A Study on the Development Plan of Smart City in Korea

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Abstract

Purpose: This study analyzes advanced cases of overseas smart cities and examines policy implications related to the creation of smart cities in Korea. **Research design, data, and methodology:** Analysis standards were established through the analysis of best practices. Analysis criteria include Technology, Privacy, Security, and Governance. **Results:** In terms of technology, U-City construction experience and communication infrastructure are strengths. Korea's ICT technology is inferior to major countries. On the other hand, mobile communication, IoT, Internet, and public data are at the highest level. The privacy section created six principles: legality, purpose limitation, transparency, safety, control, and accountability. Security issues enable urban crime, disaster and catastrophe prediction and security through the establishment of an integrated platform. Governance issues are handled by the Smart Special Committee, which serves as policy advisory to the central government for legal system, standardization, and external cooperation in the district. **Conclusions:** Private technology improvement and participation are necessary for privacy and urban security. Citizens should participate in smart city governance.

Keywords: Smart city, Technology, Privacy, Security, and Governance

JEL Classification Code: E44, F31, F37, G15

1. Introduction

The situation in which urbanization is progressing rapidly around the world is shown in Figure 1. Starting in 2009, the city's population began to increase.

A key issue of global urbanization is the continued growth of the world's population by 2050, with emerging cities projected to grow at an even faster rate and, except in Africa, rural populations are projected to decline. The world population is projected to increase by about 2.4 billion people to a total of 9.5 billion by 2050, and the urban population ratio will increase to 66% (UN, Department of Economic and Social Affairs, Population Division. 2014).
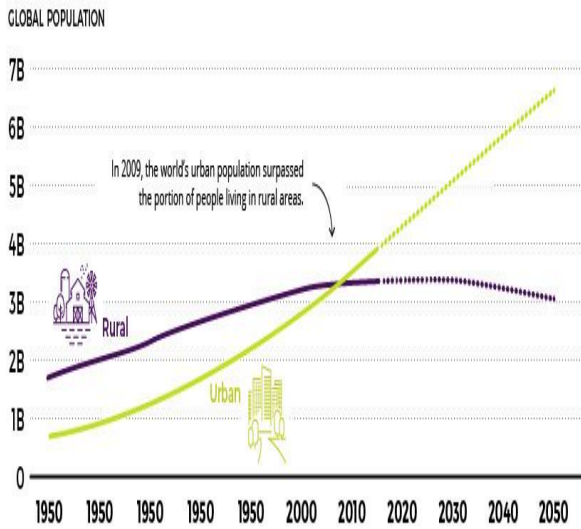
The concentration of population due to urbanization has caused many problems. And the urban problems that have arisen are being expanded and reproduced.

Urbanization causes environmental pollution caused by smoke and garbage, and mental stress due to noise. And it is causing the problem of depletion of resources. Urbanization also causes housing instability.

The development of capitalism following urbanization leads to polarization of wealth and polarization of housing. The housing poor live in degraded residential environments.

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GLOBAL POPULATION

In 2009, the world's urban population surpassed the portion of people living in rural areas.

Source: UN World Urbanization Prospects

Figure 1: Urban vs Rural World Population Trends

In order to solve these urban problems, attempts to solve urban problems using IT technology began to emerge from the early 2000s.

Recently, advanced countries around the world are making efforts to build smart cities by utilizing the 4th industrial technology such as big data and AI. Humanity has solved urban problems through technological revolution. The world is now promoting smart cities. To realize smart city, countries around the world are carrying out living lab, data platforms, and solution development.

Smart city-related technologies include: zero emission energy, water and food independence technologies, vertically farmed produce, robot shuttles, hyperloop, smart buildings, blockchain, 3D structural electronics, electrics, optics, magnetics sensors, wearable technology, and infrastructure elimination.

South Korea also began to seek advice on smart cities. And I am making those living labs. Next, smart pilot cities are being created.

Therefore, in this study, through the analysis of smart city advanced cases, we try to derive a plan for the success of smart city in Korea.

2. Literature Review

2.1. 4th Industrial Revolution and Urban

Smart City is based on the 4th industrial revolution technology. The components of a smart city are smart government, smart environment, smart housing, smart economy, smart mobility, and smart people.

Its contents are shown in Figure 2 below.

A smart government means an ICT government that provides transparent and open data. A smart environment means green buildings, green energy utilization, and green cities. The smart economy is entrepreneurship and innovation, boosting productivity, and local and global collaboration. Smart people are people with embracing creativity who live in a 21st century educated inclusive society. Smart Mobility is a mixed modal approach, a clean, non-motorized option, utilizing ICT. Smart living means culturally vibrant and happy, safe and healthy.
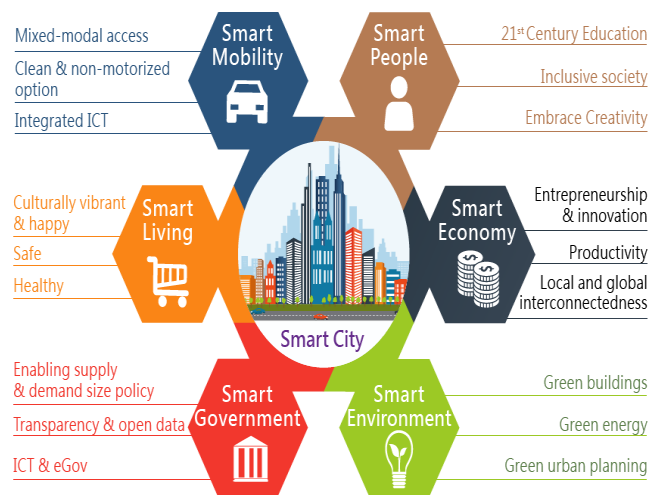
Source : glweb.eu

Figure 2: 4th Industrial Revolution and Urban

2.2. Smart City

In order to solve the continuously occurring urban problems, it is necessary to guarantee the balanced development of the city and the quality of life of citizens. To do so, it is necessary to change to a people-centered urban paradigm. The solution is a smart city.

As a result, the value of smart cities is increasing worldwide, and companies and governments are increasing their investments.

Considering this situation, the Korean government is also promoting the establishment and spread of smart cities in earnest. However, through the U-city project, we learned that smart city projects led only by the public are difficult to succeed. Citizens (users), private companies (suppliers), and the government should form multifaceted governance to promote work.

Smart cities are supported by several types of technologies, including. They are information and communications technology (ICT), connected physical

devices using the Internet of Things (IoT) network, geographical information systems (GIS).

Smart city concept integrates information and communication technology (ICT), and various physical devices connected to the network (IoT) to optimize the efficiency of city operations and services and connect to citizens.

The sustainability of a smart city is created through the following process. They are collected, communicate, analyze, and act.

First, collect is to gather data in real-time from smart devices, sensors, and connected objects, via Internet of Things and ICT platform. Second, communicate is to make the data available for all decision centers such as automated systems, government institutions, telecom providers, infrastructure managers, and citizens, ensuring interoperability, integrity, scalability, and privacy of these data. Third, analysis is to compute the data to build actionable results. Fourth, acts are transformed actionable results in social initiatives, environmental improvements, behavioral influences, and infrastructure optimization.

Citizens are the fuel and the foundation of Smart Cities. In a smart city, sensors attached to people and mobility gather various information as they move, and based on this, big data is formed.

The industrial raw material of the 4th industrial revolution era is data. Accordingly, all data generated while people move or live are used as raw materials for the 4th industry. Therefore, smart city based on the 4th industrial revolution technology is based on citizens.

2.3. Previous Studies

Research related to Korea's smart city includes smart city-related industry research, Korean smart city area research, smart city research with the concept of ubiquitous evolution, research on the function of smart city in the era of epidemics, research on smart city technology, Korea There are studies on sustainable measures of smart cities.

First, studies on the industry of smart cities are as follows. There is a study on the structural and relational changes of the Korean smart city industry from the perspective of sustainable smart city and industrial ecosystem (Cho et al., 2021). Cho and Lee (2022) measured the spectrum, penetration, impact, and network of the Korean smart city industry as a study on the development and application of the Smart SPIN model.

The following is a study on smart city strategies, and regional studies are as follows. First, there is a study that analyzes the cases of Gimpo and Namyangju as smart cities from a technological and cultural perspective (Kim et al., 2020). Here are some case studies from Songdo (Benedict, 2016; Lee et al., 2016; Carrera et al., 2021; Kshetri et al.,

2014). And there are studies on Anyang Smart City (Lee et al., 2016). There are studies analyzing Sejong City, the cutting edge of smart cities in Korea (Jang et al., 2022; Choi & Kim, 2021; Leem et al., 2019). There is also a study that analyzed the case of Eco-Delta City in Korea (Han & Kim, 2022). Kwon et al. (2016) analyzed Namyangju, South Korea, as an international example of a smart city. Yang et al. (2020) studied Korea's national strategic smart city program with a focus on regional smart city development.

Korea's smart city was viewed as an evolved concept from ubiquitous, and related studies were conducted (Namti, 2019). Kim and Kim (2021) analyzed the institutional change from e-Government to Smarter City by comparing Greenwich Royal Autonomous District in England and Seongdong-gu in Korea. Shin and Kim (2012) studied the development of Korean u-city as Enabled the smart city.

Studies on the functioning of smart cities in the era of COVID-19 include: Sonn et al. (2020) studied smart city technology for epidemic control without containment. Sonn, and Lee (2020) analyzed smart cities as spatio-temporal mapmakers in COVID-19 control and studied Korean strategies and democratic control of surveillance technology.

In addition, there are studies that analyze smart cities from a historical perspective. Yang (2020) studied genealogy as a critique of smart urbanism as a historicization of smart cities.

There are studies on sustainable smart city plans in Korea. Kwak and Lee (2021) presented implications while analyzing the development process of programs in Korean smart cities. Lee and Jang (2019) analyzed the evolution of Korean smart city policies. Jang and Kim (2022) studied considerations for inducing citizen participation in smart city information vulnerable classes. Yoo (2021) strategically analyzed the Korean Smart City Seoul portal for sustainable governance.

Research on smart city technology is as follows. Kim and Jung (2019) studied the application status of technology services in Korean smart cities. Lim et al. (2019) conducted a study on smart energy transition. Choi et al. (2020) analyzed Korea's smart city evolution process through big data.

In the previous studies above, studies related to this study are studies on sustainable smart city plans in Korea. They studied the program development process, policy evolution process, and ways to induce participation of the information-disadvantaged class. Lee Seong's research can be seen as a study of Korea's smart city development plan by field. As Korea is in the early stage of smart city development, it is necessary to present a plan for a better future from a holistic perspective.

Therefore, in this study, we analyze advanced cases of smart cities overseas and present a comprehensive plan for the development of smart cities in Korea based on their

strengths and weaknesses.

3. Analysis Framework

3.1. Foreign Case Analysis

3.1.1. Smart City in Toronto

Sidewalk Toronto in Ontario is planning a smart city.

It plans to build a high-tech community that prioritizes sustainability, safety, and affordability through innovative technologies.

It will include autonomous vehicles, underground garbage robots, green energy infrastructure, snow-melting sidewalks, modular architecture, and wooden buildings. Toronto's smart city

Improve the quality of life and lead urban innovation. However, smart cities are like two sides of the same coin. Invading privacy in rebellion that enhances the interests of citizens. Torontonians have a strong antipathy towards Google, a 'tech dinosaur'. This is because there is controversy over the leakage of personal information by tech dinosaur companies.

A clear and sustained consensus between businesses, countries and citizens is critical to addressing this issue.

3.1.2. Woven City in Japan

Toyota Is Building 'City of The Future'. The Woven City is a prototype, a "living laboratory" that tests and advances mobility, autonomy, connectivity, hydrogen-based infrastructure, and industry collaboration. This is human centered

It is a living laboratory, constantly evolving. A private company called Toyoda planned it, and there was active support from the government.

3.1.3. Masdar City in Abu Dhabi

Masdar City is located in Abu Dhabi, United Arab Emirates. This is Personal Rapid Transit (PRT). It aims for zero carbon and zero waste. It is functioning as an innovation cluster test bed leading commercialization through global partnerships.

The participating companies are actively supported by the government, including Etihad Airways, Siemens, General Electric (GE), International Renewable Energy Agency headquarters, Lockheed Martin, Mitsubishi Heavy Industries, and Schneider Electric.

3.1.4. Kalamata in in Helsinki, Finland

Realize an autonomous bus for one more hour a day. (World's first in 2017). 80% reduction in carbon emissions by geothermal heat.

To implement this, we operate three platforms. It has an

Innovators Club, Smart Solutions, Agile Pilot Program and more.

It plans to relocate 1/3 of its 3,000 residents and 100 businesses. Voluntary participation is taking place in the public and private sectors.

3.1.5. North America, Europe

North America and Europe are operating living labs, open data, open innovation, eco-friendly development, transportation linkage, autonomous driving, energy, and test beds to realize smart cities. The contents are shown in Table 2. below.

Public transit links are being implemented in Columbus, and free-ride-based taxi services are being implemented in Toronto. And an unmanned city for IT technology experiments is being implemented in a test bed in New Mexico.

Table 1: Smart City Trends in North America and Europe

Division	Contents
Living Lab	Provision of open innovation services centered on participatory innovation spaces in which citizens directly or indirectly lead and users become the subject of innovation activities.
Open data	Realization of a data-centered city that is used as a source of innovative city creation by providing various data to citizens.
Open innovation	Promotion of public value innovation based on citizen, business, and public partnerships, such as financing through the creation of a smart city crowdfunding platform.
Eco-friendly development	Application of continuous environmental improvement and technology development based on public-academic-governmental cooperation with the goal of responding to climate change and reducing carbon emissions.
Transportation connection	Vitalization of economic activity opportunities by improving safety and mobility through integrated sharing of traffic data, provision of user services and electric vehicle infrastructure.
Autonomous driving	Improving urban problems such as traffic congestion and air pollution by limiting the passage of personal vehicles and utilizing small self-driving vehicles.
Energy	Set up blocks and realize smart energy solutions (integrated intelligent energy systems) centered on energy labs in which the government and universities participate.
Test bed	Creation of a large urban laboratory with a residential environment for testing various IT devices and infrastructure, but no actual residents.

Source: Ministry of Land, Infrastructure and Transport, 2018

3.1.6. Asian Smart City Status

Asia is promoting the establishment of smart city

infrastructure in the direction of creating a high-tech city in connection with the 4th industrial revolution technology and revitalizing the industrial ecosystem based on new technology (Ministry of Land, Infrastructure and Transport, 2018).

The specific details are shown in Table 2. Asian smart cities focus on industrial ecosystem creation, high-tech city creation, low-carbon policy, urban expansion, introduction of innovative technologies, and water management.

Table 2: Smart City Trends in Asia

Division	Contents
Industry ecosystem	▲Development of new technologies for application of various advanced services ▲Promotion of policies such as establishment of industrial ecosystem for industrial revitalization ▲Focus on building infrastructure, such as creating a new city based on cutting-edge new technology
High-tech city	▲Creating a new city based on cutting-edge new technology ▲Focus on building infrastructure
Low carbon	▲70% reduction in carbon emissions compared to existing residential complexes ▲30% reduction in water consumption ▲Promote lifestyle energy innovation by using more than 30% of renewable energy
Urban expansion	▲The central government plays a role such as presenting guidelines and business funds ▲Creation of 100 smart cities across the country led by local governments
Introduction of innovative technology	▲Use the entire city as an exhibition hall for the future ▲Realization of a future city model with the world's cutting-edge science and technology commercialize the entire city
Water management	▲Connecting water-sufficient and water-scarce areas ▲Resolving water problems between regions by developing various water resources

Source: Ministry of Land, Infrastructure and Transport, 2018

3.2. Analysis Framework

The analysis framework, which was prepared based on advanced foreign cases, is presented in Table 3. The analysis criteria were economic feasibility, energy efficiency, public transport connectivity, eco-friendliness, safety, and improvement in the residential living environment.

Table 3: Analysis Framework

Category	Contents
Technology	Smart energy
	Smart mobility
	Smart water
	Smart public service
	Smart building
	Smart data center
Privacy	Personal Information Management
	Smart City certification system
	Smart city management entity checks
Security	CCTV control or similar security problems
	Specific & consistent security application
	Integration of applicable laws
Governance	Technology governance
	Global governance
	Public-private governance

4. Case study of Smart city in Korea

The K-Smart City Plan is as follows. Korea promotes smart city policies to solve urban problems. Smart City aims to protect people's health with an innovative air purification system. This policy is based on fourth technology and national cooperation.

First, K smart city works for each stage of urban growth.

Second, strengthen the smart city foundation by simultaneously developing data and AI-based technology and nurturing human resources. Third, improve unnecessary regulations and establish smart city governance in which businesses and citizens participate. Fourth, strengthen global cooperation to share experiences and know-how of each country (*smartcity.go.kr*).

The National Pilot City Promotion Direction is as follows. It serves as a test bed for new convergence technologies using technology 4.0. Through this, it solves urban problems and improves the quality of life of citizens. Promote the creation of an innovative industrial ecosystem in a balanced way. It presents the direction of smart city development for domestic new cities and activates overseas expansion.

First, it serves as a test bed for future leading technologies. Actively reflect intelligent infrastructure and convergence new industry services so that various future technologies can be grafted onto the national pilot city as a platform for the development and diffusion of 4th industrial revolution technologies. Among the core technologies that can be implemented in the city, development is possible within 5 years, and the results can be utilized in the private sector (Lee, 2017).

Second, it contributes to solving urban problems and creating new industries by operating a data-based smart city. To this end, a data hub model is implemented to integrate and manage city data, which are disconnected by sector, into big data by interconnecting them. Establish an open operating system (open API) so that companies and citizens can easily utilize city data and induce the development of new solutions tailored to creative consumers (Bae, 2020).

Third, create an innovation ecosystem led by private companies and citizens. From the early stage of urban planning, private companies participate with creative business models, and private sector participation is expanded, and public-private joint projects are promoted. Discover and reflect various contents that citizens need in all stages of planning, design, construction, and occupancy by utilizing the advantages of empty space. For this, team challenges and living labs are used (Jang, 2018).

4.1. National Pilot City

4.1.1. Sejong Smart City

It is a joint project promotion system between the private and public sectors. Breaking away from the existing public-led development method, from urban planning to operation through horizontal partnerships between the private and public sectors. It is a business promotion system that participates in all stages of a business. The propulsion system is as follows. The time range is within 15 years from the date of establishment of the business corporation, 5 years for construction and 10 years or more for operation. The spatial scope extends Sejong National Pilot City to Sejong City. The content scope is to build and operate smart services and create smart city spaces. The infrastructure is built by LH (lh-sejong-smartcity.kr).

Sejong Smart City aims to provide 11 essential services.

The contents include data collection/storage and AI/big data analysis platform, public sector IoT sensor construction and data interconnection, cyber security platform construction, digital twin platform construction and utilization, personal mobility sharing service, vehicle sharing service, autonomous driving mobility, Integrated mobility service, demand-response mobility service, smart parking service, convergence charging infrastructure selection service, 5 or more freely suggested services, personalized health management service, lifelong education service provision, renewable energy supply, energy smart transaction management, smart It is an integrated delivery service and community-promoting smart farm service. convergence charging infrastructure selection service, 5 or more freely suggested services, personalized health management service, lifelong education service provision, renewable energy supply, energy smart transaction management, smart integrated delivery service and community-promoting smart farm service (lh-sejong-smartcity.kr).

4.1.2. Busan Smart City

The goal of Busan Eco Delta City is to create a global innovative growth city where nature, people and technology meet to advance the future life.

Busan Eco Delta Smart City (EDC) is a mecca of future industries by introducing 4th industrial revolution technology, where all citizens benefit from balanced opportunities and inclusive growth and improve the quality of life of citizens such as education, culture, safety, and environment. have. By utilizing the potential of the Semulmeori waterfront space where three rivers converge, it is an attractive city where art, culture, and tourism are harmonized under the theme of water. It is to create a sustainable future city by adding urban planning and smart technology (smartcity.go.kr).

Realize 'Smart Life, Smart Link, Smart Place' that guarantees the sustainable life of future generations, maximizes social public value, and becomes a model for future cities, hydrothermal energy, water energy science, and new Korean wave VR/AR) clusters will create quality jobs that secure the economic sustainability of the city (smartcity.go.kr).

In addition, it operates three future city operation platforms (digital city, augmented city, and robot city) that enable innovative and continuous urban innovation of Busan Eco Delta Smart City, and operates 10 (robot-based life innovation) that adds value to citizens' lives. , learning-work-play convergence society, intelligent urban administration/management, smart water, zero energy city, smart education & living, smart healthcare, smart mobility, smart safety, smart park) , plans to create a representative smart city leading model that creates innovative changes in the urban field (smartcity.go.kr).

Busan EDC Smart City plans to operate 'Open Tech Sandbox' and 'Open Factory', through which it plans to foster domestic small and medium-sized enterprises (SMEs) and startups, attract overseas global companies, and create a job creation city (Kim, 2020). Open Tech Sandbox fosters and supports innovative companies that support startup space, core infrastructure, and investment funds for a certain period of time, and gives companies whose potential is recognized through competition between companies the opportunity to participate in the creation of Busan EDC Smart City (Kim, 2020). Through this, the private sector will implement high-quality smart technologies and services that can be experienced by citizens and create jobs in fierce competition. An open factory is a new concept factory to support innovative companies and supports experimentation and production equipment such as digital devices, software, and 3D printers, and supports companies participating in the

Open Tech Sandbox to freely produce various products (Ministry of Land, Infrastructure and Transport, 2018).

4.2. Regional Base Smart City Development Project

4.2.1. Gwangju Smart City

The direction of Gwangju Smart City is to create an energy-independent smart city for E100 carbon neutrality. To this end, it is to reduce carbon emissions through renewable energy power generation facilities and brokerage transactions. And energy saving through energy efficient use of aging buildings and greenhouse gas reduction. It is fostering the smart energy industry to realize the government's 2050 carbon neutral policy, Gwangju City's 2045 energy self-sufficient city, and AI-centered city policy (smartcity.go.kr).

4.2.2. Changwon Smart City

The direction of Changwon Smart City is to create a citizen-participating, carbon-neutral city. It aims to create value, distribute the traffic volume between the Anmin Tunnel and Changwon-daero, etc. where the average travel speed is less than 20 km/h during commute hours, and optimize the signal system for the habitually congested sections in Changwon (smartcity.go.kr).

4.2.3. Haenam-gun Smart City

The Haenam-gun smart city creation plan is to create an eco-friendly, renewable energy-based new city tourism and leisure type, and establish a regional economic foundation centered on balanced national development and smart services by presenting a new city standard model based on corporate urban planning (smartcity.go.kr). It is to develop solar power, build a foundation for eco-friendly mobility (electric vehicles) by distributing electric charging facilities using ESS, implement major tourist attractions in Solar City as a metaverse, and provide game element-applied content. (smartcity.go.kr).

4.2.4. Hoengseong-gun Smart City

The direction of Hoengseong-gun Smart City is to create a smart work city to revitalize the city of extinction of local population. It is to develop and spread the smart city business tailored to rural areas and work city model by presenting a role model for overcoming the crisis in response to the crisis of local extinction. It aims to spread convenience services such as reservation/payment for workation and mobility, provision of workation service reservation service, introduction of local tourist attractions and linking programs. We intend to strengthen regional competitiveness by providing eco-friendly transportation services and EV charging infrastructure projects by linking solar power installation projects with low-cost charging

rates (smartcity.go.kr).

4.3. Small and Medium-sized City Smart City

The small and medium-sized city smart city creation project is a smart city experience improvement project that builds smart solutions to solve urban problems in small and medium-sized cities in consideration of local demand and conditions. do. A total of 49 local governments applied for the 2022 small and medium-sized city smart city creation project, showing a competition rate of 3:1. Ulju-gun, Gokseong-gun, Jeonnam, Iksan-si/

Jeonju-si, Jeonbuk, Gyeryong-si/Yesan-gun, Chungcheongnam-do, and Goesan-gun, Chungcheongbuk-do were selected (smartcity.go.kr).

4.4. Case study of Korean Smart city

4.2.1. Technology

Korea can utilize the advantages of technology and communication infrastructure for U-City construction in smart city construction.

Korea's ICT technology is poor compared to major countries. The average of ICT skills is 100 in the US, 93.3 in Europe, 90.4 in China, and 87.4 in Korea (Information and Communications Technology Planning and Evaluation Institute, 2021). On the other hand, mobile communication and the Internet of Things are excellent. For mobile communication, the US scored 100, Europe scored 96.9, China scored 99.2, and Korea scored 97.8. In IoT, the US scored 100, Europe scored 94.8, China scored 88.7, and Korea scored 92.3 (Information and Communications Technology Planning and Evaluation Institute, 2021).

Internet speed and public data openness are world-class. Korea ranks first in the world in terms of wireless Internet speed, 7th in wired Internet speed, and 7th in openness of public data.

4.2.2. Privacy

The Korean government has established six principles (legality, purpose limitation, transparency, safety, control, and Responsibility) for privacy protection in smart cities. The contents are as in Table 4.

Except for cases where there are special provisions in other laws related to privacy, the Personal Information Protection Act follows (Article 6 of the Protection Act).

The Smart City Act stipulates that related laws and regulations should be followed when personal information is processed in the process of managing smart cities and providing smart city services.

In the event that personal information is collected, used, provided, retained, managed, and destroyed in the course of smart city management and smart city service provision, it

must be handled lawfully and safely within the scope of the necessary purpose in accordance with relevant laws and regulations (Smart City Act. 21, privacy).

Therefore, if personal information is included in information processed by infrastructure management agencies, service providers, etc., and information provided and linked to smart city integrated operation centers, obligations under the Protection Act must be observed.

Table 4: The 6th Principles of Privacy in Korean Smart City

Category	Contents
Legality	The basis for processing, such as the collection, use, and provision of personal information, must be legal and clear.
Purpose limitation	Personal information must not be used without permission for any purpose other than the purpose of collection.
Transparency	Disclosure of personal information processing procedures, methods, and details in an easy-to-understand manner by information subjects.
Safety	Process and manage personal information safely.
Control	Provides the means for the subject of guaranteed information to control personal information on their own.
Responsibility	Clarify management responsibility for personal information processing.

Source: Personal Information Protection Commission, 2021

4.2.3. Security

The security of the smart city is implemented through the establishment of an integrated platform. Anticipation and security of crimes, calamities, and disasters that undermine the safety of the city will be made swiftly. This is because real-time information linkage with related organizations (police, fire department, Ministry of Justice, etc.) is possible within the integrated platform.

The integrated platform enables rapid response by using CCTV images of crime cases, mass casualties, disasters, and disaster areas.

A disaster risk management service based on the Internet of Things (IoT) has also been established to provide early notification to relevant departments before road flooding through an IoT-based flood detector sensor in flooded road areas in summer, and to install temperature and humidity IoT sensors in child protection zones. It is contributing to the creation of a smart safe city by transmitting heat wave, severe cold and disaster broadcasting (smartcity.go.kr).

4.2.4. Governance

In Korea, smart city governors are composed of the Smart City Special Committee under the 4th Industrial Revolution Committee. It was formed in November 2017 to study the creation and expansion of smart cities from a national strategic perspective.

The composition of the Smart City Special Committee is directly under the president, private experts (23 people) and the government (6 people). Its role is to advise on government policies such as legal systems, standardization, and external cooperation (smartcity.go.kr).

Industries include telecommunications, SI, city and architecture, power, standards, and design. Academia includes civil engineering, energy, and computer engineering. Research areas include Data, ICT, and Structural Engineering. As for civic groups, the environment and energy fields participated. Relevant ministries include the Ministry of Land, Infrastructure and Transport, the Ministry of Science and ICT, the Ministry of Industry, the Ministry of Strategy and Finance, the Ministry of Public Administration and Security, and the Ministry of Environment (Ministry of Land, Infrastructure and Transport, 2017).

Governance at the national central government level was established. There are two problems. First, citizens who are actual users of smart cities are missing in the smart city special committee under the central government. There is a lack of civic organizations to represent the opinions of citizens. In particular, they are limited to the environment and energy sectors. There is a limit to capturing the various perspectives of citizens who will actually live in smart cities. The second is the lack of governance formation at the local government or smart city level. It is necessary to configure smart city governance that captures regional characteristics.

5. Conclusions

Smart cities are rapidly developing to solve the problems of urban safety, environmental problems of climate change, and energy depletion.

In this study, the current status and problems of smart cities, which are rapidly being discussed and promoted in Korea, are analyzed. Korea's smart city was analyzed from the perspectives of Technology, Privacy, Security, and Governance.

The study results are as follows.

First, the technical aspect.

Korea's technological strengths include U-City construction experience and communication infrastructure. This will be used for smart city construction. However, Korea's ICT technology is inferior compared to major countries. Average ICT skills are low compared to the US, Europe, and China. On the other hand, mobile communication and IoT are excellent. Internet speed and public data openness are world-class.

Second, Privacy part.

The Korean government has established six principles for privacy protection in smart cities. They are legality,

purpose limitation, transparency, safety, control, and responsibility. Except for cases where there are special provisions in other laws related to privacy, the Personal Information Protection Act follows (Article 6 of the Protection Act).

Third, it is a security problem of smart city.

Korea seeks to solve smart city security problems by building an integrated platform. The unified platform enables rapid urban crime, catastrophe and catastrophe prediction and security. This is because real-time information linkage is possible with related organizations (police, fire department, Ministry of Justice, etc.) within the integrated platform. Disaster risk management services based on the Internet of Things (IoT) are also being established.

Finally, there is the issue of governance.

Korean Smart City Governance was composed of the Smart Special Committee. This is under the direct control of the president, with private experts (23) and the government (6). This committee serves as policy advisory to the central government on legal systems, standardization, and external cooperation.

Based on the results of this study, we offer the following suggestions. First, a policy to improve private technology and increase participation is needed to protect the privacy of smart city citizens and secure the city's security.

Second, citizens, who are actual users, need to participate in smart city governance, and it is necessary to organize smart city governance for each local government that has identified regional characteristics.

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