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Knowledge State in the Era of Generative AI and the Future of the Korean Peninsula

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I. Transformation of State Governance: A New Standard of Civilization by AI?

Korea failed to transform into a fully modern sovereign state when modern international politics was being established. Traditionally, the Korean Peninsula was a single nation and state. However, as the Westphalian modern state system, originating in the West, was introduced in the form of imperialism, Korea failed to become a fully sovereign state, ultimately leading to its division. The causes of this division include external factors such as the competition among surrounding empires and Cold War rivalry, as well as internal factors like the fragmentation of state-building capabilities. However, the most significant reason was the civilizational gap, as Korea could not fully absorb and follow the new civilizational standards set by the West after the Industrial Revolution.

The current world order is at a turning point following the unipolar era of the United States. While the Western Westphalian domain is maintained, the core element of the liberal international order is being significantly challenged by revisionist states like China and Russia, as well as countries from the Global South.

It is uncertain whether global politics will form and maintain a single integrated sphere (권역) or divide into multiple regions experiencing fundamental conflicts. If modern international politics, standardized by Western civilization, were to fragment again, the division of the Korean Peninsula could deepen based on this regional separation. The recent intensification of strategic alliances between North Korea, China, and Russia illustrates this situation. A crucial phenomenon in this process is that the Fourth Industrial Revolution and emerging technologies

are redefining the international political order. Unlike previous technological advancements, current technological progress is characterized by enabling technologies or meta-technologies that define the direction of technological development. Generative artificial intelligence, in particular, exemplifies the innovation of these foundational technologies.

The role and function of generative artificial intelligence, which significantly impacts military, economic, social, cultural, and governmental governance capabilities, are just beginning. The future development of foundational technologies will have a critical impact on the international political order and the development of various diverging regions. Countries, companies, societies, and international organizations that quickly adapt to these technological changes will advance further, while those that do not will face deepening material and perceptual gaps. Considering the unification of the Korean Peninsula, the current stage of digital technology development in the North and South has maintained ethnic homogeneity and power balance to a level that can aim for unification. However, as new foundational technologies like generative artificial intelligence grow, the development paths, power balance, ethnic homogeneity, and differences in state forms and functions between South and North Korea will likely deepen.

If unification is a goal based on a certain degree of homogeneous historical experience and similarity in state systems and societies, the possibility of such similarity is decreasing. South Korea, as a liberal democratic state with the world's tenth-largest economy, a close alliance with the United States, and an innovative social and corporate atmosphere, has the capacity to rapidly absorb and disseminate artificial intelligence advancements throughout society. In this context, South Korea strives for economic development, international cooperation, and social and cultural innovation. In contrast, North Korea is an exceptionally poor country on a global scale, an unprecedentedly dictatorial state, and maintains its state through strong repression of society. In this context, it is difficult to expect societal innovation, and the acquisition and dissemination of new technologies are solely state-driven, with technological innovation also being state-led. In the increasingly polarized international technology supply chain, North Korea will find it

challenging to find alternatives other than relying on China and Russia.

North Korea is also striving to develop foundational technologies like artificial intelligence, but its direction will be very different from South Korea's. North Korea utilizes artificial intelligence for strong repression, control, and surveillance of society and aims to use open-source artificial intelligence for political intervention in South Korea and hacking and illegal manipulation in the international community.

As the civilizational standards and technological gaps, political systems, and socio-cultural perceptions between the South and North widen, what will be the future of the power balance and systemic homogeneity between the two Koreas? Will South Korea's advanced national capabilities increase the possibility of unification with North Korea, or will artificial intelligence act as a larger element of conflict between the two Koreas? It is necessary to recognize and respond to these issues.

II. From Traditional State to Network Knowledge State to AI Intelligent State

In the past, states primarily took the form of “Tianxia states (예의지방),” which were based on territory and military power. These states sought to maintain power mainly through territorial expansion and military superiority. However, in modern times, the prosperity of a state has shifted to being determined by economic power and technological prowess, particularly through the utilization of information and knowledge, thus transforming into a “National Prosperity State.” This indicates that a state's competitiveness no longer relies solely on physical resources but on the efficient use of information and knowledge (Ha and Kim 2006).

The historical development of the modern state has been linked to the need for efficient tax collection and military organization. The rise of the fiscal-military state in Europe, for example, involved the creation of centralized bureaucratic departments that could assess and enforce tax policies to fund military endeavors. This historical perspective underscores the interdependence between state power, taxation, and military capacity.

We can also witness the relationship between information capacity and fiscal capacity in state development. The ability of the state to gather accurate information about its population is crucial for effective taxation and resource mobilization. This "informational turn" in the study of state building emphasizes that states with high information capacity are better equipped to implement sophisticated taxation systems and build robust fiscal bureaucracies.

The concept of the modern state as a knowledge state, which possesses the knowledge over its population to extract economic taxes and build a national army, has been explored by several sociologists. This idea is rooted in the understanding that the state's capacity to govern effectively is heavily dependent on its ability to gather, process, and utilize information about its population.

Max Weber's theory of the modern state emphasizes the role of bureaucracy and rationalization in state governance. According to Weber, the modern state is characterized by a centralized administration that exercises authority over a defined territory. This administration relies on a bureaucratic structure staffed by trained officials who manage the state's functions, including tax collection and military organization. Weber's concept of the "monopoly of legitimate violence" underscores the state's exclusive right to use force, which is essential for maintaining order and defending the nation.

Weber also highlights the importance of legitimacy and territoriality in the modern state. Legitimacy is derived from the constitution and the participation of the people, which provides the state with the authority to govern and extract resources. Territoriality refers to the clearly defined borders of the state, which are respected by other states and provide a stable framework for governance.

Foucault's work on biopolitics and biopower further elaborates on how modern states use knowledge to regulate populations. He argues that the modern state employs various forms of surveillance and control to manage the health, behavior, and productivity of its citizens. This biopolitical control is essential for the state's ability to mobilize resources, such as building a national army and extracting taxes.

He introduced the concept of "governmentality," which refers to the art of governing beyond the traditional notion of state politics. Governmentality encompasses a range of techniques and procedures designed to manage the conduct of individuals and populations at every level, not just the administrative or political level. Foucault's analysis of power relations highlights how modern states use knowledge to exercise control over their populations. This includes the collection of demographic data, health statistics, and other forms of information that enable the state to implement policies effectively.

As we enter the digital age, we can further define the modern state as a "Network State." This refers to a form of state that exchanges and utilizes knowledge and information through various networks in the information age. Such a network state possesses the ability to efficiently manage and utilize resources through multiple interconnected networks. A network state, with its ability to move in various directions through its multiple powers, represents the network state's capability to efficiently utilize diverse information and knowledge.

The network knowledge state has several important characteristics. First, the importance of information and knowledge. The competitiveness of a modern state depends on its ability to utilize information and knowledge. This plays a crucial role in all fields, including the economy, military, and diplomacy. For example, in the economic field, information and knowledge can be used to explore new markets and introduce efficient production methods. In the military field, information and knowledge can be used to understand the movements of adversaries and formulate effective strategies. In the diplomatic field, information and knowledge can be used to understand international situations and formulate effective foreign policies.

Second, the utilization of various networks. Networks between states, between companies, and between individuals have become important. Through these networks, information and knowledge are exchanged rapidly, thereby enhancing the competitiveness of the state. For example, through networks between states, information and knowledge can be exchanged, leading to mutual cooperation. Through networks between companies, new

technologies can be developed, thereby enhancing competitiveness. Through networks between individuals, new ideas can be shared, thereby promoting innovation.

Third, continuous innovation. The network knowledge state develops through continuous innovation. This includes not only technological innovation but also institutional and social innovation. For example, through technological innovation, new products and services can be developed, thereby promoting economic growth. Through institutional innovation, efficient administrative systems can be established, thereby enhancing the competitiveness of the state. Through social innovation, new social values can be created, thereby promoting the development of society.

The network knowledge state plays a crucial role in global politics in the 21st century through these transformations. The importance of information and knowledge, the utilization of various networks, and continuous innovation are the core elements of the network knowledge state. Through these, states can enhance their competitiveness and establish their position in global politics.

In the upcoming era of economic development driven by artificial intelligence (AI), the role of the state and government will undergo another significant change. AI-based state governance and administration can leverage the synergy between knowledge management, data analysis, and AI capabilities to enhance decision-making processes, improve service delivery, and increase operational efficiency within state governments. By integrating these elements, state governments can harness the power of information, knowledge, and intelligence to make more informed and data-driven decisions that better serve their constituents.

We need to explore the transformative potential of artificial intelligence (AI) in state governance and administration. It highlights how AI technologies can enhance decision-making processes, improve service delivery, and increase operational efficiency within state governments. This new type of government is structured around several key themes, including knowledge management, data analysis, AI-powered decision support systems, and ethical considerations. The application of AI technology in the public sector and state management brings many benefits, including digitizing records, increasing labor productivity,

and saving time and costs for both people and businesses. AI-powered data analysis tools in public services can extract valuable information from large data sets, supporting evidence-based decisions. AI-powered chatbots provide effective and round-the-clock citizen support, improving engagement and satisfaction. AI algorithms can also detect and prevent fraudulent activities, protecting public resources and maintaining transparency.

III. AI-based State Governance and Intelligent Decision-Making

AI-based state governance and administration is an emerging field that leverages AI technologies to enhance decision-making processes, improve service delivery, and increase operational efficiency within state governments. This trend combines knowledge management, data analysis, and AI capabilities to support informed decision-making and policy formulation.

Knowledge Management

Knowledge management is crucial in AI-based state governance. It involves organizing and structuring information from various sources, including existing policies, regulations, legal frameworks, historical data, expert knowledge, and citizen feedback. This knowledge base serves as a foundation for AI systems to process and analyze information, enabling them to provide relevant insights and recommendations for decision-making processes.

Data Analysis and Information Processing

State governments collect and generate vast amounts of data from various sources, such as administrative records, sensor data, social media, and citizen interactions. AI technologies, particularly machine learning and natural language processing, can analyze and extract valuable insights from these diverse data sources. This capability enables state governments to identify patterns, trends, and correlations that can inform policy decisions and improve service delivery.

AI-Powered Decision Support Systems

AI-powered decision support systems (DSS) integrate knowledge management, data analysis, and AI capabilities to assist state officials and policymakers in making informed decisions. These systems provide data-driven insights and recommendations based on the analysis of relevant information and knowledge bases. They can simulate and model different scenarios to evaluate the potential impacts of policy decisions, automate routine decision-making processes to free up human resources for more complex tasks, and facilitate collaboration and knowledge sharing among stakeholders involved in decision-making processes. Overall, these systems enhance intelligence and decision-making capabilities.

By combining AI technologies with knowledge management and data analysis, state governments can enhance their overall intelligence and decision-making capabilities in several ways:

Improved situational awareness: AI systems can continuously monitor and analyze real-time data streams, providing state officials with up-to-date information and insights for timely decision-making.

Predictive analytics: Machine learning models can be trained on historical data to predict future trends, risks, and opportunities, enabling proactive decision-making and policy formulation.

Personalized services: AI-powered systems can analyze citizen data and preferences to tailor services and communications, improving citizen experience and engagement.

Optimization and resource allocation: AI algorithms can optimize resource allocation and operational processes, leading to increased efficiency and cost savings.

AI-based governance and decision-making systems must be designed and implemented with robust governance frameworks, ethical considerations, and transparency measures to ensure accountability, fairness, and public trust. This includes addressing issues related to data privacy, security, and the potential biases in AI algorithms.

Here are several examples of how AI is being used in state governance:

Monitoring and Analysis: AI systems are deployed to monitor activities such as troop movements and potential security threats, providing early warnings and aiding in managing tensions.

Disaster Response and Crisis Management: AI is used for disaster response, including fires, floods, and disease outbreaks, helping coordinate humanitarian efforts and manage refugee flows.

Public Services and Social Safety Nets: AI is integrated into public services like healthcare and welfare distribution, supporting the integration of citizens and improving service delivery.

Administrative Efficiency and Policy Analysis: Generative AI improves administrative efficiency, report writing, and policy analysis, aiding in developing and evaluating policies.

International Cooperation and Norm-Setting: AI governance norms and standards are shaped through global partnerships, fostering international cooperation crucial for managing complex challenges.

In the future, implementing AI in state governance comes with challenges such as resistance to change, data management issues, and the need for extensive training and education. Overcoming these challenges requires investments in data infrastructure, establishing data governance frameworks, and fostering collaboration between different agency departments.

AI-based state governance and administration leverages the synergy between knowledge management, data analysis, and AI capabilities to enhance decision-making processes, improve service delivery, and increase operational efficiency within state governments. By integrating these elements, state governments can harness the power of information, knowledge, and intelligence to make more informed, data-driven decisions that better serve their constituents.

Countries around the world are developing national strategies for AI to enhance productivity, improve quality of life, and achieve digital competitiveness. These strategies

involve establishing governance structures, promoting AI research and development, and addressing ethical and security concerns. National strategies for AI aim to create a supportive environment for AI innovation while ensuring that AI technologies are used responsibly and ethically.

The integration of AI, especially generative AI in government, has the potential to transform public administration, enhance decision-making processes, and improve service delivery. However, it also presents challenges that require careful consideration of ethical, legal, and governance issues. By adopting a comprehensive approach to AI governance, governments can harness the benefits of AI while mitigating its risks.

IV. Two Koreas in the Age of Generative AI

1. South Korean Efforts to Make an AI Intelligent State

South Korea has been actively pursuing the development of an AI-based intelligent state and government through various strategic initiatives and policies. The South Korean government established the National Strategy for AI on December 17, 2019, with the vision of "Toward AI World Leader beyond IT." The strategy aims to achieve digital competitiveness, create significant economic effects through AI, and improve the quality of life for its citizens by 2030. The strategy consists of 100 government-wide action tasks under nine strategies in three areas: AI ecosystem, AI utilization, and people-centered AI.

The Digital New Deal, announced in 2020, envisions state-led industrial and educational efforts to harness AI's potential. This includes heavy investments in AI infrastructure and the creation of AI-oriented startup incubators to foster innovation and entrepreneurship in the AI sector.

These efforts will lead to the South Korean government's policy for dealing with North Korean threats and preparing for future unification. Areas of related policies are:

Enhancing Monitoring and Analysis Capabilities: South Korea is deploying AI systems to better monitor North Korean activities along the border, including troop movements and potential security threats. AI can assist in analyzing large amounts of data from various sensors and sources to detect patterns and provide early warnings. This could aid in managing tensions and preparing for potential contingencies related to North Korea.

Improving Disaster Response and Crisis Management: AI is being used for disaster response, including fires, floods, and disease outbreaks. In the event of instability or a crisis in North Korea, AI systems could help coordinate humanitarian efforts, manage refugee flows, and mitigate potential chaos during the unification process.

Enhancing Public Services and Social Safety Nets: South Korea aims to integrate AI into public services, such as healthcare, welfare distribution, and citizen information access. If unification occurs, these AI-powered systems could be extended to support the integration of North Korean citizens, providing essential services and facilitating their transition.

Boosting Administrative Efficiency and Policy Analysis: The use of generative AI is planned to improve administrative efficiency, report writing, and policy analysis in South Korea. This could aid in developing and evaluating policies related to the unification process, inter-Korean cooperation, and managing the complex challenges that may arise.

Facilitating International Cooperation and Norm-Setting: South Korea is actively engaging with global partners to shape AI governance norms and standards. This could foster international cooperation crucial for managing the unification process, addressing potential sanctions risks, and ensuring a smooth transition aligned with global norms and best practices.

While AI can provide valuable tools and capabilities, the unification process and inter-Korean matters will ultimately require careful diplomacy, political negotiations, and a comprehensive strategy involving various stakeholders and international cooperation. AI should be viewed as an enabling technology to support and enhance these efforts rather than a sole solution.

2. North Korean Efforts for AI Development

The report by Hyuk Kim in 38 North titled "North Korea's Artificial Intelligence Research: Trends and Potential Civilian and Military Applications" provides a comprehensive analysis of North Korea's advancements in artificial intelligence (AI) and machine learning (ML) technologies. The global progress in AI and ML over the past decade has been significant, driven by advancements in computational power and data accessibility. Despite its isolation and the constraints of international sanctions, North Korea has been actively developing AI/ML technologies. The country's efforts in this field date back to the 1990s, with the development of the "Eunbyul" AI program in 1998. The report highlights the challenges in assessing North Korea's AI capabilities due to its secretive nature and the impact of sanctions. However, open-source information, including scientific journal articles and state media, indicates that North Korea is making strides in AI/ML across various sectors (Kim 2024).

North Korea's AI/ML development spans over three decades, addressing nationwide challenges such as air pollution forecasting, drought preparation, hydro turbine vibration monitoring, and, more recently, applications during the COVID-19 pandemic. The country has applied AI/ML to create models for evaluating mask usage and prioritizing clinical symptom indicators of infection. The report underscores the importance of monitoring North Korea's AI/ML activities, particularly in the context of intangible transfer of technology (ITT), which can circumvent sanctions.

More than anything else, North Korea has explored the use of AI/ML for military applications, particularly in wargaming and battle simulations. A study published in the North Korean journal Information Science described the development of a wargaming simulation using reinforcement learning (RL). RL involves training an agent to maximize rewards in a given environment through trial and error. The study established criteria for reward calculation, such as victory in battle and the ratio of artillery shells landed on the enemy. This suggests North Korea aims to enhance its strategic planning through AI-driven wargaming simulations.

The dual-use nature of AI/ML technologies presents significant challenges, particularly in the context of international sanctions and export controls. Monitoring and mitigating the risks associated with North Korea's AI/ML activities are crucial to ensuring compliance with sanctions and preventing the proliferation of military technologies.

V. The Uncertain Future of AI Competition and Unification Between the Two Koreas

The competition between South Korea and North Korea represents a broader struggle between a wealthy, liberal democracy and a poor, authoritarian state. Historically, this rivalry manifested in security domains such as nuclear arms races. However, in the era of AI, the competition is shifting towards a comprehensive contest encompassing entire national systems. The resulting disparity in national power could significantly influence the future of Korean unification. Although the dynamics of AI competition between democratic and authoritarian states are not yet fully understood, it is evident that authoritarian regimes possess both advantages and disadvantages in this arena.

Authoritarian/autocratic regimes like North Korea can leverage AI technologies such as facial recognition and data analytics to maintain social control and suppress dissent. This can create a stable environment conducive to economic activities. Also, authoritarian states often have fewer restrictions on data privacy, allowing them to collect and utilize vast amounts of data for AI training. This can accelerate AI innovation and economic growth. The centralized decision-making process in authoritarian regimes allows for the swift implementation of AI policies and initiatives. This can lead to faster adoption of AI technologies across various sectors, driving economic growth. Singapore's government, for example, has quickly mobilized resources to support AI development. Also, authoritarian governments can direct significant resources toward AI research and development without the constraints of political opposition. This focused investment can lead to breakthroughs in AI technologies that boost economic productivity. China's substantial investment in AI research is a case in point.

However, while authoritarian regimes can drive initial AI development, their repressive nature can stifle broader innovation. The suppression of free speech and lack of intellectual freedom can hinder creative and innovative thinking, which is essential for long-term economic growth. Also, the use of AI for surveillance and control can lead to significant ethical and social issues, including human rights abuses. This can result in international sanctions and loss of foreign investment, negatively impacting economic development. Over-reliance on state-driven AI initiatives can create an environment where private-sector innovation is limited. This can reduce the economy's overall competitiveness as private enterprises may lack the freedom to explore and innovate independently. The lack of transparency and accountability in authoritarian regimes can lead to corruption and misallocation of resources. This can undermine economic stability and growth in the long run.

As an autocratic state, North Korea can leverage AI to drive economic development through enhanced control, access to data, and rapid policy implementation; these advantages are often counterbalanced by significant disadvantages. These include stifled innovation, ethical concerns, dependence on state control, long-term economic instability, and potential global isolation. A country's sustainable economic success in the AI era is more likely to be achieved through a balanced approach that includes both strong governance and democratic principles.

In this context, South Korea must strive to maintain the innovative edge of a liberal democracy while seeking to gain a competitive advantage over North Korea. To secure a competitive edge in the AI era, South Korea must focus on leveraging the strengths of its liberal democratic system. This includes fostering an environment that encourages innovation, upholding ethical standards in AI development, and ensuring that AI technologies are used to enhance the well-being of its citizens. International cooperation with international society to foster technological development and standards for transparent and safe use of AI will give South Korea an advantage in going forward to unification, ultimately setting a unified, AI-based, liberal democratic Korean Peninsula. ■

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