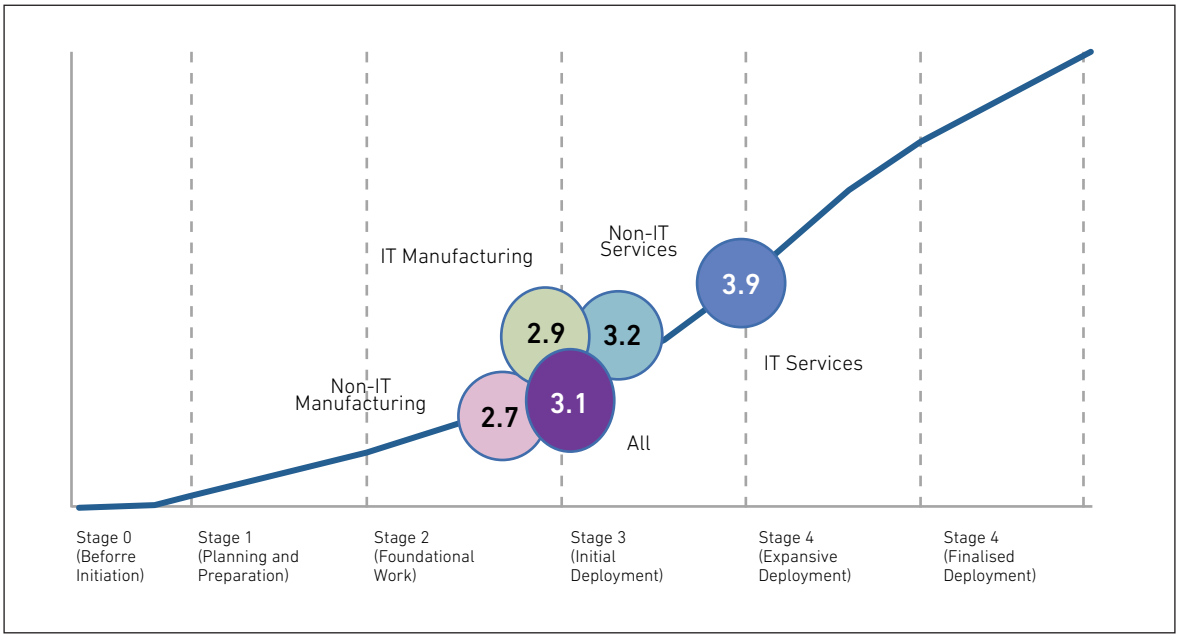
The Republic of Korea is also a global leader in digital governance, consistently earning high marks in the United Nations' e-government survey, underscoring its commitment to digital innovation in governance (UN, 2018, 2020). The nation excels in online government services, as reflected in its world-leading 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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