

# NETWORKED BENEFITS

*Realizing the Potential of 5G in South Korea*

By Clara Gillispie



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THE NATIONAL BUREAU *of* ASIAN RESEARCH

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*Clara Gillispie*

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For further information about NBR, contact:

The National Bureau of Asian Research  
1414 NE 42nd Street, Suite 300  
Seattle, Washington 98105

206-632-7370 Phone

206-632-7487 Fax

[nbr@nbr.org](mailto:nbr@nbr.org) E-mail

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## — FOREWORD —

Countries around the world are grappling with how to establish the right mix of data governance policies to incentivize economic growth and innovation while ensuring data privacy and security. This NBR Special Report by Clara Gillispie makes a substantial contribution to these discussions with an in-depth analysis of how South Korea is navigating this debate over 5G and data policies.

Through case studies of sectors that will be catalyzed by 5G technology, such as digital healthcare, autonomous vehicles, and smart cities, Gillispie demonstrates that data policies often have far-reaching and unintended consequences that affect numerous stakeholders. Policies that are flexible and focus on outcomes rather than prescriptions can improve the environment for innovation, enhance security, and promote the adoption of new technologies.

As explained in the report, South Korea is one of the world's most innovative economies and was the first country in the world to launch a commercial 5G network. How the nation approaches its data governance policies over the next few years will determine its ability to build on this momentum as a global technology leader. While there is much scholarship on global data policy, very little of it explores South Korea's unique strengths and challenges. South Korea's experience can inform other nations that are refining their own frameworks for data governance. As such, the analysis in this report is valuable for anyone interested in how policy can spur technological development that will increase efficiencies and improve quality of life.

The National Bureau of Asian Research would like to thank the Korea Foundation for the generous support that made this research and report possible.

Ashley Dutta

*Senior Director of the Center for Innovation, Trade, and Strategy*

*The National Bureau of Asian Research*



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# Networked Benefits

## *Realizing the Potential of 5G in South Korea*

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**CLARA GILLISPIE** is a Senior Advisor at the National Bureau of Asian Research and a 2019–2020 CFR International Affairs Fellow at Carnegie India. She can be reached at <[cgillispie@nbr.org](mailto:cgillispie@nbr.org)>.

**NOTE:** The author thanks the Korea Foundation, whose generous grant support provided invaluable resources that enabled field interviews and other research, as well as June Park and Ashley Dutta, who reviewed earlier drafts. Additionally, this report partly draws on research the author conducted for the paper “South Korea’s 5G Ambitions,” Korea Economic Institute of America, March 23, 2020, [http://www.keia.org/sites/default/files/publications/kei\\_aps\\_gillispie\\_200316.pdf](http://www.keia.org/sites/default/files/publications/kei_aps_gillispie_200316.pdf).

## EXECUTIVE SUMMARY

This report explores how South Korea seeks to navigate the 5G era, with a focus on the role of policy in shaping or restricting how emerging technologies can be deployed.

### MAIN ARGUMENT

South Korea has earned a well-deserved reputation as one of the world's most innovative economies, and its substantial investments in 5G could position it to realize significant returns. Yet Seoul is currently grappling with what role the government should play in guiding how data can be aggregated, used, and shared, which in turn will affect what kinds of products are developed. Several domestic policy debates focus on whether the country's established protections are too restrictive and limit its competitiveness. How Seoul navigates these issues has implications for not only South Korea but also other countries looking to strengthen their own governance practices.

### POLICY IMPLICATIONS

- The Personal Information Protection Act, the Act on the Protection, Use, Etc. of Location Information, and the Korean Land Survey Act shape how data can be collected within South Korea. Any revisions should aim to address domestic concerns while also meeting or exceeding international benchmarks for privacy and data protection, such as those set by the Asia-Pacific Economic Cooperation (APEC).
- South Korea's challenges are not exclusively regulatory in origin. A legacy of top-down approaches and a relatively homogenous field of domestic specialists are also undermining efforts to convert available information into useful information. Addressing this problem requires bringing more people to the table and ensuring greater diversity among those represented.
- South Korea cannot afford to act alone. Instead, it should consider expanding researcher exchanges, information sharing, and joint initiatives with other countries to support regional interoperability in both product development and the coordination of governance standards. As part of these efforts, strengthening coordination with the U.S. could also play a meaningful role in advancing both countries' interests.



On April 3, 2019, South Korea became the first country to officially launch a commercial 5G network. One year later, the country has what is arguably the world’s most comprehensive nationwide coverage map, providing service to over 90% of the population.<sup>1</sup> Though Seoul already had some of the fastest internet speeds in the world, post-launch tests found that switching from 4G LTE to 5G services within the city could increase download speeds by up to four times.<sup>2</sup> Meanwhile, the country’s SK Telecom, LG U+, and KT carriers have had over 5.36 million subscribers sign up for their 5G data plans.<sup>3</sup> To put this in perspective, until China launched its own network in January 2020, South Korea had more 5G subscribers than the rest of the world combined.<sup>4</sup>

Seoul hopes that an early bet on 5G will pay meaningful dividends, improving the quality of life and ultimately supporting the rise of new industries. To this point, President Moon Jae-in and other government officials have regularly argued that the enhanced speeds and capabilities of 5G enable developers to better apply artificial intelligence (AI) and other information technologies in healthcare, energy, transportation, communications, and manufacturing. Importantly, these are all sectors where South Korea has robust industrial strengths and globally competitive companies.

Yet South Korea is also in the midst of a national debate about the correct role for policy in enabling or restricting specific technologies within these fields. In contrast to ongoing debates in the United States, discussion in South Korea has often focused on whether existing safeguards are too restrictive with respect to how information technologies can aggregate, share, and use various forms of information within the country’s borders (and, if in turn, this might undermine its 5G ambitions). Thus, South Korea’s conversation on the future of data is relatively unique. Moreover, it is happening at the very moment that the country is leading the charge to rapidly deploy the world’s most sophisticated technology infrastructure. How Seoul navigates these issues has implications for not only South Korea but also other countries looking to strengthen their governance practices.

This report explores how South Korea is seeking to navigate the 5G era, with a focus on the role of policy in shaping or restricting how emerging technologies are deployed. Section one examines the specific priorities for 5G development that stakeholders have articulated and the current policy tools being applied to achieve these goals. The next section dives into three data-intensive fields that have become a mainstay of South Korean discussions about 5G—digital healthcare, autonomous vehicles, and smart cities—as a means of better understanding some of the country’s debates about the future of data.<sup>5</sup> Section three then offers insights from these case studies with the aim of identifying specific bottlenecks, potential best practices, and other considerations for how Seoul might choose to move forward—both on its own and in tandem with other international partners. The report concludes by drawing several implications for public policy.

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<sup>1</sup> Klint Finley, “The Slow Rollout of Superfast 5G,” *Wired*, December 13, 2019, <https://www.wired.com/story/slow-rollout-super-fast-5g>.

<sup>2</sup> Jessica Dolcourt, “We Ran 5G Speed Tests on Verizon, AT&T, EE and More: Here’s What We Found,” *CNET*, July 3, 2019, <https://www.cnet.com/features/we-ran-5g-speed-tests-on-verizon-at-t-ee-and-more-heres-what-we-found>.

<sup>3</sup> “5G Subscribers in S. Korea Top 5 Mln,” *Yonhap*, April 1, 2020, <https://en.yna.co.kr/view/AEN20200401005600320>.

<sup>4</sup> Finley, “The Slow Rollout of Superfast 5G.”

<sup>5</sup> This section is informed in part by the author’s field research in Seoul, Sejong, Washington, D.C., Seattle, and New Delhi in 2019–20. This includes observer participation in APEC’s 60th Telecommunication Working Group (which was jointly hosted by the United States and South Korea and had a special focus on 5G). It also includes one-on-one conversations and other discussions with senior government officials, major telecommunication companies and other 5G industry players, innovation specialists, and policy experts representing South Korea, as well as with a smaller subset of their U.S. and other international counterparts.

## South Korea's 5G Ambitions

A range of domestic stakeholders have weighed in on what sustained leadership on 5G might ultimately mean for South Korea.<sup>6</sup> Drawing on industry and expert analysis, the country's Ministry of Science and ICT has estimated that a modest share of the projected global market in 5G-enabled devices, services, and products could mean 600,000 new jobs and \$73 billion in new exports for the country through 2026.<sup>7</sup> Former KT chairman Hwang Chang-gyu and other prominent industry advocates have also emphasized the potential contribution of social goods, such as services that can help localities mitigate traffic or air pollution levels. Meanwhile, President Moon has sought to associate 5G with his policy agenda for inclusive economic growth by regularly noting that 5G industries might help create high-quality, high-paying jobs.<sup>8</sup>

The Moon administration's 5G+ Strategy envisions continued 5G development unfolding over the coming years and outlines the support the government intends to provide in this process through 2026. In particular, it calls attention to potential applications in "five core services" and "ten core industries," including fields such as augmented and virtual reality, digital healthcare, smart cities, autonomous vehicles, and smart manufacturing. These are industries where 5G's high speeds, low latency, and capacity for handling large volumes of data could make a meaningful difference in how competitive South Korean products are at home and abroad.<sup>9</sup>

To spur additional development, the 5G+ Strategy suggests a broad-based, whole-of-government approach carried out in overlapping phases. This includes tactics such as securing the early 5G market through deploying new technologies in the public sector, creating special zones with more lax regulatory requirements, and promoting linkages between commercial efforts and the Moon administration's international cooperative initiatives such as the New Southern Policy, which targets engagement with the Association of Southeast Asian Nations (ASEAN).<sup>10</sup> **Table 1** provides an overview of these aims and the specific actions that the government plans to undertake to achieve them. Many are already in progress, with others planned to commence in 2021–23. Alongside these efforts, both the government and the country's major telecommunication companies anticipate making substantial investments in additional infrastructure and network upgrades to ensure that 5G architecture covers 100% of the country within the next two to three years.

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<sup>6</sup> "5G" refers to a specific series of technical specifications that are then applied in building information and communications technologies. These specifications shape how products like smartphones function as well as how different devices and systems might exchange information with one another. Thus, 5G has a potentially open-ended range of applications, some of which might only become apparent later on.

<sup>7</sup> "Science, Technology & ICT Newsletter (NO.41)," Ministry of Science and ICT (South Korea), June 4, 2019; and author's interview with June Park, January 2020. As aptly noted by Park, one potential caveat in this estimate is the question of how new job numbers are being calculated (specifically, the extent to which part-time or temporary jobs might be counted).

<sup>8</sup> See, for example, June Park, "Strategies, Challenges, and Considerations for Economic Growth in South Korea," interviewed by Ashley Johnson, National Bureau of Asian Research (NBR), November 16, 2017, <https://www.nbr.org/publication/strategies-challenges-and-considerations-for-economic-growth-in-south-korea>; and Kyle Ferrier, "South Korea Joins the 5G Race," *Diplomat*, March 27, 2019, <https://thediplomat.com/2019/03/south-korea-joins-the-5g-race>.

<sup>9</sup> The full list includes services (immersive content, autonomous vehicles, smart manufacturing, smart cities, and digital healthcare) and industries (next-generation smartphones, network equipment, information security, edge computing, vehicle-to-everything communication, robots, drones, intelligent closed-circuit television, wearable devices, and virtual- and augmented-reality headsets). However, subsequent statements and policy guidance have modified or expanded specific callouts on this list, though the spirit has remained the same.

<sup>10</sup> "Science, Technology & ICT Newsletter (NO.41)."

TABLE 1 President Moon Jae-in's 5G+ Strategy

Goals	Methods	Select tactics
<p><b>Secure the early 5G market through public-sector investments</b></p>	<p>Support demonstration of the five core services</p>	<ul style="list-style-type: none"> <li>• Identify profit models in the private sector for immersive content, smart factories, autonomous vehicles, smart cities, and digital healthcare</li> </ul>
	<p>Support demand creation</p>	<ul style="list-style-type: none"> <li>• Support real-time 5G-based safety monitoring in educational and cultural facilities</li> <li>• Develop and adopt safe 5G-based nuclear power plant decommissioning technologies</li> <li>• Foster R&amp;D in 5G drone services, including through crafting linkages to public procurement</li> </ul>
	<p>Deploy 5G in public services</p>	<ul style="list-style-type: none"> <li>• Implement a 5G-based collaborative telemedicine pilot project for hospitals and clinics</li> </ul>
	<p>Create a 5G-based smart city</p>	<ul style="list-style-type: none"> <li>• Establish data and AI center in a pilot city</li> <li>• Actively integrate 5G technologies into projects aiming to turn established cities into smart cities</li> </ul>
<p><b>Jump-start additional investment by the private sector</b></p>	<p>Provide tax credits and other fiscal incentives</p>	<ul style="list-style-type: none"> <li>• Provide tax credits to network investment (2%–3% for 2019–20) and invest in innovation companies by engaging in financial programs driving new growth</li> </ul>
	<p>Establish 5G testbeds and demonstration infrastructure</p>	<ul style="list-style-type: none"> <li>• Establish thirteen testbeds and demonstration infrastructure in select areas</li> <li>• Establish a “Songpa mobile cluster”</li> </ul>
	<p>Support efforts by small and medium-sized enterprises (SMEs) to deploy 5G technologies</p>	<ul style="list-style-type: none"> <li>• Increase support for SMEs to conduct R&amp;D and purchase new technologies and products from public institutions and foreign countries</li> </ul>
	<p>Support immersive content market</p>	<ul style="list-style-type: none"> <li>• Carry out a “5G content flagship project” and secure infrastructure for a development hub</li> </ul>
	<p>Support productivity innovations in leading industries</p>	<ul style="list-style-type: none"> <li>• Support distribution and adoption of 5G factory solutions among SMEs</li> <li>• Establish an autonomous and intelligent smart maritime port logistics system, with pilot projects at four ports, including Busan</li> <li>• Set up an optimal energy generation system through real-time 5G and big-data processing</li> </ul>

Table 1 continued

Goals	Methods	Select tactics
<b>Support greater usage and user protection through system maintenance</b>	Reduce costs and improve flexibility in service plans	<ul style="list-style-type: none"> <li>• Continue to reduce per unit data charges for 5G plans</li> <li>• More broadly reimagine service plan structures, particularly to be flexible enough to account for services such as autonomous vehicles and smart manufacturing</li> </ul>
	Secure radio wave resources and improve regulations	<ul style="list-style-type: none"> <li>• Double the available frequency for 5G service by 2026 (from 2,680 MHz to 5,190 MHz bandwidth)</li> <li>• Further streamline administrative processes, including through the introduction of a frequency licensing system</li> </ul>
	Create a safe user environment	<ul style="list-style-type: none"> <li>• Establish a preventive system for minimizing and managing cybersecurity breaches, such as designating 5G core facilities as critical infrastructure</li> <li>• Establish a disaster-prevention and response-communication system</li> </ul>
	Support regulatory innovation	<ul style="list-style-type: none"> <li>• Identify items for regulatory improvement in connection to regulatory sandbox and pilot projects</li> <li>• Ease regulations for location-based information projects</li> </ul>
	Bridge digital divides and protect users	<ul style="list-style-type: none"> <li>• Reinforce accessibility to new terminals and services for the disabled and elderly</li> <li>• Expand education</li> <li>• Strengthen user rights to prevent harm or misuse of data</li> </ul>
<b>Establish a domestic 5G industrial base</b>	Secure global leading technologies	<ul style="list-style-type: none"> <li>• Enhance R&amp;D investment on hyper-realistic and lightweight virtual- and augmented-reality devices, 5G and AI-based wearables, and cloud robotics technologies</li> </ul>
	Strengthen the competitiveness of the information security industry	<ul style="list-style-type: none"> <li>• Develop models that demonstrate security technology on a 5G network</li> <li>• Increase R&amp;D investment on future core technologies</li> </ul>
	Establish a foundation for a 5G+ “Korean wave”	<ul style="list-style-type: none"> <li>• Produce and distribute virtual- and augmented-reality cultural content; create realistic experience zones of cultural heritage</li> </ul>
	Support the establishment of a 5G startup ecosystem	<ul style="list-style-type: none"> <li>• Support 5G tech startup R&amp;D and funding for commercialization</li> <li>• Establish a system to analyze supply and demand of workers in 5G+ strategic industries</li> </ul>

Table 1 continued

Goals	Methods	Select tactics
Support South Korean industries in “going global”	Promote globalization of 5G services	<ul style="list-style-type: none"> <li>• Formulate a consortium consisting of large companies and SMEs with a focus on exploring targeted markets and advancing into global exhibition venues together</li> <li>• Support promising companies to forge partnerships with the world’s leading 5G companies</li> </ul>
	Actively engage with and lead in 5G standardization efforts globally	<ul style="list-style-type: none"> <li>• Ensure that South Korean 5G products are built to be interoperable with devices, networks, and services in other economies</li> <li>• Encourage global adoption of specific technical standards already being deployed or under development by South Korean firms via active participation in international standards bodies</li> </ul>
	Align 5G policymaking with international cooperation initiatives	<ul style="list-style-type: none"> <li>• Identify joint projects (e.g., smart cities) in relation to the New Southern Policy and the New Northern Policy</li> <li>• Carry out “sales diplomacy” through high-level visits and international conferences</li> </ul>

SOURCE: “Science, Technology & ICT Newsletter (No. 41),” Ministry of Science and ICT (South Korea), June 4, 2019, <https://english.msit.go.kr/english/msipContents/contentsView.do?cateId=msse44&artId=2009058>.

## Bringing 5G to Scale

Simply building digital infrastructure or funding pilot projects does not necessarily guarantee how or whether new products will be brought to market. To this point, it is important to understand the ways in which South Korea’s domestic 5G ecosystem functions as a complex interaction of numerous stakeholders. In addition to the Blue House, this ecosystem includes the National Assembly and various ministries tasked with crafting and implementing policy guidance, telecommunication companies and 5G equipment vendors who manage and maintain networks, labor unions, and a range of additional private-sector, academic, and civil-society partners—as well as, of course, the eventual end users. While not all of these groups have equal weight or presence in the current ecosystem, each one informs how development choices are made. **Table 2** provides an overview of the specific roles taken on by various groups and actors.

Each group calculates the costs of trade-offs in further development through a different lens. Thus, even strong enthusiasm for 5G does not necessarily suggest a national mandate for making legal, regulatory, or educational reforms to bring products to scale, especially if such reforms might conflict with other closely held interests such as safeguarding civil liberties or protecting

TABLE 2 South Korea's domestic 5G ecosystem

Category	Roles and specific actors
Blue House	Agenda setting and strategic coordination
Government ministries	Grantmaking, regulation, external stakeholder coordination, and other development roles
National Assembly	Targeted role in 5G development, such as creating tax incentives for developers and allocating budgets for ministry projects, plus a broader facilitating role, such as law revision
Carriers	Establishment of the physical infrastructure associated with 5G networks, such as base stations and core equipment; operation of data services and plans related to their use (e.g., KT Corporation, SK Telecom, and LG U+)
Vendors	Production of base stations and other network equipment (e.g., Korean firms such as Samsung and non-Korean firms such as Ericsson, Nokia, Qualcomm, Intel, and Huawei)
Research institutes	Conducting of large-scale R&D projects related to 5G-enabled technologies (e.g., Seoul National University and Hanyang University); formal and informal evaluation of public- and private-sector approaches (e.g., the Korea Development Institute and Korea Institute for International Economic Policy)
Additional private-sector partners	Development of specific products and services built on 5G, such as autonomous vehicles (Hyundai and other <i>chaebols</i> ; small and medium-sized enterprises in South Korea continue to be underrepresented in this sector relative to other markets)
Other	Public oversight (trade associations, civil-society groups, and labor unions)

national security. Accordingly, the following sections explore how some of these concerns are playing out in practice through three case studies: digital healthcare, autonomous vehicles, and smart cities. Although these are not the only fields where 5G applications show promise, they are demonstrative of key areas where a bet on 5G could yield significant returns—though only if products are able to accurately assemble, use, and exchange diverse sets of complex and often sensitive information.<sup>11</sup>

<sup>11</sup> See, for example, the efforts by the Asan Institute for Policy Studies, the KT Economic and Management Research Institute, and the Ministry of Science and ICT to break down 5G's potential contributions to the South Korean economy, including suggestions that healthcare, automobiles, and smart cities may be responsible for as much as one-fourth of the total value added. J. James Kim and Hong Sanghwa, "Opportunities and Challenges for South Korea in the New Era of 5G," Asan Institute for Policy Studies, Issue Brief, 2019, <http://en.asaninst.org/contents/opportunities-and-challenges-for-south-korea-in-the-new-era-of-5g>; and "Science, Technology & ICT Newsletter (NO.41)." Of note, while the 5G+ Strategy emphasizes five core services as central to the country's 5G ambitions, two were explored during field research yet not selected for inclusion in this final report. Smart manufacturing—though a potentially significant source of new gains—was not included due to inconclusive field research findings and recommendations, beyond points noted in other cases here. Immersive content was also not included on the basis of general interviewee skepticism on how significantly it might feature in overall returns on investments.

## Digital Healthcare

In many regards, South Korea should be ideally positioned to emerge as a global leader in digital healthcare—an umbrella term that covers a range of fields from telemedicine to the development of drugs with guidance from AI. In surveys conducted by the Organisation for Economic Co-operation and Development (OECD), South Koreans regularly report some of the highest satisfaction rates with their healthcare system, and the country's response to the Covid-19 pandemic has been praised internationally.<sup>12</sup> South Korea also has a vibrant medical tourism industry that attracts large numbers of overseas patients every year, suggesting that it has already nurtured globally competitive talent in at least certain areas of healthcare.<sup>13</sup> In the specific context of applying 5G-enabled solutions to public health challenges, both domestic industries and universities have been proactive in crafting innovative partnership models that allow them to bring new services and capabilities to scale. Among these efforts, in April 2019, Yonsei University Health System signed a memorandum of understanding with SK Telecom to introduce specialized 5G services into its hospitals.<sup>14</sup> KT Corporation and Samsung Medical Center are pursuing a similar partnership, as are LG U+ and the Eulji Foundation.<sup>15</sup>

However, developers looking to bring new digital healthcare services to market within South Korea can face a number of legal barriers and regulatory restrictions. In interviews and other conversations in Seoul and Sejong in October 2019, several government and industry associations expressed concerns about intentional limitations on how health and other personal information is aggregated, shared, and transmitted within South Korea. The country's Personal Information Protection Act (PIPA) is considered one of the world's more rigorous and restrictive data protection frameworks.<sup>16</sup> PIPA not only establishes civil and criminal liabilities for violations but also requires that data be used for task-limited purposes by a single entity and only after receiving explicit user consent.<sup>17</sup>

PIPA was passed in response to valid concerns about the risk of personal information being exploited, both via data breaches and by firms themselves. Yet the trade-off is that, in practice, PIPA often severely limits the ways in which an individual's information can be exchanged between different organizations, regardless of whether individuals provide consent. Similarly, these restrictions also affect how historical data can be used as training data. Such larger sets of data could be a key means of improving the diagnostic capabilities of AI and machine-learning systems, which in turn could prove critical to developing precision medicines.

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<sup>12</sup> See, for example, Organisation for Economic Co-operation and Development (OECD), *Government at a Glance 2017* (Paris: OECD Publishing, 2017), 233; Ashley Johnson, "Strengthening the U.S.-ROK Alliance for Job Creation and Sustainable Development," NBR, Workshop Report, June 7, 2018, <https://www.nbr.org/publication/strengthening-the-u-s-rok-alliance-for-job-creation-and-sustainable-development>; and Gregg A. Brazinsky, "South Korea Is Winning the Fight against COVID-19. The U.S. Is Failing," *Washington Post*, April 10, 2020, <https://www.washingtonpost.com/outlook/2020/04/10/south-korea-is-winning-fight-against-covid-19-us-is-failing>.

<sup>13</sup> See, for example, Neil Lunt et al., "Medical Tourism: Treatments, Markets and Health System Implications: A Scoping Review," OECD Directorate for Employment, Labour and Social Affairs, 2011, <https://www.oecd.org/els/health-systems/48723982.pdf>; and Lee Han-soo, "Korea Selected as 'Medical Tourism Destination of the Year,'" *Korea Biomedical Review*, December 9, 2019, <http://www.koreabiomed.com/news/articleView.html?idxno=6964>.

<sup>14</sup> Dean Koh, "Yonsei University Health System to Introduce 5G-Powered Digital Hospital," *Healthcare IT News*, April 30, 2019, <https://www.healthcareitnews.com/news/yonsei-university-health-system-introduce-5g-powered-digital-hospital>.

<sup>15</sup> Cho Mu-Hyun, "KT and Samsung to Apply 5G for 'Smart Hospital,'" *ZDNET*, September 25, 2019, <https://www.zdnet.com/article/kt-and-samsung-to-apply-5g-for-smart-hospital>; and Jin Mi-ji, "LG U+ Partners with Eulji Foundation to Make 5G Hospital," *Korea JoongAng Daily*, September 10, 2019, <https://koreajoongangdaily.joins.com/news/article/article.aspx?aid=3067846>.

<sup>16</sup> For a nuanced assessment of how South Korea's privacy regime compares to European standards, see Haksoo Ko et al., "Structure and Enforcement of Data Privacy Law in South Korea," Brussels Privacy Hub, Working Paper, October 2016, <https://brusselsprivacyhub.eu/BPH-Working-Paper-VOL2-N7.pdf>.

<sup>17</sup> The text of the Personal Information Protection Act is available in English at <http://koreanlii.or.kr/w/images/0/0e/KoreanDPAct2011.pdf>.

Over the past several years, an inter-ministerial effort involving the Ministry of Health and Welfare and the Ministry of Land, Infrastructure, Transport and Tourism, among other agencies, has sought to tackle these concerns. As several scholars have documented, this has helped reduce barriers to the integration of health data into other public datasets across and within government agencies.<sup>18</sup> To this end, the Ministry of Health and Welfare and others have suggested that some of the country's accomplishments in responding to the Covid-19 pandemic owe to the government's enhanced abilities to share and aggregate timely information on the virus's community spread.<sup>19</sup>

Yet critics of how this inter-ministerial effort has prioritized reforms continue to fall into two camps. On one side are individuals and privacy organizations concerned that not enough has been done to mitigate surveillance and other abuse risks; on the other is a vocal group of industry advocates who have argued that reform efforts have ignored the need for similar changes in regulating data transfers that involve the private sector. To these points, the National Assembly is currently reviewing additional reforms to PIPA and other privacy legislation (as will be discussed later in greater depth), though how their implementation might proceed remains to be seen.

Even with reforms on these fronts, others have noted more fundamental restrictions on the kinds of digital healthcare services that can be delivered within South Korea. The country's Medical Service Act and related sectoral legislation set strict regulatory guidelines for how and whether medical information can be shared digitally. In practice, this has created a de facto ban on telemedicine within South Korea. As recounted by Gwanhoo Lee, a professor at American University, some of the country's restrictions emerged out of concerns about maintaining high standards of patient care.<sup>20</sup> This includes stringent credentialing prerequisites designed to limit the role of pseudo-experts in providing healthcare information. These requirements, however, are potentially at odds with a startup model that brings together both medical practitioners and technologists to deliver services. Other regulations establish requirements for in-person consultations on sensitive topics, which can reduce access to various healthcare services for the homebound. While government offices have authorized limited telemedicine services on a case-by-case basis over the past few years—including as a means to facilitate social distancing during the Covid-19 pandemic—the Korean Medical Association and various other organizations representing medical practitioners remain opposed to the Blue House and National Assembly approving larger regulatory changes.<sup>21</sup> This leaves the digital healthcare industry in South Korea with a difficult path forward. Further development requires answering complex questions about how to mitigate risks while also navigating trade-offs.

### *Autonomous Vehicles*

Much like healthcare, transportation is an industry where demand, urgent needs, and technical potential all align in ways that make the industry ripe to benefit from the 5G era. Between 2014 and 2040, Asia is expected to see 550 million more cars added to its roads. The self-driving vehicle is viewed by many as part of the solution for how this can be done in ways that minimize traffic

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<sup>18</sup> Hannah Kim, So Yoon Kim, and Yann Joly, "South Korea: In the Midst of a Privacy Reform Centered on Data Sharing," *Human Genetics* 137, no. 8 (2018): 627–35.

<sup>19</sup> Helen Chan, "Pervasive Personal Data Collection at the Heart of South Korea's Covid-19 Success May Not Translate," Thomson Reuters, March 26, 2020, <https://blogs.thomsonreuters.com/answeron/south-korea-covid-19-data-privacy>.

<sup>20</sup> Author's interview with Gwanhoo Lee, Washington, D.C., October 2019.

<sup>21</sup> See, for example, "S. Korea Adopts Telemedicine to Battle Coronavirus Outbreak," *Korea Herald*, March 13, 2020, <http://www.koreaherald.com/view.php?ud=20200313000725>; and Choi Yoon Sup, "Temporary Nod for Telemedicine against Covid-19 Too Hasty," *Korea Biomedical Review*, March 17, 2020, <http://www.koreabiomed.com/news/articleView.html?idxno=7733>.



congestion, maximize road safety, and mitigate air pollution levels.<sup>22</sup> To achieve these goals, autonomous vehicles must be able to mimic (or improve on) human reflexes. Some estimates suggest that this requires a system that can make decisions in real time with a latency of less than 7 milliseconds. At best, 4G LTE can deliver 30–40 milliseconds, whereas 5G is capable of delivering well under the necessary threshold.<sup>23</sup>

Thus, the ability to link 5G technologies with autonomous vehicles offers enormous potential. Over the course of more than a dozen interviews I conducted in Seoul and Washington, D.C., in fall 2019, the autonomous vehicle industry was repeatedly called out as holding the most promise for how South Korea's early bet on 5G could pay off in the near term, especially given how aggressively the South Korean government and major companies are pursuing the technology. Hyundai Motor Corporation alone is anticipated to invest roughly \$35.5 billion in bringing autonomous vehicles to market, with its first cars projected to hit the road in 2021.<sup>24</sup>

Equally important, though, is understanding the headwinds that autonomous vehicles face within South Korea that other promising technologies do not. South Korean stakeholders not only are heavily investing in the technologies themselves; they also are actively working to overcome several prominent legal and regulatory barriers to deployment, including coming up with ways to adapt insurance rules and operator responsibilities to address liabilities related to accidents that involve self-driving cars.<sup>25</sup> Hyundai Motor Corporation and partners such as Hanyang University have taken an incremental approach to ensuring that vehicles both have access to the data they need and know how to use it by testing vehicles under lab conditions or in other controlled environments to methodically assess different stages of road readiness.

The case of autonomous vehicles demonstrates that good, robust regulation need not be viewed as the enemy of innovation; in fact, it can increase trust and confidence that a product can be operated safely. Yet it would be misleading to paint the prospects for a South Korean champion to dominate the market for autonomous vehicles as exclusively rosy. As part of their training data, autonomous vehicles need to be able to reliably access and interpret large amounts of information about real-world driving conditions, including by drawing on various forms of topographical, geospatial, and land-use data. These kinds of datasets can reveal information about the placement of critical infrastructure and other national security assets—a point that the South Korean government has regularly highlighted to justify restricting access.

In addition to the aforementioned PIPA, geographic datasets fall under the purview of the Act on the Protection, Use, Etc. of Location Information and the 1961 Korean Land Survey Act. Taken together, this legislation not only imposes restrictions on what kinds of data can be collected but also limits the portability of geographic data outside South Korea and requires that companies set

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<sup>22</sup> “Asia/World Energy Outlook 2016: Consideration of 3E’s+S Under New Energy Circumstances in the World,” Institute of Energy Economics, Japan, October 2016, <http://eneken.ieej.or.jp/data/7199.pdf>; and Clara Gillispie and Laura Schwartz, “How Asia’s Auto Boom Shapes Its Energy Security Strategies,” *Georgetown Journal of Asian Affairs* 4, no. 2 (2019): 25–37.

<sup>23</sup> “6 Key Connectivity Requirements of Autonomous Driving,” *IEEE Spectrum*, <https://spectrum.ieee.org/transportation/advanced-cars/6-key-connectivity-requirements-of-autonomous-driving>.

<sup>24</sup> Kyunghee Park, “South Korea Speeds Up Plans for Autonomous, Electric and Flying Cars,” *Bloomberg*, October 15, 2019, <https://www.bloomberg.com/news/articles/2019-10-15/south-korea-speeds-up-plans-for-robocars-electric-vehicles>.

<sup>25</sup> Undeniably, certain barriers may prove difficult to surmount. One example is the resistance of labor unions to autonomous vehicles providing taxi and ride-sharing services. South Korea’s taxi unions are particularly powerful and had an influential impact in limiting Uber’s entrance into the country. However, this concern, though notable, is not considered here because its impact would be on patterns of domestic demand rather than on whether autonomous vehicles can be deployed in South Korea more broadly.

up local servers for storage.<sup>26</sup> While the purpose of these restrictions is to keep certain kinds of information out of the hands of bad actors (such as North Korean hackers), some companies have found them to be unworkable. Google, for example, opted to limit its popular mapping services in South Korea rather than navigate this process or compromise services. Although this regulation may be viewed as opening opportunities for domestic developers, it has knock-on implications for how quickly other kinds of companies can develop new products that can compete globally. Ride-sharing apps such as Uber and Grab, for example, often rely on Google Maps application programming interfaces (APIs) to achieve economies of scale in providing location services across multiple markets. Since South Korean mapping alternatives have not built up this kind of global reach, the country's ride-sharing apps face a competitive disadvantage when trying to expand into international markets.

Developers of autonomous vehicles need to demonstrate that their vehicles can appropriately navigate complex, real-world conditions without exceptions. As specific vehicles move into later phases of testing, geographic restrictions could ultimately undercut the kinds of studies that South Korean researchers can conduct to figure out why autonomous vehicles might be struggling under certain conditions. These restrictions could also limit how findings from South Korea can be included in cross-market studies.

None of these restrictions necessarily inhibit the rise of a significant, competitive autonomous vehicle player in South Korea. They may also carry costs that various decision-makers are willing to accept (if the alternative is viewed as posing unacceptable risks). But in the context of the goals of the 5G+ Strategy, these restrictions do suggest ways in which creating limited, domestic testbeds for development might not be enough to enable South Korean companies to bring new products to scale. Much like in the next and final case study, this struggle has implications for how South Korean firms might be able to compete globally.

### *Smart Cities*

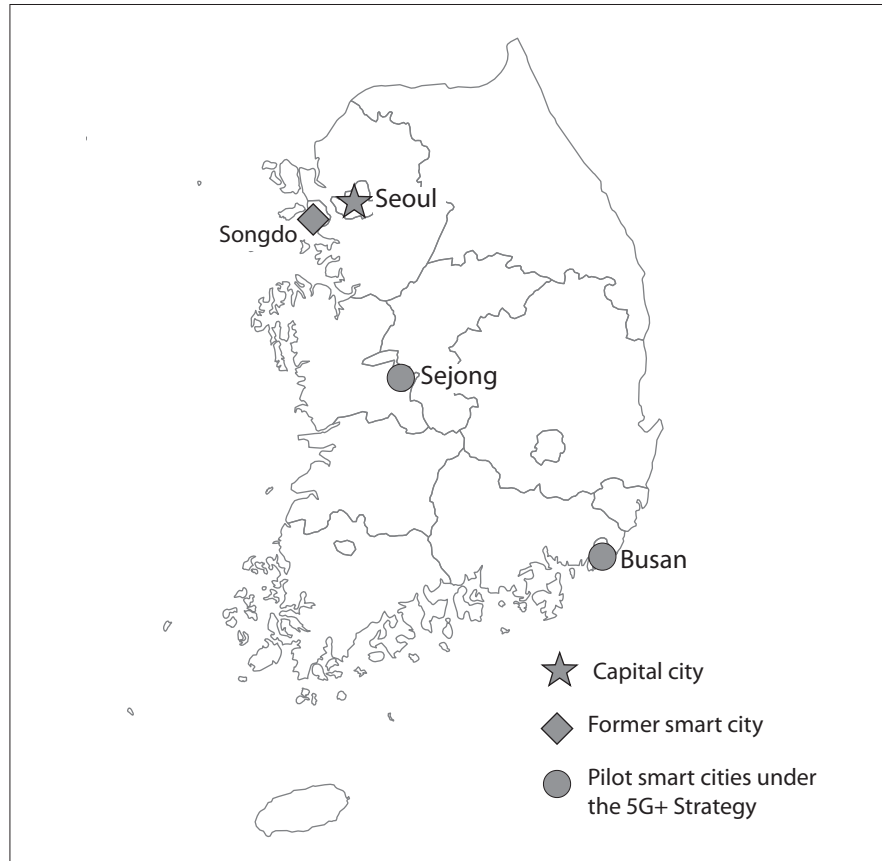
Smart cities bring together a number of industrial threads that underpin Moon's 5G+ Strategy.<sup>27</sup> They can seek to integrate a range of technologies—from autonomous vehicles and drones to smart manufacturing and AI-enabled security systems—into a single geographic area so that different services can benefit from and add to a larger pool of available public data. Smart cities also represent an opportunity for policy to play a more direct and substantial role in accelerating the deployment of new technologies (for example, through requiring developers or city procurements to align with certain standards that inevitably push them toward more advanced technologies). To that end, the South Korean government has designated the areas surrounding both Sejong and Busan as sites for pilot 5G smart cities (see **Figure 1**). In Sejong, for example, the government is

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<sup>26</sup> Julia Yoon, "South Korean Data Localization: Shaped by Conflict," University of Washington, Henry M. Jackson School of International Studies, February 28, 2018, <https://jsis.washington.edu/news/south-korean-data-localization-shaped-conflict>. As Yoon has thoughtfully argued, this makes South Korea's approach to data localization relatively unique: "unlike other countries, South Korean data localization regulations on data not only are meant to protect the privacy and security of citizens, but also put strict limitations on geographical data for national security reasons."

<sup>27</sup> Although definitions of a smart city abound, the World Bank notes that most definitions generally convey one or both of the following ideas: "a technology-intensive city, with sensors everywhere and highly efficient public services, thanks to information that is gathered in real time by thousands of interconnected devices"; or "a city that cultivates a better relationship between citizens and governments—leveraged by available technology." See Arturo Muente-Kunigami and Victor Mulas, "Smart Cities," World Bank, Brief, January 8, 2015, <https://www.worldbank.org/en/topic/digitaldevelopment/brief/smart-cities>.

FIGURE 1 South Korea's pilot smart cities



specifically focusing on bringing to scale smart projects related to energy and transportation.<sup>28</sup> Linking this push to the fifth pillar of his 5G+ Strategy, President Moon has advocated for early engagement with counterparts in Singapore, and with ASEAN more broadly, with the aim of ultimately crafting a successful business model that South Korea can export to countries across Southeast Asia.<sup>29</sup>

Smart cities raise many of the same questions about privacy, data protection, and localization requirements that the two prior case studies do. To that end, they underscore the urgency of crafting effective policy around these issues—given the sheer volume of information about everyday life that such cities may be tasked with collecting, and that this could enable mass surveillance or leave communities vulnerable to cyberattacks if not well-managed. But reviewing South Korea's history with smart cities in its own right also highlights an additional challenge that South Korea and other countries continue to grapple with: the reality that potentially available data is no guarantee for good or useful analysis. In some cases, this might be the most pivotal factor in determining how successful South Korea is in developing globally competitive 5G-enabled products.

<sup>28</sup> Kyongae Choi, "(LEAD) S. Korea to Build 1st Smart City in Busan by 2024," Yonhap, November 24, 2019, <https://en.yna.co.kr/view/AEN20191123003251320>; and Lee-ho Jeong, "Busan and Sejong to Become First Smart Cities," *Korea JoongAng Daily*, January 29, 2018, <https://koreajoongangdaily.joins.com/news/article/article.aspx?aid=3043959>.

<sup>29</sup> Ibid.

A poignant example is the story of Songdo, a planned community near Incheon International Airport that for years was touted as South Korea's opportunity to be the first country in the world to successfully establish a true smart city. City planners invested heavily to ensure that by the time the city was opened to residents in 2015, Songdo would use some of the most advanced technologies on the market, including by deploying advanced analytics to design cleaner, more efficient transit systems. The city, however, continues to struggle with attracting residents and local industries. Although the reasons for this are hotly contested, some criticism has centered on the idea that the city's planners simply made faulty assumptions about prospective residents. This includes, for example, failing to invest from the outset in museums, cinemas, and other cultural institutions—features that may seem irrelevant to the stated goal of promoting sustainable living, but that are nonetheless invaluable to making a relatively isolated city attractive.<sup>30</sup>

5G-enabled systems promise to generate large amounts of data that planners of future smart cities can use to inform their decisions. Yet, at the end of the day, such data can still be plagued by surprising gaps in coverage or selective biases in how it is processed and interpreted. City planning, in particular, can be undercut by any number of incorrect assumptions or algorithmic biases—for example, focusing on solutions that meet the needs of a theoretical rush-hour commuter while overlooking the elderly, children, and adults who regularly bike or walk rather than drive.<sup>31</sup> Failing to catch and address such systemic biases can produce cities that misrepresent community priorities. It can also result in different groups being subjected to serious forms of discrimination or other harm.

In terms of improving data analytics, a key pillar of South Korea's 5G+ Strategy is exploring what it means to nurture globally competitive talent, including through resourcing efforts to “adopt practical and advanced 5G courses within major ICT talent training programs.” Yet better training on its own might not be enough. As is the case in many countries, South Korea's community of high-tech experts (including in fields such as AI) tends to be relatively homogenous in its professional, social, and demographic composition. For example, in 2017, women accounted for only 18% of South Korean researchers working in STEM-related fields, which influences what products are built and results in an enormous amount of untapped potential.<sup>32</sup> As aptly argued by Troy Stangarone of the Korea Economic Institute, a “South Korean AI field that is dominated by males could socially reinforce gender patterns and be a less valuable commercial product for sale abroad.”<sup>33</sup> Thus, addressing these concerns is not only a matter of reducing potential sources of bias. It is also simply good business when aiming to establish an industrial foundation that nurtures globally competitive talent, as the 5G+ Strategy strives to do.

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<sup>30</sup> Linda Poon, “Sleepy in Songdo, Korea's Smartest City,” CityLab, June 22, 2018, <https://www.citylab.com/life/2018/06/sleepy-in-songdo-koreas-smartest-city/561374>; and Chris White, “South Korea's ‘Smart City’ Songdo: Not Quite Smart Enough?” *South China Morning Post*, March 25, 2018, <https://www.scmp.com/week-asia/business/article/2137838/south-koreas-smart-city-songdo-not-quite-smart-enough>.

<sup>31</sup> Caroline Criado-Perez, *Invisible Women: Exposing Data Bias in a World Designed for Men* (New York: Abrams Books, 2019).

<sup>32</sup> UN Educational, Scientific, and Cultural Organization (UNESCO), “Women Still a Minority in Engineering and Computer Science,” September 2, 2017, [http://www.unesco.org/new/en/media-services/single-view/news/women\\_still\\_a\\_minority\\_in\\_engineering\\_and\\_computer\\_science](http://www.unesco.org/new/en/media-services/single-view/news/women_still_a_minority_in_engineering_and_computer_science).

<sup>33</sup> Troy Stangarone, “Gender Inequality Makes South Korea Poorer,” *Diplomat*, June 14, 2019, <https://thediplomat.com/2019/06/gender-inequality-makes-south-korea-poorer>.

## Scenarios for Future Development

As Seoul looks at how it might seek to shape the 5G era, a wide range of stakeholders have weighed in on what they envision as the most promising technologies. Meanwhile, as detailed earlier, the Blue House has developed its own strategy to support how these technologies can be better deployed. But through case studies of digital healthcare, autonomous vehicles, and smart cities, this report has sought to question how effective this strategy can be without taking on a more explicit focus on barriers to leveraging data and information and clarifying the extent to which removing or maintaining specific barriers is a national priority. How important is it to South Korea to secure the early market in certain 5G-enabled technologies—such as digital healthcare—if doing so might require reforms that run up against opposition from privacy advocates or labor groups? Is establishing limited testbeds enough to give developers a sense of how technologies function in real-world conditions? Finally, what does it mean to build a globally competitive industrial base when it comes to improving data analytics?

The current framing of South Korea's 5G+ Strategy only indirectly or lightly touches on each of these questions, something that should be considered as part of additional implementation measures as well as in the design of other strategies to complement this effort. To that end, the Moon administration's nascent national AI strategy identifies several potential steps to reduce barriers around access to data, which could be applied to the execution of the 5G+ Strategy. This includes language suggesting that Seoul will prioritize making additional datasets within the public sector (i.e., under its direct purview) available to developers.<sup>34</sup> Still, this remains only a partial measure. Developers in South Korea currently face barriers not only to what kinds of information are available but also to how information can be used or exchanged (as in the case of digital healthcare).<sup>35</sup> Given that these questions apply not only to AI but also to other types of 5G technologies, elevating these discussions within the bounds of the 5G+ Strategy could provide a platform for a more comprehensive discussion of how certain barriers affect a wide range of technologies.

Seoul cannot afford to think about these questions in purely domestic terms. While South Korea has an early technological edge in 5G, its relatively modest population size all but guarantees that other markets—from the United States to China to ASEAN—will ultimately develop a larger consumer base for 5G products. Developers in South Korea are keenly interested in ensuring that domestic policies do not undercut their competitiveness in international markets.<sup>36</sup> The following analysis explores specific tactical questions and potential options for how Seoul might move forward, either on its own or in tandem with other countries interested in strengthening governance practices.

### *Advancing Reforms While Sustaining Safeguards on Privacy, Consent, and Data*

PIPA, the Act on the Protection, Use, Etc. of Location Information, the Korean Land Survey Act, the Medical Service Act, and other sector-specific legislation all place significant

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<sup>34</sup> Ministry of Science and ICT (South Korea), “Ingongjineung (AI) Gukgajeollyak Balpyo” [Announcement of AI Strategy], December 17, 2019, available at <http://www.korea.kr/news/pressReleaseView.do?newsId=156366736>.

<sup>35</sup> To this point, although the AI strategy does include an acknowledgment that some legislation may be in need of revision, what legislation (or even what kind of legislation) is left unspecified.

<sup>36</sup> For further discussion, see Clara Gillispie, “South Korea's 5G Ambitions,” Korea Economic Institute of America, Academic Paper Series, March 23, 2020, [http://keia.org/sites/default/files/publications/kei\\_aps\\_gillispie\\_200316.pdf](http://keia.org/sites/default/files/publications/kei_aps_gillispie_200316.pdf).

restrictions on how data can be used, stored, and aggregated in South Korea—and not without good reasons. South Korea is not alone in restricting the sharing, aggregation, and transmission of various forms of personal data, especially healthcare data, given the often sensitive nature of the underlying information. Japan, India, Taiwan, and the United States have their own restrictions on data sharing in this space, including requirements for when and how consent must be obtained.<sup>37</sup> However, as aptly put by François Godement, sound frameworks for regulating privacy are often a moving target. As technologies and values evolve, these frameworks can benefit from regular reassessment.<sup>38</sup>

More technically advanced security systems powered by 5G could play a role in alleviating some of these concerns, as suggested by the 5G+ Strategy's emphasis on system maintenance. Yet even so, technical measures seem unlikely to resolve the debates. Although anonymization tools and processes have been floated as a means for allowing South Korea to loosen its restrictions on transfers without undercutting privacy protections, numerous experts have noted serious limitations in terms of the ability to truly and permanently anonymize data.<sup>39</sup> As the case study of digital healthcare demonstrates, even if technical safeguards could reduce the extent to which systems are vulnerable to cyberattacks or other data breaches, domestic stakeholders may push back against the idea of virtual consultations out of principle (for example, out of concern about standards of patient care).

Nonetheless, the public debate on what does strike the right balance among privacy protections, economic growth, and social welfare is itself evolving. In January 2020 the National Assembly passed several amendments to the country's existing suite of privacy legislation, including to PIPA. An analysis by legal scholars has suggested that, among other changes, amendments to PIPA could enable the unrestricted use of pseudonymized data for scientific and statistical purposes and increase the number of situations in which an entity is allowed to reuse previously collected personal data. At the time of writing, these amendments are anticipated to be put before the Blue House in July 2020.<sup>40</sup>

Questions remain about what efforts to operationalize these amendments might look like. Seoul might nonetheless benefit from some additional (and relatively narrow) targeted revisions to PIPA and other aforementioned laws. These could include reducing discrepancies between how different groups are treated (e.g., government vs. private sector and entities with a local vs. overseas server), so long as these groups meet comparable thresholds for security and accountability. Seoul should also strongly consider what it might require to grant more permanent approval to telemedicine as a general category of service, in anticipation that ongoing global challenges linked to Covid-19 could drive greater demand for services and shifts in the domestic consensus on this issue.

Collectively, such revisions could not only have substantial implications for enabling new products to be brought to market, but also have worrying knock-on effects on consumer privacy and welfare safeguards. At a minimum, through its amendments to PIPA, Seoul is already

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<sup>37</sup> For further discussion, see François Godement, "Digital Privacy: How Can We Win the Battle?" Institut Montaigne, November 2019, <https://www.institutmontaigne.org/en/publications/digital-privacy-how-can-we-win-battle>; and Syed Mohamed Aljunid et al., "Health-Care Data Collecting, Sharing, and Using in Thailand, China Mainland, South Korea, Taiwan, Japan, and Malaysia," *Value in Health* 15, no. 1 (2012): 132–38, <https://www.sciencedirect.com/science/article/pii/S1098301511035418>. Of note, however, is that due to the different structure of the healthcare system in each of these countries, the same restrictions can have a more or less limiting effect. For example, South Korea, Taiwan, and Japan have universal healthcare systems with larger roles for government entities in providing services.

<sup>38</sup> Godement, "Digital Privacy."

<sup>39</sup> Ibid.

<sup>40</sup> Kwang Hyun Ryoo et al., "Korea's Data Privacy Laws Amended, Paving Way for Big Data Services," Bae, Kim, and Lee, January 20, 2020, <http://www.bkl.co.kr/upload/data/20200120/bkl-legalupdate-20200120.html#>.

modestly bucking global trends toward increasing protections. For example, India is poised to pass its own data protection bill (which shares a number of similarities with current South Korean standards, including significant fines and criminal penalties for violators). Even China is looking to implement more robust standards for personal data protection.<sup>41</sup> Though not at the national level, within the United States, California has passed its own privacy legislation, the California Consumer Privacy Act, as well as legal requirements for security safeguards on devices built for the Internet of Things.<sup>42</sup> Both policies entered into effect in January 2020 and are expected to have ripple effects in informing wider U.S. thinking.

If South Korea's policies begin to drift from other global best practices on privacy and data protection, this could undercut the country's ambitions for expanding its 5G market share in North America, Europe, and Asia—in addition to being counter to domestic interests. To avoid such drift, Seoul should continue to prioritize close coordination with other countries in shaping how safeguards might be adapted to better fit a 5G era. The APEC Privacy Framework and the European Union's General Data Protection Regulation suggest two potential starting points. Several APEC privacy framework ideals, such as focusing efforts on preventing harm and giving individuals the ability to choose what can be collected or shared, are already deeply embedded within South Korea's data governance culture. With capitals from Tokyo to Washington interested in practices that can be adopted region-wide, South Korea's experience with recalibrating protective measures within a fairly mature framework for data governance could position the country to be at the forefront of setting the regional gold standard. In these ways, South Korea could not only safeguard its own interests but also support the transition in other countries from general principles to specific implementation.

### *Weighing Trade-Offs in Measures That Restrict Data Flow*

Restrictions on the portability of domestic data, including data localization requirements, are likely to remain a highly contentious issue. Although South Korea views such restrictions as a way to minimize its exposure to various security threats, this line of reasoning at best has a checkered ability to deliver on its intended results. As Rishab Bailey and Smriti Parsheera have explored, data localization requirements do not inherently force firms to implement higher levels of security protection. Instead, restrictions on portability can compromise any one group's ability to fully understand the larger story. In the meantime, these requirements impose additional costs, which could make it difficult for certain products to be developed or deployed domestically (as well as reinforce advantages that larger, established firms have over small and medium-sized enterprises).<sup>43</sup> To this point, one study found that “for many countries that are considering or have considered forced data localization laws, local companies would be required to pay 30–60% more for their computing needs than if they could go outside the country's borders.”<sup>44</sup> Thus, localization

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<sup>41</sup> For more on the evolution of China's data governance regime, including the issue of what qualifies as “important data,” see Samm Sacks, Mingli Shi, and Graham Webster, “The Evolution of China's Data Governance Regime: A Timeline,” *New America*, February 8, 2019, <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/china-data-governance-regime-timeline>.

<sup>42</sup> More detailed information on both pieces of legislation can be found at California Legislative Information, “Senate Bill No. 327,” September 28, 2018, [https://leginfo.ca.gov/faces/billNavClient.xhtml?bill\\_id=201720180SB327](https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB327); and California Department of Justice Office of the Attorney General, “California Consumer Privacy Act (CCPA),” <https://oag.ca.gov/privacy/ccpa>.

<sup>43</sup> Rishab Bailey and Smriti Parsheera, “Data Localisation in India: Questioning the Means and Ends,” *National Institute of Public Finance and Policy*, Working Paper, no. 242, September 2018, [https://www.nipfp.org.in/media/medialibrary/2018/10/WP\\_2018\\_242.pdf](https://www.nipfp.org.in/media/medialibrary/2018/10/WP_2018_242.pdf).

<sup>44</sup> “Quantifying the Cost of Forced Localization,” *Leviathan Security Group*, June 24, 2015, <https://static1.squarespace.com/static/556340ece4b0869396f21099/t/559dad76e4b0899d97726a8b/1436396918881/Quantifying+the+Cost+of+Forced+Localization.pdf>.

requirements may be undercutting the speed and pace of how South Korean firms can expand into other markets.<sup>45</sup>

Can South Korea have it both ways by continuing to restrict access to large amounts of domestic geographic data, while still finding ways to make sure that developers can tap into substantial and complete sets of training data? It is possible. One way of sidestepping this issue might be for the country to expand its network of international partnerships and collaborations for bringing new 5G-enabled products to market. For example, if the concern linked to providing developers with access to complete and unredacted land-use data (that they can use in testing and refining the capabilities of autonomous vehicles) is that it would expose too much information about the domestic landscape, then shifting elements of research and development overseas to markets that do not have this concern could be an answer. The U.S. states of both Washington and California, for example, have already conducted several pilot tests for autonomous vehicles and have long-standing bilateral partnerships with South Korean city governments and firms that could serve as a basis for new cooperation in this space.

More broadly, South Korea also stands to lose if other countries directly copy its existing model for restricting data flows. With less than 1% of the world's population, the country has long pursued a strategy of export-oriented growth, and sustained efforts to reduce trade barriers have had positive impacts on boosting its economic outlook. As South Korean firms look at international markets as key destinations for their 5G-enabled goods and services, cross-border data flows are an indispensable part of what would allow different applications or services to function in various markets (or at the very least, function without taking on additional operating costs, which could price South Korean firms out of being competitive with local players). Yet over the past decade, the number of countries requiring data localization regimes has ballooned and threatens to undermine cross-border data flows. This is something that should be viewed as a direct threat to South Korea's national economic interests.

As argued by several scholars at the Information Technology and Innovation Foundation, "rather than tell firms where they can store or process data, countries should hold firms accountable for managing data they collect, regardless of where they store or process it."<sup>46</sup> In this regard, the emerging concept of "data free flow with trust" that has been championed by Prime Minister Shinzo Abe of Japan offers one potential way forward. Trust is ensured by countries making shared commitments to safeguards around personal and sensitive data and also implementing stringent cybersecurity protections. Yet there are conflicting perspectives across the Indo-Pacific as to what "trust" should mean in this context, particularly when it comes to intraregional divides over providing access to data for national security and law-enforcement purposes.<sup>47</sup> To the extent that Seoul weighs in on these discussions in the G-20 or APEC (both of which are currently expected to revisit this issue in the second half of 2020), it could play a meaningful role in guiding how countries might navigate these debates. But South Korea still has much work to do in clarifying its own red lines on cross-border data flows before reaching this point.

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<sup>45</sup> As in the case of Google, such requirements may also lead international players to skip the South Korean market, which in turn limits the kind of products and services that local consumers might enjoy.

<sup>46</sup> Nigel Cory, Robert D. Atkinson, and Daniel Castro, "Principles and Policies for 'Data Free Flow with Trust,'" Information Technology and Innovation Foundation, May 27, 2019, <https://itif.org/publications/2019/05/27/principles-and-policies-data-free-flow-trust>.

<sup>47</sup> Author's conversations with senior Indian academics and policymakers in December 2019 and January 2020; and William A. Carter and Arun Mohan Sukumar, "RESOLVED: Japan Could Lead Global Efforts on Data Governance," Center for Strategic and International Studies, Debating Japan, June 27, 2019, <https://www.csis.org/analysis/resolved-japan-could-lead-global-efforts-data-governance>.



## *Moving from Gathering Information to Producing Real Insight*

South Korea's challenges in effectively exploiting data and information are not exclusively legal or regulatory in origin. Design team biases and faulty assumptions about the interests of potential users have acted as impediments to converting available information into useful information. This is actively costing Seoul.

At least part of this problem has a remedy that is relatively straightforward: listening to more voices while decisions are being made. To that end, Jung-hoon Lee, an expert on smart cities who advises the city of Seoul, has argued that one of the failings of past smart city efforts was an emphasis on a one-size-fits-all approach to development, failing to integrate substantial mechanisms for community feedback into various planning and execution stages. As one way to address this issue, more recent projects have begun to convene small-group committees to invite local input early on and at regular intervals (rather than implementing a strictly top-down or technology-led approach to navigating development choices).<sup>48</sup> This kind of hybrid approach should be encouraged as a potential template for how other projects might reduce blind spots or biases in their development at early stages.

However, simply bringing more people to the table is not enough; good decision-making depends on ensuring greater diversity among those represented. This suggests a much broader task ahead for South Korea—one that will require attention to recruitment, retention, and the elimination of entrenched biases. Similarly, ensuring that universities prepare individuals to enter the workforce with skills and competencies in AI and advanced computer programming is an essential task but only a partial measure. South Korea also faces a more fundamental need to better prepare future workers to look at challenges through an interdisciplinary lens that captures the larger story.

Elements of each of these various tasks are already underway. Yet more could still be done, particularly in the context of engaging with international counterparts in government, industry, and the research community as resources, partners, and advocates in developing new best practices. As part of this way forward, South Korea should consider expanding researcher exchanges, information sharing, and joint initiatives with other countries on specific areas of 5G collaboration such as autonomous vehicles or digital healthcare. This could serve as a means to identify additional near-term solutions that might help overcome specific barriers to successful commercialization. To that end, Washington State's recent decision to launch an "innovation partnership zone" for 5G complements President Moon's emphasis on creating testbeds for piloting new 5G projects. Local efforts within the state that focus specifically on energy and healthcare technologies could serve as additional avenues for collaboration. Similar initiatives are being launched in other U.S. states, as well as being taken up by regional forums such as APEC, where South Korea is already active and influential in driving dialogue on 5G.

## Conclusion

South Korea has earned a reputation as one of the world's most innovative economies. Its substantial investments in 5G could position domestic stakeholders to realize significant social,

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<sup>48</sup> Author's conversation with Jung-hoon Lee, Seoul, October 2019. More on Lee's insights into the history of and current development approaches for various smart cities projects can be accessed online at <http://isiyonsei.cafe24.com/#publication>.

economic, and strategic benefits if such investments are matched with the right comprehensive policy strategy. This includes a whole-of-government approach that engages with the private sector, civil society, and international counterparts on addressing ongoing barriers to developing and deploying new 5G products. As this report has argued, when it comes to technologies that rely intensely on the ability to assemble and exploit big data, such an effort should prioritize legal and regulatory reforms that can strike a better balance between privacy and usage concerns, while also promoting much-needed investment in workforce development.

Yet it is also important to recognize that there is no single best technology policy. Good policies are flexible. They emphasize developing strategic capabilities over one-off investments and regularly involve multiple layers of feedback loops so that course corrections can be made midstream. South Korea has the technical skills and culture of innovation necessary to lead the world in the 5G era. But there may not always be a clear roadmap for how to move forward.

Ultimately, South Korea is not alone in looking for better answers to the questions raised within this report about data governance in the 5G era. Nor is there any reason to believe that these answers have to be geopolitically zero-sum. As suggested earlier, South Korea can benefit from the alignment of its practices and policies with those in other markets. Likewise, the United States and other countries can (and do) learn from South Korea. Equally important, though, is the possibility that certain challenges might only be addressed via more collaborative and coordinated multinational action. This includes, for example, questions about cross-border data flows that are at the nexus of navigating geopolitical, economic, and national security concerns.

Thus, a final imperative for South Korea in the year ahead is exploring whether and how it might be able to deepen its work with other economies in addressing common concerns about the future of data. This is also an area where joint U.S.–South Korea leadership could play a meaningful role in advancing both countries' shared interests inside larger multilateral dialogues. Though the United States and South Korea have periodically found themselves at odds with one another in debates about 5G or data governance, they have nonetheless found ways to closely partner on addressing challenges in global technology policy (including on 5G). Both are also tireless advocates for policies that promote transparent and fair governance, competitive markets, and secure digital architecture. The question is how to take this further.





*Seattle and Washington, D.C.*

1414 NE 42ND STREET, SUITE 300  
SEATTLE, WASHINGTON 98105 USA  
PHONE 206-632-7370, FAX 206-632-7487

1819 L ST NW, NINTH FLOOR  
WASHINGTON, D.C. 20036 USA  
PHONE 202-347-9767, FAX 202-347-9766

[NBR@NBR.ORG](mailto:NBR@NBR.ORG), [WWW.NBR.ORG](http://WWW.NBR.ORG)