

# Comparison of AI Transformation Policy Directionality in Korea and Japan\*

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This study examines the Artificial Intelligence (AI) transformation policies of South Korea and Japan through a comparative case study approach, analyzing policy documents from the OECD AI Policy Observatory and other recent legislation. Policies targeting emerging sectors like AI offer the groundwork for understanding policy directionality through how policy objectives and mechanisms evolve. The analytical framework employed includes policy objectives, level of implementation, and dynamics. The findings reveal that both countries follow similar stepwise approaches, but their strategic focus differs significantly. South Korea pursues a sector-oriented strategy, leveraging its existing semiconductor manufacturing capability through vertical integration. In contrast, Japan adopts a more society-centered approach, prioritizing the addressal of challenges such as an aging population and disaster response while building on its strengths in materials science and precision manufacturing. Both cases demonstrate the critical importance of government coordination in AI transformation, although gaps persist in balancing technological innovation with social issues, including safety and ethics. These findings emphasize the need for national AI policies that build upon existing national strengths and call for flexible governance to facilitate communication necessary for AI ecosystem building.

Keyword: AI transformation, Industrial policy, Korea, Japan

## 1. Introduction

Recent advancements in artificial intelligence (AI) offer new opportunities for entrepreneurship-oriented companies to gain ground in the emerging market segments or even create new

markets that are driven by AI technology. AI is expected to provide greater functions and efficiency leading to new products and services and to greater technological competitiveness (Cooper, 2024; Xu and Choi, 2025). Global AI market competition currently has China and the United States in the leading

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positions, with more breakout companies possessing the most advanced AI capabilities. In order for them to compete, companies in other countries need to develop AI capabilities broadly. How this transformation happens successfully, however, is still unclear but will likely require a policy push.

While companies must develop some of these technological capabilities internally in response to market changes, many external capabilities are needed in the AI ecosystem, necessitating public policy responses (Lee and Malerba, 2017). Within the past few years, many countries have responded with policies specifically geared towards advanced AI such as generative AI and agentic AI, which represent a great leap in capabilities and the opportunity to transform economies. In this sense, governments encourage the development of capabilities in firms and environmental conditions to assist its acceleration. Countries that are known to have successfully applied industrial policy and have already developed some AI capabilities such as Korea and Japan are particularly interested in advancing government-driven policies to support AI transformation.

In order to bridge the public and private sectors, recent policy studies literature has emerged focusing on transformative policy objectives and frameworks within the context of the policy ecosystem (Bergek et al., 2023; de Graff et al., 2025; Radu, 2021; Schot and Steinmueller, 2019). While much of the re-

search has focused on green transformation, the theoretical frameworks are applicable to AI transformation policy because they are innovation policy responses to broad, emergent, and complex technologies with a wide range of stakeholders (Schot and Steinmueller, 2018). AI transformation requires directionality under the high complexity of the AI ecosystem, including its policy formation processes. How directionality is initiated under this complexity, however, has not been studied in the past literature.

What is the basis for the claim that there is a lack of understanding of how governments should formulate and respond to policies in line with the AI transformation? AI possesses distinctive characteristics that set it apart from other technologies. In general, new technologies have a finite lifespan, and their impacts are typically confined to specific industrial sectors. In contrast, AI currently appears to have no discernible lifespan, and it is expected to be applied across virtually all sectors of industry. In other words, once AI becomes firmly embedded in society, humanity will face an irreversible transformation. From this perspective, AI policy fundamentally differs from previous science and technology policies or industrial policies, making it difficult to find precedents for such a comprehensive and cross-cutting policy framework.

Given the newness of AI policies and lag in its outcomes, the case provides the opportunity

to study how firm strategy should respond to and even influence the formation of initial government policies. In the past, policies often aimed to correct market or system failures regarding technological emergence through long, feedback loops, but the rapid pace of AI emergence and evolution has eliminated the luxury of a slow response. This study aims to provide insight on how policies are aligned to support effective and timely AI transformation of firms in early entrant countries by specifically focusing on how policy directionality is developed.

This study asks the following research questions:

- What aspects of the emerging AI market are the focus of policy implementation?
- How can AI policy in South Korea and Japan leverage strengths of the economies such that they are not left behind by global AI champions?
- What gaps, if any, in the AI policy exist that need to be addressed to ensure successful transition to an AI economy? How?
- What lessons might these and other countries learn when considering AI evolution in the future?

The rest of the paper is divided into sections that develop a theoretical framework for AI transformation policy, the comparative cases of Korea and Japan, a discussion on the findings, and a conclusion.

## II. Theoretical Framework

A wide range of self-learning algorithms applied to big data sets enable AI technological capabilities including machine learning, deep learning, and neural networks. AI techniques are also being applied to a broader range of business activities including innovation, management decision-making, and product development (Cooper, 2024). For firms to apply AI technologies, they must develop the digital capabilities that encompass new AI advancements in organizational and process performance and the underlying aspects of the digital infrastructure that support AI (Wamba-Taguimdje et al., 2020). The underlying digital capabilities include collecting, analyzing and managing big data necessitating the ability to not only apply the required new technologies but also to innovate them (Holmström, 2022). The sector that develops the new technologies often depends on the type of (structured and unstructured) data associated with it. For instance, cancer research in healthcare has adopted computer vision techniques to diagnose potential tumors earlier and more accurately than oncologists (Gao et al., 2018; Lee and Chen, 2014; Mukadam and Pakil, 2024). Yet, firms still face similar problems when pursuing AI business strategies such as ensuring readiness, managing costs, and navigating risks associated with adopting new

technologies (Cooper, 2024). Moreover, governments seeking to support socially beneficial AI transformation need to consider how to initialize related policies.

A form of industrial policy, innovation policy for AI plays an important role in ensuring that companies are able to develop the necessary capabilities as well as preparing the ecosystem so that the demand is clearly connected to the new products and services provided, the external resources such as financing and skilled human resources are available, and the necessary infrastructure, i.e., digital networks, are in place (Jacobides et al., 2021). The evolution of innovation policy has gone through several stages expanding its perspective along dimensions of innovation systems: inputs and/or outputs for economic growth, systems considerations, and finally systems transformations (Haddad and Bergek 2023; Schot and Steinmueller, 2018). As the different stages emerged, the frameworks expanded to include additional aspects of innovation policy at different target levels. Initially, innovation policy focused on capital accumulation, especially for sectors and the firms within them. The policy objectives, concerned with government inefficiency, targeted market failures to be corrected (Munger, 2000). The complexity of innovation, however, led to a systems approach being adopted at the national, sector, or sector level. These approaches recognized the necessity to consider different

stakeholders connected within the innovation ecosystems (Janssen et al., 2022). Patterns of innovation might lead to different outcomes and depend on a variety of factors to be handled by policy mixes (Borrás and Edquist, 2013). Finally, grand challenges that addressed social issues presented different needs across many different socioeconomic dimensions that required broader considerations of systems of systems (Diercks et al., 2019; Janssen et al., 2022; Kuhlmann and Rip, 2018; Schot and Steinmueller, 2018). Innovation policy targeting the AI economy bears the hallmark of the same transformation policy evolution. While it has been highlighted as an important facet of innovation policy, there is still little research on directionality itself.

While examining the evolution of innovation policy, the main aspects of innovation policy considered in this study are the policy objective, the level of policy, and policy dynamics to understand how directionality develops. The policy objective includes the purpose and mechanisms to achieve it. Many innovation policies adopt resource-oriented approaches to encourage innovation through direct support, e.g., R&D funding/subsidies, tax incentives, human resource development, or other input for innovation. Other policies may fill in for undeveloped demand by articulating technical specifications, standards development, or public procurement (Haddad and Bergek 2023). Transformational innovation

policy often includes developing these capabilities and capacities (Moon and Wu, 2022). The potential pathways that arise from the possible policy mixes are crucial to achieving economic transformation (Bergek et al., 2023).

The level of policy refers to the technology, firm, sector, or social issue that is targeted by the policy. The level determines the bounds of the innovation system, its actors, and how the mechanisms operate. It may also include the geographic level: municipal, regional, or national. While we consider national level policies (i.e., Korea and Japan), they often incorporate aspects of technological (i.e., AI), sectoral (e.g., manufacturing), and/or regional (e.g., clustering, decentralization) policies within them. As conditions of innovation change or are expected to change, policy may incorporate these dynamics into the policy response. The transformation policies that may combine into a 'policy mix' are also important to consider, requiring coordination capabilities to develop dynamically (Jacobides et al., 2021; Kuhlmann and Rip 2018; Mao et al., 2024).

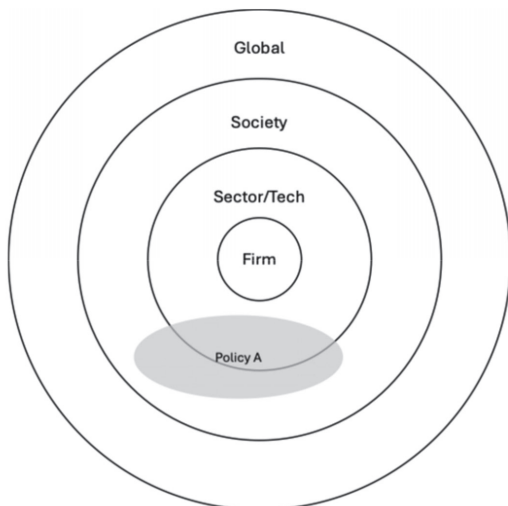
When considering the change of policy over time, policy innovation occurs through dynamic forces that require policymakers to respond according to government objectives, societal needs/demands, technological changes, and other impacts to the policy environment (Jacobides et al., 2021). AI emerges through innovation activities of firms often including interaction with other actors in the innovation

ecosystem. How policy emerges depends on factors regarding (de)centralization, (non-) transparency, government vs citizens, and political drivers (Moon and Wu, 2022). Public policy serves as institutions that promote or constrain certain activities, guiding the development of innovation in the ecosystem (Jacobides et al., 2021).

Lastly, the overall societal or system objective that is determined at an aggregate level including the other dimensions is referred to as directionality (de Graaff et al., 2025). Transformation policy requires directionality because the complexity involved in innovation systems requires coordination to develop the ecosystem towards the desired objective, i.e., an AI-enabled economy. Often, coordination often requires a central authority that guides other parts of the system (Parks, 2022; Radu, 2021). Furthermore, the resources are usually allocated from the central authority, especially when considering public funds. The policies and organizations that are tasked with drafting, communicating, and enforcing them are the means through which directionality is transmitted. Policymakers can anticipate how technologies can or should be adopted for the optimal social and economic wellbeing of citizens by interacting with other actors in the ecosystem (Mintrom et al., 2025). Mintrom et al. (2025) identify characteristics of these policies to be ensuring safety, addressing privacy and ethics, encouraging productivity, and

promoting equitable access. Broad socioeconomic policies such as Society 5.0 in Japan represent directionality across many parts of the government and society (Figure 1), providing a coordination mechanism across ministries and agencies (Holroyd, 2020).

Yet, transformative innovation policy can often lead to directionality challenges such as goal conflicts, ambiguous system boundaries, achievable pathways, strategy formulation, destabilization, accessing leverage points (Bergek et al., 2023). These challenges often lead to ineffective policies that fail to achieve the desired transformation because it is still unclear who, what, where, and when innovation policy should be targeted.



Note: Specific policies may specify different levels, sectors, technologies, or aspects of society or global governance that it targets. For example, AI policy that addresses societal concerns might be depicted with the gray oval.

〈Figure 1〉 Levels of transformative innovation policy

### III. Qualitative Content Analysis

The advancement of AI has spurred AI policy implementation that has expanded not only the scope of policy but also evolving terminology that is associated with AI and related issues. For instance, the term “trustworthy AI”—an overarching concept driving AI policy—is intuitively understood but the technical definition has continued to expand, now including an increasingly broad and still debated range of aspects, from explainability to fairness and transparency to human-centricity. The evolution of the context and the meaning of the text itself demands a qualitative approach to understand what the policy is as well as how and why the policy changes. Qualitative research takes on different objectives than quantitative research, attempting to answer questions of what, how, and why phenomenon occur (Yin, 2017).

Our qualitative study explored how national policy is initiated for emerging technologies, i.e., AI, to understand how directionality is implemented in policy, especially as it is initialized. The study adopts qualitative content analysis of policy documents to understand the evolution of directionality through a transformative policy framework. Qualitative content analysis is performed in five steps: assembling the dataset, systematically coding, generating categories, grouping by category,

and extracting meaningful themes (Lyhne et al., 2025). We began with the OECD AI Policy Observatory, which gathers all national policies related to AI from member states of the intergovernmental think tank. To ensure that the database was complete, we looked at government ministries and agencies in Korea and Japan find more recent policies on AI, including those in the Korean and Japanese languages. Then, the policies were reviewed to code them according to the policy objective, the level of policy, policy dynamics, and directionality, which were then classified into categories and themes.

#### IV. Comparative Case Study between Korea and Japan

Having currently developed the most sophisticated AI, China and the United States are at the forefront of the global AI market at the moment. Yet, there are several other countries that have strong related technologies and infrastructure that can be leveraged to support AI transformation of their economies. This study adopts a comparative case study approach because of the descriptive and exploratory nature of the research into institutional differences between nations when addressing policy objectives (Baumgartner et al., 2011) in economies that regularly adopt

industrial policy, i.e., Korea and Japan. The evolutionary aspects of innovation policy of an emerging technology of AI needs a qualitative approach to understand what the policy changes are as well as identify how and why the policies are enacted. Additionally, comparative policy analysis can be applied considering macro-, micro-, and meso-dimensions of national strategies (Bartlett and Vavrus, 2017). The analytical framework considered aspects of transformation policy dynamics: policy objectives, levels, dynamics, and directionality. These were considered along the dimensions of the AI sector: data systems, computational power and infrastructure, industrial use cases, and societal impacts.

The successful development and scaling of AI-based industries require more than talent and capital—The advancement of artificial intelligence (AI) fundamentally depends on the availability and integration of four critical components: high-quality data, computing power, and well-defined use cases. First, data serves as the foundational input for machine learning models, enabling algorithms to identify patterns, optimize decision-making, and generalize to novel scenarios. The volume, variety, and velocity of data significantly influence the performance and applicability of AI systems. Second, substantial computing power—typically provided by high-performance GPUs and specialized AI accelerators—is essential to train increasingly large and complex

models, especially in the domains of natural language processing and computer vision. Third, use cases not only drive demand but also inform the design and optimization of AI systems. They provide context-specific objectives, performance criteria, and constraints that guide the development process from experimentation to deployment. In combination, these four elements constitute a mutually reinforcing ecosystem necessary for the sustainable growth and real-world application of AI technologies.

Many governments recognize the imperative to advance AI ecosystems through public policy that supports the development of firm capabilities within their economies. This paper makes a comparison between Korea and Japan. In this paper, Japan was selected as the object of comparison with Korea for both historical and academic reasons. Historically, Korea has long regarded Japan as a practical benchmarking target in its process of economic development. In this context, the present study also selected Japan as Korea's comparison counterpart. Academically, while numerous comparative studies between Korea and Japan have been conducted across various policy areas, there has been no comparative research specifically on AI policy. For this reason, as well, this study compares the AI policies of Korea and Japan.

The OECD has systematically kept track of national AI policies for 70 countries (and 2

regional blocs) around the world in the OECD AI Policy Observatory National AI policies & strategies, which provides comprehensive overviews of each country's AI-related policy initiatives and serves as the primary data source for this study. This study augmented this repository of policies with the latest policy developments from both countries, including Korea's AI Basic Act and Japan's AI Promotion Act, using official government documents and policy announcements to capture ongoing policy developments not yet included in the OECD database. We adopt qualitative content analysis of the AI policies found in the OECD database and supplementary government sources to understand how AI policies affect the AI ecosystems, using a structured analytical framework that categorizes and compares policies across four dimensions: (1) policy objectives, (2) level of policy implementation, (3) policy dynamics, and (4) directionality. The analysis involved systematically categorizing each policy document and initiative according to these four analytical dimensions, with each policy initiative categorized for its stated purposes and mechanisms, implementation scope (technological, sectoral, national, or regional), evolutionary patterns in response to changing conditions, and overall coordination objectives, allowing for structured comparison between the two countries' strategic approaches to AI transformation.

## 4.1 Overview of Japan's AI Strategy

Japan's AI strategy focused on expanding its data availability, supercomputing and infrastructure, and integrating AI into targeted industries with special social benefits. The government policy prioritizes the societal needs of its citizens when crafting its AI policy.

### 4.1.1 Data

Data is the raw material for AI systems. The performance of machine learning models, especially in deep learning, improves with the volume, diversity, and quality of data. To promote AI industries, governments must ensure legal and technical mechanisms for data accessibility, especially in high-impact sectors like mobility, health, and energy. However, the development and utilization of data in Japanese society have not progressed sufficiently.

Japan formulated the "Comprehensive Data Strategy" on June 18, 2021 (Digital Agency, 2021). Due to the absence of a strategy focusing on data as a core element in realizing a digital society, "Comprehensive Data Strategy" was formulated to promote the utilization of data. It provides fundamental guiding principles: data connectivity and accessibility, secure data usage, and collaboration for value creation.

Building on the progress of "Comprehensive Data Strategy," "Priority Plan for the Realization

of a Digital Society" was approved by the Cabinet in June 2023 and outlines specific implementations and identifies additional priority areas as future initiatives to further advance the strategy. It provides the strategic direction and key initiatives. For example, the key initiatives of the Development of an AI-Friendly Environment include the development and operation of base registries (public foundational information databases, the promotion of open data, ensuring interoperability of data across government and local authority systems, and the development of data centers for AI. The key initiatives for Cooperation for Competition and Growth include the promotion of data collaboration and utilization.

Efforts based on the comprehensive data strategy and priority plans are still only half-way complete. It is necessary not only to steadily implement the measures set out in the Priority Plan, but also to take even more robust action.

### 4.1.2 Infrastructure

AI innovation depends on access to large-scale computational power. A supercomputer is necessary for AI. Training modern AI models requires massive computational resources to process huge datasets efficiently. Supercomputers provide high parallel processing capabilities, fast memory access and interconnects, and ability to run distributed training across many

nodes. Without such computational power, training modern AI models would be infeasible.

Japan is a leader in supercomputing, and its primary supercomputer is known as Fugaku. Developed by RIKEN and Fujitsu, Fugaku has consistently ranked high in global performance rankings. There are high expectations for Fugaku. For example, Tokyo Institute of Technology, Tohoku University, Fujitsu, RIKEN, Nagoya University, CyberAgent, and Kotoba Technologies released Fugaku-LLM, a large language model with enhanced Japanese language capability, in May 2024.

While Fugaku holds a prominent position, Japan is also actively developing a next-generation supercomputer with superior AI performance. Japan launched the AI Bridging Cloud Infrastructure (ABCI), an open super computing infrastructure for both developing AI technology and bridging AI technology into the industry, constructed by National Institute of Advanced Industrial Science and Technology (AIST), and operated by AIST Solutions Co.<sup>1)</sup> (AISol). AIST and AISol upgraded ABCI to ABCI 3.0 in January 2025 and began offering general access to its large-scale AI cloud computing system. The general availability of ABCI 3.0 is expected to accelerate research and development, evaluation, and human resource development in cutting-edge AI technologies, including generative AI.

#### 4.1.3 Use cases

Usage of AI is already irreversible in business and society. Japan's policy strategy is to integrate AI with selected fields. One of these fields is science- and technology-based industries. Japan is renowned for its strengths in physics, chemistry, and machinery, and integrating AI into these areas is expected to enhance their global competitiveness. In addition to science and technology, Japan also excels in cultural and creative industries, including food, tourism, and traditional arts. Japanese anime and other forms of content are popular worldwide, and leveraging AI to support these industries is considered desirable. Finally, Japan aims to apply AI to sectors facing uniquely domestic challenges. These include an aging and rapidly declining population and frequent natural disasters. AI utilization is expected to help address these issues more effectively. Policy examples are presented in the table below.

#### 4.1.4 Talent development

AI talent refers to professionals with technical skills, interdisciplinary knowledge, and soft skills needed to develop, implement, and manage AI systems. Countries are competing for AI talents in an effort to strengthen their

1) <https://abci.ai/ja/>

〈Table 1〉 Examples of Japanese policies on AI utilization

Industry	Policies
Strengthening the Utilization of AI in Medicine, Drug Discovery, and Materials Science	<ul style="list-style-type: none"> <li>- Promote R&amp;D for applying AI technologies to the field of materials science.</li> <li>- Promote R&amp;D toward the development of AI-driven medical diagnostic systems and systems to assess diagnostic reliability.</li> <li>- In addition to whole genome analysis, utilize omics and clinical data for AI-based analysis to identify drug discovery targets.</li> <li>- Conduct high-quality clinical research and investigator-initiated trials aimed at the creation of innovative medical devices.</li> <li>- Develop AI for microbiome analysis to accelerate personalized diabetes prevention.</li> <li>- Promote demonstration projects using AI-related technologies, including semiconductors, to reduce CO<sub>2</sub> emissions and enhance energy efficiency in local communities.</li> <li>- Promote technological development and demonstration of innovative catalytic technologies utilizing local resources and digital technologies such as AI.</li> <li>- In Japan's stronghold of materials science, promote the development of systems that enable the use of data—including AI analysis—alongside the collection and accumulation of materials data nationwide.</li> </ul>
Promoting AI Utilization in Japan's Cultural and Creative Industries	<ul style="list-style-type: none"> <li>- Promote R&amp;D in multilingual simultaneous interpretation technologies.</li> <li>- Enhance inbound tourism infrastructure using ICT and related technologies.</li> </ul>
Integrating AI with Japan's Unique Challenges and Strengths	<ul style="list-style-type: none"> <li>- Build information infrastructure, legal frameworks, and AI services that enable seamless provision of government, healthcare, nursing care, and education services across domestic and international smart cities.</li> <li>- Ensure interconnectivity of data platforms by referencing Smart City Reference Architectures in related government projects.</li> <li>- Implement demonstration projects in prevention and nursing care, and based on the outcomes, support the formation of networks of AI startups in these domains.</li> <li>- Promote "smart safety inspections" in infrastructure management.</li> <li>- Enhance flood control functions through advanced dam operations utilizing AI.</li> <li>- Streamline and advance maintenance of infrastructure by automatically detecting anomalies using AI and other technologies.</li> <li>- Realize digital twins by building national land and transportation data platforms, infrastructure databases, and developing, utilizing, and open-sourcing 3D urban models.</li> <li>- Monitor coastlines using satellite imagery.</li> </ul>

domestic industrial competitiveness with the adoption of AI. Japan is aware of a lack of the quality and quantity of AI talents in the country. There are two policy tracks.

One track is education reform. The educa-

tion reform aims for all citizens to acquire necessary skills to live in the AI-adopted society and for human resources to play an active role in the AI-adopted society. This reform will be implemented to achieve that all

high school graduates have acquired basic literacy in mathematics, data science and AI, approx. 250,000 professionals will be developed who understand data science and AI, approx. 2,000 are expected to be capable of creating innovation using data science and AI, especially approx. 100 of them are expected to become the top-class talents, and approx. 1 million people will receive recurrent education of math, data science and AI. The target of this reform includes international students in Japan.

The other track is utilization of overseas talents. This track aims not only to attract AI talents from abroad but also to increase international joint R&D projects between Japan and overseas. The target of the joint projects are not limited to research and educational institutions and companies in North America and Europe. It includes ASEAN countries, India, the Middle East, and Africa which are expected to grow in the future.

#### 4.1.5 AI ecosystem

The following outlines the currently identified policy implementations on the AI ecosystem in Japan. The outcomes include collaborative research projects between the public sector and the private sector. For example, the National Institute of Information and Communications Technology (NICT), the public research institute under the Ministry of Internal

Affairs and Communications, and KDDI, a Japanese telecommunications operator, have initiated collaborative research on Japanese language - focused generative AI. NICT, Preferred Networks, and Sakura Internet have reached a basic agreement to build a domestic generative AI ecosystem in September 2025. In addition, NICT reached a basic agreement with Preferred Networks and Sakura Internet to work together toward building a generative AI ecosystem. These actions imply that the government is indirectly involved in the formation of AI ecosystem in comparison to Korea, as seen below.

#### 4.1.6 The latest update: AI Promotion Act

Japan's Diet passed the Act on the Promotion of Research, Development, and Utilization of Artificial Intelligence - Related Technologies (the AI Promotion Act law) on May 28, 2025 (Cabinet Office, 2025). This act aims to establish a comprehensive framework for advancing AI in Japan. It recognizes AI as a foundational technology essential to economic growth, administrative efficiency, national security, and industrial innovation. The Act outlines five guiding principles: (1) AI as a strategic asset; (2) integration from basic research to application; (3) ethical and safe use; (4) transparency and public trust; and (5) international cooperation.

Responsibilities are assigned to various

stakeholders. The national government is to lead policy development and implementation, and local governments, research institutions, businesses, and citizens are also expected to contribute to AI advancement through research, application, education, and public engagement. Key policy measures include support for R&D, development of data and computing infrastructure, workforce training, ethical guidelines, and public outreach. The government will formulate an AI Basic Plan to coordinate strategy across sectors. A central coordinating body, the AI Strategy Headquarters, will be established within the Cabinet, chaired by the Prime Minister and composed of all Cabinet ministers. It will oversee the drafting and execution of AI policies.

The Act allows for regular review and revision, ensuring adaptability to technological and societal change. It represents Japan's effort to lead in responsible AI innovation and global governance.

#### 4.2 Overview of South Korea's AI Strategy

South Korea's approach to AI development focuses on three critical areas: infrastructure, data accessibility, and semiconductor capabilities. The government has committed substantial resources to building world-class AI infrastructure while fostering industry adoption.

##### 4.2.1 Infrastructure and Computational Power

South Korea recognizes that AI leadership requires massive computational resources. In 2022, South Korea's AI strategy called for spending 1 trillion won (\$820 million) to support the development of the AI semiconductor industry, including but not limited to the development of Processing-In-Memory (PIM) chips.<sup>2)</sup> The country is leveraging its position as a global leader in memory semiconductors, particularly developing high-bandwidth memory (HBM) chips that are essential for advanced AI applications. Two national AI computing centers will be established through a public-private partnership as part of a project to enhance South Korea's supercomputing capabilities, with each center equipped with cutting-edge infrastructure. These centers represent a departure from traditional supercomputing approaches, focusing specifically on AI workloads and machine learning optimization rather than general-purpose scientific computing.

The infrastructure strategy also emphasizes distributed computing capabilities and cloud-native AI development environments. Korea's AI infrastructure is purpose-built for commercial AI development, training large language models, and supporting industry-specific AI applications.

2) Ministry of Science and ICT of Korea. (2022). MSIT to announce the "Support Plan for AI Semiconductor Industry Promotion." June 28, 2022.

Korea's approach includes establishing regional AI hubs to ensure equitable access to computational resources across the country. The Ministry of Science and ICT announced an investment of \$34.9 million by 2025 into a Research Data Center of AI Innovation Hub at Korea University, with the objective to integrate the AI capabilities of regional universities, businesses, and research institutions.

#### 4.2.2 Data Strategy and Digital Infrastructure

Korea's data strategy builds upon the comprehensive Digital New Deal launched in 2020, which established the foundation for a data-driven economy. The Digital New Deal represents one of the most comprehensive national digitization programs globally, encompassing government services, healthcare systems, educational institutions, and industrial processes.

The government has prioritized creating robust data infrastructure that enables both public and private sector AI development. This includes establishing national data exchanges, standardizing data formats across government agencies, and ensuring interoperability between different sectors and systems. The data strategy emphasizes three core principles: accessibility without compromising privacy, quality assurance through standardized collection and processing methodologies, and collaborative value creation

through cross-sector data sharing initiatives.

The public sector data availability program includes comprehensive digitization of government records, real-time economic data streams, and integrated social services databases. These resources provide Korean AI companies with access to high-quality, structured datasets that are often unavailable in other jurisdictions, creating a significant competitive advantage for domestic AI development.

#### 4.2.3 Industrial Integration in Semiconductor

South Korea's AI strategy leverages the country's position as a global leader in memory semiconductors and advanced chip manufacturing. South Korea will invest 9.4 trillion won (\$6.94 billion) in artificial intelligence by 2027 as part of efforts to retain its edge in cutting-edge semiconductors. This investment focuses specifically on AI-optimized chip architectures, including high-bandwidth memory (HBM) chips that are essential for training and running large AI models. The semiconductor strategy extends beyond memory chips to encompass AI processing units, neuromorphic computing architectures, and edge AI devices.

The government's semiconductor AI initiative includes substantial research and development funding for next-generation chip architectures, advanced packaging technologies, and AI-specific manufacturing processes. This vertical integration approach, from chip design

to AI application deployment, creates a comprehensive ecosystem that supports both domestic AI development and export opportunities.

#### 4.2.4 Use of AI in specific sectors

Firstly, the Korean government supports manufacturing AI by including the establishment of Smart Manufacturing Innovation Centers across major industrial regions. These centers provide smaller manufacturers with access to AI expertise, testing facilities, and implementation support that would otherwise be prohibitively expensive. The Korea Institute for Advancement of Technology (KIAT) operates these centers as part of the broader Industry 4.0 transformation initiative.

Secondly, in terms of healthcare, Korean hospitals are deploying AI for medical imaging analysis, with systems that can detect early-stage cancers, predict cardiovascular events, and optimize treatment protocols. For example, The Seoul National University Hospital has implemented AI systems that analyze over 100,000 medical images monthly, improving diagnostic accuracy by 15% while reducing analysis time by 60%. The government supports healthcare AI through regulatory sandboxes that allow testing of innovative medical AI applications while maintaining patient safety standards. The Korea Food and Drug Administration has streamlined approval processes for AI-based medical devices,

reducing approval times from 18 months to 6 months for qualified AI systems.

Thirdly, for autonomous vehicle and smart transportation, Korea's autonomous vehicle initiative builds on the country's leadership in automotive manufacturing and 5G network infrastructure. The goal is to deploy fully autonomous vehicles on Korean roads by 2030, supported by intelligent transportation systems that integrate AI across the entire mobility ecosystem. The government's smart transportation strategy extends beyond autonomous vehicles to include AI-powered traffic management, predictive public transit optimization, and integrated mobility-as-a-service platforms. These systems are being tested in major cities like Seoul and Busan, with plans for nationwide deployment by 2027.

#### 4.2.5 Talent development

In 2019, the Korean government already identified the need to produce approximately 100,000 AI professionals by 2030 to support its AI ecosystem development, and specific policies followed afterwards. Recently, the Korean government set initiatives to align both general educational system and specialized talent programs with evolving AI environments.

Firstly, the Korean government focuses on educational system transformation. Korea is implementing comprehensive curriculum reforms from elementary to university levels to

integrate AI and data science education. The Ministry of Education established AI as a mandatory subject in all high schools from 2025, with the goal of ensuring every student graduates with basic AI literacy. Also at the university level, the government assigned future talent for AI-digital age as their primary goal, and decided to support new programs that integrates AI with traditional academic fields (called AI+X).

Secondly, Korea focuses on elite generative AI talent through the Generative AI Leading Talent Development Program launched by the Ministry of Science and ICT in 2024. This program targets 100 elite AI specialists annually who can lead in generative AI research and application development. Unlike conventional AI education, it emphasizes hands-on experience with large language models, multimodal AI systems, and foundation model development. Participants receive access to national AI computing centers and collaborate with leading AI companies and research institutions through intensive project-based learning.

#### 4.2.6 AI ecosystem

The following outlines the currently identified policy implementations on the AI ecosystem in Korea. The Ministry of Science and ICT plans to procure around 10,000 NVIDIA H200 GPUs through the first supplementary

budget in 2025 recognizing the supply of GPUs as an urgent issue. The Electronics and Telecommunications Research Institute (ETRI) signed a Memorandum of Understanding (MoU) with LG AI Research to collaborate on AI data compliance and R&D of LLMs. In October, the Ministry of Science and ICT (MSIT) has signed an MoU with OpenAI to promote the development of AI ecosystem. These actions imply that the government is directly involved in the formation of AI ecosystem in comparison to Japan.

#### 4.2.7 The latest update: AI Basic Act

South Korea's National Assembly passed the AI Basic Act on December 9, 2024, and it was officially promulgated on January 21, 2025. This act aims to establish a comprehensive framework for advancing AI in Korea while ensuring safety and ethical deployment. It recognizes AI as a foundational technology essential to economic growth, administrative efficiency, national security, and industrial innovation.

The Act outlines five core principles: (1) AI as a strategic national asset; (2) integration from basic research to commercial application; (3) ethical and safe AI development and use; (4) transparency and public trust in AI systems; and (5) international cooperation and standards alignment. These principles reflect Korea's ambition to become a global

AI leader while maintaining responsible development practices.

#### 4.3 AI Policy Comparison between South Korea and Japan

This section compares the institutional logic, policy instruments, and strategic orientations of South Korea and Japan's AI ecosystems, focusing on three key domains: data infrastructure, computational capacity, and use cases (Table 2). They are commonly aware of the impact of the AI-led paradigm shift and are preparing for the new era. However, there are similarities and differences between them.

First, regarding the data strategy, both countries frame high-quality, accessible data as the bedrock of AI, yet their policy maturity diverges. Both countries developed data systems including personal information protections before the current stages of AI development. South Korea's data agenda emerged from the 2020 Digital New Deal, one of the most ambitious digitization drives worldwide. Seoul has already launched nationwide data exchanges, enforced common formats across ministries, and digitized real-time economic and social series. Its strategy rests on three pillars—privacy-respectful accessibility, standardized quality assurance, and cross-sector value creation—turning public data into a commercial asset that gives domestic firms a tangible edge in training and deploying AI.

Japan has pursued a step-by-step institutional build-up. The 2021 Comprehensive Data Strategy and the 2023 Priority Plan set out interoperability, secure use, and open-data promotion, backed by “base registries” and public-sector interoperability standards. Implementation, however, is partial: data-sharing mechanisms are only slowly entering industrial workflows.

Second, regarding large-scale computing infrastructure, South Korea and Japan differ in how they structure and operationalize computational capacity. South Korea has taken a more decentralized and industry-oriented approach. The government is building two national AI computing centers through public-private partnerships and establishing regional AI hubs to democratize access. These systems are optimized for commercial AI workloads, such as training large language models and deploying industry-specific solutions. The infrastructure is explicitly designed to support industrial AI uptake, not just scientific research. Japan has invested heavily in centralized high-performance computing (HPC) assets, most notably the Fugaku. Japan has also developed the AI Bridging Cloud Infrastructure (ABCI), upgraded to ABCI 3.0 in 2025. These systems are designed to support research, public-sector applications, and industrial experimentation. However, access remains concentrated, and HPC resources are primarily tailored to scientific rather than commercial use.

Thirdly, regarding use cases, South Korea's strategy is built around vertical integration of the AI hardware stack. The Korean government has committed approximately \$6.9 billion by 2027 to support AI-optimized chip development, including high-bandwidth memory (HBM), neuromorphic computing, and dedicated AI processors. Major firms such as Samsung and SK Hynix are at the center of this effort, positioning Korea to challenge incumbent global hardware leaders. This strategy leverages Korea's existing comparative advantage in semiconductors and seeks to make AI not only a consumer of hardware, but also a source of industrial sovereignty and export revenue. Conversely, Japan's strategy emphasizes the application of AI to address societal challenges—particularly aging populations, natural disaster response, and material science innovation. Policy initiatives prioritize the deployment of AI within existing industrial verticals and public service delivery.

Finally, regarding the recent AI law, South Korea's AI Basic Law and Japan's AI Utilization Promotion Act share the common objective of establishing a comprehensive legal framework to support the development and deployment of artificial intelligence (AI) technologies. Both countries recognize AI as a foundational technology for 21st-century socioeconomic progress. Accordingly, they each emphasize the establishment of government-led governance systems, the incorporation of ethical principles

to ensure the reliability of AI, and the promotion of collaboration among the public, private, and academic sectors. However, the two legislative approaches diverge significantly in terms of legal philosophy, structural design, and policy priorities. First, regarding legal enforceability, South Korea's Act takes a binding and prescriptive approach as it mandates the formulation of a national master plan every five years, requires each relevant ministry to submit and implement annual action plans, and institutionalizes a presidential-level coordinating body, the AI Policy Coordination Committee. On the other hand, Japan's Act adopts a more declaratory stance as "shall endeavor to" or "shall give due consideration to" indicates an advisory rather than mandatory character. Second, South Korea emphasizes enhancing international competitiveness through AI-driven transformation across all industries, with a strong focus on fostering an export-oriented AI industry and taking leadership in setting global norms while Japan views AI primarily as a tool for solving domestic social issues such as demographic aging, regional depopulation, and disaster response.

〈Table 2〉 Comparison of AI policies in Korea and Japan

	Korea	Japan	Comparison
Policy objectives	<ul style="list-style-type: none"> <li>• Supply-side policies focus on providing infrastructure (high-speed networks, supercomputers, data centers) and R&amp;D activities focused on AI, big data, IoT, and cybersecurity; Regional development initiatives</li> <li>• Demand-side policies support specific sectors and also provide safety related guidelines &amp; institutional development, e.g., AI Safety Institute; data privacy initiatives</li> <li>• Economy-focus, e.g., financial sector application</li> </ul>	<ul style="list-style-type: none"> <li>• Supply-side policies focus on providing infrastructure (high-speed networks, supercomputers, data centers) and R&amp;D activities focused on AI, big data, IoT, and cybersecurity</li> <li>• Demand-side policies focus on social objectives (safety), demand articulation for AI service providers; data privacy initiatives</li> <li>• Values-based, human-centered AI</li> </ul>	<ul style="list-style-type: none"> <li>• Scope: Japan included early infrastructure development policies as part of its AI policy; Korea included policies more specific to AI development.</li> <li>• Japan uses demand-pull, highlighting societal needs; Korea adopts technology-push in certain sectors</li> </ul>
Level of policy	<ul style="list-style-type: none"> <li>• Mostly national-driven policy, i.e., infrastructure &amp; network development, industrial support, HRD</li> <li>• Industrial policy focused on SME as technological niche</li> </ul>	<ul style="list-style-type: none"> <li>• Mostly national-level policy, i.e., infrastructure &amp; network development</li> <li>• Industrial policy focused on SME (inclusivity) promotion &amp; AI/digital sector</li> </ul>	<ul style="list-style-type: none"> <li>• Both countries have nationally driven policy, coordinating ecosystem actors top-down</li> </ul>
Policy dynamics	<ul style="list-style-type: none"> <li>• National innovation networks (government, firms, research, civil society) and network infrastructure</li> <li>• Nationally-driven coordination mechanisms</li> <li>• Governance institutions developed, e.g., Cabinet-led committee, AI Safety Institute</li> <li>• AI G3 target</li> <li>• Non-AI/digital industry targets: financial</li> </ul>	<ul style="list-style-type: none"> <li>• National innovation networks (government, firms, research, civil society) and network infrastructure</li> <li>• Nationally-driven coordination mechanisms</li> <li>• Several guidelines (strategies, agendas, plans, etc.) provided, especially for "proper" usage; non-binding regulations</li> <li>• Governance institutions developed, e.g., Cabinet-led committee, AI Safety Institute</li> <li>• Non-AI/Digital industry targets: agricultural</li> <li>• Little funding, mostly to build initial infrastructure (early) or support SMEs &amp; HRD (later)</li> </ul>	<ul style="list-style-type: none"> <li>• Infrastructure development has been emphasized earlier, reflecting the natural outgrowth of AI from efforts to digitalize the economies</li> <li>• Initially developing AI inputs, e.g., AI capabilities, data &amp; network infrastructures</li> <li>• Safety/trust issues (broader social considerations) emerged more recently</li> <li>• Dependent on existing AI capabilities                             <ul style="list-style-type: none"> <li>◦ Japan: More AI capabilities but in smaller companies</li> <li>◦ Korea: Strong AI capabilities in large companies</li> </ul> </li> <li>• AI capability development                             <ul style="list-style-type: none"> <li>◦ Japan: International orientation: R&amp;D ecosystem (RIKEN, NIST, etc.)</li> <li>◦ Korea: Domestic orientation: science-industry cooperation</li> </ul> </li> </ul>
Directionality	<ul style="list-style-type: none"> <li>• Combines industry-oriented technology-push of AI/digital sector development, e.g., R&amp;D, HRD, industrial support; industry-aligned demand</li> <li>• Trust in AI &amp; supporting infrastructure, i.e., data privacy, emerged focusing on safety</li> <li>• Domestic capability development focused policy</li> <li>• AI/digital sector considered through broad service sector implementation, e.g., financial services</li> <li>• Public-private orientation of AI industry development</li> </ul>	<ul style="list-style-type: none"> <li>• Leans towards technology-push through supply of AI/digital infrastructure and HRD; development or R&amp;D ecosystem; demand-pull of societal challenges</li> <li>• Safety perspective in application, e.g., guidelines, consumer protection</li> <li>• International outlook with respect to R&amp;D &amp; guideline development: European &amp; Asia-Pacific oriented (Australia, France, Germany, India, &amp; USA)</li> <li>• AI/digital sector expected to drive development of SMEs &amp; other sectors</li> <li>• Market-driven attitude towards industry selection, e.g., multilingual translation</li> </ul>	<ul style="list-style-type: none"> <li>• Similar: Development of R&amp;D and HRD ecosystem elements</li> <li>• Difference: Japan seems to take a broader perspective on trust than Korea, which focuses on business-oriented "safety"</li> </ul>

## V. Discussion

### 5.1 Theoretical Implications

When biotechnology first emerged a few decades ago, industrial policies were found to harm competitiveness of countries and regions due to a lack of proper theoretical grounding and a bias towards incumbents rather than focusing on innovation (Wheale and McNally, 1993). The design of innovation policy has evolved to incorporate broader facets of socio-economic concerns. As AI technologies have advanced, countries have responded with public policies meant to develop AI sector emergence, specifically supporting firms entering the field and to avoid public policy hindrances that can obstruct AI transformation.

This qualitative comparative case study considered the emerging AI transformation policies in South Korea and Japan and the policy process of developing directionality. The qualitative analysis considered specific aspects of policy development (policy objectives, levels, and dynamics) along the dimensions of AI sector development (data systems, computational power and infrastructure, industrial use cases, and societal impacts). The policy development started out similarly in both countries, focusing on data and network infrastructure on which AI capabilities are built. In addition to these infrastructure-oriented

goals, policies also emerged to support development of human resources in the ecosystem. The policy targets then proceeded to develop the AI industry, especially targeting domestic SMEs and entrepreneurs to meet national demand and complementary sectors, e.g., agriculture, finance, and healthcare. Later stages of policy development focused on more human-centric, citizen concerns defined by AI trustworthiness. Throughout this process, public policies focused on developing networks connecting the relevant actors depending on the targeted needs. The definitions regarding the policy targets seemed to become more diffuse in later policy pronouncements, which may have led to less tangible, financial resources attached to them. As expected, the national government played a strong role in coordinating the different levels and creating organizational changes including specific agencies or governing bodies when needed. Societal concerns emerged later in the policymaking, often by providing a platform for citizens to voice concerns in multi-stakeholder forums.

This comparative analysis of Korea and Japan's AI policies reveals three theoretical insights that extend recent innovation policy framework such as Schot and Steinmueller (2018). First, our findings suggest that transformative innovation policy sequencing follows a predictable pattern: infrastructure to capability building to application to governance, but the timing and emphasis of each phase varies

based on national technological capabilities. Korea compressed the infrastructure phase by leveraging existing semiconductor capabilities, while Japan extended the research phase to build new competencies. This shows that transformation policy sequencing is not universal but capability dependent. Second, this study demonstrates that national capabilities not only influence policy content but fundamentally shape policymaking mechanisms. Korea's vertical integration strategy, from chips to applications, reflects manufacturing-based, technology-push approach, while Japan's horizontal integration strategy, across social sectors, reflects service-based, societal demand-pull approach. Third, the concept of directionality in AI transformation policy is more complex than previously theorized, as it must simultaneously address domestic challenges and global competitiveness. Transformation policy may require a polycentric model (cf., Carlisle and Gruby, 2019) that encourages multi-stakeholder coordination and/or collaboration across levels.

Moreover, safety has been emphasized in early stages of formative AI innovation policy because of industry-driven concerns around corporate liability; but this is a narrow definition of trustworthy AI that fails to incorporate concepts of human-centric values, fairness, explainability, accountability, and privacy (cf. Li et al., 2023) because of later stage policy paralysis (Eom and Kim, 2024). Lastly, while

these socioeconomic issues are readily adopted as drivers for AI adoption, the lack of clarity in policy directionality, directly impede technological adoption (Cubric, 2020; Eom and Kim, 2024). Further studies should benefit from investigating the policy directionality of AI transformation, as it brings multidimensional challenges especially from strategy formulation (Bergek et al., 2023) and requires extensive coordination among a broad set of actors.

## 5.2 Practical Implications

The policy dynamics that can be discerned are that the order of AI ecosystem development emerged in similar stages in both countries, focusing on existing digital infrastructure or expanding it. For instance, data privacy policies were drafted after data systems had been created, using data that had been collected, transferred, and analyzed. Safeguards usually followed, targeting the specific areas that had been targeted for development, defining uncertainty into risks for industry. The dimensions of the AI transformation have certain elements of linear progress as well as opportunities for non-linear disruption. Considering that the AI sector is emergent globally, the technological change presents a window of opportunity to enter new markets and respond actively through policy. Yet, institutional design through policy offers op-

opportunities to embed and guide safeguards and ensure trustworthiness earlier by design. Since directionality is sensitive to temporal implementation (de Graff et al., 2025), policy design should be emphasized early.

Since AI policy in both South Korea and Japan targets specific industries, it is important for firms to be aware which sectors those may be and whether or not they fall into them. For instance, Korea targets AI-specific semiconductors, but Japan does not. The technological progression of sectors, products, and components represent different paths. The relationship can be extended to needed capabilities for these paths. Firms should be aware of competitive advantages they have and are capable of achieving through technological development and learning relative to the policy actions. Firms may have internal capabilities but rely on surrounding AI ecosystems to provide external resources. When this occurs, firms should be capable of articulating needs to policymakers that may respond with public policy to compensate for ecosystem deficiencies and use push-pull policy mechanisms.

Governments, however, are responsible for the economy beyond firms and industry. While socioeconomic issues are readily adopted as drivers for AI adoption, the lack of clarity in policy directionality, directly impede technological adoption when policymakers opt for a wait-and-see approach (Cubric, 2020; Eom

and Kim, 2024; Placidi, 2022). The directionality issues that fall outside market mechanisms are unlikely to be resolved naturally, especially when stakeholders' interests clash. Close interaction between public policy and industry (Kim et al., 2023) can increase the speed of AI transformation in an economy. Governments must develop the capacity to sense the needs for new resources in the AI ecosystem, especially when domestic firms lack such capabilities or are absent themselves or when citizens lack economic or political power. They may also need to create new institutional organizations that are responsible for carrying out the activities of supporting the development and implementation of the policies. Broad stakeholder representation should be maintained through existing institutions and collaboration networks. Policy directionality can help the formation of mutually beneficial institutions by design rather than expecting to resolve conflicts after they emerge.

While governments should ensure that ecosystem network platforms exist to facilitate communication of firm needs and demands, they are also responsible for ensuring the safety and welfare of citizens that go beyond physical danger and material harm. They may need to create new programs that provide individuals the skills to participate in the new AI economy and also to develop awareness of new potentials and dangers that AI poses (Yi and Kim, 2019). This is particularly true of

citizens that lack parity to extract necessary safeguards against firms that wield these powerful new technologies that can be easily embedded out of sight. National governments are also the conduits through which economies interact with foreign governments and other entities, e.g., UN Sustainable Development Goals. The different levels or segments within global society complicates the coordination mechanisms that are required. This presents a challenge for policy directionality that should be further studied.

In short, directionality requires its own set of capabilities that should be developed early. While objective setting at the macro level is part of policy directionality, the AI ecosystem requires technological capabilities that enable actors within it to overcome heretofore unseen and possibly unpredictable obstacles. Policymakers need to have market sensing capabilities to spot potential social demand—rather than industry’s role of identifying market demand; but they also need to have the ability to identify systemic technological obstacles and social hindrances early and to respond to them.

### 5.3 Limitations

Despite a number of policy implications for AI transformation, this study has several limitations. First, the analysis relied primarily on official policy documents and government

announcements, which present plans that may not have taken effect yet, such as investment plans that have been actually disbursed, or may change through amendment. In the future, when the effects of policies have stabilized and sufficient, comprehensive data can be collected, we believe that analyses and studies on the effectiveness of the policies compared in this study should be conducted.

Second, from methodological side, the qualitative content analysis approach does not lead to quantification of policy impacts or provides generalizable evidence of a causal relationship between policies and their results.

Third, this study focused on national-level policies. Regional-level policies, however, are often extensions of national policy and can provide experimental outcomes that inform national strategies. This study focused on how directionality emerges in the process of innovation policy formation. In the future, when the effects of policies have stabilized and comprehensive data become sufficient, we believe that empirical analyses and studies on the effectiveness of the policies compared in this study should be conducted.

## VI. Conclusion

This study compares the AI transformation policies in South Korea and Japan, specifically

on the strategic approaches both countries are taking to compete in the dynamic global AI landscape. As the United States as well as other countries demonstrate today, the era in which industrial competitiveness was left entirely to corporations has ended. The role of the state is becoming increasingly important in building industrial competitiveness. In this context, we conducted a comparative study of AI policies in Korea and Japan—countries with similar industrial structures—because examining their similarities and differences can be helpful in revising and strengthening future AI policies, as well as in exploring areas of cooperation between the two nations.

We found that both countries focus on data infrastructure development, computational power enhancement, and sector-specific industrial applications. However, there are certain differences in their policy implementation, marking a departure from past histories of benchmarking by Korea. South Korea leverages its comparative advantage in semiconductor manufacturing through AI hardware capabilities by investing in chips and memory technologies, whereas Japan utilizes its advantages in materials science and precision manufacturing to address its societal challenges such as aging population and disaster response. The analysis brings up several gaps in AI transformation policies. The South Korean approach, more economically focused, may benefit from learning from the Japanese human-

centered approach with broader safety and ethical frameworks, and on the other hand the Japanese approach may learn from Korea's more agile, market-driven implementation strategies. Key policy implications for successful AI transformation from the two countries would be having stepwise policies starting from building digital infrastructure and data systems, followed by targeted industrial applications optimizing the national comparative advantage, and lastly setting up governance frameworks for both technological innovation and social values such as safety and ethics, while maintaining well-designed government coordination and encouraging public-private partnerships to build competitiveness in the global AI landscape.

These cases highlight challenges and gaps when crafting AI transformation policy. By contrasting them, the approaches are distinct, but no inherent reason can be identified why one approach is required over the other. AI transformation policy combines technology-push and demand-pull at different levels. By supporting broad, foundation technologies aligned with societal challenges, Japan pursues a more diffuse approach; Korea adopts a market-oriented solution by supporting industry-level support. The two countries also approach trust in AI from different perspectives. One considering broader characteristics of trustworthy AI, and the other adopting a safety-oriented approach preferred by industry. The

challenge presents itself of pursuing technological AI advancement at the potential cost of embedding difficult-to-change technologies broadly. The latter also represents the possibility of policy paralysis. By establishing mechanisms that them, convey citizens' concerns may be incorporated into policy earlier, avoiding some causes of policy diffidence. Lastly, both countries could use policy to safeguard and balance against potential negative impacts that may go beyond AI policy, e.g., AI-driven job displacement.

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