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Master's Thesis of Public Administration

A Case Study of Successful Smart
Cities Applying Governance Theories

거버넌스 이론을 적용한 스마트시티 성공사례
분석 연구

August 2019

Graduate School of Public Administration
Seoul National University
GMPA Major

Junghwan LIM

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Examiner Soon Eun Kim

Submitting a master's thesis of Public
Administration

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Graduate School of Public Administration
Seoul National University
GMPA Major

Junghwan LIM

Confirming the master's thesis written by

Junghwan LIM

August 2019

Chair	<u>박 정 훈</u>	(Seoul National University)
Vice Chair	<u>구 민 교</u>	(Seoul National University)
Examiner	<u>김 순 은</u>	(Seoul National University)



Abstract

This study will analyze how governance has led to the success of smart cities as a key analytical. On the premise that it is necessary to establish urban governance in order to achieve the success of smart cities, this study analyzes the success factors of smart city through the governance theories and applies them to the cases of domestic and overseas smart cities to analyze how the factors work.

This study's analytical framework for applying governance theories to the cases is summarized as follows: (1) city networks in which various stakeholders participate, (2) rational decision-making process, (3) attracting sustainable investment (financial support), (4) government innovation, (5) building citizen-oriented cooperative city operating system. Based on this framework, the study aims to analyze the success levels of smart cities by applying the cases of smart cities in the Netherlands, Spain, Denmark, Singapore, and Korea.

As a result of analyzing the cases of successful smart cities, it is found that the success factors are the influence of specific actors in the process of execution rather than the institutional characteristics of each country that form the basis for policy execution. In the process of creating smart cities, through the activation of governance and living labs, the active participation of companies, civil society, global companies, etc., along with consistent government-led policies, has brought about the success of smart cities.

Keyword : smart city, governance, living lab, civil participation

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Chapter 1. Introduction

1.1. Study Background and Objective

Currently, smart city is attracting attention as a new economic growth engine all over the world. Frost & Sullivan estimates that the global smart city industry will grow to \$2 trillion by the year 2025. Both developed and developing countries are pursuing policies to create smart cities as a new urban model that can transform their cities into innovation platforms. In order to preoccupy the world smart city market, countries are investing government funds and conducting private–public cooperation.

Under this circumstance, this study will analyze how some smart cities, which changed the paradigm of hardware–centric social overhead capital (SOC) investment, have succeeded and will look specifically at which factors have led to the smart cities' success through case studies. This study analyzes success levels of smart cities in some countries by applying the governance theory and draws policy implications.

1.2. Research Methods

This empirical study will use qualitative methods, emphasizing literature review and in–depth interview to investigate the reasons for the success of smart cities across the world. It will include a systematic investigation into the origins, evolution, and

features of international smart city projects. It also examined each countries' institutional status as a response to policy-making processes and as a challenge to dramatic change. I conducted a qualitative study using a case study approach. The two main sources of data will be employed: in-depth interviews and each countries' internal policy implementation documents.

I interviewed foreign policy directors who work for the governments on smart city policies in each countries and a Korean smart city expert who has studied international smart cities and Korea's smart city policies closely with the Korean government. The in-depth interviews with foreign policy directors were made through official overseas business trips as a public servant in charge of smart city and direct interviews with embassy staff. The list of policy directors and expert interviewed is as follows.(table 1)

(table 1) list of the interviewees

	Countries	Division
P1	Netherlands	Dutch Smart City Policy Director
P2	Spain	Barcelona Smart City Policy Director
P3	Denmark	Danish Smart City Policy Director
P4	Singapore	Singapore Smart City Policy Director
P5	Korea	Smart City Policy Specialist

Chapter 2. Literature Review

2.1. Existing Research on Smart City

(1) Concept of Smart City

The definition of smart city differs according to economic levels and city policies of countries, but it can generally be defined as a platform for pursuing sustainability or a new life system of humanity which utilizes information and communication technology (ICT) to improve city competitiveness and the quality of life (Lee & Sagong, 2015).

In addition, according to the Act on Smart City Creation and Industry Promotion (abbreviated as Smart City Act) by the Ministry of Land, Infrastructure and Transport of the Republic of Korea (MOLIT), smart city is defined as a sustainable city that provides a variety of city services based on urban infrastructure built with a fusion of construction and information and communication technologies (ICT) to improve city competitiveness and the quality of life. Similarly, the EU defines Smart City as a city that intelligently uses integrated energy, transportation and IT technologies to minimize environmental impact and provide a better life for citizens. The goal of smart city is various according to the situations of various countries all over the world, but it exists as energy efficiency, improvement of urban competitiveness, development of innovative technology, data opening, efficiency of urban management, and innovation through citizen participation.

< Various Definitions of Smart City >

120 Definitions of Smart City in Use Now (Data: ITU, 2014)

- 
a city that embraces the ICT and takes an integrated approach to city management to improve its efficiency and quality of living and boost the local economy ("12)
- 
a city that uses the ICT to improve functions of the city as well as its livability and sustainability ("13)
- 
A city that provides means and conditions for change to transform the city to an ecosystem for innovation, a testbed and an agent of change to guarantee comprehensive growth and future success of the city ("14)

(2) Background of Smart City

The most important reason for the recent spread of smart city-related projects around the world and the growing interest of countries in creating smart cities are summarized by the rapid increase in urban population and response to climate change. The world population is expected to increase to about 9.5 billion by 2050, about 67% of whom are expected to reside in the city, and measures to solve urban problems are becoming a big concern (Lee & Sagong, 2015).

< Background of Smart City >



For example, the EU is pursuing the construction of smart cities centering on the energy sector in order to achieve its policy goal of 20% reduction in greenhouse gas emissions by 2020 compared to 1990. ICT is attracting attention as a means to maximize the effect of investment to resource. In particular, providing ICT-enabled information can have a great effect on solving urban problems (Lee & Sagong, 2015).

(3) Diverseness of Smart Cities

Looking into the nature of smart cities, there are differences among countries. In developed countries, smart cities are concentrating on information utilization and governance, such as big data, rather than building large-scale infrastructure. For example, in the case of the European Union, the Smart City and Community Innovation Partnership was launched in 2012 in order to secure a leading position in energy technology and innovation, establishing a strategic partnership with European smart cities. In developing countries such as China, India and Southeast Asia, they are in the process of constructing new cities by securing city competitiveness and investing large capital in order to achieve economic growth (Lee & Sagong, 2015).

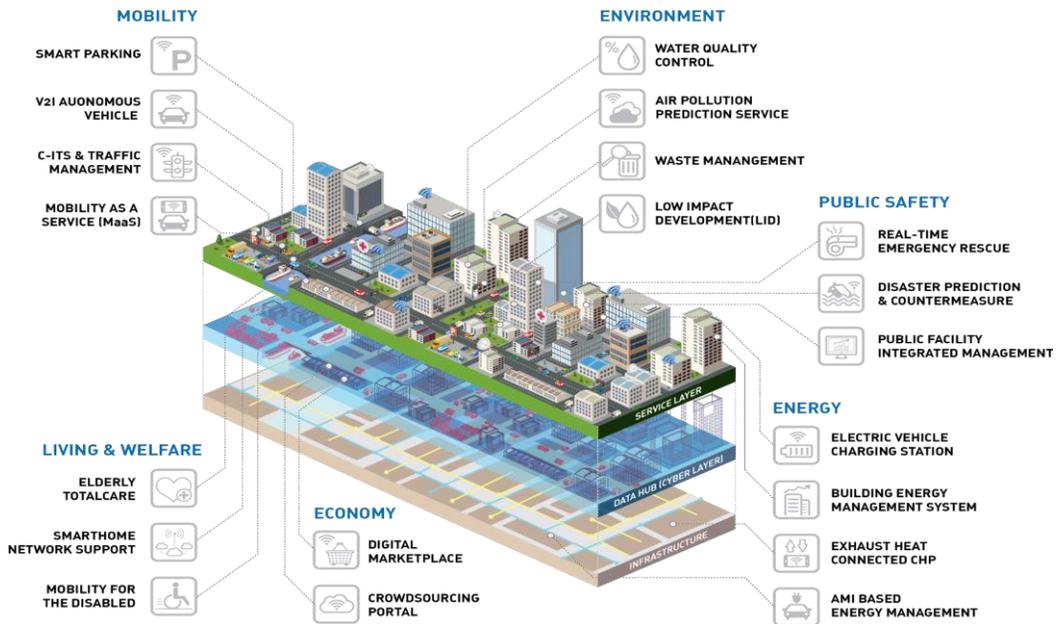
(4) Smart City and Governance

This study will analyze how governance has led to the success of smart city as a key analytical framework that determines successful smart cities. In order to do this, it will first grasp the relationship between smart city and governance. In other words,

this study will find a basis for successful development of smart cities only if the governance of the city is established and the governance is built through various actors interacts

First, the study examines the relationship between smart cities and governance. Currently, a growing number of cities across the world find smart services that combine urban infrastructure with new technologies of the fourth industrial revolution such as IoT, AI, Big Data, and ICT to provide smart cities to citizens. Through the provision of these services, smart city provides citizens with a more effective and convenient way of running a city.

< Examples of Smart Services >



The development of smart cities through the utilization of these smart services began with the recognition that smart cities in the early 2000s were driven by suppliers and lack of communication

and contacts between technology and citizens (NIA report, 2018). In other words, the key point of Smart City is that the real city operation is completed when the government, private sector and citizen participate together and make cities.

The EU, which has been regarded as the most successful settling of smart city, sees the establishment of governance as one of the most important factors for successful smart cities. According to the EU report (2016), the existing government-led, stable policy enforcement methods are not suitable for integrated smart city solutions and need to be transformed into cooperative operating models. In particular, in order to respond to the demand for complex urban services in various fields, the central government should break down the boundaries of each sector, form a centralized planning organization dedicated to urban planning, and delegate its function of planning smart city through the organizing power.

In addition, it should ensure that all stakeholders, including private companies, universities, and research institutes, participate as much as possible from the urban design stage. Information should be freely shared through the installation of an open, interoperable IT platform, where information is protected and the quality of information is controlled and evaluated (EU report, 2016).

The EU report (2016) also emphasizes citizen participation in urban governance. In other words, not only the design of an urban operation project but also the participation of stakeholders at all stages of implementation of the project will contribute to the

success of smart cities. Particularly, in order to systematically secure community participation in urban design and implementation, important factors in determining the success of smart city are the ways that citizens' participation strategies should be set up in advance, or that the citizens, companies and communities should be co-owners in the procurement process. In other words, the creation of an environment in which citizens, ICT companies, researchers and policymakers can create smart cities through outside-in solutions, by establishing a base on which solutions under different experimental conditions can be shared, is seen as the key to success (EU report, 2016).

On the premise that it is necessary to establish urban governance in order to achieve the success of smart cities, this study will analyze the success factors of smart city through governance theories and apply them to the cases of domestic and overseas smart cities to analyze how the factors work.

2.2. Governance Theories

(1) Concept and Features of Governance

Governance has been one of the most actively discussed theories in political science, administration, and economics for the last 20 years. The background of the emergence of governance theories can be seen for the following reasons. First, the boundaries between the state and society have been blurring, and various actors outside the government have been involved in government policy making and enforcement. Second, public policy decisions involving complex social issues have been increasing, and social issues are interdependent. Finally, the perception that governments are not the only actors to deal with major social issues has spread (Kennis & Schneider, 1991; Kooiman, 2002).

The concept of governance is defined in many different ways by scholars. Rhodes (1996), who had a great influence on governance research, focused on the interdependence of governance and defined governance as a network of autonomous actors from the nation. Keohane and Nye (2000) defined governance as the formal or informal processes and institutions that affect organizational structure and activities.

In addition, Pierre and Peters (2000) viewed governance as involving various actors and processes, including the state, market, community, and network, and Kooiman (2002) defined governance

as a system in which various actors cooperate based on interdependence.

Stoker (1998) analyzed the main features and constituents of governance and proposed the five main propositions, defining the main characteristics of governance. Those are as follows:

- (1) *Governance refers to a set of institutions and actors that are drawn from but also beyond government.*
- (2) *Governance identifies the blurring of boundaries and responsibilities for tackling social and economic issues.*
- (3) *Governance identifies the power dependence involved in the relationships between institutions involved in collective action.*
- (4) *Governance is about autonomous self-governing networks of actors.*
- (5) *Governance recognizes the capacity to get things done which does not rest on the power of government to command or use its authority. It sees government as able to use new tools and techniques to steer and guide.*

Governance can be classified into narrow governance and broad governance depending on the level of concept definition (Jessop, 2002). Narrow governance refers to a mediator that can function in sectors where the focus of discussion is on civil society and where the government cannot play a leading role. In other

words, it explains the concept of governance focusing on citizen voluntary participation and improvement of social system through development of democracy. On the other hand, broad governance focuses primarily on partnerships and new forms of cooperation among various actors. That is, governance is defined as a new way of coordination that has emerged since the collapse of public-private sector boundaries.

Kim (2004) classified key elements and characteristics of governance defined by major scholars and international organizations, analyzing different meanings of governance depending on academic fields and scholars. First, Rhodes (1996) argued that governance means "Corporate Governance, New Public Management, Good Governance, inter-relations between nations, Socio-cybernetic, New Political Economy and Network". UNDP (1997) said that the elements of good governance are: "participation, rule of law, transparency, responsiveness, consensus orientation, equity, Effectiveness and efficiency, accountability, strategic vision, legitimacy, resource prudence, ecological soundness, empowering and enabling, partnership, and spatially grounded in communities."

Kim (2004), based on the research on the above components of governance, indicated that governance recognizes the limitations of central and local governments and emphasizes the network system based on cooperation among members of the government, private companies, NGOs, and other social groups. In other words, under the governance system, the role of the

government can be seen as a coordinating body that encourages cooperation and coordination among the members of society rather than government itself.

(2) Scope and Levels of Governance

The scope of governance is very widespread in global governance as far as to discuss the role of local governments and citizens. The level of the range can be broadly classified into four dimensions as follows (Ra, 2009).

First, global governance discusses international cooperation and interactions among transnational actors. In other words, it aims to jointly respond to transnational issues. These issues started from international organizations and intergovernmental cooperation organizations and broadening the levels and range of participation of various transnational actors outside the state.

Second, regional governance explains how major regions of the world are influencing each other in the fate of 'community' (Norris, 2000). It focuses on economic and security issues, focusing mainly on regional communities, such as the European Community, the Asian Community, and the African Community.

Furthermore, national governance refers to the part of the national administration that efficiently responds to domestic issues at the individual country level. In this level, urban development, human rights, environment, women, political issues, and economic issues are the main topics of discussion.

Finally, local governance discusses the governance of local participation and local development in local governments and communities. At the local level, citizens, civic groups, local governments, and markets, rather than central governments, share decision-making power over common issues in the community and discuss how governance works to raise awareness of local citizens' participation. In particular, issues such as society, culture, local festivals, environment, and welfare have emerged as a common concern for preserving and promoting local understanding.

These four levels of governance analysis show that the scope of various governance theories varies depending on the subject. In the following, based on the analyzed concept of governance and the level of analysis, the scope of this study will be narrowed down towards smart city governance.

(3) Theories of Smart City Governance

As mentioned above, for the successful development of smart city, a cooperation system that is different from existing city operation is required. In recent years, smart cities in developed countries have been supporting smart communities in which various actors participate and developing smart governance systems. This means that the public sector is no longer staying in product-focus, such as the development of advanced ICT, but rather in the process-focus of smart urban activities to create an ecosystem that can be nurtured in various areas including the private sector (Nam, et al., 2017). Therefore, in order to analyze the factors of successful smart cities, it is necessary to consider theoretical backgrounds about what constitute smart city governance.

Castelnuovo, et al. (2015), who studied smart city governance through a holistic approach, proposed three possible requirements for sustainable growth of cities in terms of smart governance: (1) a **clear strategic vision** of policy-makers and stakeholders; (2) **active participation** of major actors such as urban communities; and (3) an **effective organizational structure** capable of forming and managing public values. Based on these, Castelnuovo, et al. (2015) proposed **five factors** of smart governance for Smart City success.

- *‘Community building and management’ , which aims to assess urban stakeholders’ engagement in smart city governance and decision-making processes. This dimension also considers the strengths of a city’ s networks of relations with*

other urban communities and relevant stakeholders, both inside the urban context and outside of it.

- *‘Vision and strategy formulation’ , which aims to assess a smart city’ s capability of using strategic planning and implementing monitoring and evaluation techniques to generate evidence to inform future strategic plans.*
- *‘Public value generation’ , which aims to measure the outcomes and/or the long-term impacts of the initiatives implemented. This value generation usually includes the more general social objectives that the interventions address, such as economic growth, employment, social inclusion, and well-being.*
- *‘Asset management’ , which aims to assess the generation of knowledge to benchmark the city’ s performance and provide an evidence base for the enhancement of current interventions and the development of future plans.*
- *‘Economic and financial sustainability’ , which aims to assess a smart city’ s long-term sustainability and its ability to attract investment and manage change. This dimension also focuses on the availability of economic and financial resources and evaluates their efficient and effective use.*

In addition, Nam et al. (2017) distinguished the four types of prior studies on smart city governance theory: (1) general governance theory, (2) smart decision making, (3) smart administration, and (4) smart city cooperation. Among these, smart

decision-making means a change in the decision-making structure rather than a change in the government organization or institution itself (Nam, et al., 2017). In this regard, UNESCAP (2007) defined the concept of smart city governance as a "procedure by which decision-making processes are implemented."

Regarding Smart Administration, Gil-Garcia (2012) defines it as a new form of electronic governance that uses sophisticated ICT to interconnect and integrate information, processes, institutions and physical infrastructure and to better serve citizens and communities, arguing that the government has to be innovative in order to address the differentiated policy requirements. Finally, Btgan (2011) viewed smart governance as a way to promote economic growth through cooperation with ministries and communities, and to create city operations and services centered on citizens.

Chapter 3. Analytical Framework

So far, the theoretical analysis has found that governance has a wide range of concepts and analytical levels, and studied governance factors which can be applied to smart cities. The analysis of the success factors of smart city using the governance theories to be conducted in this study cannot be performed by applying all the governance factors mentioned. Rather, it is necessary to extract some elements suitable for smart city and carry out customized analysis, and then this study will be able to draw out policy implications through case study by finding the suitable factors of smart city success. Therefore, the level of analysis should be narrowed down to form the theoretical analysis framework of this study, and the smart city case will be applied in the next chapter.

To begin with, this study intends to utilize the following three elements as a framework of analysis among the five proposed by Castelnovo, et al. (2015): (1) network of various stakeholders participates (the first element); (2) rational decision-making process through monitoring and evaluation (the second factor); and (3) long-term and sustainable investment (financial support, etc.) (fifth factor).

Looking more closely at these three elements, first, it examines whether stakeholders participate in decision-making process by participating in smart city governance. It also assesses whether communities and stakeholders in different cities form their networks and how they relate to each other.

The second part is about the process of establishing local vision and strategy reasonably. This means that it evaluates whether reasonable alternatives have been made through the evaluation of the ability to use strategy or after verifying the alternatives derived from the strategy. Finally, it assesses whether long-term, sustainable investment or financial commitment to Smart City is possible as a measure of economic and financial sustainability. This includes assessing whether the city's financial and economic resources are utilized efficiently and reliably.

The third factor, the long-term impact of public value, is not appropriate for application because the smart city history of policy agenda, policy decision, and execution are not long (Less than 10 years). In addition, the public value aspect is considered to be a result of the success of Smart City, and it does not fit the framework of analysis in the sense that all successful smart cities have public values.

In addition, items such as collective intelligence and ability to perform are not appropriate as the framework of analysis. First, collective intelligence is already overlapping with other specific factors such as 'network construction' and 'rational decision-making process', thus collective intelligence as a theoretical framework has to be replaced by these specific items. The ability to perform can also be replaced by specific items such as 'sustainable investment attraction', 'innovation of the government', 'citizen-centered cooperative city management'.

In addition to the above three analysis frameworks, this study adds two more: says government innovation to address the differentiated policy requirements (Gil-Garcia, 2012) and collaboration with governments and communities, citizen-centered city management (Btgan, 2011).

In conclusion, this study's analytical framework for applying governance theory to cases is summarized as follows: (1) city networks in which various stakeholders participate, (2) rational decision-making process, (3) attracting sustainable investment (financial support), (4) government innovation, (5) building citizen-oriented cooperative city operating system. (table 2)

(Table 2) Summary of analytical framework

Key words	Analytical Framework
City Networks	whether stakeholders participate in decision-making process by participating in Smart City governance and whether communities and stakeholders in different cities form their networks and how they relate to each other.
Rational Decision-making Process	whether reasonable alternatives have been made through the evaluation of the ability to use strategy or after verifying the alternatives derived from the strategy
Sustainable Investment	whether long-term, sustainable investment or financial commitment to Smart City is possible as a measure of economic and financial sustainability and whether the city's financial and economic resources are utilized efficiently and reliably.
Government Innovation	whether a new form of electronic governance uses sophisticated ICT technologies to interconnect and integrate information, processes, institutions and physical infrastructure and to better serve citizens and communities, meaning that the government has to be innovative in order to address the differentiated policy requirements.
Citizen-oriented Cooperative City Operating System	whether to promote economic growth through cooperation with ministries and communities, and to create city operations and services centered on citizens.

Chapter 4. Case Analysis

4.1. Objects of Analysis

This study will focus on how countries with different economic systems, which are largely divided into liberal market economies and coordinated market economies, have led to the successful development of smart cities based on the actions of various participants like central and local governments, citizens, academics, enterprises, etc. Despite different economic systems, developed countries will have a common success on smart cities in the aspects of transportation systems, renewable energy and information accessibility through open governance with citizen participation.

In the capitalist diversity theory, or the production regime model, the institutional framework of advanced capitalism is largely divided into a free market economy and a coordinated market economy. It analyzes “the ways in which the micro agents of capitalist systems—companies, customers, employees, owners of capital—organize and structure their interrelationships, within a framework of incentives and constraints or 'rules of the game' set by a range of market—related institutions within which the micro agents are embedded.” (Soskice, 1999: 102).

First, in the Free Market Economy, companies are coordinating corporate activities around markets and this economic system is expressed as shareholder capitalism or Anglo—Saxon

capitalism. For this economic system, this study will analyze the smart city case of Seoul, Korea. Second, Adjusted Market Economy (Adjusted Economy by Industry) is characterized by industry adjustments. This includes the technology transfer and diffusion in the industry and inter-agency coordination takes place within the industry sector. For this economic system, this study will conduct smart city case study on Amsterdam, Barcelona, and Copenhagen. (table 3)

Lastly, Authoritarian economy (dictatorship or monarchy) is half-open economy under the dictatorship of many countries like some of Southeast Asian countries or the Middle East. For this economic system, this study will analyze the smart city case of Singapore. (table 3)

(table 3) Cities of Analysis

Economic System	Case Analysis	Key Features
Free Market	Seoul , Korea	New Town and Urban Regeneration combined
Adjusted Market	Amsterdam , Netherlands	Data-Based Civil Communication
	Barcelona , Spain	Creation of Innovative Ecosystem
	Copenhagen , Denmark	Living Lab-Based Environment-Friendly
Authoritarian	Singapore	Government-led Systematic Development

4.2. Amsterdam, Netherlands

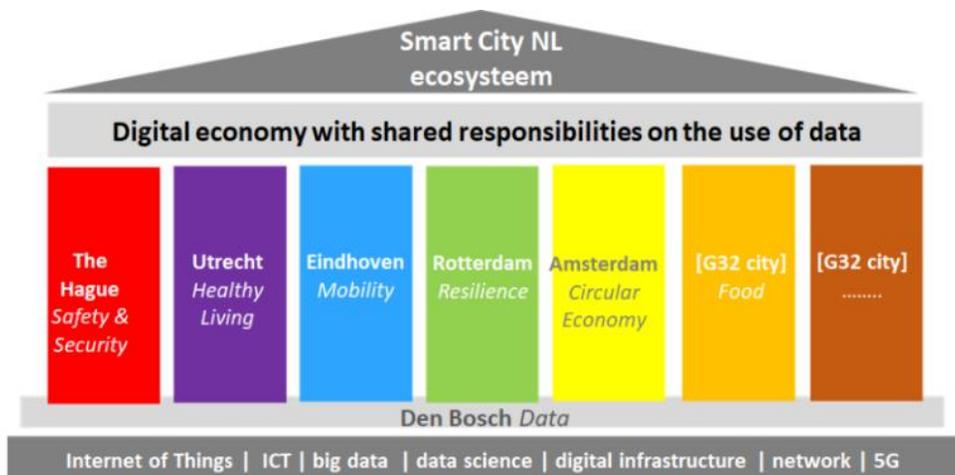
(1) Overview of Amsterdam Smart City

According to the Amsterdam city government documents, Amsterdam's efforts to become a smart city started from 2009 when its independent agency, Amsterdam Innovation Motor (AIM), and the grid operator, Liander, have begun the Amsterdam Smart City (ASC) project in active collaboration with the Amsterdam Municipality. The ASC project has as a clear purpose of carbon emissions reduction and lesser energy use, which can create a more sustainable and energy-efficient city. This is done through close cooperation between government organizations, public and private corporations, knowledge institutions and citizens of the city. All the diverse and different actors together developed and implemented innovative new technologies in the city fabric, which will not only help directly reducing the amount of energy use and CO2 emissions, but also spark behavioral change among citizens. New initiatives are tested in local and small-scale projects, which proved to be one of the most efficient pathways toward implementing a large scale. (www.amsterdamsmartcity.nl)

“So far this has led to a vast amount of new projects ranging from smart school education with a focus on sustainability, to smart transport, to larger smart grid, smart metering and smart electrical vehicle charging projects. To support the innovation process taking place in the city, the Municipality of Amsterdam is constantly opening up and sharing their data. This has resulted in an “Apps for Amsterdam” concept, where data about life in the city

is shared, ranging from crime rates to refuse collection routes. This access facilitates open innovation as citizens/developers are able to create applications based on city data. The result is not only economic growth, but more importantly new solutions which make life in the city smarter.” (www.amsterdamsmartcity.nl) (P1)

The Amsterdam Smart City (ASC) was built on the Dutch smart city strategies to create a data-driven smart city ecosystem, according to an interview with Dutch Smart City policymaker P1. In particular, Amsterdam is making efforts to create a smart city with a cyclical economic model. (www.amsterdamsmartcity.nl)



< Netherlands Smart City Governance >

If you look closely at its characteristics, the city first stresses the creation of an innovative ecosystem. Through the six major thematic Smart City projects, 'Digital City Implementation', 'Energy', 'Mobility', 'Circulation Economy', 'Governance & Education', the city is creating a smart city industrial ecosystem, such as the development of innovative technology-based products and the

establishment of a cyclical economic platform. It is also operating an open platform to facilitate the participation of citizens in all Smart City projects of Amsterdam. In other words, the city intends to encourage the participation of companies, citizens, research institutes and local governments, and discloses various city information to all participants. (P1 interview)

P1 said that the Dutch smart city strategies have been implemented in other major Dutch cities, including Amsterdam. Eindhoven is building an intelligent community for solving social problems through local collaborative projects. For example, the Brainport Eindhoven Region, through collaboration with companies in the Eindhoven Brainport area, has developed solutions to social problems in the region.

In addition, according to P1, Smart City living labs are fostered in Scheveningen of the Hague, where research institutions, citizens, and businesses can participate and study together. In addition, the Hague and Rotterdam are building a business environment and building a smart city infrastructure through the Rotterdam–The Hague Metropolitan Area (MRDH), which consists of 23 local authorities within a single government network. The Rotterdam–The Hague Metropolitan Area (MRDH) creates opportunities for businesses through a unified network, attracts talented people and investment, and creates an attractive smart city environment.

(2) Analysis

This study applies the Amsterdam Smart City into the governance theories based on interviews with Dutch Smart City policy officer P1 and internal documents provided by the Dutch government.

First, the Amsterdam Smart City operates based on city networks in which various stakeholders participate. Any citizen or private enterprise can suggest their ideas online, and the government can accept them to solve urban problems and social issues in the Netherlands, such as finding new industries and creating jobs. In particular, the City is building a smart platform centering on citizen-oriented cooperative city-operating systems and is promoting private-sector initiatives rather than the government in order to reflect the innovation of the private sector in its policies. This approach can be seen as an innovation of the Dutch government.

Amsterdam operates through an open platform called the "ASC (Amsterdam Smart City)", which involves not only the government but also private companies, schools and local residents. The city collects citizen's opinions online through 'ACS web page'. Off-line, the 'Smart City Experience Lab' is being operated to provide a space where citizens can directly share Smart City projects and experience smart services. (P1)

According to P1, the ASC is pursuing projects in six areas. Among

them, the 'Sustainable Neighborhood' project, which can be called the ASC's representative project, improves policy by bringing action changes to reduce energy consumption voluntarily and receiving immediate feedback from citizens. The private and public sectors formed a partnership and promoted the participation of various entities by utilizing the ASC's awareness centered on Liander, a power grid company. (table 4)

(table 4) 6 Major Projects

6 projects	Core contents
Infrastructure & Technology	Improvement of ICT environment in response to continuous internet usage increase in Amsterdam
Energy	Sustainable City Energy Creation Project
Mobility	Bicycle parking lot, solar bicycle road, car sharing program, etc.
Circular city	Establishment of production-consumption-recycling circulation system of products
Education	Improving civic education through links with universities and educational institutions in Amsterdam
Citizen & Life	Improvement of residential environment and resident life in high population density

Smart meters and displays are installed and distributed free of charge to residents in the village, and citizens can check their specific energy usage (total of 730 households, 1,460 units installed). Energy-related education and discussions were conducted for the residents to attract citizens' attention, and the government was able to test the interaction between smart meter and network for home use through the project. (P1)

By creating a smart city where citizens and experts participate together rather than by government-led unilateral decision making, the Dutch government and the Amsterdam city government have secured a rational decision-making process. In addition, by participating in more than 40% of Smart City projects, companies can relax the financial burden of the government and the city was able to establish a long-term basis for sustainable investment.

4.3. Barcelona, Spain

(1) Overview of Barcelona Smart City

According to interviews with Barcelona Smart City policy officer P2, the city of Barcelona is a urban model that succeeded in revitalizing the area by overcoming severe urban problems such as industry decline and population decline, leading to a creative cultural destination along with urban regeneration. Since the 1980s, existing cities have experienced decline of industrial hollowing out and local economy, and as a result, an interest in 'culture' has increased as a new strategy to revitalize cities and regions and to improve the quality of local residents.

In order to grow as a creative city, Barcelona has promoted the urban renewal strategies such as the production of creative spaces (Laval district), international event holding, creative industry promotion (22@Barcelona district, creative talent training). The past industrial zone (District 22) was transformed into a new industrial area centered on knowledge-based industries such as research centers, IT and media, and to spread the effect to its surroundings. It has attracted various organizations such as the Barcelona Media Foundation to promote the Fifth Industry (culture, art, design, architecture, media, marketing, advertising, etc.) (P2)

And El Raval used to be a region where 20,000 immigrants from around 70 countries (47% of the Laval district) were living together, but crimes were frequent. However, Barcelona has successfully implemented Smart City policies by establishing special plans for

urban regeneration, the introduction of social facilities, the creation and expansion of public spaces (open space maintenance), and cultural functions. In addition, the city government has held events such as various exhibitions and performances to transform the Raval district into a center of cultural space, attracted the University of Barcelona campus, which had once been located outside the city, and continued its cultural activities and educational activities for residents. (P2)

In the interview, P2 said that the Poblenou region of Barcelona used to be a textile industrial complex in the 1800s, but the decline of manufacturing in the 1960s led to the withdrawal of factories, worsening the city's decline. As a result, it has begun the '22@Barcelona Plan' with the aim of changing into a knowledge-intensive industrial structure from the year 2000, and started to focus on five industries (design, healthcare, IT, renewable energy and media).

We have succeeded in establishing university-enterprise clusters in connection with the five major industries, and operated programs to support start-ups efficiently. In addition, we succeeded in attracting broadcasting-related universities and broadcasting stations in the neighborhood, creating a basis for fostering the media industry. In order to help students with internships in broadcasting, the use of broadcasting equipment, and on-the-job training, the City of Barcelona also provided appropriate sites for broadcasting stations. (P2)

According to P2, Barcelona has increased urban sustainability by taking almost 30% of the privately developed land as a donation for public facilities (10%), rental housing (10%) and green space (10%). In the process of supplying public housing, existing residents were given the opportunity to re-occupancy, and in consideration of social revitalization, the residents were provided with opportunities for continuous vocational education so that they could integrate with newly coming intellectuals from outside.

Through the promotion of the Smart regeneration policies, the city has attracted major corporations and provided various cultural spaces by utilizing corporate buildings, thereby contributing to the expansion of exchanges with local residents and attracting tourists. While creating a new image of regional functions, the area have become a landmark of Barcelona. The Poblenou traditional industrial complex has become one of the most dynamic and creative areas with a scientific, cultural and technological base. (P2)

(2) Analysis

This study applies the Barcelona Smart City to the governance theories based on the interviews of Barcelona Smart City Policy Officer P2 and the document provided by the city government of Barcelona.

First of all, it can be seen that the Barcelona Smart City operates based on city networks in which various stakeholders participate. With the accumulation of IT companies, a technological environment has been built to produce smart solutions. As a result of the attractive investment environment, global IT and energy companies are now participating (for example, Cisco invested 400,000 euros in 2011), and private companies are participating in each of the 22 smart city solution projects promoted in Barcelona. For reference, a total of the 24 Smart City Programs (Smart Global Programs) have been being implemented throughout the city, with 22 businesses participating as global partners.

In addition, Barcelona has established a governance system by unifying the administrative organization of Smart City for the rational decision-making process. The Smart City Strategy team has been established as a direct agency for the Barcelona market and has integrated smart solutions such as transportation, energy, crime prevention, tourism and logistics into the overall city administration. The city of Barcelona established the 22@Barcelona company, which led the business and strengthened the rationality of the decision-making process by utilizing the sub-network through

private companies.

< Smart Global Programs >

- ❶ **(Smart Lighting)** LED streetlight replacement, motion recognition and remote control function → Reduce power consumption by at least 30% per year
- ❷ **(Smart Energy)** Smart meter introduction (about 20,000 smart instruments installed)
- ❸ **(District Heating and Cooling)** Providing hot water using solar heat and incineration heat, Cooling of buildings using seawater (Currently 64 buildings are being piloted)
- ❹ **(Smart Transportation)** Bus lines that can reach 95% of destinations with one transfer, Introduction of bus information system using solar heat
- ❺ **(Zero Emission Mobility)** Installation of electric car charging stations, hybrid taxis, electric motorbike distribution, application of public bike rental application etc.
- ❻ **(Open Government)** Open data portal establishment, kiosk installation to solve complaints

And the City of Barcelona has strengthened stability through its solid financial support. Since the 1980s, over 200 million euros have been invested in the Raval redevelopment, resulting in new cultural facilities such as the Cultural Center and the Museum of Modern Art that blend the old and new towns of Raval. In addition, the city government has implemented a step-by-step investment

management for each business according to its long-term vision and strategic plans. For example, a public bicycle program was introduced after over seven years of a pilot project. 22@Barcelona invested 180 million euros to create innovative clusters by moving into public institutions, research institutes and universities around the five key industries (information, communication, media, design, energy and medical technology). It focuses on the creation of an ecosystem that cooperates with industry and academia, and encourages private development by opening various public data to the private sector.

Furthermore, the city of Barcelona is promoting innovative policies to create a smart city. First, it opens the city data collected by the city and induces the development of creative services. Barcelona has an open data portal that shares more than 330 data and has also developed an independent platform for managing the city (Barcelona City OS, '14) to enhance the efficiency of city management. In addition, the city continues to partner with major cities around the world, holds a prestigious international event like SCEWC (Smart City Expo World Congress) and focuses on promoting tour programs.

Finally, Barcelona is implementing citizen-centered urban operating systems. 22@Barcelona prohibits the passage of vehicles except for residential and public transportation. Against this backdrop, the citizens discussed how to utilize the space freed from automobile and finally transformed the car-free area into a space only for citizens' rest, leisure and markets. In addition, the

Barcelona Smart City is gathering various stakeholders such as municipalities (governments), citizens, academia, and companies to come up with ideas for city problems and carry out projects. The website runs various projects with private initiatives. Off-line, an exhibition space called 'Smart City Experience Lab', citizens are able to directly experience Smart City projects and exchange ideas. A number of projects are being created through citizen participation.

“The project 'Smart Loop 2.0', which stores rainwater through a special device on the roof of a building and uses automatic sensors to supply water to plants, was launched by a municipal government, a water network management company and a research institute. There is a 'smart parking' system in the vicinity of the Marine Terrine area, where a car is parked for more than 10 minutes on the roadside, and a solar sensor equipped with IoT recognizes it, warns the car and informs the parking agent. We gave this idea and constructed the system through municipal funding.” (P2)

4.4. Copenhagen, Denmark

(1) Overview of Copenhagen Smart City

According to the Copenhagen city government' s documents, “the city of Copenhagen’ s efforts to become a smart city has developed from the ambitious vision of becoming the world’ s first carbon–neutral capital by 2025. In order to reach this ambitious goal, the city is determined to implement new and innovative solutions within transport, waste, water, heating, and alternative energy sources. Carbon neutrality will result in a better quality of life, innovation, job creation and investment. The Danish capital has been awarded on various occasions for its targeted work to create a greener, more sustainable and livable city. Recently Copenhagen was awarded the prestigious European Green Capital Award 2014 by the European Commission.” (www.kk.dk)

According to an interview with Danish Smart City Policy Director P3, Copenhagen aims to create a smart city that realizes environmentally friendly green growth by utilizing abundant city infrastructure and intelligent technology under the slogan of "Smart Growth, Green City". The Copenhagen Solutions Lab (CSL) has been established as a separate agency for the promotion of Smart City, and citizens, universities, research institutes, companies and start–ups are participating in the Smart City project.

“Copenhagen is especially famous for living labs. First, the DOLL (Denmark Outdoor Light Lab) is the largest lighting complex in

Europe located in the Hersted industrial park, a living lab that promotes smart LED demonstration. The Lab connects local streetlights to provide online managed and digitized information on a single network. In addition, the data exchange is used to make a wide range of data collected from the public and the private sector and made available to developers, citizens and businesses. The data will be used to establish the Copenhagen infrastructure investment plan and to manage the traffic. It also sets up energy blocks in Nordhavn, northern Copenhagen, and runs the Energy lab, which is part of the Copenhagen City government and the Copenhagen Institute of Technology.” (P3)

(2) Analysis

Based on the interviews with P3 and the documents provided by the Danish government, I would like to apply the Copenhagen Smart City to the governance theories.

First, the Copenhagen Smart City operates based on its city networks in which various stakeholders participate. Ranked among one of the top smart cities in the EU, the Danish city is an ideal test place for newly-adopted technologies and smart solutions. The nation not only holds a leading status among several environmentally friendly smart solutions necessary for smart city, but its diverse stakeholders in the decision-making process makes it an ideal living lab for smart city solutions. This is more supported by the fact that Denmark is a highly digitalized society where all the stakeholders can connect, share and collaborate each other in innovative ways. In addition, municipalities, companies and citizens

provide a large amount of open data that can be used in the development of new smart technologies. Finally, Denmark is an innovative country, where new forms of collaboration and cooperation across the country have been constantly being developed and tested.

In addition, citizen-led living labs can be operated with reasonable policies tailored to demand and government innovation can be maintained. As private companies actively participate, the financial burden of the government is relaxed and long-term smart cities can be created.

“DOLL (Denmark Outdoor Light Lab) is Europe's largest living lab that demonstrates and studies a variety of smart city solutions including intelligent street lights, digital infrastructure, environmental monitoring, and waste management. It is a consortium formed by the central government (the Ministry of Energy and Climate), the local government (Albertslund) and the Technical University of Denmark. 159 cities worldwide have visited DOLL and more than 50 partner companies have moved in to provide policy makers with smart-city demonstration data.” (P3)

< DOLL project contents >

solutions	business information	
<p>Digital Infrastructure</p>		<p>With the expected number of Internet-enabled devices to reach more than 12.5 billion by 2030, DOLL has tested a wide range of networking solutions from LoRaWAN to 5G</p>
<p>Outdoor Lighting</p>		<p>Maximize energy efficiency by connecting all 37 street lights in Albert-Strand area in Copenhagen by remote control and self-dimming lighting (saving 80% of existing outdoor lighting resource consumption)</p>
<p>Environmental Monitoring</p>		<p>Provides real-time measurement of rainfall, temperature, noise, and fine dust pollution through sensors installed on street lamp poles, providing necessary information to configure urban infrastructure according to the situation</p>

“In order to create smarter technologies and cities, Denmark is systematically promoting new and innovative ways to break the knowledge silos and facilitate collaboration within society. This is the case of the "innovation platform", adopted by the city of Copenhagen in collaboration with Clusterech. The aim of the approach is to explore how public procurement can be used as a driver of innovation.” (P3)

“This will be done through a number of "innovation platforms" that will engage experts and entrepreneurs from across society in a creative process to identify problems and propose smart solutions. Innovation platforms should serve as a basis for a smarter and more focused purchasing process, which involves the most skilled actors to solve the problem. So far, innovation platforms have been successfully launched in the areas of "smart cities in the Oresund region", "increased reuse of plastic waste", "increased reuse of construction waste" and "better digital infrastructure in Copenhagen". (P3)

4.5. Singapore

(1) Overview of Singapore Smart City

According to the internal documents of the Government of Singapore, the 'Smart Nation' policy has been underway since November 2014, and an independent organization directly under the Prime Minister (SNPO) is in charge of Singapore's Smart City policies. In addition to global companies and universities, Singapore is pursuing a variety of Smart City projects in the fields of transportation and water management. R&D is also underway to build platforms for data sharing. Singtel, a state-owned telecom operator, acts as the manager of the Smart Nation businesses and global companies such as IBM has been investing in the projects. Singapore is also actively involved in the promotion of the outside world, holding famous international events in the field of smart cities (hosting world cities summit), and actively participating in overseas smart city projects by taking advantage of the city's know- (establishing Master Plan and providing consulting for 164 cities in 45 countries).

“Despite its size and lack of natural resources, Singapore has overcome many of its challenges in the last 50 years to become one of the world's most advanced and livable countries. It has embarked on its next phase of transformation towards a Smart Nation, and endeavors to harness the power of networks, data and information communication technologies to improve living, create economic opportunities and build closer communities.” (P4)

(2) Analysis

This study applies the case of Singapore to the governance theories based on the interviews of Singapore Smart City Policy Officer P4 and the document provided by the Singapore government.

First, Singapore is building a smart city by utilizing its city networks in which various stakeholders participate. In order to develop and spread efficient and practical solutions, the nation is working on smart city projects by establishing active cooperation system with domestic and foreign universities and companies regardless of nationality, public or private.

“In addition to the National University of Singapore (NUS) and the Department of Design Technology, the city has established partnerships with world-class universities such as MIT in the US, attracting professionals and providing innovative ideas. Singapore is also working with global leading companies such as IBM, Microsoft, and Dassault Systeme as well as SingTel, a state-run telecommunications company.” (P4)

In addition, Singapore is pursuing an innovative Smart City policy. Beyond an usual "smart city" concept, Singapore is pursuing a national "smart nation" policy that encompasses governments, economies and societies. It is planning service for government, economy, and society such as computerization of administrative service, electronic payment, and city management using data. For example, SmartNation Platform (SNP) is introduced to utilize city data such as air, water quality, traffic, and public safety collected through sensors for citizen service improvement and business

creation.

In particular, Singapore is primarily developing smart solutions that are both viable and civilized.

< Smart Solutions of Singapore >

- ① **Housing:** Public housing designated as a test bed, applying solutions such as energy management, water management, and waste disposal
- ② **Health:** In order to prepare for an aging society, mainly using sensors for elderly people and apply solutions to cope with emergency situations.
- ③ **Traffic:** Based on Smart Mobility 2030, implementing solutions such as ITS system construction, traffic control system (bus), smart parking, etc.
- ④ **Living Lab:** To enable leading-edge demonstration of advanced smart city service solutions through deregulation in the living lab space and commercialization
- ⑤ **Open data:** Promotion of personal information protection, information sharing and utilization at the same time, and raising the trust and transparency of government through public information disclosure

Singapore maintains a long-term smart city through stable budget support. As the core national project, the Smart Nation policy was selected as a strategic national project (2016) and the Prime Minister directly has led the project. Also, to develop practical and efficient solutions and expand the market, the nation is actively promoting the participation of domestic and foreign universities, private companies, and establishing international cooperation system. In particular, the Prime Minister 's Office has been the main axis to support research and development funding. The budget of Smart Nation has increased by 7.7 times from S \$ 28 million in 2016 to S \$ 216 million in 2017. The ratio of technology to the total budget has increased by 9 times from 1% (2016) to 9% (2017).

In addition, Singapore has established performance indicators for its Smart City projects and is now pursuing policies under a rational decision-making framework. Singapore has set the milestones for Strategic National Projects that have been implemented since the year 2017 to create Smart Nation as follows: ① National Digital Identity, ② E-Payments, ③ Smart Nation Sensor Platform, ④ Smart Urban Mobility, and ⑤ Provision of customized government service package (Moments of Life)

However, Singapore, which is an Authoritarian economy system, has a top-down policy promotion system. The city has created a Smart Nation and Digital Government Group consisting of Smart Nation Administration (SNDGO) and Government Technology Agency (GovTech), and coordinated the Smart Nation policy as a

whole. Separate ministries or agencies such as the Ministry of Transport are also pursuing smart strategies simultaneously for the relevant fields. For example, the Housing Development Board (HDB) is responsible for the installation of smart infrastructure such as elevator sensors (for prevention of breakdowns) and solar panels in public housing construction.

Singapore has actively leveraged the Living Laboratory to demonstrate Smart City solutions, and has established a foundation for a variety of entities to create smart cities. In particular, Singapore National University (NUS) has cooperated with IBM and MIT among the many Smart Nation projects and is playing a key role in promoting the Smart City Living Lab projects. In doing so, the city takes advantage of feedback from college students on all the aspects of Smart City technology validation and solutions.

4.6. Seoul, Korea

(1) Overview of Korea's Smart City Policy

Based on interviews with the Smart City policy specialist P5 and documents from the Ministry of Land, Infrastructure and Transport (MOLIT), Korea has created the 'U-city' brand in the early 2000s based on experience of more than 50 years of accumulated urban development, and, since then, the government has promoted smart city policies such as the national pilot smart cities.

According to MOLIT, Korea went through several turning points in urban development. In the 1960' s, Korea established legal framework for urban and housing development and based on this, large-scale housing construction was initiated in the 1970' s. From the 1980' s, development gradually expanded to suburban areas as well and as a part of this, the government announced New Town Projects in the suburbs of Seoul in the 1990' s. From the 2000' s onwards, the trend shifted to urban regeneration and smart city. (MOLIT internal document)

Under the latest transition, Korea tapped into its strength in the ICT field and created its own city brand called 'Ubiquitous City.' To give momentum to the initiative, the government made an unprecedented move and enacted an act on ubiquitous city construction. Ubiquitous City was different from cities of the past as it sought to integrate basic public services such as transportation and safety as part of the city. (MOLIT internal document)

With arrival of the fourth industrial revolution, however, Korea faced a need to upgrade its urban development paradigm. Accordingly, the government installed Presidential Committee on the Fourth Industrial Revolution to adapt to the disruptions caused by new digital technologies such as Big Data, AI (Artificial Intelligence), IoT and Cloud Computing. Under this Presidential Committee, a special sub-committee on smart city was created. The role of the sub-committee is to develop an urban development strategy tailored to each city. (MOLIT internal document)

Broadly there are three approaches— new development, improvement and regeneration. For new city development, the government designated several cities of Korea as sites for National Smart City Projects. The idea is to turn these cities into test beds and apply the lessons learned from the past new town projects as well as new technologies. For improvement of existing cities, a digital platform for data collection and utilization will be built to improve competitiveness of the cities. Lastly, there is urban regeneration. Named ‘Urban Regeneration New Deal,’ the policy aims to revitalize old cities by providing smart solutions that can transform the cities in an affordable but highly effective manner. And to encourage the private-sector participation, the government will introduce regulatory sandbox to improve business climate and offer support to start-ups with innovative ideas. Such bold measures will give boost to local economies and create jobs. (MOLIT internal document)

Building on its success in urban development, Korea is working to export its smart city. There are two ways to realize this goal. First is to export components of smart city such as technologies or solutions that can improve transport, energy and environment in cities as G2G projects. Second approach is the full-package export where Korea participates in new city development overseas. Korea Land and Housing Corporation or LH is very active in the area and is currently working in various countries around the world including Kuwait, India and Bolivia. One recent achievement in regards to this is a new cooperative project in Kota Kinabalu in Malaysia. (MOLIT internal document)

(2) Overview of Seoul Smart City

The city of Seoul is rated as the world's best in the field of e-government, but it is somewhat undervalued in the field of smart city. In the e-government evaluation of the world's top 100 cities, it ranked first for seven consecutive times (sponsored by UN, Rutgers University, 2017). In the evaluation of the world smart city, Seoul received the following evaluation: (1) third place in the top 50 in the McKinsey Global Research Institute (November 2018); (2) third place in the top 50 of the Eden Strategy Institute (Singapore Enterprise Consulting Institute); and (3) 6th out of the top 20 in Juniper Research (UK global market researcher) (March 2017).

According to the Seoul Metropolitan Government's internal document (2019 Smart City Promotion Plan), Seoul is a world-known smart city and is pursuing a variety of smart-city projects in various fields such as traffic, safety, and the environment. In the case of traffic, a next-generation intelligent transportation system is introduced and traffic information based on big data is provided. In the case of safety, the capital city has a smart disaster response system, and plans to manage urban infrastructure through big data. In the case of the environment, it provides smart services in energy fields such as intelligent power metering, solar energy, water and sewage management, and water quality management. In the case of welfare, Seoul provides women's relief services using CCTV and security services to social underdogs, who suffer from dementia and developmental disabilities. In the case of governance, the city is running a citizen participation online channel using M-voting.

In addition, the Seoul Metropolitan Government has applied IoT (27 sites, 101 proving demonstration services) to create internet living labs, and utilize it as start-up test beds. For example, the Seoul IoT Center is now being operated to help enterprises to explore, demonstrate and commercialize their services and to enter the market. In addition, the city has built a big data platform and applied a big data analysis system to the city. In addition, the city have expanded public wireless Internet WiFi (installed 110,000) and built a cloud center infrastructure. From 2018, Seoul is promoting the introduction of block chain and artificial intelligence (AI), which are high-tech technologies in the era of the fourth industrial revolution, to the administration of Seoul.

(3) Analysis

According to Interviews with Smart City Expert P5, Seoul has excellent ICT infrastructure, smart city experience, resources, and corporate technology, but it still lacks governance such as citizen participation and living lab. First of all, it has broadband networks and public WiFi installed all over the region and has experience of building the world's best e-government. Depending on the infrastructure, almost 95% of start-ups are doing their businesses in the Seoul metropolitan area.

However, it can be said that Seoul is not in the stage of creating itself into a smart city in which various entities participate in comparison with leading European countries. According to the internal documents of the Seoul Metropolitan Government (2019 Smart City Promotion Plan), the city acknowledges that its citizens and businesses are not actively accepting ideas, new technologies and innovations. In other words, since it is unable to utilize the innovation, challenge, and abilities of the private sector to cope with changes, Seoul is now making efforts to create a smart city that will create and develop with citizens and companies in the future.

In addition, the lack of public-private cooperation in the field of urban data also needs to be improved in the future. The free use of city data is the foundation of smart city, but the sharing environment of big data produced and utilized jointly by the private sector is insufficient. Furthermore, high quality data are not utilized in real time compared to the amount of data disclosed, so that the city plans to pursue a policy of establishing governance in which the

public and private sector jointly create and utilize high-quality data.
(2019 Seoul City Smart City Promotion Plan)

Chapter 5 : Conclusion

As a result of analyzing the cases of successful smart cities, it is found that the success factors are the influence of specific actors in the process of execution rather than the institutional characteristics of each country that form the basis for policy formation and execution. In other words, the factor that goes beyond the difference between the political system and the economic system is the dynamics of actors in the execution stage. This means the activation of governance. In the process of creating Smart City, the active participation of companies, civil society, global companies, etc., along with consistent government-led policies, has brought about the success of Smart Cities.

Although Europe may have just pursued its smart city policies in earnest since 2013, it is leading the global smart city initiative through diverse programs, organizational systems, and financial resources. Korea's Smart City has already been promoted since the early 2000s, but it has been lagging behind the global smart city trends while maintaining its fragmented models. Currently, however, Korea has secured various smart city models like national pilot projects and is expanding the field of smart city policy promotion. The nation is still maintaining its advantages of urban development experiences and the recent creation of smart cities with high-tech infrastructure facilities and practical smart city solutions for transportation and safety. Furthermore, Korea can take overseas success models such as the diversification of smart city demonstration projects, government-led government

participation, the establishment of a governance system operating with citizens, and support for performance indicators and international standards.

Smart City means a sustainable and intelligent city that combines city development and ICT to solve urban problems and improve the quality of people 's lives. In the early 2000s, Korea implemented a U-City project to efficiently manage urban infrastructure such as traffic signals, water and sewerage by installing communication networks and CCTV in new cities. After the 2010s, while the 4th Industrial Revolution Technologies (IoT, Big Data, AI, etc.) have been being developed, the existing U-City project is not focused on providing sustainable services based on citizen demand because it is promoted by infrastructure construction such as integrated control system. Therefore, it is necessary to promote smart city policies in order to solve urban problems efficiently and help citizens to actively participate in smart projects, moving away from the level of simply managing the urban infrastructure with ICT.

As in the case of European cities, it is essential to create citizen-centered smart cities for a successful execution of smart city projects. It is also necessary to actively support citizen-led living lab activities so as to achieve problem solving results through bottom-up approach based on consumer (citizen) rather than top-down approach led by the government, and to improve the quality of smart services through monitoring and feedback from citizens.

Smart City will provide innovative communication channels and is a platform created to encourage the development of new modes of behavior that promote communication and cooperation between the private and public sectors, and consumers and suppliers as well as between departments or agencies. It will be possible to construct a community that can utilize citizens' and companies' ideas, and to create smarter city services through mutual exchange and feedbacks. In addition, the realization of democracy could be closely related through the provision of citizen-led services and the transition of decision-making processes. The establishment of smart city governance is a fundamental element for the realization of community values, formation of local community, building of citizens and social capital, and is an essential element for the completion of ideal smart cities. In particular, the establishment of a mutual cooperation system between public institutions, private and municipal governments is fundamental to the operation of smart cities.

Bibliography

The Act on Smart City Creation and Industry Promotion

(abbreviated as Smart City Law),

<http://www.law.go.kr/lsInfoP.do?lsiSeq=192559#0000>

Castelnovo, W., Misuraca, G., & Savoldelli, A. (2016). Smart Cities Governance: The Need for a Holistic Approach to Assessing Urban Participatory Policy Making. *Social Science Computer Review*, 34(6), 724–739.

European Commission, Directorate –General for Energy, 2016, "Analysing the potential for wide scale roll out of integrated Smart Cities and Communities solutions", European Union report

Gil–Garcia, J. R., 2012, 『Enacting electronic government success: An integrative study of governmentwide websites, organizational capabilities, and institutions』, Springer Science & Business Media, New York.

Jessop, Bop. (2002). *Governance and Metagovernance: On Reflexivity, Requisite Variety, and requisite Irony*. published by Department of Sociology. Lancaster University.

Kennis, P. & Schneider, V. (1991). “Political Networks and Policy Analysis: Scrutinizing a New Analytical Analysis.” In B.

Marin & R. Mayntz(eds.), Policy Networks: Empirical Evidence and Theoretical Considerations. Campus Verlag: Westview Press.

Keohane, R. O. & Nye, S. Jr. (2000). Introduction. Nye, S. Jr. Donahue, J. D.(eds.), Governance in Globalizing World, Washington D.C: Brookings Institute Press.

Kim, S. (2004). "Urban Governance and Decentralization: A Missing Link". Korean Local Government Association, Conference resources, 59–78.

Kooiman J. & Vliet, Van M. (1993). “Governance and Public Management.” In K. A. Eliassen & J. Kooiman(eds.), Managing Public Organization, London: Sage Publisher.

Kooiman, J. (2002). Governance: A Social–Political Perspective. In Jurgen R. Grote & Bernard Gbikpe(eds.), Participatory Governance: Political and Societal Implications, Opladen.

Nam, K., Park, J., Park, J & Ji, S., 2017, "The Organizational Structure and Role of Smart City Governance", *Journal of the Korean Regional Science Association* 33(1), 69–85

Norris, Pippa. (2000). Global Governance and Cosmopolitan Citizens. in Nye, J. S. Jr. & E Kamarck(eds.), Globalization and Governance.

Pierre, Jon. & Peters, B. Guy. (2000). *Governance, Politics and the State*. New York: St. Martin's Press.

Ra, M. (2009). *Current Issues on Governance Study*.
한국거버넌스학회보, 16(3), 91–108.

Rhodes, R.A.W. (1996). *The new governance: governing without government*. *Political Studies*. 44(4).

Soskice, D. (1999). *Divergent production regimes: coordinated and uncoordinated market economies in the 1980s and 1990s*. In Kitschelt, H., Lange, P., Marks, G., & Stephens, J. D. (Eds.). (1999). *Continuity and change in contemporary capitalism*. Cambridge University Press.

Stoker, G. (1998). *Governance as theory: five propositions*.
International Social Science Journal, 50 (155), 17–28.

UNESCAP, (2007), *What is good governance?*. UNESCAP,
<http://www.unescap.org/pdd/prs/ProjectActivities/Ongoing/g/g/governance.asp>.

Netherlands Smart City Policy Internal Report

Barcelona Smart City Policy Internal Report

Singapore Smart City Policy Status Internal Report

Danish Smart City Policy Internal Report
MOLIT internal document

2019 Seoul City Smart City Promotion Plan

www.amsterdamsmartcity.nl

www.kk.dk

Abstract in Korean

본 연구는 스마트시티의 성공 여부를 결정짓는 핵심적인 분석 틀로서, 거버넌스가 어떻게 스마트시티의 성공을 이끌어 내었는지를 분석하고자 한다. 스마트시티의 성공을 위해서는 다양한 주체가 참여하는 도시 거버넌스의 확립이 필요하는 전제에서, 거버넌스 이론을 통한 스마트시티의 성공 요인을 분석하고, 이를 구체적인 국내외 스마트시티 사례에 적용하여 그 요인이 어떻게 작동하였는지를 구체적으로 분석해 보고자 한다.

사례연구를 위해 거버넌스 이론적 관점의 분석틀을 (1) 다양한 이해관계자들이 참여하여 네트워크를 구성, (2) 합리적인 의사결정 과정, (3) 지속가능한 투자유치(재정지원), (4) 정부의 혁신성, (5) 시민 중심의 협력적 도시운영체계 구축 등 5가지로 설정하고, 이를 바탕으로, 네덜란드, 스페인, 덴마크, 싱가포르, 한국의 스마트시티 사례에 적용하여 각 도시별로 스마트시티 성공 수준을 분석하고자 한다.

각 국가의 스마트시티의 사례를 분석한 결과, 성공한 요인은 정책이 형성되고 실행되기 위한 토대를 형성하는 각 국가의 제도(경제제도)적 특성 그 자체보다는 오히려 집행되는 과정에서 특정 행위자가 얼마나 큰 영향을 미쳤는가가 정책성과에 영향을 준다는 것을 알 수 있다. 이는 거버넌스와 리빙랩의 활성화를 통해, 스마트시티를 만들어가는 과정에서 정부 주도의 일관성 있는 정책과 더불어, 기업, 시민사회, 글로벌 기업 등의 활발한 참여가 스마트시티의 성공을 가져왔다고 볼 수 있다.

Keyword : 스마트시티, 거버넌스, 리빙랩, 시민참여

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