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Master's Thesis of City Planning in

Environmental Studies

A Study on the Governance and Policy implications for the Establishment of Smart Green Cities

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Abstract

Recent years it has been witnessed that rapid urbanization, climate change and sustainable cities are much debatable subjects concerning city development. Particularly, as cities become vulnerable to climate change but benefits from the technological advances, the construction of the sustainable and environmentally-friendly cities has drawn attentions from policy-makers, experts and academia.

Nevertheless, very few attempts have been made at the city development, focusing on governance on Smart Green Cities (SGCs). This study examines challenges the governance faced and policy implications for developing the SGC policy in Korea, focusing on institutionalization of 2020 smart green city projects. It explores where and how governance and urban environmental policy are located in building SGCs, erupting political conflicts and contesting interests among stakeholders.

In order to demonstrate the argument, the study embraces literature reviews and semi-structured interviews including policy-makers, practitioners, experts, and academia, focusing on SGC projects.

Additionally, this study adopts a multi-level governance perspective to explore limiting factors which take place in creating SGCs by examining its vertical and horizontal governance framework. In the absence of a comprehensive urban environmental policy, local governments have developed distinct SGC plans within their

jurisdictions.

However, this study identifies that challenges the multi-level governance faced to build SGCs where stakeholders express contesting interests. More concisely, SGC projects in Korea exemplify a situation of conflicting agendas and policies due to multi-levels of governments, creating a great dispersion of initiatives.

Second, it concludes that the governance of SGCs shows a matter of politics, because the urban environmental policies employ multi-level parties in which negotiation and compromise are inevitable among various stakeholders with different interests.

Last but not least, the study implies the well-organised communication channels inviting embedded stakeholders are proposed for the success of SGC projects. It means that a good governance and adherent administrative systems can be a vehicle to obtain established goals of SGCs, while encouraging citizens to participant in those projects.

Keyword : Smart Green Cities (SGCs), multi-level governance, limiting factors, policy implications

Student Number : 2018-23089

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Acronyms and abbreviations

MOTIE : Ministry of Trade, Industry and Energy

MOLIT : Ministry of Land, Infrastructure and Transport

ME : Ministry of Environment

MSIT : Ministry of Science and ICT

MOIS : Ministry of the Interior and Safety

MAFRA : Ministry of Agriculture, Food and Rural Affairs

MOEF :Ministry of Economy and Finance

ICT : Information & Communications Technology

SGCs : Smart Green Cities

SNDGO : Smart Nation and Digital Government Office

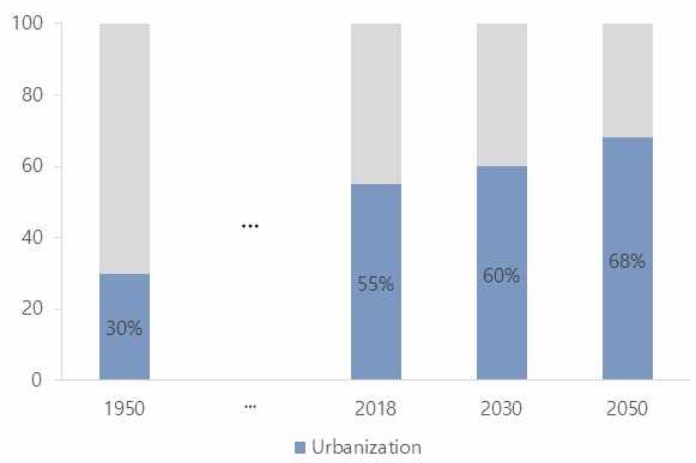
SNDGG : Smart Nation and Digital Government Group

Govtech : Government of Technology Agency

Chapter 1. Introduction

1.1. Study Background and Objective

"Cities can be drivers and platforms for innovation, which is essential to sustainable urban development (UNESCAP, 2019)." People live in cities to enjoy economic opportunities, technological advances, and the lifestyle they pursue. According to UN urbanization prospects report, 55% of the world population is currently living in urban area and the rate is expected to increase to 68% by 2050. "The urban population has grown from 751 million in 1950 to 4.2 billion in 2018 and is projected to reach 6.7 billion in 2050. As such, it is the urban environment where the pressure and opportunity for change lies (UNESCAP, 2019)."



[Figure 4] World urbanization prospects

However, this rapid urbanization always involves challenges such as city congestion, water/air quality, poverty, rising inequalities, urban-rural divide, citizen security and safety (ASEAN Smart Cities Network, 2018). Despite of growing economy provides greater opportunities, environmental consequences are increasingly becoming severe. As cities become vulnerable to climate change, the need for climate change adaptive cities is becoming urgent. IPCC Sixth Assessment Report(2021) found out "the frequency and intensity of heavy precipitation events have increased since the 1950s over most land area for which observational data are sufficient for trend analysis (high confidence), and human-induced climate change is likely the main driver."

Sun-Jin Yun (2016) pointed that cities cause climate changes but, at the same time, cities are victims of disasters caused by climate change and have potential to be problem solvers as well then, can become a platform in which the problems change over.

From waste and air quality management to transport and land use planning, local authorities are increasingly responsible for delivering sustainable development. Despite this global perception that sustainable cities and sustainable communities are desirable policy goals, there is less confidence about what this might mean in practice (Bulkeley & Betsill, 2005).

With global trends of 90% of urbanization, securing sustainability of cities is becoming an important task in Korea. To the end, the

government included “Smart Green Cities (SGCs)” as a representative project to restore the city’s green ecosystem among the eight Green New Deal initiatives of South Korea. The goal of SGC projects is to save energy and create an eco-friendly city to cope with climate change which combines digital and green (Ministry of Environment, 2020). While the rise of international and domestic eco-cities has attracted some academia attention, especially regarding the design, financing, and lifestyles of the residents, insufficient attention in how different administrative levels and from different political boundaries are governed by actors. This is an important knowledge gap, as the governance processes are critical to implementing eco-city projects (Bulkeley and Marvin, 2014).

SGC projects also face complex challenges to situate various stakeholders in the context of domestic politics. These challenges result in both national actions to coordinate the policy and legal frameworks based on urban and environment issues. Consequently, building SGCs goes beyond the capabilities of a single government agency. This does not mean a weakening of central governance over urban environment, but it is a clear break from a hegemonic government-centric system and cities are recognized as a important areas for solving environmental issues. The fact that urban environments are the place where stakeholders express their contesting, interesting and competitive arguments, despite their shared goals on SGC projects. Accordingly, multiple-layers of government and social forces do not mean that cooperation is smooth or that

co-organization ensures a convergence of priorities. On the contrary, action systems over these multi-level issues tend to reflect complex and conflicting interests rather than stable cooperation processes.

In this paper, it explore where and how multi-level interactions arise to build SGCs, which issues create political conflicts and related consequences on urban environmental policy governance.

Little attention has been given to study on governance in building smart cities, despite of several studies on smart cities. For instance, the smart city project is organized by Ministry of Land, Infrastructure and Transport and SGC projects are organized by Ministry of Environment. They have a common goal of 'Sustainable urban development using information and communication technologies (ICTs) and improving the quality of life' but the plans and promotion are being carried out separately. The lack of comprehensive governance can cause problems such as lack of integrated policies, redundancy between departments, and bureaucracy over investment and inefficiency.

The central government must have the ability to influence stakeholders to take steps to achieve shared goals. This involves establishing new governance intermediaries to coordinate multiple interests, identifying stakeholders interested in collaboration, and negotiating common interests to build cooperation. However, the government's strategies to mobilize stakeholders and how they play a role in multi-level governance are depends on the situation. They are based on the specific political environment in which stakeholders are

embedded (Piattoni, 2014).

Transforming urban environmental governance is thus considered as an urgent and challenging issue. However, the debate over multi-level governance in South Korea has created a particular sensation of the need to find the balance between the horizontal and vertical integration of development plans and institutional priorities (Pieterse and van Donk, 2008)." As the cities' contribution to the population and national economic growth increase, there is an urgent need for a coordinated approach to multi-scale challenges.

Drawing from research literature and in-depth interviews, this paper examines the background of SGC projects within the Korea urban environmental system in Chapter 2. In Chapter 3, the study discusses existing approaches to the role of cities in the green transformation and formulates an analytical framework for a multi-level perspective on governance. The multilevel governance framework illustrates how Korea's urban environmental "governance is not simply about hierarchical central-local relations, but is consisting of a mixture of horizontal and vertical governance interactions (Kostka and Nahm, 2017; Lo, 2015)." And then Chapter 4 analyzes and illustrates limiting factors of the resulting lack of comprehensive governance. From a horizontal governance perspective, it analyzes some limiting factors between ministries, departments, and city networks. From a vertical governance perspective, this study illustrates limiting factors in hierarchical structures between central and local governments. Finally, in Chapter 5 it concludes with

implications of the study, focusing on the governance of multi-level urban environmental issues and proposal.

1.2. Research Methods

In this study, literature review was conducted and in-depth interviews were undertaken, where literature review could not cover the aim of the study. The research approach is based on reviewing the existing theoretical studies and precedent research data. The major referencing materials are research articles, proposals and reports published by central and local governments, reports from intercity network organizations, such as ICLEI (Local Governments for Sustainability), which are dealing with the climate change. In-depth interviews were done with experts in SGCs and practitioners in charge of the project in order to investigate the stepwise development procedures for development of the SGC policies.

(1) Literature Review

Literature review is a process to obtain data from various types of records, such as journals and publications of governmental and/or private organizations, newspaper articles, research reports, and personal documents, e.g., diaries, letters, which are then strategically recorded and analyzed.

In order for rich debate and theoretical background on the smart city, it examines existing overall studies on the subject. The

advantage of the review process is that no direct contacts are required with relevant organizations or personnel, and thus it is time-saving, cost-effective in a long-term study. However, possible disadvantage would be with biased data collection, limited availability of information with no records or the ones under secrecy, and hard to figure out non-verbal communication (Choi Myung Son, et al. 2008). In order to overcome the disadvantage, in-depth interviews are used to gather unrecorded information and figure out the non-verbal communication.

(2) In-depth Interviews

When it is required to find out perceptions and interests of stakeholders, and when it is not possible to figure out those through literature review, in-depth interview process is used. It is a qualitative approach using structured or unstructured questionnaire to obtain and analyze data. In this process, the interviewer can figure out the interviewees' perceptions and opinions through the way of face expression and gesture while meeting with them in person. Interview is a process that can be explained as a linguistic action in respect to their social and political circumstances, and is advantageous in that the interviewer can dig out contextual information which will not be obtained through the quantitative studies using predetermined questionnaire (Yun, Sun-Jin & Lee Seung Ji 2013). Furthermore, more adequate data can be obtained through the in-depth interview process because it is conducted with

interviewees in person where repeated supplemental questioning and answering are possible for accurate information.

There are structured and unstructured interview processes. In the structured interview process, the interviewer uses prepared questionnaire in order. In this, quantification of the interview report and the measure are consistent but lacking flexibility and it is hard to collect further in-depth information. In contrast, for the unstructured interview process, the interviewer does not use prepared questionnaire but relies on subjective interview topics and questions. It would be advantageous to have more detailed and intended information from interviewee more easily based on personal relationship but again, it is prone to lack of objectiveness.

In this regard, semi-structured interview is adopted for the study to reinforce the advantage and supplement the disadvantage of unstructured interview. In this process, the main frame was following the structured format but, depending on the circumstance, any supplemental topics were subjectively managed by the interviewer. The interviewer had standardized contents in the interview and added supplemental questions to retrieve more detailed information from the interviewee.

In this study, semi-structured interview was conducted including policy makers, practitioners, experts, academia, focusing on 'SGC project' to specific evaluation and improvement of the policy. More specifically, situation of each stakeholder was figured out in specific areas of the policy (development of overall objective, legislation and

policy, structure organization, stakeholders' collaboration, effectiveness of environment improvement, etc.) and strategies for improvements and future directions were drawn through the analysis of various preferences of the stakeholders. Due to the limitations with statistical and quantitative analysis in this respect, in-depth interview was supposed to be more effective.

Interviewees in the study are from 3 groups - experts in smart city, experts in SGCs, and practitioners from the city. First, group of the experts is supposed to provide knowledge on the environmental consideration and involvement of stakeholders in planning on smart city construction. Second, group of the experts in SGCs is to provide expertise on relatedness and suitable conformity of the SGCs plan proposal to the existing smart city master plan. The third group is to provide answers to details on specific project plans and about the involved stakeholder groups as to who are in the group and how their interests are negotiated and managed. This group will be divided further into 2 subgroups: A group from cities with both smart city and SGC plans, B group from cities with SGC plan only. From these groups, it will be attempted to find out distinctiveness from the existing smart city project planning and figure out possibility of redundant duplicate tasks and/or budgeting.

The list of interviewees is follows.

[Table 1] List of the interviewees

ID	구분	Division	Position	Date	Time (min)
A	Expert	MSIT	researcher engineer	2021.03.06	40
B		ME	researcher engineer	2121.02.16	90
C		ME	public officer	2021.04.06	60
D		MOLIT	researcher engineer	2121.04.06	70
E	Group A	Seongnam	team manager	2021.02.17	60
F		Anyang	team manager	2021.03.15	60
G	Group B	Jin cheon	general manager	2021.04.05	50
H		Pyeongtaek	team manager	2021.04.05	60

Interview was conducted intermittently on 02/16/2021-04/06/2021. Since there were no changes in policies or incidents to impact the content of the interview, there was no possibility of biased data from the interview being affected by any historical effects. The contents of the interview were ‘persistency of smart city and SGC’, ‘organization of stakeholder group and consultation process in planning’, and ‘administrative tasks for persisting SGC’. The questionnaire details are summarized on Table 2 but the interview was conducted with streamlining flexibility.

[Table 2] Contents of the interview

<table>
<tr><td rowspan="3"></td><td colspan="3">Exemplified questionnaire</td></tr>
<tr><td rowspan="2">Experts on city development</td><td colspan="2">SGC practitioner</td></tr>
<tr><td>*A</td><td>**B</td></tr>
<tr><td>Present situation</td><td colspan="3">• Most important consideration in SGC development
• Definition of sustainability in the concept of SGCs?
• Opinions on directions for SGC development</td></tr>
<tr><td>Perceptions</td><td colspan="3">• What do you think about the 2020 green new deal SGC project?
• What do you think the differences are between smart cities and SGCs and how they are distinctive?</td></tr>
<tr><td rowspan="2">Governance</td><td colspan="3">• How do you resolve when conflicted? Do you agree that it ends up democratic?
• Do you think it is necessary to organize a committee for stakeholders for SGC project?
• Which stakeholders' participation do you think is desirable for each objective of the project?</td></tr>
<tr><td colspan="2">• Did you know that there are cities supported for both smart city and SGC projects?
• What would be the reason if there were?</td><td>• Was the SGC project under consideration from the beginning stage of smart city planning?</td></tr>
</table>

* A : Practitioner of the city selected for both smart city and SGC projects

** B : Practitioner of the city selected for SGC project only

	Exemplified questionnaire
	* A
present situation	• What were the differences in planning smart city and SGC projects?

Chapter 2. Literature Review

2.1. Existing Research on SGCs

(1) Concept of SGCs

Many cities and regions in the world are making efforts to respond against climate changes and environmental issues in urbanization. In accordance with the global trend, the Korean Government presented 'Korean New Deal Plan' in 2020 which integrates digital new deal and green new deal with a goal to net-zero. Sun-Jin Yun (2021) defined the green new deal as a social agreement to restore economy and transformation to green country by eliminating negative effects on environment, especially by reducing carbon emission, which is the major cause of the climate crisis. The government stated that it would aggressively take actions to move forward to the goal of net-zero up to 2050, and the local governments established practicing committees for net-zero, calling up the climate crisis in 2020.

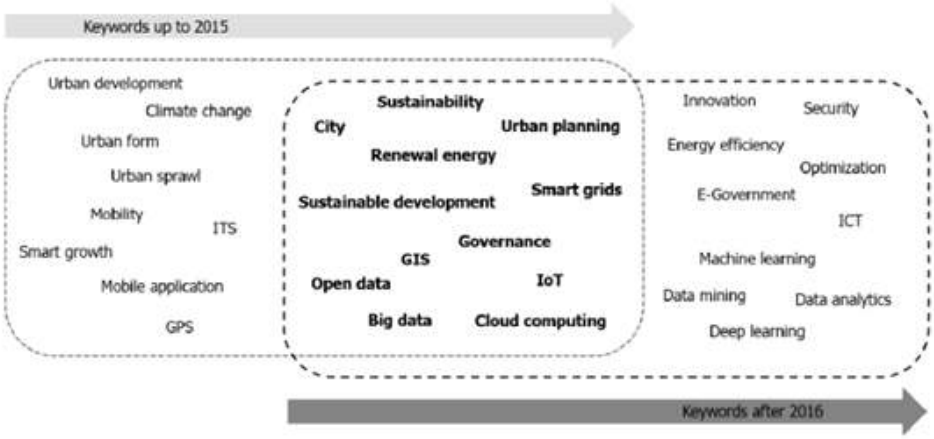
(2) Background of SGCs

The concept of Smart Cities has evolved since around 2008 when underlying technologies, such as RFID (Radio Frequency Identification) sensors, wireless connectivity, electronic payments, and cloud-based software services enabled new access to collaborative

solutions to respond to urban challenges based on extensive collected data. The International Telecommunications Union (ITU) statistics identify that there are already more than 100 definitions related to smart cities (APEC Telecommunications and Information Working Group, 2020). One of the ITU's definition about smart city is "a smart sustainable city as an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness while ensuring that it meets the needs of present and future generations concerning economic, social and environmental aspects (APEC, 2020)."

These definitions show that there is no common definition about smart city and the term can be viewed and analyzed from different angles (APEC, 2020). There is often much potential for improvement in the plan and its enforcement if such strategies exist. This paper trying to deliver recommendations for central and local governments on how to build a successful Smart Cities, and overcome barriers to implementation (Roland Berger, 2019).

The global research trends on smart cities are also looking at smart cities as new models for sustainability. Figure 2 shows that there have been many studies focusing on smart city concepts and introductions, climate change mitigation and adaptation, mobile applications and geographical information until 2015, but research on renewable energy, energy efficiency and innovation has evolved since 2016 based on sustainability (Min, Yun and Furuya, 2019).



Source : Min, Yun and Furuya(2019)

[Figure 5] The international research trends on smart cities

Monzon(2015) emphasized that smart city could a be solution to a variety of environmental challenges facing cities. He identified and addressed urban problems in five areas (governance, economy, environment, mobility, and living) of European smart cities and suggested guidelines for applicable policies and techniques. Specifically, the table below is a matrix of environmental issues and smart city applications which enables, smart cities to suggest various ways to solve various environmental problems such as energy and resource problems, climate change, and rapid urbanization.

City challenges	Smart City Project Actions					
	Network / environmental monitoring	energy efficiency	urban planning / urban refurbishment	Smart building	Resources management	Environmental protection
Energy saving						
Shrinking cities						
Pollution						
Urban sprawl						
Scarcity of resources						
Water scarcity						
Climate change effect						
Very rapid urbanization						
Unbalanced geographical development						
Smart City Project Actions	Air Quality / Water Monitoring	Smart Grid / Renewable Energy	Smart community	building renovation	Water utilities	Forest Fire detection

Source : Monzon(2015)

[Figure 6] environmental issues and smart city applications

The definition of smart city has various aspects in terms of ICT, education, fair development, possibility of consistency in that there is no available template and one-size fits-all definition. But just simply, the common understanding is that harmonized combination of various technologies should sustain the smart city (Ahvenniemi et al. 2017).

In conclusion, smart city creates knowledge, innovation, and visualize integrated and inclusive prospect of urban life quality from perspectives of economy, government, transportation, green belt, medical service, and public culture. Particularly, smart city utilizes ICT for various elements and the user to be able to interact with each other by combining with smart systems so that the efficiency of

city processes, activities, and service quality can be maximized (Hajduk, 2016).

(3) Diverseness of SGCs

In early 80's, the idea with integration of ecology and urbanization planning drew attention then subsequently in 2000's, a new idea has emerged to develop concepts and theories to reflect consolidated socio-ecosystem applications rather than urbanization designing and planning. This is mainly due to understanding of negative effects on landscapes and ecosystem caused by urbanization, and due to development of research on sustainability and improved human well-being and policies (Heymans et al, 2019). The ICLEI Montreal Commitment and Strategic Vision 2018-2024 resulted from the 'Montreal Protocol on Substances that Deplete the Ozone Layer' which proposed 5 paths forward to environment protection and sustainable urbanization.

Specifically, these 5 paths are, First, low emission development including net-zero and automobile with no greenhouse gas emission. Second, nature-based development to protect and enhance the biodiversity and ecosystems. Third, circular development which includes zero waste, sustainable production and consumption, city metabolism. Forth, resilient development to enhance of restoration and response to climate impacts and natural disaster. Fifth, equitable and people-centered development which includes improved environment for public to approach, health, quality life, and equality (ICLEI, 2018).

Source : ICLEI (2018)

[Figure 7] ICLEI green transition

The principle of sustainable city appeared as a political initiative in 20th century to respond to issues emerged from issues with urban environment. The sustainable urbanization of human residence was the assignment on top priority of the Rio Summit in 1992. UN's sustainable city program defines sustainable city as the one which accomplishes economical, physical, and social development while secures natural resource supply and protect environmental risks which would be harmful to development progress. Furthermore, sustainable urbanization includes sustainable strategic planning process, therefore, there are various approaches to meet the various demands and needs reflected from various characteristics of the city (physical, climate and ecological, economical).

Representative examples of the approach implicates that sustainable cities take energy conservation, management and reduction of waste and pollution, reduction of automobile, open space and sensitive ecosystem, community quality life and preservation of cultural environment as the development principle, and reflect management of density, diversity, consolidated land usage, compactness, sustainable transportation, passive solar energy design, and green ecosystem design as their designing elements. In this regard, city models with academic attention were compact city, eco city, green city, low carbon city, resilient city.

Eco city is described by 4 different anonyms. First, large scale new complex purpose development rather than direct expansion of the city. Second, specific urban area developed or improved by sustainable strategies. Third, terminology describing the overall city to represent a particular area of the city with ecological initiative. Forth, umbrella label to various sustainable initiative occurred by the local government in the city.

Low carbon city is a part of policy designed to relieve climate changes. It focuses on physical properties of the city such as energy, transportation, infrastructures, and buildings for the purpose of creation of low carbon economy. Zero energy city, zero net energy city, carbon neutral city, net-zero city, zero carbon city are in the similar concept. Resilient city is the one ready to respond to impacts and stress, recovery and adaptation. Through sustainable risk management, including essential basic structure and service

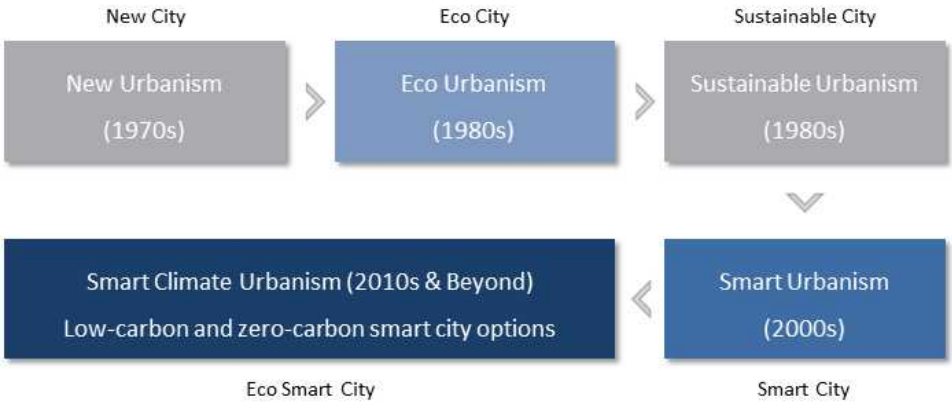
maintenance and restoration, resilient city is able to timely and efficiently resist, absorb, accept, adapt, modify and restore itself against disasters and impacts. Green city is defined as the one which reduces emission and pollution to pursue economic growth by taking action in accordance with information flow, to make the eco system more resource-efficient and sustainable (Hajduk, 2016). These are the contingency plans against negative factors which prevent sustainability and are the most preferred model of sustainable city.

In many technology-oriented studies on future directions of the smart city in Korea, smart city is conceptually named eco-smart city, environment friendly smart city, and so forth, but it is commonly convinced that smart city shall be combined with sustainability. As an example, Kim, Kwigon (2017) stressed that evolution of urbanism gave rise to a concept of eco-smart city in 2010 which is a sustainable city model of a combination of eco city and smart city. Contrary to the 70's where new city development was the mainstream, eco city and sustainable city became a new trend in 80's and 90's as a solution to the aggravating environmental issues.

Upon 2000's with outstanding IT development, smart city appeared, and coincidentally new technologies were being developed and applied in 2010's to manage climate changes and facilitate low carbon city then, resulting in introduction of eco-smart city concept. Eco-smart city resulted from combining city infrastructure and IT so that efficient management of the city and life quality can be improved. The concept of eco-smart city is of integrated urbanization

planning and design, eco system, environment friendly infrastructure, IT, and culture.

It could be defined as a smart, ecological, and climate friendly city where IT would be an integrated solution to management of eco system and climate changes. These eco-smart cities would be characterized by its sustainability, restoration capability, connectivity and efficiency (Kim, Kwigon 2017, Lim, Bong Gu, et al. 2018).



Source: Reorganized based on Kim Kwigon (2017)

[Figure 8] Transition of Urbanism

(4) SGCs and Governance

17 Sustainable Development Goals included in 2030 Agenda for Sustainable Development are interconnected. “No goal can be attained in isolation, but rather only in conjunction with other Goals (UNESCAP, 2019).” Although the Sustainable Development Goals rely on nationally-led initiatives, It is essential local governments to play a role in providing basic services. Misselwits(2016) estimated that

participation of local governments is necessary to achieve up to 65% of the Sustainable Development Goals (Misselwitz and others, 2016).

The Paris Agreement/COP 21 Provision fifth section emphasized on the efforts from stakeholders of non-member countries. V.134 states "All the stakeholders' efforts from non-member countries are welcome, including citizen societies, civil governments, financial organizations, cities, local governments" and V.235 states "the stakeholders described on V.134 are requested not only to make efforts and supports to reduce greenhouse gas with flexibility and eliminate weak points in control of negative effects on climate changes but also to prove their efforts via the Non-State Actor Zone for Climate Action platform.

Now, it is being urged that not only the national unit's but also individual performer's active efforts in each area are required to respond to climate changes. Sun-Jin Yun (2016) described the possibility that local governments, so-called local self-governing organizations, could quickly develop corresponding policies and practice to respond against climate changes, not simply like the central government which is staying with narrow-scoped pursue only for their benefits that are resulting from multi-party collaboration led by the government. Accordingly, it is desirable to organize systematic governance for climate changes at a local government level on the base of the citizens' participation and cooperation so that the performers in their region can more effectively take action against climate.

City plays a crucial role in taking action against climate changes (Sun-Jin Yun, 2016), and governance is the core factor in reducing carbon dioxide emission and improving energy efficiency. Dameri and Benevolo (2016) pointed out that the city's major goal is to reduce carbon footprint and improve the life quality. Furthermore, Ahvenniemi et al., (2017) insisted that a smart city without a sustainable goal would not be of being smart even if they realized ICT. EU also established a concept of smart city to be a goal to reduce greenhouse gas emission and maintain its sustainable environment by introducing innovative technology and supporting the initiative (EU, 2011).

Gunningham (2009) insisted that successful cooperation among actors should be playing a critical role in achieving the smart city's ultimate goal. And the significance of the stakeholder is recognized from determined environment sustainability. Newig and Fritsch (2019) found that various stakeholders' preferences determine the sustainability of the city. As well, Calder and Beckie (2011) found out that the involvement of citizens develops common goals and takes important part in planning on establishment of environmentally sustainable local community.

2.2. Governance Theories

(1) Concept and Features of Governance

In a broad scope, governance is defined as a management system

which emerged while nation, market, citizen's community composed interrelationship and cooperative systems different than the past. (Sun-Jin Yun, 2006).

Marchall (1999) comprehended the common interests of individuals, private and public organizations as the overall driving force to accomplish the common goal by controlling and managing their resources. Conceptualization of the governance means a mutually cooperative management system which appeared while the borderline disappeared between public and private organizations. This implies that a new cooperative relationship is built up through partnership among the nation, citizen's community, and the market.

In a narrow scope, governance is a voluntary, self-regulating, self-organized management system existing in citizens' community which is aside from the nation or market. Though without formal authorities, it is defined as self-regulating management system based on mutually reciprocal, interdependent relationship (Kooiman & Vliet, 1993) with a focus on reinforcement of public culture, self-motivated activities, improvement of social infrastructure towards democracy (Rosenau & Czempiel, 1992).

Information sharing is indispensable in governance system because it is not possible for governance to attain agreements, coordination and collaboration on the objectives and values of the individual community unit without information sharing. Information sharing is more than making it public but is embracing a process to verify and recognize the incidence and obtained data through the

interactions with communities.

Especially in regard to climate issues, which take place in routine, the approach at a governance level is very important to ensure the citizens' participation, and information sharing is critical in environmental governance where sustainable development is the goal. Environment information is necessarily required as a basis of judgement and discussion in environment decision making in order to consider the future generation, who cannot be the participating entity, and the need of non-human (Bullard, 2000).

(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 global governance, regional governance, national governance, local governance (Ra, 2009).

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.

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.

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.

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. Particularly, 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 multi-level governance.

(3) Multi-level Governance

The pahrase of multi-level governance is emerged by Gary Marks(1996) to explain EU structural policy in 1988. Subsequently,

Marks developed the concept from domestic politics to international politics. Marks defined multi-level governance as "a system of continuous negotiation among nested governments at several territorial tiers" (Marks, 1996). This means the concept of multi-level governance contained both vertical and horizontal dimensions.

Further, Rosenau (1997) indicated "since governance involves the exercise of authority and the necessity of people looking 'up' to, and complying with, the authorities to which they are responsive, it is understandable that the multi-level governance concept connotes hierarchy. But once one broadens one's analytic antennae to encompass networking processes and a variety of dissimilar SOAs, it becomes clear that authority relations have to be reconceived."

In summary, Jessop (2004) "suggests that 'the key issue for a research agenda into this new form of statehood becomes the manner and extent to which the multiplying levels, arenas, and regimes of politics, policy making, and policy implementation can be endowed with a certain apparatus and operational unity horizontally and vertically; and how this affects the overall operation of politics and the legitimacy of the new political arrangements'."

Bulkeley (2010) started to arrange local government sustainability action within multi-level governance. In this framework, "central governments might use incentives or regulations to establish broad goals and provide technical or fiscal capacity for local action." Practitioners choose suitable action for each local situation. "In this coproduction approach, knowledge and policy innovation flow up from

local governments, down from higher authorities, and horizontally across networks of municipalities (Homsy and Warner 2013)." Agranoff & AcGuire(2001) also pointed out that the governance structure should play roles in management of the governance to find the participants in the governance, activate, frame the consistent objectives of the group, motivate them, reconcile conflicts then, synthesize the governance.

At this point, it is desirable to make academic and policy level efforts to develop an efficient, open-end, and integrated operating system, while the present smart city projects mostly have been operated in different departmental perspectives.

Though local level policy essential to construct the SGC, in many cases, it can be made more efficient by connecting with government policies and collaborating with other cities. Keren (2008) emphasized the need of multi-level governance for cities to adapt to climate changes. That is because the adaptation can be achieved not only by the horizontal governance in which neighboring cities collaborate and furthermore, they cooperate each other through international network, but also by the vertical governance where cities collaborate with central government. Uniting cities is a process of newly appearing multi-level governance and a network of policies which follow specific issues. Uniting of cities appeared under the goal to unite environmental changes, economy, science, city development, and social unification which are having effects on 21st century's cities (Lee, 2018). Collaboration among cities is sometimes described as dispersed

collaboration. Dispersed collaboration policy means the one that government personnel, non-governmental organizations, community-based organizations, and private performers collaborate based on partnership among them. Cooperation is more frequent among cities through dispersed collaboration, sharing their experiences, to supplement the top-down operating programs (Lee Jong Seo, 2018).

Sun-Jin Yun (2015) insisted that it is important to identify who are participating and how decision-making process works in the climate change governance. The partnership between government and private is essential for the governance to adapt to climate changes as well as the partnership between governments.

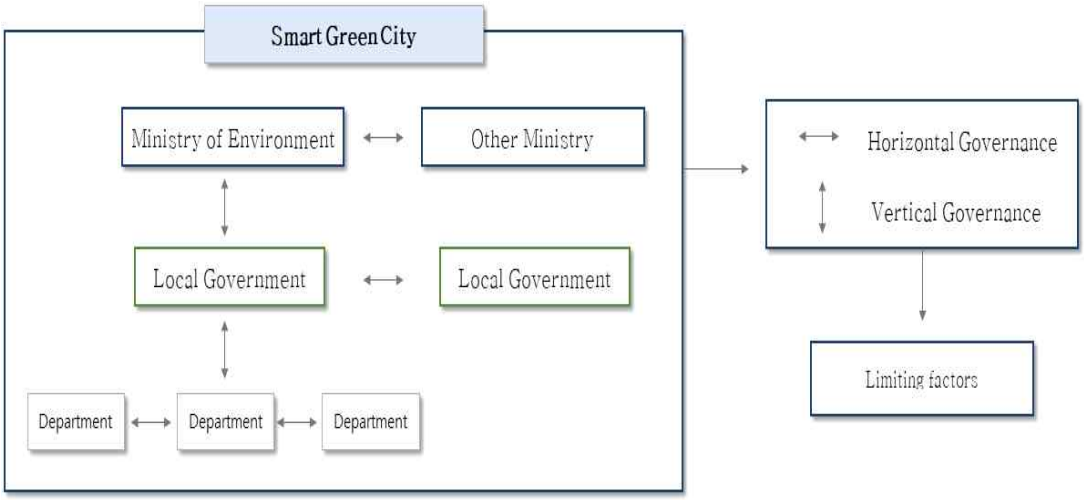
Previous studies have been criticizing lack of governance in Republic of Korea and proposing alternative solutions for establishment of the governance. Open-minded communications, interactions, trust building, and information share were proposed from participants' standpoint. From the administrative standpoint, negotiation process, body of negotiation, fair rules and policy, and democratic systems were proposed. However, there was no sufficiently detailed consideration on interactions, trust building, and information sharing plan in the actual project operation. Especially, there was no sufficient analysis on the 'SGC' project from governance's standpoint as well as the main reason that the governance couldn't be systematically in place under the social, cultural, and political situations.

2.3. Analytical Framework

(1) Analytical Framework

So far, theoretical analysis has found that governance has a wide range of concepts and analytical levels, and studied governance factors which can be applied to SGC project. Therefore, the level of analysis should be narrowed down to form the theoretical analysis framework of this study, and the SGC case will be applied in the next chapter.

Mark (1993)'s multi-level governance study presented in the preceding study was reflected in the analysis frame, and the analysis frame was prepared by modifying it to meet the limiting factors of SGC planning and implementation. Through the analysis of the background of SGC project, this study derived the role of central and local governments, and analyzed the governance that works in the meantime by dividing it into horizontal and vertical governance.



[Figure 9] Analysis Framework

First, Background of the SGC project. The idea as to how social-economic or environmental factors influenced the SGC planning will give implications to realize the concept of SGC in policy making. Especially, this study observed how the central and local governments' leadership played a role in the policy making process and divided the governance that works in it horizontally and vertically.

The second part is about the limiting factors from horizontal governance. The basis will be observed between ministries in central government and departments in local government. Then, the legal system, structure of the governmental organizations their scope, area, and measures will be observed.

The third part is about the limiting factors from vertical governance. Particularly the focus will be on the roles and relationship between central and local governments, the

communication process, the budget process will be observed.

[Table 3] Analytical questions

Key words	Analytical questions
Background	• How the central and local governments' leadership played a role in the policy making process? • What is the driver of the project for the various stakeholders? • How the multi-level governance structure is organized in the project?
Horizontal Governance	• What legal system is provided for smart city and SGC construction? • How are the departmental areas and roles categorized? • Are the departments cooperative in planning and practicing? • Are cooperative system and city network provided between neighboring cities?
Vertical Governance	• Are the central and local governmental operations running systematically? • How are the central and local governmental roles relevant? • Is the project implementation and budgeting organically linked?

After investigation of the background and limiting factors in respect to governance, policy implications will be drawn through case studies on successful governance of other countries at a policy level in order to apply to our SGC construction strategies. However, the

implications from the case studies are not always applicable to our cases. It would be noteworthy to realize that the implications would be major key points to consider in efficient planning the policies for SGC construction at a country or city level.

It is mainly due to the different and unique political, social, economic, and environmental circumstances because SGC is constructed in efficiency in a physically specific location. At this point, analysis of every detail on every element will not be provided since the purpose of this study is an overview on the background of the policy, legal basis, and the structure of governance.

Chapter 3. Background of SGCs

3.1. Leadership of Central Government

By starting with the introduction of an urban information system that applies information and communication technology to urban spaces since the mid-1990s, Korea has made efforts to develop smart cities through Ubiquitous-city (U-city). As digital cities have started to gain great interest worldwide in 1994, the establishment of Korea's urban information system was a key part of the government movement and they systematically carried out its smart city plan. The early form of a smart city is the U-City under 「the Act on the Construction of Ubiquitous City」, which was enacted in 2008. The U-City was first introduced and intensively promoted as new cities, happy cities, and innovative cities. It was implemented in places

including Dongtan in Hwaseong and Unjeong in Paju with the aim of creating a pleasant residential environment using information and communication technologies. However, potential obstacles to succeed may include the lack of clear goals and visions, restrictions on funding dependent on new city development, and lack of participation of residents and private enterprises (Lee, 2018).

With the suspension of large-scale urban development projects since 2014, U-city developed into a project to discover new services and build an urban integration platform by linking CCTV, sensors, traffic and crime prevention systems. In 2017, shifting its focus from its existing technology-oriented urban development and management approaches, 「the Act on the Promotion of Smart City Development and Industry」 was enacted to outline government's commitment to people-centered, interconnected, and sustainable cities as the core values of smart city initiatives.

However, despite the declarative aim of the sustainability of the city, most of the smart city projects are remained on the application of high-technologies, raising issues such as capital productivity. Although the level of technology in Korea is higher than that of other countries, green and sustainability are relatively overlooked as related policies and projects are focused on technology (Ahn, 2018; Jung 2019). Changsuk Park et al. (2020) described the issues with smart city policy in Korea such as 1. Insufficient consideration of the smart city from environmental and sustainability perspectives, 2. Lack of systems for sharing, connecting and integrating relevant data, 3.

Insufficient strategies for cooperation among organization of interest and the stakeholders, 4. Problems with efficiency in terms of duplicated services from individual projects operated by separate organizations, 5. Conventional approaches to project in technology oriented and public interest oriented manner, 6. Lack of integrated approaches between planning policy and legislation. Therefore, it is necessary to push more strategic move to smart cities and sustainable cities.

In conjunction with this circumstance, the government is pushing for "SGC" project at the Green New Deal level, which will strengthen the environment and secure sustainability.

[Table 4] Process of Smart City Development in Korea

Year	Contents
1995 - 2000	Established a national geographic information system and promoted a project to establish an urban information system(UIS) to systematically manage the city.
2004	Established IT839 Strategy[1] and introduced the concept of Ubiquitous-City (U-city).
2008	Enacted 「the Act on the Construction of Ubiquitous City」 and stipulated infrastructure under the U-City Act in new city areas
2017	Revised 「the Act on the Creation of Smart Cities and Promotion of Industries」 due to the limitation of the existing U-City Act
2020	Planned to speed up the construction of Smart Green cities as a core project of the Korean version of New Deal that combines digital and green.

Source : Reorganized based on KEI(2020)

1) IT839 Starategy : The Ministry of Information and Communication's plan to

The Korean government put green energy transition, eco-friendly urbanization, and SGC construction on top priority which is the core elements of the Korean New Deal Project. The SGC project planning took their pending issues, weaknesses, and uniqueness into consideration, and attempted modeling by integrating 4 different areas (resilience, low emission, ecological restoration, human-centered approach) and 10 different categories (climate resilience, hydrologic cycle, water safety, autonomous vehicle, resource circulation, resting ecosystem, clean air, environment education, living environment).

> *"While the existing smart city and city reconstruction projects aimed at building planned city based on new technology, the SGC project puts a focus on green which aims at mitigating climate change, reducing greenhouse gases and restoration of eco system." - (B)*

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develop IT industry of Korea in a comprehensive manner through eight services that generate high demand and expect high synergy effects through wireless telecommunication convergence.

[Table 5] Planning Model of SGCs

	Resilience	Low Emission	Ecological Restoration	Human-centered Approach
Objective	Environment improvement project to empower restoration and to respond to climate environment changes caused by climate changes	Life patterns of emission reduction to reduce greenhouse gas (supporting infrastructures such as transportation, circulation of resources)	Conservation of natural environment and the approach, types of projects for conservation and restoration of eco system	Types of education-based programs and facilities to secure self-directed environment management and environment rights
Example	• Water management • Green infrastructure • GHG reduction	• resource circulation • eco-friendly car	• resting ecosystem • ecotourism	• environment education • smart clean city

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Categories	climate resilience	hydrologic cycle	water safety	autonomous vehicle	resource circulation	restoration of ecosystem	resting ecosystem	clean air	environment education	living-environment

Source : Ministry of Environment(2020)

The SGC project is led by the Ministry of Environment, and 25 cities have been chosen to establish a solution model and comprehensive model. The solution model consists of a combination of more than 2 project categories, and is intends to improve and solve the climate and environment issues taking place in city. Twenty cities have been chosen for this model, and they will be supported

with $60M grant for 2 years. The comprehensive model consists of a combination of more than 3 project categories, and is intends to improve and solve the climate and environment issues taking place in regions of larger than city unit communities. In this model study, five cities have been chosen by their influencing novelty and relevance to the solution model, and they will be supported with $100M for 2 years.

However, there is always discrepancy between ideals and reality. Because there are many smart cities approaches stand from economic standpoints, they tend to conflict with environmental and social standpoints, causing different directions, strategies, and lack of cooperation. The policy is in its beginning stage and it already encounters various problems and limitations. First, currently, there is a lack of legal and administrative systems to promote SGCs. Second, it is a question whether each single project will be implemented in an integrated way. However, it is significant in that it was an attempt to combine urban development and the environment that had been separated. Therefore, in this study, we aim to derive policy implications for settling SGCs in line with global trends through analysis of various limiting factors in the current project.

3.2. Leadership of Local Government

UNDP (1997) defined administrative governance is the authority for an authorized entity, country or city, to manage various tasks.

The city government is an entity that is composed at various levels of community, country and city. The area of governance includes governance, community of the citizen, market, and private sectors. Therefore, it has to be considered in respect to their historical, traditional, technological, and cultural features (The Seoul Institute, 2009).

At present with the 7th popular elected local governments since the 1st one started in 1995, their roles and responsibilities are more crucial than ever for persistent development. Actually, many of them are proactively and aggressively developing and driving new projects. For the 2020 SGC project, 100 out of 243 local governments applied for public smart green project grants at an unprecedented competitive rate of 4:1. The fact implies that many local governments are highly interested in the SGC projects. They had presented various SGC models and 25 (5, comprehensive models, 20 solution models) have been selected.

Through interviews with local governments, it was confirmed that various projects suitable for the actual situation and characteristics of local governments were discovered in cooperation with citizens and local communities.

> *"Though it was practitioners who dug out (smart green city recruitment) projects, it was the cooperation of the residents, Korea Rural Community Corporation, and Agricultural Technology Center.*

Sinchok Reservoir used to be possessed by Korea Rural Community Corporation. As the Reservoir lost its functionality and the pollution was getting worse, civil complaints have been claimed and filed. As the complaints keep stacking, our department as well as Korea Rural Community Corporation, and Agricultural Technology Center, and City Hall started looking for solutions. (omit). The residents not only filed complaints but also suggested practical solutions like cooperation with companies such as Assum and KT."
- (G)

"Population of Pyungtaek is 540 thousand and 40% of them are living near Tongbuk Chon. An important feature in city construction is stream control and Tongbuk Chon was the main subject to control. The water quality of the stream is in Grade 4(which is really bad). Due to the high rate of the impermeable area, pollutant accumulated and made the water quality worse. Therefore, we started planning on a project to improve the environment around the area."
- (H)

Twenty cities chosen for the solution model are Buchon, Sungnam, Ansung, Anyang, Yangju, Pyongtaek in Kyunggi-Do,

Sunchon City, Jangheung-Gun, Haenam-Gun in Chonman, Gangneung and 6 locally governing communities in Gangwon-Do, Jangsu-Gun in Chonbuk, Pohang City in Gyungbuk, Jinchon-Gun in Chungbuk, Gongju City in Chungnam, Dong-Ku in Gwangju City, Saha-Gu in Busan City, Milyang City in Gyungnam, Seo-Ku in Inchon, and Cheju. 5 cities chosen for the comprehensive model are Hwasung City in Gyunggi-Do, Jeonju City in Chonbuk, Gangjin-Gun in Chonman, Gimhae City in Gyungnam, and Sangju City in Gyungbuk.

[Table 6] List of 2020 SGCs

Wide-are Unit	Basic Unit	Model	SGC Plan
Kyunggi	Buchon	Solution	• Buchon Green New Deal Center • Eco pond for exterminating gold frog
	Sungnam	Solution	• Improvement of eco-friendly energy facilities • Support for the overall process of separate waste collection by residential type
	Ansung	Solution	• Construction of integrated system for monitor, operation, and management of climate crisis. • Utilization of energy (heat, electricity, water) from incineration.
	Anyang	Solution	• Eco Green Center in manure treatment plant • Citizen-participating circular economy infrastructure
	Yangju	Solution	• Employing micro dust management

			systems in industrial areas • Construction of a platform for integrated environment monitoring system
	Pyongtaek	Solution	• Stream control to restore water cycle. • Hydrogen green mobility • City woods and water quality improvement projects
	Hwasung	comprehensive	• Activation of Shihua lake for purification of Siwha lake. • Resource circulation type collection system • Air quality monitoring system
Ganwon	6 locally governing communities	Solution	• Integrated management of water resources using military sites • Establishment of buffering zone against climate changes by using integrated green technology
	Gangneung	Solution	• Smart integrated environment platform. • Eco system restoration, e.g. ecoroad
Chungbuk	Jinchon-Gun	Solution	• Re-use of treated water from industrial waste water • Botanical garden on the water as an eco rest area
Chungnam	Gonju	Solution	• Encouragement of water circulation and recycle.
Chonbuk	Jangsu-Gun	Solution	• Platform for agricultural waste and smart waste
	Jeonju	comprehensive	• Construction of green carbon ICT village in vulnerable residential area near industrial zone.

Chonnam	Gangjin-Gun	comprehensive	• Eco-friendly eco water lane (improvement of water circulation) • Utilization of land-fill area as environment education community space
	Sunchon	Solution	• Installation of rain garden in upstream region of Sunchon bay to get rid of pollutant
	Jangheung-Gun	Solution	• Employing hydrothermal energy supply facility
	Haenam-Gun	Solution	• Providing recycle compensation and sharing center • Establishment of smart experience space and family garden
Gungbuk	Sangju	comprehensive	• Improvement of water circulation, e.g. cleanroad, green infrastructure • Reduction of heat island and micro dust • Expansion of facilities for electric vehicles, e.g. charging station
	Pohang	Solution	• Construction of water circulation forest
Gungnam	Gimhae	comprehensive	• Smart eco restoration project for water reservoir using LID • Green line network (LID, green infrastructure construction) • Smart environment patrol (measurement and smart alarm for bad smell, micro dust)
	Milyang	Solution	• Cooling road, cooling fog, cool loop, cool pavement • AI recycle collection machine, smart waste compacting and collection

Inchon	Seo-Gu	Solution	• Construction of smart eco recycling center
Gwangju	Dong-Gu	Solution	• Resident-led waste report, collection, education, and public relation • Participating in overall re- & upcycling activities
Busan	Saha-Gu	Solution	• Development of climate, eco education, sport facilities, parks, and rainwater recycling system in Eul Sook Do. • Reduction of pollutant, installation of water draining walking street. • Streetlight installation for Habitats and path of migratory birds
Jeju	-	Solution	• Construction of eco park using spring water resources

Source : Ministry of Environment(2020)

The distinctive feature of the SGC project is that it is led by local governments and supported by the central governments. To find a business model which is really needed for citizens, local governments developed plans by organizing task force teams and residents' committees, collecting opinions and suggestion, inviting expert consultants, and technically collaborating with private companies. They tried to create human-oriented city restoration strategies with corresponding stakeholders' participation rather than indiscreet redevelopment or reconstruction to avoid leaving people neglected. Through the course of the planning, they developed the basis on which the community and culture would be conserved, and the local economy could be activated at the same time.

"(omit) need to move them by finding a contact point between residents and the community. In order to do that, the citizen organization's roles are more important while the government employees play their roles. Therefore, we kept persuading and educating citizens in cooperation with environment association groups. (omit) Government employees have a prejudice that citizen associations are who just object for objection. However, we reach out to them with all frankly open questions then, "could you help us wit h…?" We drove the project with a mindset such that we are the problem solver on the household waste issue". - (E)

"The residents got much more worried about the situation from early days. Not simply reporting and filing complaints, they had strong intent to find solutions. They started taking action such as actively participating briefings, public hearings, survey, etc. We could develop a model being supported by desires from us, the residents, along with participating expert groups." - (G)

Local governments need to consider the citizen as problem solver

and the subject who are having sense of ownership, so that they must be given opportunities to participate and communicate on their needs. According to 'Paradox of Distance' by Frederickson (1995: 167), citizens preferably have more positive perception on the governmental organizations which they have contacted and frequently serviced by, rather than the ones far from their lives which are existing as an unexperienced subject.

Mostly, elementary local governments or community service centers had positively effected in encouraging the residents' participation in a sense that the local organizations are much closer to the residents than the central government while they have direct and frequent contacts or services. SGC project could take advantage of the citizens' participation and trust as they take parts in the project as experts with practical knowledge on the facing issues of the community.

3.3. Measures responding to climate change

As the global economy is getting into a New Normal phase of low-growth, low-price and low interest rate, the world is experiencing economic recession along with the 4th Industrial Revolution, giving rise to employment crisis. Particularly, since the economic recession is getting deeper due to the pandemic with the COVID-19 and the neglected vulnerable population is increasing, it is becoming a significant subject to drive the economy in a way that

controls climate change.

In December 2019, EU has agreed with 'The European Green Deal' and taken it as a new strategy for growth. Subsequently in May 2020, they are driving the project providing 750 billion euro under the statement of 'Next Generation EU'. The contents include climate neutrality, circular economy, zero pollution (air, water, soil), and support to vulnerable class of people until 2050.

Korean New Deal is a transformation of the country into a leading country of Korea: With a leaping up prospect from catch-up to the leading economy, carbon-dependent to the low-carbon economy, inequality to the embracing society, the new deal is an acceleration path for the basis of economy forward to being environment-friendly and low carbon. The Green New Deal is under the jurisdiction of the Minister of Environment and Minister of Trade, Industry and Energy.

Ministry of Trade, Industry and Energy (MOTIE) is forecasting 659,000 new employments with an investment of $65.6 billion out of the $143 billion budget for the Korean New Deal project. As the project succeeding, it is projected that greenhouse gas will be reduced by 12.3 million tons. On top of it, there is Green Digital New Deal project which integrated Green New Deal and Digital New Deal, and the sub projects are Green Smart School, Digital Twin and SGCs. The Green Digital project will grant $31.1 billion until 2025 and 316,000 new employments are anticipated. Ministry of Environment (ME) is expecting that there will be 3,000 new employments and

greenhouse gas reduction by 27,000 tons per year.

For the central government, the background motivations from the SGC project through the Green New Deal were national economy growth, greenhouse gas reduction, and elimination of social inequality. As well, for the local governments, securing the budge, local economy growth, and creating new employments were their driving force of the project..

> *"Pyungtaek is a complex of urban and rural community. However, urbanization plan is generally similar among big cities like Seoul or Suwon. As the central area of the cities are constructed in similar ways, most cities have high rate of impermeable area. Road construction causes soil fragmentation and destroy eco system. This is a common environmental problem that most of the 250 local governments are facing. We started planning on the project to find a solution to the common problems with modern cities."*
> *- (H)*

3.4. Implications

The following implications would be drawn as to the background circumstance that SGC project was developed. First, the leadership of

the central and local governments took a crucial part in planning and developing SGC project that being supported by the central administration, the mayor, and the policy maker. Second, local governments have been at the center to find projects suitable for the actual situation of each city and citizens also took parts as the problem solver against the facing city problems. Third, SGC project is a part of the Korean Green New Deal as a tool for economy growth, creation of employment, and greenhouse gas reduction.

However, Sun-Jin Yun (2021) pointed out that a long term goal of net-zero cannot be competently achieved by the present Green New Deal project which is split into several segments. Therefore, it was suggested that green new deal and net-zero must not be recognized as an ideology but as a global trend, regardless of politics. At this point, the SGC project and its relevant tasks would be systematically and consistently proceeding as long as the 2050 net-zero objective, based on the Green New Deal Legislation, was provided with legal power and the basis on which relevant organizations and budgets are secured (Sun-Jin Yun, 2021).

In order to construct our cities in a way that is more efficient, it is desirable to comprehensively consider public oriented administrative governance, private oriented technology governance, and overseas expansion oriented global governance. Especially, administrative governance targets at developing a smart city model through interdependent relationship among central and local governments and entrusted private organizations (Meijer & Bolivar, 2016). However, it

is criticized that Republic of Korea has unsatisfying systems to control mutually interdependent relationship among central and local governments, private and other various organizations. It is mainly caused by the fact that they have different circumstances, different objectives on the city, lack of clear understanding on specific definitions of SGC, and lack of central control systems to manage relationship among governances. Besides, each party's selfishness makes it worse as pursuing their own interests and being not cooperative with each other (Jang Hwan Young, 2017).

Gollagher and Hartz-Karp (2013) pointed out that deliberative collaborative governance is crucial in sustainable development. Since sustainability is including complex interrelationship among social, economic, and environmental factors of the stakeholders, it is highly recommended to have sufficient and cooperative communications among the stakeholders to resolve issues arising from problem-solving, decision-making, and legislation process.

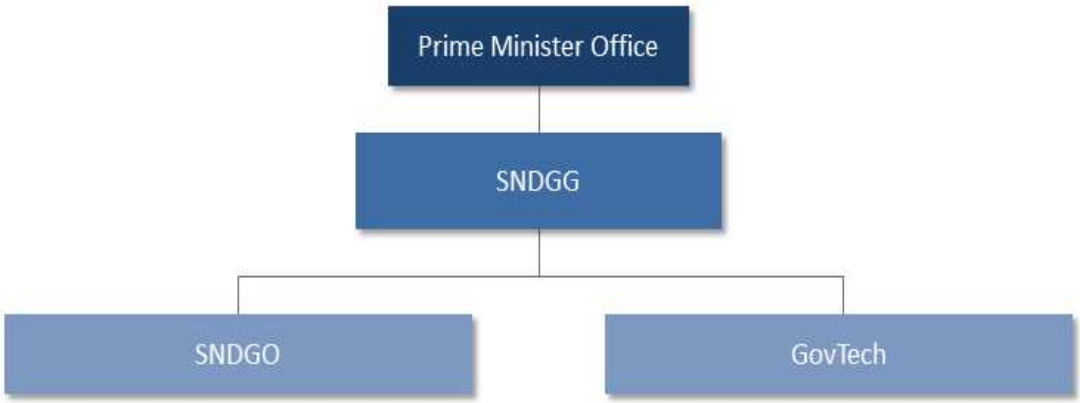
Singapore is a representative example of a well-established administrative, political and policy framework to implement consistent policies. Singapore is an island country, which is located in the southern end of the Malay Peninsula, having a territory similar to the area of Seoul, with 5.4 million populations. Its official country name is Republic of Singapore. In 80's and 90's, they had been actively utilizing and embracing ICT. They have been making efforts to create and maximize the efficiency of the government such that 3 master plans were established for National Computerization Plan,

National IT Plan, IT 2000 to develop essential IT infrastructure and data network, electronic transaction platforms, IT manpower, and computer software. In 2000s, they established additional 3 master plans for Inforcomm 21, Connected Singapore, Intelligent Nation to consolidate with data, process, and service. On top of it, they launched Smart Nation Initiative then, took digital economy, digital government, and digital community into reality throughout the areas of health, education, environment, and finance.

Since 2014, "Smart Nation Project" is led by Prime Minister, Lee Hsien Loong, as a core national project. Smart Nation Program Office is in charge of the smart city project, and it is worthwhile paying attention that an assigned officer in charge of the project is exclusively engaged in the smart city tasks only. And a new department has been separately established in the government to manage the smart nation project. SNDGG (Smart Nation and Digital Government Group) is a smart nation initiative operating system under a direct jurisdiction of the Prime Minister. It is aimed at the objective to develop a digital platform supported by public and private organizations or corporations and maximize the economy value.

SNDGO (Smart Nation and Digital Government Office) is a department of SNDGG and is committed to planning and developing smart nation initiative vision and policies. They will lead digital conversion of public areas or sectors, and develop long-term capacity and capability. The department is composed of personnel from ministry of finance, ministry of communication and information, and

prime minister office. Govtech (Government of Technology Agency) operates SNDGG's smart nation research support program, reinforces joint research programs and research capability, and develops new core platforms and solutions such that they are in charge of the initiative operation (Kim Myung Hee, 2021).



Source : Reorganized based on Singapore (2014)

[Figure 10] Structure of Smart Nation in Singapore

Despite the uniqueness of Singapore being a city country, it is noticeable that efficiency and progress of the project can be maximized, in terms of administrative governance, by reinforcing connections, cooperation, and coordination of various smart city projects.

Chapter 4. Analyzing limiting factors

Based on the background studies in SGC, I analyzed how various stakeholders are participating in the 2020 SGC projects and the drivers that make them behave differently. Also, this study investigated stakeholders' relationship with the governances and explored frameworks in which they interact with one another. As a result, the relationship between Central government-local government was divided into vertical governance, and relationships between central government departments, local governments, and local government divisions were divided into horizontal governance.

Chapter 4 analyzes the limiting factors of SGC projects due to lack of governance. In-depth interviews were conducted with experts from the central government and practitioners who were in charge of establishing SGC plans for local governments. Since the SGC project is one of the representative Green New Deal project of the Ministry of Environment (ME), the limiting factors burdening the central and local government were analyzed, leading to a solution to divide them into vertical and horizontal governance. As in-depth interview is the main content of the analysis in Chapter 4, it is presented by directly quoting how the interviewees said.

4.1. Horizontal Governance

(1) Side effect of bureaucracy in the policymaking

Recently, many departments are driving similar projects as the

SGC projects are becoming of common interest. The Ministry of Land, Infrastructure, and Transport (MOLIT) is moving forward to green remodeling to increase energy efficiency of old buildings and reduce greenhouse emission. The Korea Land and Housing Corporation (LH) is supporting the green remodeling project for public buildings in accordance with the Green Building Certification Article 3 (September 1, 2016) based on the Supporting Act for Green Building Development Article 27. The purpose of the remodeling project is to present examples of successful cases of energy saving projects to private enterprise so that they can lead the green remodeling market, such that the project supports the assessment and consulting process for the old building (KRIHS, 2020). However, since the green remodeling project does not include new renewable energy and renewable energy items, they are encouraged by supporting grants when they install solar panel, solar heat system, geothermal system, small scale wind power, or fuel cell.

New renewable energy propagation project is led by the Ministry of Trade, Industry and Energy (MOTIE). New renewable energy and new technology propagation is encouraged for non-residential buildings according to the "Statute of new energy and renewable energy development, utilization, dissemination, Article 27' and 'New renewable energy equipment supporting act' announced by MOTIE.

Domestically, the smart city related projects are led by relevant departments and in many cases by local governments. MOLIT is the major organization to legislate smart city laws, develop national

project plans, and carry out R&D, demo projects, and manpower training.

Ministry of Science and ICT (MSIT) takes their own advantage in communication network and exerts itself to provide specific smart service solutions. MOTIE puts focus on electric supply, introduction of smart grid, and industrial standardization of smart city. MOIS has been taking charge in safety and the Government 3.0 project. They are driving the CCTV control center project, too.

[Table 7] Projects related to Smart and Green by Ministries

Ministry	Project related to Smart	Project related to Green
MOLIT	• Smart City test bed • Smart challenge project • New deal urban regeneration project	• Green remodeling • Zero energy building
ME	-	• Smart green city • Eco recycling center
MSIT	• 5G • Smart village • Instruction of smart city	-
MOIS	• Instruction of smart town with ICT • CCTV control center	-
MOTIE	• Smart industry • Industrial Standardization of smart city	• Renewable energy supply (Solar heat, Solar farm, geothermal heat) • Ecological industry
MAFRA	• Smart farm	-

Interviews have shown that this situation leads to a power struggle in between central government departments.

"While Ministry of Environment (ME) adopted smart green city project as a green new deal, Ministry of Land, Infrastructure, and Transport (MLIT) had bad

feelings against it because they were thinking that smart city is under their jurisdiction and could not agree to combine it with environment. Ideally, it would be the best to cooperate in that MLIT supports the project from smart city perspectives and Ministry of Environment supports from green city perspectives but is just ideal and not realistic. Furthermore, government employees mostly look for legal basis to take their responsibilities first. (omit) It is highly required to have higher management groups prepare a cooperative system to coordinate for all relevant departments to take parts the areas of land, energy, technology, and environment." - (D)

The difficulties were revealed by interviews which SGC experts and local government practitioners were having. Most of the difficulties in planning out project items were due to separate legislation and policies by separate departments.

"When their area overlaps with other departments, they think that their area is taken by others. Once they lose it, their budget is thought to be taken away and subsequently they might lose their opportunities of performance and further their promotion in every aspect. It is the main reason they cannot be

cooperative." - (D)

While excluding the projects being run by other departments, local governments can choose projects like resource circulation, eco, and citizen education then, they can not achieve the ultimate aims for SGC such as efficient greenhouse gas reduction and green urbanization. In contrast, the central government can not grant duplicate projects among departments.

> *"I used terminology, zero energy building, on the project plan but I couldn't use it on field evaluation or PPT presentation. Ministry of Environment intended to recruit projects for job making as well as greenhouse gas reduction, but it is getting tough to dig out new project items while other projects are coincide, which conincide with other departments, such as green remodeling, solar ray, green belt, and citizen organization supporting programs. Thus, I had to call the green remodeling as building remodeling project". - (E)*

> *"(omit) The budget support system of the central government doesn't allow Minister of Environment to grant the green remodeling project. Another case is*

such that Ministry of Land, Infrastructure, and Transport is not allowed to grant micro dust control project. So is the government budget system much separate. But still there is room for Ministry of Environment to take flexibility to support the city restoration and smart city projects. It is highly desirable to take action to coordinate the existing project aims of the local governments". - (B)

"Since the new renewable energy related project belongs to Ministry of Trade, Industry and Energy(MOTIE) the solar power project is limited to self-generating power only. Originally it had a larger scope, but we were told to limit the capacity to self-generating power capability while the project was evaluated." - (G)

(2) Overloaded work for the local government practitioners

Nijkamp and Kourtit (2013, p. 299) emphasize that "the city is a social fabric based on interaction, participation, and collective responsibility." Theories on collaborative, networked, and co-productive governance highlight that the quality of policies can be strengthened by managing good relations between all stakeholders and tapping into their shared intelligence and experiences.

Collaborative learning is at the heart of this approach and (virtual) communities can strengthen the intelligence of the city (Meijer, 2016).

To build up the collaborations, ME grades in 10 point scale on ‘cooperation and its plan among corresponding departments’ as a selection standard to encourage various departments to actively participate in planning on the project. Looking into the selection standard and evaluation protocol, the cooperating system of the participants plays an important role in the SGC planning process.

[Table 8] Criteria for SGC projects

	Criteria	Contents	Point	
			Solution model	Comprehensive model
Communication and participation of the citizen (60)	Analysis of current issues	• Analysis of climate environment status and working condition and urgency of the project	15	10
	Vision and objectives	• Vision, feasibility of the objects, details	5	5
	Details of the plan	• Relevance of the project (size, contents, budget) • Easiness of the project (permit, secure plant to provide land, etc.)	30	30
	Innovation	• Originality, relevance, innovation	10	15
Proceeding protocol(20)	Basis of driving force (Local government)	• Plan on providing manpower and management structure • Cooperation and its related plan among related departments	10	10
	Basis of driving force	• Cooperating system with citizen and corresponding organizations	10	10

	(Community)			
Effectiveness and steadiness (20)	Expectation	• Climate and environment improvement, e.g. greenhouse gas reduction • Job creation	10	10
	Accomplishment measure and consistency of the operation	• Adequacy of performance review system • Operating management after completion of project	10	10
Plus points	Connections to departmental projects, e.g. green new deal, city regeneration		1	

Source : ME(2020)

Throughout the various interviews, it was confirmed that some local governments had established a system to distribute the tasks of planning, implementing and managing detailed projects for efficient policy implementation.

> *"The Environment Department has Environment Policy Division and Ecologic Stream Division. Project management and overall control is Environment Policy Division's area but 60% of the budget is allocated to the Ecologic Stream Division. (omit) 4 practitioners are in charge of the project. In our case, as we have professional background in environment with expertise in the area, it is easier to cooperatively work with a common goal. (omit) As we have been assigned together who were from 2*

separate divisions in charge of the project, somehow the process for budget allocation is more complicated. While budget is executed and expense is reported separately, we cooperatively work each other and have high responsibility to our own areas." - (H)

In spite of that, there were variations in cooperation and participation among the corresponding departments while proceeding with planning and operating the SGC project. Most of the local governments were burdened by one department taking charge of all the works. In the process of excavating the project, opinions of various departments were collected including the formation of TF teams. But at the end, all budgets were attributed to the general department. For this reason, the interest and participation of other departments were bound to decrease, and the burden of all work was concentrated on the general department.

"We have insufficient manpower and poor condition to steadily carry out projects. Though other departments participate, they are very passive and not proactive at all. (omit) It is wall in between. They might be more active if performance-based promotion system was in place, but actually only one department takes all the tasks. The situation turns out to be disadvantageous directly to the citizen. It would be possible to

encourage their active participation if ME introduced bonus points to the performance review when collaborating on the project recruitment process." - (D)

"It would be better to have multiple departments to take parts in a given project rather than having one department. So that we could maximize specialized manpower and minimize risks in budget execution by distributing it to each participating department. (omit) The recruited project should not bring up interests of participating departments because it would be their additional workload on top of their own tasks. However, the local government is not able to supply additional manpower due to the lump-sum personnel expenditure system. Thus, we may need support from the central government with manpower even during the period of the project recruitment." - (H)

To prevent these problems, MOLIT provided a grading system onto the existing selection criteria for the adequacy of the proposed projects. The followings will be graded; 'the strategy to organize responsible working groups and the governance', 'details on the collaborating strategy for preliminary consultation with relevant organizations and future collaboration plans', 'management measures

to prevent possible delays', 'details and superiority of structural consideration on the management system'. And they provided a basis for the collaboration by having the applicants submit written agreements made by relevant organizations. The written agreement should include reports on the result from preliminary consultation and future plan.

[Table 9] Criteria for Smart City Projects

Criteria	Contents	Points
Necessity and adequacy	• Validity of target area adequacy of trouble shooting • Adequacy of objectives necessity • Details and practicality of the KPI	10
Adequacy of solution structure	• Adequacy of solutions against goal setting • Adequacy of solution structure and its connectivity • Expectation and possible expansion plan	30
Adequacy of operation plan	• Strategy to organize and operate responsible working groups and the governance • relevant organizations and future collaboration plans • Management measures to prevent possible delays • Details on procurement	30
Adequacy of maintenance plan	• Details and superiority of structural consideration on the management system • Adequacy of the plan to steadily maintain the established solution • Connectivity of the platform and applicability of obtained data	30

Source : MOLIT (2020)

However, since the agreement is not compulsory, it is difficult to

create an atmosphere of cooperation between various divisions. Due to the properties of public officials' work, it is an environment in which they should continue to build achievement through the promotion of new projects because of the performance-oriented system. As a result, establishing and implementing projects is a competition between departments and practitioners. However, there was lack of central government's understanding of the problems arising from these meritocratic systems. The central government should provide criteria to distribute specific budgets and performance from the public offering stage of the project to establish a solid cooperative system.

> *"(The agreement doesn't have enforcement) it is important to have fair distribution of budget and performance evaluation. Though we have a main department, we need to build up a concrete structural organization to control the various participants from various departments. First, it is needed to have a local government plan how to distribute tasks, forecast required manpower, and properly execute budget. The main department shouldn't take all the budget and accomplishment but has to develop a system that the budget is fairly executed, and the performance of every participating department is reasonably evaluated and compensated. Then, the head of local government*

and central government should subsequently assess and approve." - (D)

In addition to the lack of cooperation between departments, it is also found to be overloaded work for practitioners because they had to do both administrative work and the SGC project. In general cases, the work for general administrative part and technical part are separate. However, in SGC project, they are in charge of the project regardless of the background knowledge. In order to promote the efficiency of the project, a capable team should be supported to establish and implement the project on its own ability by considering the expertise of practitioners.

"As we are at Administration (lack of professional background in environment), we offer ideas but can not be confident of the realization of the project. Therefore, we drive the project relying on a system consisting of our department, residents, and expert group. The residents provided ideas and the expert group made the ideas realized. Actually, all of them actively have participated in designing and planning. In the meantime, they couldn't take parts in upon a step to make contracts. Accordingly, I was thinking that it would be better to develop a system where expert group can get involved from the beginning.

(omit) Actually, other departments assembled a consortium and initiated projects as a 'One Team'. Then it should be of more time saving and less workload, and further be more efficient." - (G)

"We're in the administration. There are parts that administrators can handle and technical workers can handle, so it became a work burden for us to lead professional businesses." - (G)

(3) Lack of inter-city network for sharing experiences

Keren (2008) indicated that multi-level governance is required to respond to climate changes in cities. It consists of horizontal governance which means cooperation between neighboring cities or communities and up to global inter-city networking, and vertical governance which means cooperation among the city and central government. Interview with an expert revealed that they want inter-city network to appear with accumulated experiences over time.

"I am working on the current SGC project, hoping that it would be an experienced model for other cities to reference. And again hoping the model would be advanced while being applied to other cities and another as the smart technology had been effective in this city." - (A)

However, there is not enough network through which local governments can share policies or experiences acquired from various projects. For the time being, it depends on the proactiveness of the local government with interest to share the idea and experiences. Sungnam city, as an example, has good experiences in resource cycling and citizen-participating projects. They are sharing the experiences by constructing city network for natural resource cycling.

> *"(The resource cycling store project of our city) seems likely to expand. Once we open a RE100(resource cycling store), local government employees and city council members visit from all around, asking to share the experience. This year we have more plan to open RE100 nationwide. And we will hold an annual workshop to share the idea as to what problems we had and how we had overcome." - Sungnam city SGC practitioner.*

> *"It is first time for us too. We are not pretty confident. So, we go see other cities with similar on-going projects or success stories. We could indirectly experience trial and error of other local governments. (omit) We make chances for all participating practitioners to see other cities and*

share their experiences.” - (H)

It is a global trend that they construct smart city network as an interface to share knowledge and to present success studies for public relations. International collaboration is also taking place through this network. The European Urban Knowledge Network (EUKN) is sharing expertise in Europe by connecting with city policy, research, and practical execution. They keep developing various private-public business models by incorporating numerous project types as examples.

[Table 10] Smart City Global Network

Network	Contents
Smart Cities Council	• Biggest global network on smart city • Over 120 global enterprise and international organizations are participating
Smart City Expo World Congress	• Most influencing conference on SGC since 2011 in Barcelona. Expo is held on site regarding smart city • Supported by global enterprise such as Amazon, Cisco, Microsoft, Huawei
Smart Cities Innovation Summit	• International conference and expo with 200 participants • Supported by global enterprise, e.g. Cisco, Intel, AT&T, Hitachi, HewlettPackard
China Smart City Expo	• International smart city conference at a nation level and hosted by National Development and Reform Commission
European Network of Living Labs	• European network but it is turning global. • A network sharing idea for user-oriented living labs and is based on PPPP.
Global City Teams Challenge Super Cluster (GCTC)	• Workshop to share information on transportation, public WiFi, disaster and safety, energy and water management, dashboard, health care, and environment, with focus on representative cities in each area
The European Urban Knowledge Network (EUKN)	• Shares knowledge and experiences on problem solving

Source: MOLIT (2018)

Andersen & Atkinson (2013) indicated that “there is a clear need for more knowledge on cities, their functions, problems and current situation. In particular, what is required is knowledge that provides, or enables the development of, an integrated understanding of the different aspects of contemporary urban situations and is able to facilitate the development of economically efficient and effective

policies, thereby enhancing the competitiveness of cities." It would be possible to reach an agreement on the concept of SGCs, standards, and direction by the SGC network which enables them to share knowledge and experiences. Accordingly, SGC model is required to develop at a central government level through appropriate responsive measures and various business models.

(4) Implications

In respect to horizontal governance, the following implications can be drawn. First, not only ME, but also MOLIT, MOTIE established individual projects, legislation, and policies related to green. They have limitations in achieving ultimate goals of SGC projects such as efficient greenhouse gas reduction and green transformation projects while other projects overlapping with departments are excluded. Second, there is no sufficient participation or cooperation among relevant departments. In local governments, they assemble task force teams of various corresponding departments at a developing stage but planning, operation and managements roles fall under the general departments' responsibilities. Furthermore, there is no apparent systematic support for collaboration and performance evaluation for the practitioners on duty. Third, the present SGC project is of a simple business model for infrastructure construction being granted by the central government. Information sharing and collaboration are not systematically carried out among cities and communities. It is needed to develop a consistent business model through the SGC

network where the central and local governments can participate, so that they could share the concepts, standards, and directions acquired from their knowledge and experiences.

4.2. Vertical Governance

(1) Constraints on implementing local needs

Even though with the local self-governing system has been operating since the mid-1990s, the central government has influenced and at times overlooked the local governments' decision making or administration. As a consequence, inappropriate coordination or cooperation among the organizations hindered the local infrastructure projects and resulted in a delayed project timeline.

> *"(omit) In fact, I proposed a green rooftop project for the recent SGC project recruitment. The slate rooftop removal and the green rooftop project are supported by ME. So I planned to build the roof as the SGC but I was told that they cannot support the business because it is a citizen support project. I had to remove the project from the proposal. (omit) there is a blank room between departments of ME and construction. There has to be an appropriate system to fill in the blank and integrate the process, I guess". - (E)*

ME started supporting slate rooftop removal roof improvement project to protect people from harmful asbestos by safely removing the widely spread slate rooftop. Each family is provided with a removal cost of $2500 and new roof installation cost is the household's responsibility. As part of the 2020 green new deal, annual $45 million dollar projects are carried out to drive the green roof and green wall. Coming across the projects, it was attempted to combine the two projects to support the roof construction, but these could not be included in the citizen supporting project.

> *"We actively tried to develop a zero-carbon park by using renewable energy. Vertical garden and green wall were attempted to use to educate the school-age population in the area. The idea contained a lot about the renewable energy but many of them were not accepted on the evaluation process." - (G)*

The example is pointing out the limitations of the departmental integrated supporting system and capability of the central government departments. While the current SGC projects are planned mainly by local governments, administrative planning and execution are ordered by the central government. The central government has to provide high level directions then, collect and screen the local governments' corresponding idea proposal to encourage active engagement in the

SGC construction project.

> *"From time to time, there are overlapping areas in a given project. The central government would take it as redundancy. In order to avoid the situation, we exclude expected overlapping areas. (omit) In fact, it is a matter of trust among organizations. The central department wouldn't trust transparency of the local without specific objectives or standards." - (D)*

Therefore, a new governance system needs to be established not as a top-to-down, but a bottom-to-top process such that the central government collect, screen and select local governments' idea proposal at all times and financially support the selected projects.

(2) Lack of connectivity with basic plans

Korea research institute for human settlements (2020) pointed out that there has to be liaison among local organization units in planning and development stage so that the ultimate goal can be achieved through efficient connection between land and environment plans. The local organizations generally establish mid-to-long term developing plans in every 10 years such as city-county basic plans, city-county management plans, and city-province environment conservation plans so that they can set up strategic projects for setting up the developed features in 20-30 years.

The mid-to-long term developing plan is a guideline and master plan for the project to consistently proceed in 10-20 years regardless of changes in any circumstances or the leadership of the local organizations. The mid-to-long term developing plan spans future 10-20 years and includes wide scope embracing legal or non-legal plans. Furthermore, $200,000-500,000 is put in depending on the scope of the research area.

However, the plan is lacking empirical details on near 3, 5, or 10 year future stepwise business plans or budgeting plans supported by the government. At the present, the city-province basic management plan, city-province environment plan, city-county-province environment conservation mid-to-long term plans do not include budgeting plans through empirical business plans on smart town challenge, smart city challenge, and SGC projects.

> *"Up to the point, city planning has been in the area of construction and civil engineering. Environmental departments couldn't participate in city planning and designing. In law, land and environment planning is consolidated and defined, but they are not realistically executed. At present, city planning department sets up a master plan and environmental department takes some parts of it. I hope the SGC could be a chance to have a system to take environment into consideration at the beginning stage of city planning.*

(omit) In case of our city, the City Planning Department got smart city project (by MOLIT) adopted and the Environmental Department got smart green city project (by ME) adopted. Ideally these two projects are to be integrated and carried out together, but the two departments are not cooperative at all." - (H)

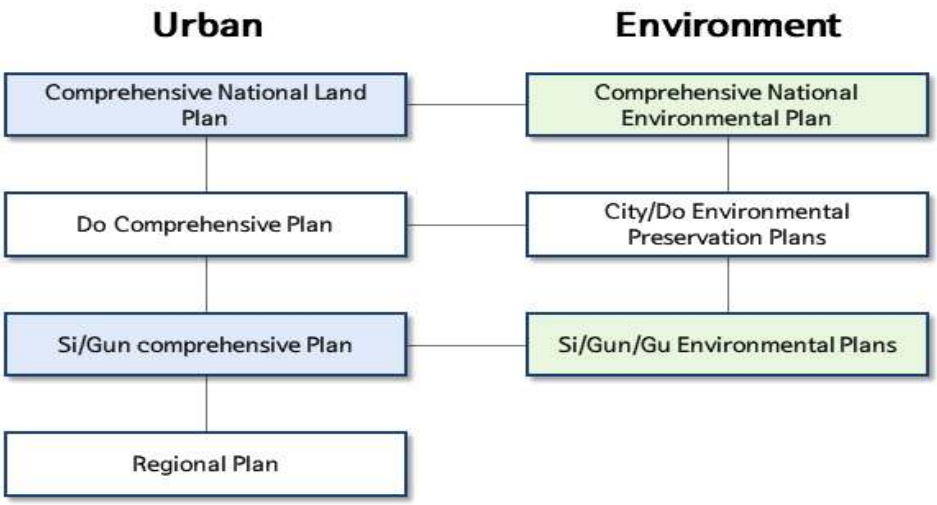
The problem is caused by the separated empirical projects recruited by separate departments of the central government. KEI (2020) suggested that Comprehensive Land Plan and National Comprehensive Environment Plan must be taken into consideration for local organizations to unify the management in the planning stage. However, it is hard to reflect the idea to the mid-to-long term plan due to the separate recruiting system for smart city and SGC projects.

In 2019, Ministry of Land, Infrastructure, and Transport(MOLIT) provided a revised SGC policy being represented by 'The 3rd Comprehensive Smart City Project (2019-2023)'. Accordingly, the local governments will develop smart city plans to visualize the details of the smart city that cities and counties must pursue, being aided by "Establishment of Smart City and Promotion of Industry Act, Clause 8". Ministry of Land, Infrastructure, and Transport defines the SGC project as an indispensable basis for SGC construction project and a plan to deliver directions to the high-level project of the

comprehensive SGC project, as well as to connect and harmonize relevant basic city plans.

Since interlinked Management of Land and Environment Planning has been actively discussed in 2013, a regulation framework of Integrated Management of Land and Environment (2017), and Joint Directive for Land and Environment Conservation Plan (Joint Directive) (2018) were developed based on Basic Laws of Environment Policy (2015) and Basic Laws of Land (2016).

Integrated Management of Land and Environment enforced 'The 5th Comprehensive National Land Plan (2020-2024)' in conjunction with 'The 5th National Comprehensive Environment Plan (2020-2024)' In December 2019, MOLIT and ME agreed with National Land-Environment Management Strategy to integrate the future management of local organizations (KEI, 2019).



[Figure 11] Integrated Management of Land and Environment in Korea

However, it was revealed by an interview with a SGC expert that the 25 local governments selected as the SGC are already working on the smart city project granted by MOLIT. As well, it was found through interviews with local governments having completed smart city planning that they are lacking connections between the smart city project and SGC project.

> *"Regardless of the Integrated Management of Land and Environment Policy, connections between the city plans are not solid even within MOLIT. It is even worse between the basic city plan and smart city plan because the management system is separated by multiple departmental organizations. For example, the smart city planning is under IT and Facility Management Departments, while the basic city planning is under Urbanization Policy Department, and so forth. It has to be seriously addressed how to develop a strategy to connect and integrate the two different areas. (omit) Another reason for the lack of connectivity is that the basic city plans are of compulsory for 10 years cycle while the smart city plan is not. Thus, it is hard to connect and coordinate these two unless the smart city project is renewed within the period of the city plan project. (omit) Due*

to the fact, the Integrated Management of Land and Environment Policy is only a recommendation or suggestion and not practical." - (D)

"The current SGC project was supposed to proceed with a focus on city space with an idea to connect to city regeneration project. However, if (smart city project and SGC project) had strong interactions, it would be valuable to consider uniting policies. (omit) it is the critical role of the central government to develop a common goal for local organizations to succeed in the project." - (B)

[Table 11] Connection between Smart Cities and SGCs

Wide-area	Basic	Smart City Project	SGC Project
Kyunggi	Bucheon	• Smart Town Challenge(2018-2019) • Smart City Challenge(2019-2020)	• SGC(2021-2022)
	Anyang	• Smart City Plan(2020-2024)	• SGC(2021-2022)
	Pyeongtaek	• Smart City Plan(2018-2022)	• SGC(2021-2022)
Gangwon		• Chuncheon: Smart City Plan(2018-2022) • Wonju: Smart Town Challenge(2020)	• Combinde 5 Cities (Cheorwon, Hwacheon, Yanggu, ,Inje, Goseong) (2021-2022)
Chung-nam	Gongju	• Buyeo: Smart Town Challenge(2019)	• SGC(2021-2022)

Jeon-nam	Soon cheon	• Smart City Urban Regeneration(2018-2022) • Smart Solution Challenge(2020)	• SGC(2021-2022)
Kyoun g-buk	Poha ng	• Smart City Urban Regeneration(2018-2022)	• SGC(2021-2022)
Kyoun g-nam	Kimh ae	• Smart City Plan (2018-2022) • Smart Town Challenge(2018-2019)	• SGC(2021-2022)
Incheo n		• Incheon: Smart City Plan(2020-2024) • Bupyeong: Smart City Urban Regeneration (2018-2022) • Incheon: SGC (Eliminated) • Smart City Challenge(2019-2020)	• Seo Gu SGC(2021-2022)
Busan		• Saha Gu: Smart City Urban Regeneration(2018-2021) • Gangseo Gu: Eco Delta City • Suyoung Gu: Smart Town Challenge(2019)	• Saha Gu SGC(2021-2022)
Jeju	-	• Smart City Challenge(2020)	• SGC(2021-2022)

Lee Sang Ho & Lim Yun Taek (2016) who studied our smart city governance pointed out that the central government is leading our smart city projects and developing administrative governance, but it does not operate very well.

> *"Project practice is at the lowest level on which plan, and policy are at higher levels. (Due to the vertical structure,) integration and cooperation among projects are not possible unless the coordination is well*

established by higher level management." - (D)

The governance takes part in eliminating overlapping projects and facilitating efficient connections among central and local departments, but it is not properly playing a role due to the silo effects existing among the organizations. Therefore, it is highly required to get rid of the silo and connect the smart city project and SGC project to the existing land-environment management system by improving the comprehensive management system.

(3) The gap between budget process

SGC projects are supported 60% by national and 40% by local funds. Problem solving projects are granted with $5.3 million dollars for two years and comprehensive initiative projects are granted with $8.8 million dollars for 2 years.

[Table 12] Cost composition of SGC project

	Solution model (2 years)	Comprehensive model (2 years)
National Budget (60%)	Max 5.3 million USD	Max 8.8 million USD
Local Budget (40%)	Max 3.5 million USD	Max 5.8 million USD

Source : Ministry of Environment(2020)

Although the importance of project recruiting and local governments' budgeting schedules is realized, it is observed that the

local governments lack structured processes or systems to efficiently execute the budget for the current SGC projects, according to several interviews with persons in charge of the executing the project.

> *"(preparation period for project recruiting is) 3 months which is very tight and tough. (omit) On top of it, it takes another 3 months to spend to validate the feasibility. It is hard. (omit) It is hard to efficiently operate the process due to the uncertainties with the budgeting process". - (E)*

> *"As we have city budget independent of the project recruiting, we try to support related projects first. I heard of difficulties that other local governments are experiencing in connecting their budget to the existing projects because of their random recruiting process. (omit) Ministry of Environment is pushing the project to proceed as soon as budgeted but there are too many steps in the process to execute the budget. In reality, there is no way to spend $ 9 billion in two years". - (B)*

> *"There are multiple steps for local governments in the process of approval and execution of budget. At this time when the smart green city project was*

submitted, I was told to budget the national grant as immediate budget while the local grant as of the revised supplementary. The efficiency can be maximized by appropriate and secure budget. However, we are spending too much energy upon administrative procedure rather than putting energy and focus on executing and driving the project itself."
- (H)

MOIS presents budget plan instruction then the local governments select the project and provide the budget plan.

• April, MOIS evaluates the local project and assesses the feasibility following 'Local Finance Act' Article 37. The local government is allowed to budget based on the assessment.

• July, MOIS provides budgeting instructions and notifies local governments. The process is in accordance with 'Instructions for local governments' planning and executing budget, and financial operation process'.

• August-September, the local government selects projects, and each department provides budget plan. Project selection is manages by budgeting department and individual department provides the budgeting department with details on the selected projects.

• September- October, the corresponding departments and divisions submittes written departmental budget requests to the budgeting department.

- October-November, the budgeting department verifies and finalizes the submitted budget plans from local governments.
- November, the budget plan of the fiscal year is submits to congress.

The operation process of 2020 SGC project is as follows. ME assembles an evaluation committee which consists of experts from fields of climate, energy, environment management, environment program, environment economy, social environment, city planning, designing and construction. The committee takes overall management of project selection and operation.

- September, 2020, ME and KEI publicly announced the guideline for smart city related projects which includes project scope, timelines, project models, evaluation standards, and proposal format.
- November, 2020, local governments submitted proposal and the committee started evaluation.
- December 2020, 25 local governments were chosen who acquired over 60 points through preliminary review, field audit, and total evolution. The preliminary review and field audit were conducted by supporting group, KEI, and the evaluation committee. The evaluation committee made final determination on the project selection.
- January-March, 2021, the selected projects were finalized based on opinions through evaluation process, adequacy of budget, and feasibility.
- March 2021, national funding details were determined and the finalized projects were allocated national funds.

As mentioned above, local governments can obtain budget once they pass the screening by the local financial review process in accordance with Clause 37 of the Local Financial Act.

In general, the facility construction project can proceed only when budgeted. Thus, any projects supported by local matching funds to national budget can proceed only when it is budgeted (MOIS, 2015). Even in case budget is allocated after evaluation, the project cannot proceed until the departmental budget is finalized through the screening process which takes place in April. There should be 9 months inactive blank period in the 2 year project term. For the reason, local governments cannot efficiently proceed with the planned and budgeted project.

> *"Our goal is apparent. The process is transparent. In this regard, we should be able to much more efficiently carry out the project, as far as the administrative system and process became simplified. It would be better having an established system to kick in contracts and budget execution from the beginning so that the original plan can be seamlessly realized." - (G)*

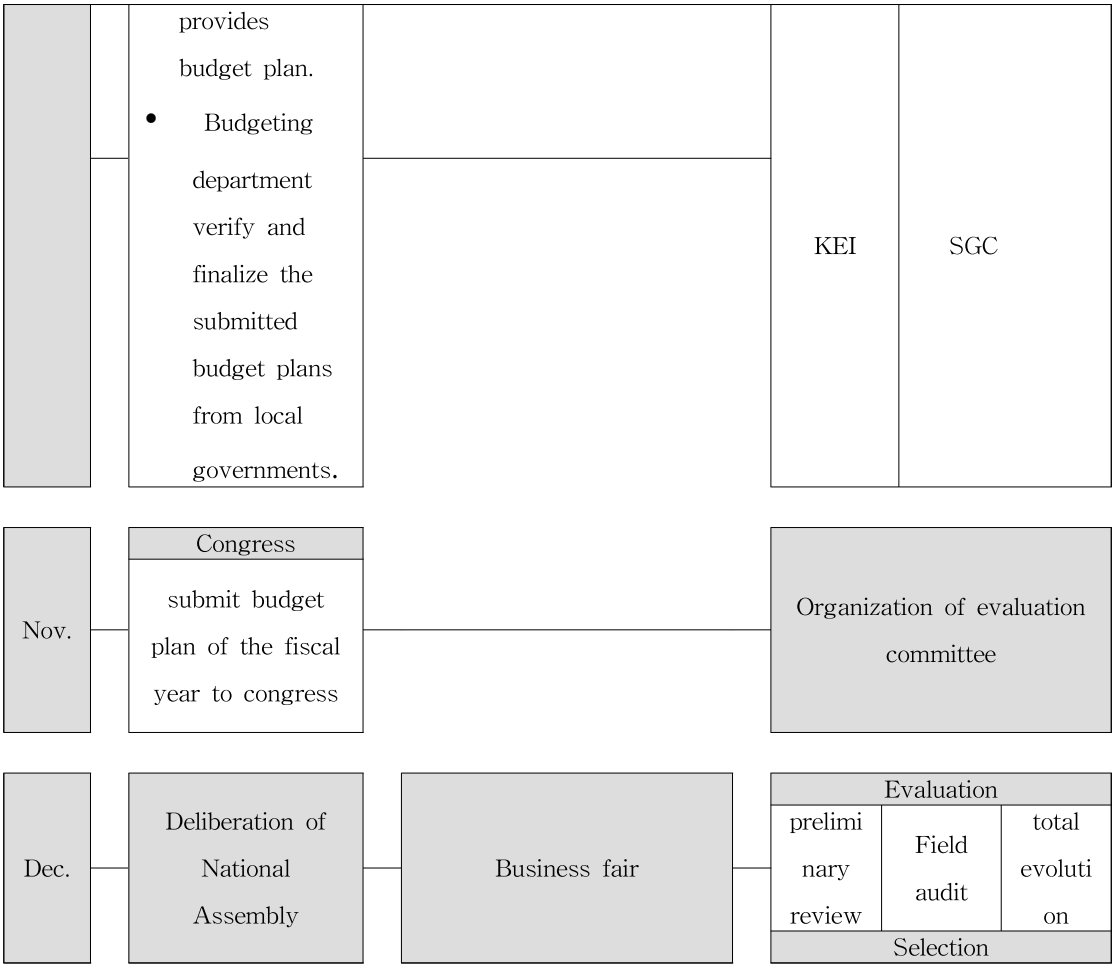
> *"While validating the feasibility and realize the project, we face many hurdles in legal and administrative processes. It is the way that we must*

finalize our proposal after all the issues are resolved. I would say we should be able to make a complete project proposal without issues if we were given enough time until final decision, such that the recruitment of the project is announced in the beginning of the year and final decision of the approval is done in year end." - (H)

"It is half of the year until June 2021. 30% of the total budget is allocated to 2021 and 70% to 2022. I was told to execute 60% of the 2021 portion until June. (omit) The local government has to complete working design, assign contractors, and pass the investment feasibility approval by Kyunggi-Do by October, at best. It is unrealistic to execute the 60% until June. However, it is being said that Ministry of Environment (ME) must visualize outcome and progress in order to secure the 2021 budget from of the Ministry of Economy and Finance (MOEF). (omit) I hope that the central departments would sufficiently discuss the way to reflect the situation where local governments currently are." - (H)

[Table 13] Procedures for Local Government Budgeting

	Budgeting process of Local government	Process of Smart City project by MOLIT	Process of SGC by ME
Jan.		Announcement • Announcement • Application	Estimate eligibility • Value for money • Examine business program • Arrangement of workshop
Mar.		Organization of evaluation committee	Business enforcement • Budget allocation • Business enforcement • Business management and monitoring
Apr.	Screening MOIS evaluate the local project and assess the feasibility	Evaluation prelimi nary review / Field audit / total evoluti on Selection	
May		Business enforcement • Budget allocation • Business enforcement • Business management and monitoring	
Jul.	MOIS provides budgeting instructions		
Sep.	Local government • selects projects and each department		Announcement ME, Support group, / • Announceme nt of the guideline for



As a solution, MOLIT provides a written promise to grant local matching and national funds in advance. Based on Clause 45 of Local Financial Act, the selected local government can execute national funds in advance even before supplemental budget has been allocated. Being supported by the national fund, they are able to order design maps, order materials and start the project in 3 weeks and have the project on track in a month to complete within a given period.

Therefore ME, which is in charge of SGC project, needs to set

up a system to facilitate the project to efficiently proceed by reducing the gap caused by the budgeting procedure.

(4) Implications

In respect to vertical governance, the following implications can be drawn. First, not only ME, but also MOLIT, MOTIE established individual projects, legislation, and policies for the urban environment. They have limitations in achieving ultimate goals of SGC projects such as efficient greenhouse gas reduction and green transformation projects while other projects overlapping with departments are excluded. Second, currently on-going local mid-to-long term projects (e.g. comprehensive land development projects and national environment projects) lack of connectivity to the empirical project plans on smart city and SGC. Third, the 2020 SGC project does not have sufficient systems to support the local governments to be able to efficiently execute the budget. At present, there is a 9 months period gap in the 2 year project term. ME needs to provide a written promise to grant local matching and national funds in advance before supplemental budget has been allocated so that the gap can be minimized.

In order for sustainable SGC construction, a legislative basis needs to be established. However, it has to be taken into deep consideration whether to apply the existing 'Climate Crisis Act' and 'Green Transition Law' or to separately legislate. As well, it is required to set up integrated systems to manage scattered systems.

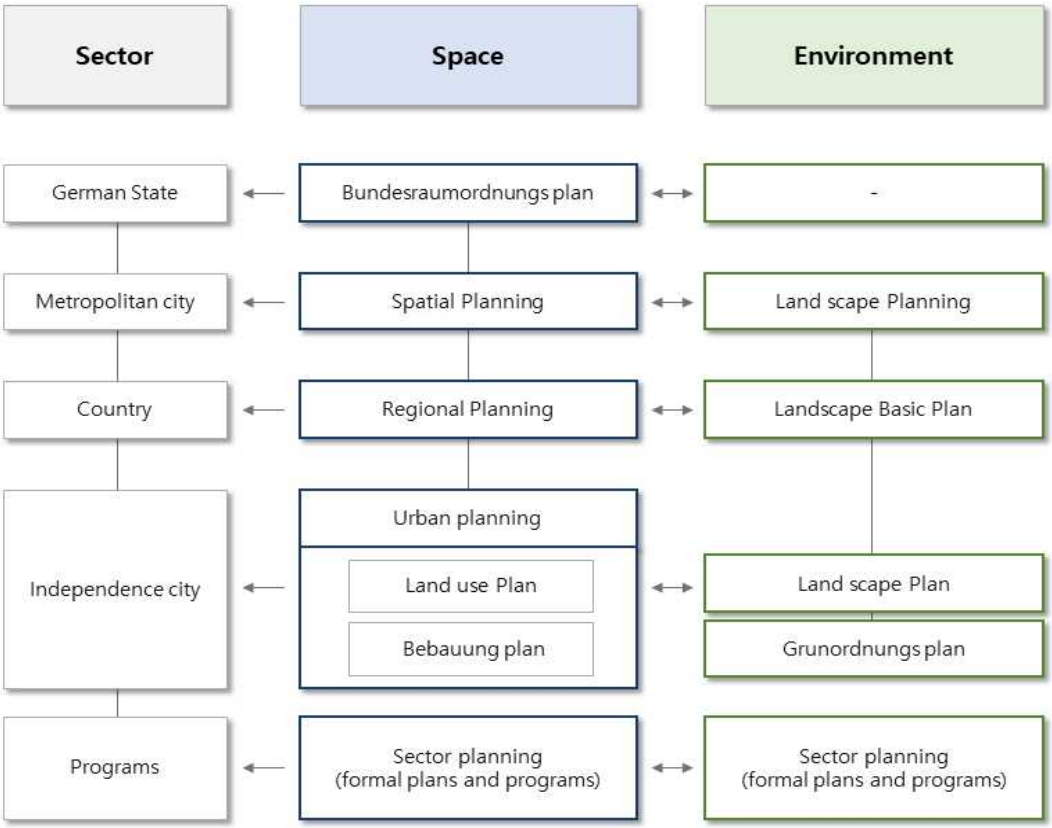
The scope of the existing integrated management model of land-environment plan needs to be expanded and its effectiveness to be maximized to establish an integrated long-term SGC construction plan. The current smart city plan, in terms of the structure and content, is correlated with the basic city plan as to the physical space plan. The SGC plan is correlated with the city-district environment conservation plan as to the environment.

The current comprehensive land-environment management model system, being limited to land development plan and national comprehensive environment plan, needs to be expanded to embrace the smart city and SGC projects so that it can be used as a common basis on which the central and local governments can develop an integrated long-term plan.

[Figure 12] Extended Integrated Management of Land and Environment in Korea

The case of Germany is of a representative mutual cooperation system composed of a structural hierarchy at levels of province, county, city, and down to individual business unit. They drive projects based on coordinated space utilization plans covering lands and environment plans covering landscape and ecosystem, within a given legal boundary. The federal land plan, as a space utilization plan, is set up at a national level and provincial development plan is set up at a provincial level. Construction plan is at an individual building business level.

Being connected with the space utilization plan, environment plan is simultaneously set up and the plan is called landscape eco plan (Landschaftsplanung). The landscape eco program is a provincial, landscape eco basic plan is a regional, landscape eco plan is a municipal, and the green belt plan is a plan corresponding to global detailed plan.



Source : KRIHS (2012)

[Figure 13] Integrated Management of Land and Environment in Germany

They survey natural environment in response to land utilization plan to facilitate development of environment-friendly city. The survey data is analyzed and used to generate and evaluate the biotope. The biotope evaluation report is used to create land utilization plan and landscape eco plan schemes, and the schemes are amended and finalized to use for the land utilization and landscape eco plan.

Chapter 5. Conclusion

This study concludes that smart green city (SGC) project could efficiently and proactively proceed when the project was planned specifically for the community, and supported by the citizens with interest and participation, so that it could effectively embrace the needs and demands.

And local governments could actively perform the project under an integrated management system and customized budget support from the central government.

In this context, this empirical study carried out in-depth interview with various stakeholders to figure out how they understood the common administrative system and what their demands are for the right direction with positive changes.

On top of it, the analysis result should be valuable and applicable information for developing a mid-to-long term project based on the figured current status of our SGC projects then will be used to generate scenarios and roadmap forward to the future SGC project. As noted, even a common system is understood and evaluated differently by different stakeholder with different interests.

The effectiveness of a given system can be maximized when the system coincides with the interest and agreements of the stakeholders. Therefore, the government has to keep communicating, sharing ideas with all relevant groups of the people for better understanding of the given system. It would the way to establish an

organization to coordinate integral systems so that it can obtain effectiveness and supports from the people for SGCs.

This study provides some implications from academic to policy makers. First of all, academically, the historical changes of the urbanism were observed to draw out the current concept of SGC. In other words, the theoretical background of domestic and foreign SGC governance as well as the learned lesson in Korea is noteworthy.

Second, in terms of policy perspective, a practical direction was suggested based on analysis of the current legal systems to successfully drive the SGC policies to properly execute, at the present initial stage. Especially, it is postulated that a reference manual has been provided to the policy executor by proposing a stepwise SGC operating system while considering the uniqueness of the recruited smart green city projects.

Third, sharing and utilization of data was not conducted since the focus was on political and administrative governance in this study. Research on data governance management is required by referring to laws, systems, and guidelines for smart cities.

Lastly, construction of the local governance with participation of citizens was not studied in depth at this time since the focus was on the interactive governance for the central and local governments.

A further direction of SGC will be provide more evidence for this research. Particularly, as the nature and concept of smart green city has been evolving circumstance, there is room for following up research in terms of policy, governance, environment and

technological approach.

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초록

스마트그린도시 구축을 위한 합리적 거버넌스와 정책에 관한 연구

이서영

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기후위기가 심각해지면서 적응이 갈수록 중요해지고 있다. 특히 도시가 기후변화에 취약해짐과 동시에 기술발전에 따른 혜택이 집중되면서 지속가능하고 환경친화적인 도시건설에 대한 정책입안자, 전문가 그리고 학계의 주목을 받고 있다.

그럼에도 불구하고, 스마트그린도시의 구축과 지속가능한 도시개발을 가로막거나 힘들게 하는 장애요소에 대한 논의는 부족한 실정이다. 이 연구에서는 2020 그린뉴딜 사업으로 지정된 스마트그린도시 정책을 수립하고 이행하는데 있어서 마주하는 한계 요인을 살펴보았다.

본 연구는 문헌연구와 스마트그린도시 사업에 참여한 정책입안자, 실무자, 전문가, 학계의 비구조화 심층면접을 통해 진행하였다. 선행연구 검토를 통해 한계 요인을 크게 '수평적거버넌스'와 '수직적거버넌스'로 나누어 살펴본 결과, 유사정책의 상충, 통합관리제도의 부재, 성과주의 등의 요인을 발견할 수 있었다.

기후위기에 대한 지역단위의 적응 역량을 구축하고 강화해나가기 위해서는 이 연구에서 발견한 한계 요인들을 지속적으로 보완해 나가야 할

것이다. 다양한 이해관계자 간의 소통을 통해 스마트그린도시를 만들어 가는 과정에서 정부의 일관성 있는 정책과 더불어, 지방정부, 기업, 시민사회 등의 활발한 참여가 요구된다.

keywords : 그린뉴딜, 스마트그린도시, 다층적거버넌스, 한계요인
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