



Article

The Institutional Change from E-Government toward Smarter City; Comparative Analysis between Royal Borough of Greenwich, UK, and Seongdong-gu, South Korea

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Abstract: The research questions of the current study include: “Is it beneficial for countries, local governments, and autonomous districts with a high level of e-government to become smarter cities with the electronic, digital, and smart introduction of information and communications technology (ICT) technologies?” “Do cities with well-developed e-governments have a similar process from e-government to smarter cities?”, and “Do cities with similar levels of e-government or smarter cities go through different development processes in terms of their socio-cultural attributes?” This study focuses on the fact that e-government and smart cities, whose academic roots arose differently over time, are evolving to address governance, including next-generation e-government, urban e-government, and civic engagement, which has expanded to digital government and platform government concepts. Therefore, the scope of this study is set to e-government and smart/smarter cities as platforms. By comparing the key success factors of e-government with the smart city through a prior study, some intersections were found, but the success factors of the e-government and smart city were different. In order to explain the change of system from e-government to smart city as a platform in the socio-cultural attributes in which each case is involved, two cases—the Royal Borough of Greenwich and Seongdong-gu—were selected under similar conditions by comparing the e-government development level, economic indicators, and smart city development level. As a result of the case analysis, it was confirmed that the development level of e-government affected the smarter city process. The changes in the system from e-government to smart city was capable of being explained in different ways depending on the social and cultural attributes. In the process from e-government to smarter city, the case of Seongdong-gu, which has followed the informatization project and e-government development formula, was analyzed from the viewpoint of institutional overwrap, and the case of the Royal Borough of Greenwich, which was an active innovation agent for solving urban problems through public-private cooperation, was analyzed from the viewpoint of institutional transformation. In the Korean context with a collective hierarchical culture, citizens and stakeholders have participated in the public sector to the extent that they raise issues and express their preferences in policy-making decisions. The governments, including the autonomous district, have still treated citizens and stakeholders as guidance targets or customers rather than cooperative partners. On the other hand, the UK, which has an individualistic rational culture, citizens and stakeholders have become accustomed to maintaining cooperative relationships and operating cities based on partnerships as innovators. Since the socio-cultural contexts of each country have affected the actual system operations and changes, implementation plans and solutions under feasibilities need to take into account critical success factors and the socio-cultural properties of each autonomous district for the introduction, expansion, and establishment of smarter cities. This result of this study is that transferability considering sociocultural properties should be considered when introducing best practices, etc.

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Keywords: e-government; smart city; smarter cities; institutional changes; citizen participation

1. Introduction

Over the past two decades, governments in the world have continued to invest and innovate in developing e-government strategies for public transparency and administrative effectiveness. In particular, the recent technological change of the Fourth Industrial Revolution and external environmental factors such as the coronavirus pandemic have driven the transformation of the public sector, the central government as well as local governments, into digitalization. As a trend different from the informatization and digitization of the public sector, smart cities have been developed in the long term to become better living spaces for the problem-solving competence and sustainability of local governments, businesses, and citizens in urban areas [1–14].

In particular, the topic of this paper came from the similarity between the second-generation concept of digital government or e-government that emphasizes the expanded civic participation and civic autonomy in the innovation of the public sector and the concept of the smart city that emphasizes a joint effort, that is, governance to develop into a better city space on the basis of not only civic participation but also other actors' involvement [15,16].

In terms of the concepts and actual applications of e-government and the smart city, different understandings among different stakeholders have often led to controversies. There have not been many studies on next-generation models that play a role as a platform for e-government or digital government [17,18], and other lines of inquiry for smart cities deal not only with the purpose of smartization but for the digitization of cities from the viewpoint of adopting technologies, such as artificial intelligence (AI), the Internet of Things (IoT), cloud computing, big data, and mobile applications that literally put an emphasis on the purpose of building high-tech cities [2,19–21]. Therefore, just like the non-existent system between these two parties, which are core institutions and policies in the era of digital transformation that is accelerating due to the COVID-19 (coronavirus disease 2019) pandemic and the 4th industrial revolution, various studies have addressed their concepts, structures and elements, and level diagnosis of each case without mentioning the existence of the others. This paper conceptualizes and sets the boundary for e-government and the smart city, which emphasizes their role as governance, citizen participation, autonomy, and platforms.

Meanwhile, comparative administration and development administration, which has been an administrative discourse since World War II, have been interested in comparison between countries' levels as examples for developing countries [22,23]. There are also changes in the level diagnosis by UN DESA (United Nations Department of Economic and Social Affairs), which has only been measuring the level of e-government development, such as measuring separate measurement indicators that deal with local e-government, including smart city projects. This paper aims to conduct a case study on the process of a successful transition of autonomous districts to successful smart cities as a problem-solving and implementation entity and to analyze the process of institutional change from e-government to smart cities as a social and cultural characteristic.

In line with the research objectives, this paper strives to differentiate with regard to others in three ways. First, the study analyzed the process from e-government to smarter city (referred to as smarter city to differentiate this from the smart city focusing on future technology-oriented high-tech city construction) [24,25] from an institutional change perspective with path dependence, that is, from a dynamic perspective. It also identified how the socio-cultural contexts of cities limited the transition to smarter cities. By defining the concepts of e-government and smart city clearly, despite various controversies, this study determined that it could analyze the two institutions with different origins but similar

properties and temporal precedent relations as institutional changes with path-dependence [18]. Second, in order to analyze the effects of high-level e-government establishment experience and the socio-cultural contexts of the cities on the smarter city transformation, this study utilized pattern matching and selected analysis cases, thereby providing the rationale for generalization of the case analysis results [26]. Except for the socio-cultural contexts in which the influences were to be identified as constraints, environmental factors such as e-government level and technology/economic level in the UK and South Korea were similar. Moreover, the smart cities, which were the analysis cases of this study, were located in the capitals of both countries, and major smart city strategies also secured the similarities as smart transport test beds. Third, this study analyzed the cases of autonomous districts, not entire cities, as an administrative unit capable of expanding governance of civic participation and civic autonomy in order to solve actual urban problems, not a declarative vision and policy goals. This was because the study determined that the autonomous district was a more meaningful case unit than a metropolitan area for the regional base that a smarter city was targeting. As the role of cities as on-site communication channels or service providers has recently been emphasized in the cases of Australia [27] and Denmark [28], where governmental cooperation is highlighted to ensure the proper implementation of national digital strategies and digital service utilization at the local level, cases at the autonomous district unit can be significant [29].

With these differentiating points, the literature review in Section 2 defines the concepts of e-government and the smarter city, summarizes the key success factors of these two systems, and reviews institutional changes and constraints including path dependence. Section 3 explains the research design, such as case selection and case study methods. Section 4 compares smart city implementation in Seongdong-gu, Seoul, Korea, and the Royal Borough of Greenwich in London, UK, in accordance with the analysis framework, and analyzes their institutional changes. Section 5 provides suggestions for smart city implementation, and the final chapter, Section 6, presents the conclusions and implications of the study.

2. Literature Review

2.1. Definition: E-Government and Smart City as a Platform

2.1.1. E-Government

E-government refers to a government that uses information technology (IT) to redesign administrative functions, improve services to the public, and realize democracy [15]. In a narrow sense, it is exemplified as a government using IT and the Internet as tools for better government implementation [30], a government improving the relationship between the government and its citizens using the Internet and Web [31], and a government using information technology to improve the connections between its citizens, companies, and governmental agencies [32]. Beyond the initial emphasis on the efficiency of administrative work and performance at the time of introduction [33], e-government highlights the role of supporting values through more civic engagement, development, and political processes based on better policy results and quality services in a broader sense [15]. Since then, with regards to the form of next-generation e-government, various terms and concepts have been introduced with a focus on cooperation and governance in the public sector.

Apparently, many organizations not only concentrate on the efficiency of administration or the effect of e-government service itself. Most of them have stressed those aspects which produce better policy outcomes and public services that are qualified by easier citizen participation in the decision-making process, which more conveniently arise from it [15].

Since *Gov 2.0* advocating Web 2.0 in 2010 by O'Reilly, many studies have suggested a change in the role of the government from a technical point of view utilizing ICT technology, such as the Internet and the government's platform strategy [34–36]; Defining the

future government as *the platform-based e-government*, which indicates that the government aims to create a common evolution environment and implement rules so that the values that people and the community aspire to can be continuously provided and secured. Moreover, this concept of governance extends civic governance to realize direct democracy based on technological innovation with the purpose of encouraging civic interventions in the entire policy-making process as well as a customer-oriented perspective of administrative services [15].

2.1.2. Smart City

The term *smart city* began to be used globally in the 1990s. It is difficult to define clearly and consistently what a smart city is, as the term applies to new technologies such as ICT and the 4th Industrial Revolution in the public service infrastructure and various other concepts such as infrastructure construction and urban development [37–41]. Cities that have been asked to solve problems related to urbanization by urban governments' technical, social, physical, and organizational management of urban governments have pursued smarter solutions. Cities classified as smart cities also show diverse characteristics in their historical development paths, socioeconomic factors, and governance forms [42]. Recent studies on smart cities have dealt with expanded concepts with more diverse contexts and significance [43] (pp. 40–53).

In order to efficiently provide the key infrastructure and services of cities, cities with technologies [44], modern cities implemented by information and communication technologies [45], and more efficient, sustainable, proper, and lively cities, the Natural Resources Defense Council [3,46] has stressed the roles of technologies for smartization as a tool to solve the problems that cities are facing [10,14,38,43,47–49]. A similar idea includes a ubiquitous (meaning 'existing everywhere at any time', originating from Latin) city (*u-city*) along with the trends of introducing RFID (radio-frequency identification)/USN (ubiquitous sensor network) and developing new cities in South Korea [50–53].

Moreover, promoting sustainable economic growth and quality of life through participatory governance such as investment in human and social capital as well as technology and civic participation also characterizes the smarter city [8]. Urban sustainability is a concept that embraces public participation, and smart cities emphasize that citizens and users create and realize city services and activities using new technologies. That is, smart cities are not simply about technological applications [54]. For the differentiation of the technology-oriented smart city concepts, a smart city maturity and evolution model is used. [17,18,55,56], which is named *smart city 2.0 or 3.0* and defined by the expansion of market-driven services on a common platform that enables autonomous interactions between the public and private sectors beyond the investment in advanced technology in a specific sector [55,57]. This is not the idea of a smart city that only focuses on the applications of advanced technologies, but is differentiated and emphasized in that it includes civic participation and residents' autonomy in governance for sustaining urban development and alleviating urbanization problems that cities are facing.

Unlike smart cities focused on adopting emerging technologies, the concept of smart cities in this study involved citizens and stakeholders in the process of solving urban problems, and becomes very similar to open innovation platforms targeted by next-generation e-government or digital governments. Recently, smart cities have been required to understand cities as platforms and actively respond to and address the use of available resources and carbon emissions of cities and urban population problems [58,59].

2.1.3. Required Role as a Platform for Open Innovation

E-government and smart cities are similar in their goal of expanding open innovation and public governance, the need for various roles to achieve the goal, and their ways of operation. With the emphasis on civic participation in e-government, citizens [60] demand the roles of customers, users, and taxpayers who consume public services, away from the traditional power relations of master–agent [61]. *Living Lab* [62–65] and *Crowd Sourcing*, which are widely used in recent smart cities and urban regeneration projects, guarantee

direct citizen participation in policy decisions and operation methods [61,66–68]. Open governments, such as the citizen-participating government, can effectively access information, new technologies, and public participation of public sector organizations. Living Lab is a user-led, open, and innovative ecosystem where public research, private companies, and civil society cooperate to conduct innovation activities in a specific area or space [69,70]. This is an ecosystem in which a public-private-people partnership (PPPP) is performed [62,63,71,72]. Citizen-participating crowdsourcing uses the expertise of planners and institutions to define problems, organize public values through citizen participation, and adjust interests [64–70,73–75].

The e-government, which has developed to secure innovation and efficiency in the public sector, is being asked to play a role as an open innovation platform for realizing e-democracy such as civic participation. Smart cities that emphasize the sustainability perspective as well as the application of new technologies and infrastructure build-up to solve urban problems are the same as those of e-government in that they consider the participation of not only citizens but also various stakeholders as a core element [76–82]. In other words, as a platform for the government and public to solve public or common problems, the two systems, such as PPP (public private partnership) and securing participation of citizens and stakeholders in the policy-making process, are moving in the same direction. The scheme of the two systems is shown in Figure 1 below.

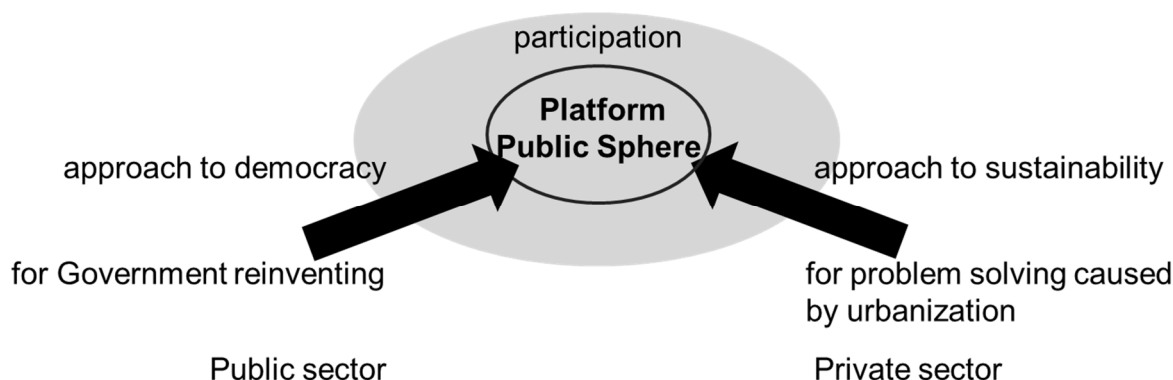


Figure 1. E-government and smart city, which started separately in the public and private sectors but now both emphasize its meaning as a public sphere.

The left arrow in Figure 1 illustrates that the e-government initiated for government reform in the public sector is evolving toward democracy, meanwhile the right arrow embodies smart cities from the private sector’s similar development of e-government as a platform when emphasizes on its sustainability. It also describes a keyword for participation that is equally emphasized on platforms as the public sphere.

2.2. Critical Success Factors of E-Governments and Smarter Cities

In order to examine the process of institutional changes from the characteristics of “the open innovation platform” where the e-government and smart cities of different origins and theoretical backgrounds converge, this study reviewed previous studies on the success factors of each of the two systems.

2.2.1. Critical Success Factors of E-governments

Prior studies on e-government success factors have examined informatization and e-government level diagnosis, success factors themselves, and case analysis of success factors of individual countries. Informatization and e-government indexes devised by international organizations are exemplified by the International Telecommunication Union (ITU) Digital Opportunity Index (DOI), the IDC (International Data Corporation) Information Society Index (ISI), the EIU (Economist Intelligence Unit) IT Competitiveness, the

IMD (International Institute for Management Development) National Competitiveness (technology infrastructure), the WEF (World Economic Forum) Technology Competitiveness (IT index), and the Korea Information Society Agency's National Information Technology Index [83]. The indexes focusing on the e-government level include biannual EGDI (E-government Development Index) by the UN since the 2000s, the Open Useful Reusable Data Index (OURdata index) by OECD (Organisation for Economic Co-operation and Development), and the Global Cybersecurity Index (GCI) by ITU. As with the Balanced Scorecard (BSC) or the Pan-Government EA (enterprise architecture) models, cross-country comparisons of detailed indexes assessing (1) determinants of changes in the work environment, (2) allocation of skills/human resources/financial resources, (3) organizational culture, values, vision, and strategies including internal leadership, (4) legal and regulatory changes, and (5) external support, are presented [84–89].

E-government success factors include political background, economic and technical environment, political leadership, vision and policy goals (integration of informatization and administrative reform goals), strategic priorities, role performers and stakeholders, customers (accessibility, governance participation, privacy protection), resource allocation (budget, project management), common framework cooperation (inter-agency cooperation, accountability, inspection and evaluation), and information technology level [90–92].

Cho and Song [83] explained the achievements of e-government and its success factors according to the horizontal element flow suggested in the general system theory. They derived political, social, economic, industrial, technological environment, political will and leadership, vision and policy objectives, strategic priorities of business, implementation systems and human, financial, technological resource allocation, inter-agency cooperation and common framework, feedback, and learning [93,94]. From the system perspective, the environment, input (political will and leadership, vision and policy goals and business rankings), conversion (promotion system and human financial and technical resource allocation, cooperation system between institutions), output (performance), feedback (feedback and learning) were explored [83]. Jeong and Kim [95], who derived the success factors of e-government based on a survey with governmental officials in charge of each country, pointed out (1) vision and policies related to e-government, (2) recruitment, training, and employment retention programs of Chief Information Officers (CIOs) or information technology personnel and decision makers in similar organizations, (3) structure in connection with IT systems through the intranet, (4) links with performance through redesign of work processes, and (5) investment in technology fields such as standardization, personal information protection, and security as success factors. 6 of models have been used as theoretical backgrounds for innovation factors of e-government; BPM (business process management), BSC, ITG (IT governance), MISR (management information security risks), POE (project, organization and environment), SMART (soft, mainstreaming, attractive, reinventing, transcending; related to IT vision for an advanced Korea). 6 of models have been used as theoretical backgrounds for innovation factors of e-government; BPM (business process management), BSC, ITG (IT governance), MISR (management information security risks), POE (project, organization and environment), SMART (soft, mainstreaming, attractive, reinventing, transcending; related to IT vision for an advanced Korea) [95–97]. Lee [97] suggested manager selection, opinion collection when establishing IT policies (consumer perspective), work process and function analysis, considerations of short-, medium-, and long-term perspectives (time management), promotion entities, organizations, reformative and innovative perspectives, and safety.

Kim [98] concluded the importance of process, technology, human resources, vision, strategy, and organizational sequence based on an analysis of relative importance and achievement, using a survey on the major components in successful e-government implementation. Here, achievement was secured in the order of technology, vision strategy, human resources, organization, and process [98]. Indicators derived as success factors

were classified by selecting the characteristics mentioned in previous studies as keywords. Table 1 below is organized with that.

Table 1. Key success factors of e-government.

Key Success Indicators	Researchers
Legal change	Gil-Garcia and Pardo [84], OECD [85]
Security consideration	OECD [85], Jeong and Kim [95], Lee [97],
Innovative perspective	OECD [85], Song [88], Lee [97]
Analysis of work processes and functions	Gil-Garcia and Pardo [84], OECD [85], O’Looney [86], Jeong and Kim [95], Lee [97], Kim [98],
Opinions collection and customer-orientation	OECD [85], O’Looney [86], Lee [97]
Feedback and learning	Cho and Song [83]
Common framework	Cho and Song [83]
Inter-organizational cooperation	Cho and Song [83], OECD [85], Gil-Garcia and Pardo [86], Song [88]
Resource allocation (HR and budget)	Cho and Song [83], Gil-Garcia and Pardo [84], OECD [85], O’Looney [86], Jeong and Kim [95], Kim [98]
Initiative system	Cho and Song [83], Song [88], Lee [97], Kim [98]
Strategic priority	Cho and Song [83], Gil-Garcia and Pardo [84], OECD [85], Lee [97]
Vision and policy goal	Cho and Song [83], Gil-Garcia and Pardo [84], OECD [85], O’Looney [86], Jeong and Kim [95], Kim [98]
Political will and leadership	Cho and Song [83], Gil-Garcia and Pardo [84], O’Looney [86], Jeong and Kim [95], Lee [97]
Technical environment	Cho and Song [83], Gil-Garcia and Pardo [84], Song [88], Kim [98]
Economic and industrial circumstance	Cho and Song [83]
Political and social background	Cho and Song [83], Gil-Garcia and Pardo [84], O’Looney [86]

Regarding the core success factors of e-government, the leadership, and internal factors such as vision and investment of the nation’s top decision-makers, and leadership within the organizations are emphasized rather than technical factors [84–89]. In particular, the main success factor of the Korean e-government, which was characterized by strong leadership and top-down decision-making processes, was the will of the top decision-makers toward informatization, which was quantitatively confirmed in the success of the smart government initiative. That is, there is a need for policymakers to understand smart government and to take responsibility for and promote smartization of all governments at different digital levels along with a long-term vision [99]. In other words, top-down decision-making in which the government with vision and understanding encompasses the whole picture is analyzed as a key success factor for e-government.

2.2.2. Critical Success Factors of Smarter Cities

Despite insufficient consensus on the concept of smart city, research on smart cities has been conducted in various fields [100]. They identify the components of smart cities [7,49,101], classify the concepts and policies on smart cities [12], discuss government in a comprehensive viewpoint [7,8,10,11,13,14,43,101–103] and address the sectors and inter-sector projects comprising smart cities [6].

In expanding various research topics on smart cities, scholars have generally agreed that smart governance, that is, involvement and engagement of stakeholders and citizens, is essential in its decision-making process [9,14,38,104,105]. The success factor of smart cities is known as bottom-up decision making, such as participation of citizens and communities; with the linkage and participation process between citizens (residents) and communities, local stakeholders, and local companies, citizens (residents) participate as key actors and decision makers in the process of converting to a smart city, thus creating an

inclusive atmosphere based on mutual connections and community activities in the community [106]. Unlike e-government driven by top decision-makers, the success factor of a smart city depends on solving community problems with citizens.

Even if the success factors of smart cities itself are not their main research focus, the following studies partially mentioned them: some of them examine smart cities from a technical point of view, while they also underscore connection, data, and sensors as key elements for smart city operation for the public [107–111], some of them emphasize the roles of stakeholders as subjects of innovation [11,13,112–115], and some of them emphasize the citizen-centered shift of governance expansion [9–11,115–117] and some of them emphasize clusters and sectors [10,115,118]. Some studies emphasize smart city initiatives as strategic guidelines [9,14,49]. Especially, Nam and Pardo [49] stressed the importance of internal factors such as direct technologies, organizations, and policies rather than the external environment. Some studies emphasized the application of living labs [65]. Others emphasize networking between technical, political, and institutional aspects for the shift of smart cities [10,119]. Batty, M. et al. [120] suggested the linkage between the infrastructure and operational functions of smart cities to smart city planning in the form of challenges faced in the smart city process, the importance of Living Labs, urban simulation portfolio, technologies that ensure broad participation, and technological enhancement for the quality of urban life. Compared with e-government, there is a lack of studies on the success factor or determinants of smart cities. Nevertheless, they pay more attention to the differences in the success factors, such as regional-based problem solving, smart city vision with civic engagement, and organizational performance indicators with priorities set.

At a recent *European Union (EU) Smart Cities Marketplace Forum*, they found key findings for future cities; EU policies, mobility, investment/funding, sustainable transformation [121]. Before that, the EU [122] analyzed more than 300 cases of cities and suggested the success factors of SCC (smart cities and communities) as follows: (1) expansion of citizen and community participation; (2) governance: expansion of private participation in design and operation; (3) funds: integration of efficient support through established operations; (4) procurement: standardization of procurement, enhancement of accessibility through sharing best practices, (5) expansion of smart solutions through testing and demonstration. The EU [122] suggested the expansion of citizen and community participation, expanded governance including the private sector in smart city design and operation, funding for interoperability, procurement standardization through benchmarking cases, and the spread of smart cases through testing and demonstration. KEIT (Korea Evaluation Institute of Industrial Technology) [123] suggested mid- to long-term investments and policies for sustainable smart cities, test beds for smart cities, living Lab use and management, and smart city performance indicator.

Peters [106] pointed out support and integration of citizens, regional support from a community perspective, urban integration including urban planning, stakeholder benefits with measurable outcomes, data standards for initial success, strategic momentum based on previous work, securement of fundamental initiatives, lessons from past cases, support of citizens and communities to improve their understanding of smart cities, clear indicators of performance measurement, emphasis on punctuality rather than program details, and creating a smart city culture. Deloitte [124] also pointed out collaborative ecosystem that goes beyond governments, business, startups, academia and non-profit organizations, participation in the establishment and execution of smart city vision, all participants' involvements in the establishment and implementation of smart city vision, various funding sources, and technology-based vision of an integrated, successful smart city. Höjer and Wangel [125] also pointed out a top-down approach for solution utilization, a bottom-up approach for civic engagement, use of ICT to mitigate or solve problems, strengthening of ICT capabilities of urban administration and IT companies, coordination of governance, and a strategic evaluation indicator for the smart city that can easily identify priorities. The results from the literature review on the key factors and success factors

for the operation of smart cities are summarized in Table 2 below. Indicators derived as success factors were classified by selecting the characteristics mentioned in previous studies as keywords.

Table 2. Key success factors of smart city.

Key Success Indicators	Researchers
Civic participation	Castelnovo et al. [9], Chourabi et al. [10], Fernandez-Guell et al. [11], Vanolo [78], Peters [106], Dameri [115], Hemment and Townsend [116], Dela pena [117], EU [122], Deloitte [124], Höjer and Wangel [125],
Governance including stakeholders	Castelnovo et al. [9], Fernandez-Guell et al. [11], Leydesdorff and Deakin [13], Meijer and Bolivar [14], Albino et al. [38], Giffinger and Le [104], Nam and Pardo [105], Deakin [112], Etzkowitz and Zhou [113], Lombardi et al. [114], Dameri [115],
Local based	Peters [106], EU [122]
Clear vision and sharing	Peters [106], EU [122], Deloitte [124], Höjer and Wangel [125]
Smart city initiative (Strategy)	Castelnovo et al. [9], Meijer and Bolivar [14], Nam and Pardo [49], Batty, M. et al. [120]
Financial and political support and governance	EU [122], KEIT [123], Deloitte [124], Höjer and Wangel [125]
ICT problem-solving and technical competence	Peters [106], Batty, M. et al. [120], Deloitte [124], Höjer and Wangel [125]
Political and institutional networking served by technologies	Chourabi et al. [10], Murgate, B. et al. [54], Goodchild, M.F. [108–110], Walravens, N. et al. [111], Fleischmann and Heuser [119], Batty, M. et al. [120]
Importance of sectors or clusters' selection	Chorabi et al. [10], Dameri [115], Lombardi et al. [118]
Sharing success stories	Peters [106], EU [122]
Test, demonstration, and living lab	Niitamo, V. et al. [65], Batty, M. et al. [120], EU [122], KEIT [123]
Performance measurement index	Peters [106], KEIT [123], Höjer and Wangel [125]
Other-punctuality and culture	Peters [106]

2.2.3. Implications

The success factors of e-government and the smart city are presented in Figure 2 that shares commonalities. It is regarded that the shared success factors and the characteristics of the precedent e-government influenced the smart city transformation later. Among the success factors of e-government and the smart city are the sharing of vision and policy goals, strategic priorities based on policy or smart city initiatives, provision of technological environment, securing of technological capabilities, and securing of human and financial support are identified as common points. Emphasis on learning by e-government, sharing success cases of smart cities, promoting reform and innovation through e-government promotion, and promoting problem solving through ICT are considered similar features.

When promoting e-government, the differences from the success factors of smart cities include cooperation between organizations, political willpower and leadership, work process/function analysis, safety, promotion system, feedback, legal system change, political and social background, economic and industrial environment, application of common frameworks.

The distinctions of smart city success factors include civic participation, regional base, political support governance, governance including stakeholders, importance of sectors or clusters' selection, and tests, demonstrations, application of living labs, performance measurement indicators, timely goal achievement, and culture.

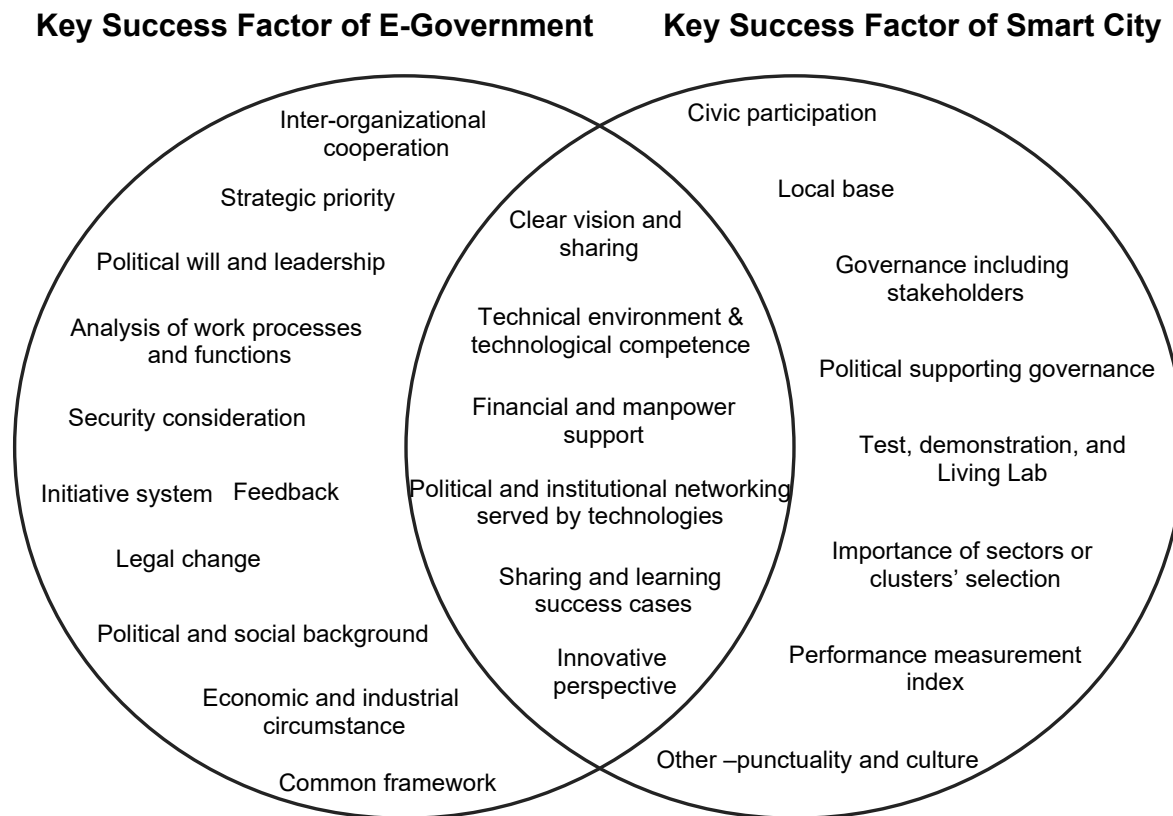


Figure 2. Comparison of smart city key success factors with those of e-government.

2.3. Institutional Changes and Path Dependency

Early research on institutional changes emphasized external shocks such as war and panic, which generally assumed that institutions with inertia to continue would change only by external shocks [126]. Afterwards, scholars suggested ideas such as historical junctures [127] on the reform of social relations and institutions due to political and economic crises, and punctuated equilibrium in which fundamentally changing critical junctures and institutions formed after the changes create new paths [128]. Research on institutional changes generally conceptualizes changes as political interactions rather than rational processes by acknowledging the complexity of reality instead of intentionality [129]. It envisages the system composed of various heterogeneous elements or logic, and that their conflicts and ruptures between the elements cause institutional changes.

The key factors that explain institutional changes are divided into external and internal factors. Early institutional change studies, which were caused by external factors such as wars and the Great Depression [126,130,131], have been extended to institutional change studies based on internal organizational factors that affect organizational political aspects and behaviors [132–134], conflicts between components or interactions between groups [135–141], combinations and recombination processes by historical heritage [142], political contexts, characteristics of the scheme itself, and relationships with variable agents [143].

The internal factors are more important than the external factors to the success of smart cities [49]. Following Thelen's discussion of institutional changes in relation to the

internal factors, this study explained the smart city implementation process as a type of institutional overlap and institutional changes [132,133].

Institutional layering occurs when the existing system adds partial revisions of certain elements and continues the rest as they are. The addition of new elements to the existing system is a mechanism by which new elements are simply added while maintaining the existing system so that the locked-in system bypasses opposition in the case of insufficiently secured political support. In contrast, institutional conversion occurs when a particular institution changes its role from its original purpose to another new purpose; an actor facing a new problem caused by environmental changes converts the existing system to deal with the new changes. Here, the process of converting an existing system for a specific purpose in a new context may result in unintended consequences of institutional changes [144].

In the context of institutional changes, path dependence means that, despite institutional changes, a new institution is applied under the existing institutional framework and circumstances and thus has certain constraints. Once a path is chosen, previous alternatives extinguish and actors accept the emerging patterns. That is, what happened earlier affects the outcomes of events that appear in succession [145] (pp. 262–263). A representative study that described institutional changes as institutional layering and institutional conversion is Thelen's work on German vocational training system and the public pension system of major welfare states [132] (pp. 226–227). Other studies also analyzed the development system formed in the process of industrialization as the cause of the different results of venture support policies in Korea and Japan in the information age [144], and net neutrality policy changes in the process of creating principles and institutional conditions by considering the information society characteristics of the United States and Europe [146]. Another example is a study analyzing the changes in employment policy of the welfare state in the transition period in the Netherlands using the political framework [147].

Institutional layering and institutional conversion complement existing path dependence theory and are useful analysis tools for more simultaneous and complex characteristics of the institutional change process. Such institutional perspective is significant to explain the process of institutional changes from e-government to the smart city, and the relationship between institutions of political aspects and actions of internal organizations of e-government and local governments.

From the perspective of path dependence, the characteristics of e-government that proceeded in time affect the process of smart city development with lagging relationships. Therefore, the success factors of countries with high e-government readiness and existing e-governments have a prior relationship with smart city development and its expansion. Due to the existing relations between structure and actors and sunken costs, it is rare in reality to undergo a radical institutional change from the existing path (institution) to a completely new path [148]. In order to explore the institutional changes in which the e-government readiness or success factors are combined with external factors such as socio-cultural contexts, the current study conducted a case analysis focusing on institutional layering and institutional conversion [132,133,144].

2.4. Constraints of Institutional Changes

In recent years, it has been emphasized that locals or cities become the subjects of problem solving instead of the nation state. Nevertheless, the role distinction between a city and a nation state has hardly been presented. With the emergence of global spatial economic units of wide-area economic zones, new regionalism has spread as a competitive economic unit, and companies with multinational capital alliances find specific cities or regions in a country more attractive than directly working with individual countries [149]. Hence, effective implementation plans at the local level based on regional development and sustainability have become more important. Currently, local governments seek sustainable growth and harmony to resolve issues such as changes in the population

structure along with an increase in foreign residents and an aging population, the vulnerability of the old downtown residential environment, and the declining industries and infrastructure in the region [55,150,151]. In this context, as an on-offline integrated channel, a digital partnership based on a platform where the e-government at the local level can support citizens' daily lives improves the process of finding problems by themselves and identifying 'hidden policy demands', and promotes accurate and professional policy decisions by ProUsers [152] who jointly produce, share, and use economic and social values. If the e-government at the local level fulfills its role as a platform so that the public can directly participate in policies and complete the desired service using public infrastructure and data, the city as a local government adopts the concept of smart city 2.0 (smart city as a platform) [55].

Most of the case studies have released individual smartization cases as best practices of the year by sector [153]. The research that derived rankings on the generic model of smart cities is *Smart Cities-Ranking of European Medium-Sized Cities* published in 2007 [103], which employed 33 indexes and 6 characteristics—smart economy (competitiveness), smart people (social and human capital), smart governance (participation), smart mobility (transport and ICT), smart environment (natural resources), smart living (quality of life) to determine the rankings of the smart cities. The *CITYkeys project (2015–2017)* promoted by the *Finnish Technical Research Centre* with funding from the *EU Horizon 2020 program* was a similar case as well; it developed performance indicators to monitor and compare smart city solutions across Europe [154,155].

This has affected not only smart cities themselves but also e-government level diagnosis. The e-government survey of the United Nations Economic and Social Affairs Bureau, which has examined the development level of e-government in member countries, proposed a new *Local Online Service Index (LOSI)* score analyzing the level of online e-government at a local (city) level beyond the comparison between countries. Since its pilot study in 2018, the 2020 report covered not only the level of e-government in each country, but also smart city projects promoted at a local level.

This study explained socio-cultural characteristics as constraints of institutional changes of e-government and smarter cities. Studies on e-government and smart cities that mainly emphasize the use of technology may have difficulty in linking the preference for technology and the level of use of information and communication technology with socio-cultural characteristics. However, given that this study has set civic participation including stakeholders, residents' autonomy, and governance operations, that is, participation in the decision-making process as the aim of smarter city, the consideration of socio-cultural characteristics can explain the degree of familiarity. The examples include the study by Huntington [156] that classified cultural domains/cultural patterns, the Cultural Map by Inglehart-Welzel using the World Values Survey (WVS) conducted for approximately 100 countries every 5 years [157], the study by Zammuto and Krakower [158] that established the competing values model using the 4 types of group culture, hierarchical culture, rational culture, innovative culture.

A representative study that analyzed national characteristics in terms of socio-cultural features is Hofstede's 6-type study [159]: power distance, individualism, masculinity/femininity, uncertainty avoidance, long-term orientation, indulgence, Edward T. Hall [160] suggested a comparative cultural model using a typology of high-context culture and low-context culture, while the book, *Riding the Waves of Cultures*, by Fons Trompenaars and Charles Hampden-Turner [161] articulated 7 dimensions: universalism versus particularism, individualism versus communitarianism, specific versus diffuse, neutral versus emotional, achievement versus ascription, sequential time versus synchronous time, internal direction versus outer direction.

3. Research Design

3.1. Research Framework

By analyzing institutional changes in e-government and smarter cities, this study examined whether high-level experience in establishing/operating e-government positively affects smarter city transition, and whether the socio-cultural characteristics of case cities constraint the smarter city transition. The study set the following research propositions.

1. A high level of e-government readiness promotes local governments' transition to smarter cities.
2. Even with a high level of e-government, the socio-cultural factors of cities (nation states and local governments) affect the institutional changes to smarter cities.

The research framework constructed through the research hypothesis is shown in Figure 3. It showed the process that the preparation of the e-government would affect the transition to smart cities and urbanized areas that social and cultural characteristics would affect the transformation process.

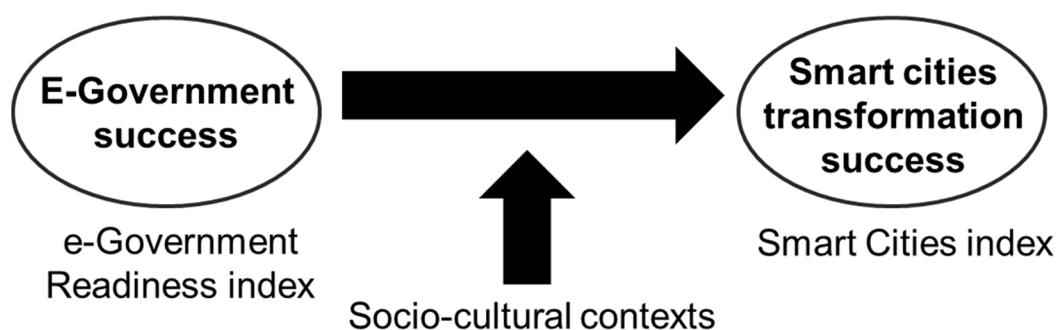


Figure 3. The concept of research framework.

To examine the relationship between the e-government development level and the local government's transition to smarter city, this study used the data from the e-government development level by the UN DESA and LOSI, which reviewed the e-government development index of member countries and confirmed that case cities selected as examples in countries with high-level e-government were also ranked at the top as smarter cities.

In order to analyze the institutional changes from e-government to smart city, the current study first identified the success factors of the smart city as major variables based on the previous studies and analyzed the process of institutional changes that aimed at civic participation and governance expansion as the socio-cultural factors of the case cities. The factors of smarter cities included the LOSI values by the UN DESA, civic participation, governance including stakeholders, local-based plan, clear vision and sharing, smart city initiatives, financial and political support and governance, ICT problem-solving and technical competence, political and institutional networking served by technologies, the importance of sectors or cluster's selection, sharing success stories, test, demonstration and living lab, performance measurement index. The socio-cultural factors used the typologies from Huntington [156], Inglehart-Welzel [157], Zammuto and Krakowe [158], Hofstede [159], Hall [160], Trompenaar and Hampden-Turner [161] to compare the two nations of the two case cities.

3.2. Research Method: Case Analysis

To determine whether the data of the cases collected according to the research design support the propositions, the current study utilized the rival explanations as pattern matching in case selection, although limited [26] (pp. 106–110). In order to test the proposition that a high level of e-government readiness promotes the local government's transition to a smarter city, this study set the UN DESA's E-Government Development Index

(EGDI) consisting of the Online Service Index (OSI), Telecommunication Infrastructure Index (TII), and Human Capital Index (HCI) as an independent variable, and set LOSI including technology, content provision, service provision and participation and engagement as a dependent variable. The two indices with different national and regional levels and each item composed of sub-variables secures independence could assure the internal validity.

UN DESA has released e-government readiness for all member countries every two years since 2002, and since its second survey, it has conducted an e-government portal assessment emphasizing the role of local governments in achieving sustainable development goals. It has selected and evaluated model cities in consideration of geographic scope and population size. The metrics included 40 cities and 60 items in 2018 and 100 cities and 80 items in 2020 [29].

To test the influences of socio-cultural factors on the institutional changes of smarter cities, this study used the rival explanation as pattern matching for case selection. The measurement of socio-cultural characteristics by country is very diverse, and there are very few existing studies on related variables that have influenced the changes of the actual smart city system. Therefore, this study utilized the mutually exclusive nature of the rival explanation as pattern matching. In other words, although the socio-cultural factors of the two cities were situated at the opposite point, the two cities had similarities in their e-government level, economic performance of the country, information and communication infrastructure, and the features of the selected autonomous districts (i.e., population, smart city transformation plan status, major themes of smart cities). In the case study design, the socio-cultural factors playing the role of mutually exclusive independent variables could reinforce the internal validity, although limited. Table 3 below summarizes the case study method of this study.

Table 3. Case study method.

Category	Construct	Explanation	Indicators
Independent Variable	EGDI ¹	National level	Quantitative
	Socio-cultural Characters	National level Individualism vs. Collectivism etc.	Qualitative
Constraints	Economic index	National level	Quantitative
	General Overview of Cases	Municipal level	Quantitative/Qualitative
Dependent Variable	LOSI ²	Local level	Quantitative
	Critical Success Factors of Smarter City	Local level/Municipal level	Qualitative

¹ EGDI (E-Government Development Index) is the index for assessment on the e-government development in member countries released by UN DESA. ² LOSI (Local Online Service Index) proposed a new score analyzing the level of online e-government at a local (city) level by UN DESA from 2018.

A case study was conducted on the success factors of the smart city as outlined in Section 2.2.2. The indicators are: civic participation, governance including stakeholders, local based, clear vision and sharing, smart city initiative (strategy), financial and political support and governance, ICT problem-solving and technical cs selection, sharing success stories, test, demonstration, and living lab, performance measurement index.

3.3. Case Selection

Prior to the selection of smarter cities at the municipal level, this study selected VH (Very High) cases, the top-rank group among V1, V2, V3, and VH groups assessed by the UN DESA's EGDI and the World Development Indicators [162] by WBG (World Bank Group) at a national level, Measuring Information Society of the ITU in terms of the economic structure [163] of developed countries, advanced information and communication

infrastructure, and a high degree of e-government development [29] (pp. 4–6). In 2020, a total of 14 countries, such as Denmark, South Korea, Estonia, Finland, Australia, Sweden, UK, New Zealand, USA, Netherlands, Singapore, Iceland, Norway, and Japan, belonged to the VH group. Among them, this study selected the UK and South Korea with opposite socio-cultural characteristics.

The analysis of the two countries using the topologies of Inglehart-Welzel [157], Zam-muto and Krakowe [158], Hofstede [159], Hall [160], Trompenaar and Hampden-Turner [161] in terms of each of the socio-cultural characteristics are as follows.

The UK is a Western European country with an English-speaking rationalist culture [71–73]. It believes in the minimization of inequalities between individuals (analyzed by power distance), has a high level of individualism (analyzed by individualism), is masculinity-driven given its emphasis on competition, performance, and success, has a low level of uncertainty avoidance in that the society tolerates non-specific task plans with a clear final goal and is satisfied with processes and outcomes and requires a high level of creativity and innovation (analyzed by uncertainty avoidance). It does not particularly have past- and future-orientated preferences (long-term orientation) and has an attitude of enjoying a life and realizing individual desires (indulgence) [159].

South Korea as one of the East Asian countries rooted in Confucianism, collectivism, and hierarchicalism [156–158]. It has hierarchical social characteristics that relatively embrace social inequalities and class orders. Its collectivistic nature puts an emphasis on the strong obligations for in-group members in addition to one's own family members. The socially-embedded femininity is shown in the societal efforts to reach consensus and reduce conflicts through compromise and negotiation; the Korean workplaces emphasize fairness, unity, and quality. It emotionally needs rules with a great will to avoid uncertainty, often resists innovation, considers stability as a key factor in individual motivation, and strives to educate children and save money for the future. In other words, it can be said that the Korean society aims to invest in a practical and long-term perspective. In addition, it shows a kind of pessimism, an emphasis on temperance, restraint by social norms, and less emphasis on pleasure and leisure [159].

For the case selection of smarter cities at the municipal level of both countries, this study focused on the Royal Borough of Greenwich (RBG) and Sungdong-gu (SDG), the two similar cities in terms of their general status and smart city transformation strategies as well as the e-government level of the local government to which the districts belonged and considered the external environmental factors excluding socio-cultural factors as much as possible. They are both autonomous districts with a population of about 300,000 located in the capitals of both countries (London and Seoul) that are similarly traditional cities with more than 50 years of history as an autonomous administrative district and have simultaneously prepared smart city transition plans. Table 4 below summarizes the general status of the autonomous districts as cases.

Table 4. General status of the autonomous districts [164,165].

Category	Royal Borough of Greenwich (RBG)	Seongdong-Gu (SDG)
Population	254,557 (2011)	298,249 (4/2020)
Area	47.34 km ²	16.85 km ²
Planning of smart city transformation	Smart city strategy launched (10/2015)	Basic ordinance of Smart city enacted (9/2018)

What these two districts located in each capital have in common is that they focus on smart transportation and efforts to induce smart city development funds from outside the autonomous region. The Royal Borough of Greenwich (RBG) is London's representative smart city case, leading the UK's smart city innovation, and in particular, finance investment through an external organization called *Digital Greenwich* [166]. Seongdong-gu, as WeGO (World Smart Sustainable Cities Organization), is the representative smart district

of Seoul. This is one of two districts (Seongdong-gu and Yangcheon-gu) designated by the Seoul Metropolitan Government to apply new smart city technologies and services to citizens' daily lives and to commercialize technology in collaboration with companies. In addition, it was the first in the country to announce the basic ordinance on the promotion of smart city, and after reinforcing manpower in relevant departments of the ward office, it participated in various smart city competition projects, attracting investments from the Ministry of Land, Infrastructure and Transport and Seoul.

Both cities are also promoting *smart mobility* as a key promotion theme for smart city transformation. DG City, an innovator company of RBG, has conducted several experiments with connected autonomous vehicles (CAV), and built a smart mobility Living Lab to strengthen its role as a local innovation system. Seongdong-gu is establishing and executing various strategies to solve the local transportation/parking problems in the process of upgrading the local industrial structure from manufacturing to high-tech industry.

4. Case Analysis

4.1. The Royal Borough of Greenwich (RBG)

4.1.1. General Overview

Royal Greenwich has a historical image of scientific invention, navigation, and discovery. The Greenwich Observatory, the standard of the Greenwich Meridian with a nickname of 'Home of Time', is a famous World Heritage Site. Furthermore, the O2 arena, a multi-purpose performance hall, attracts more than 18 million international visitors every year, earning £1.4 billion for the local economy. This innovative tradition of the Royal Borough of Greenwich served as a background for actively playing a role as a test bed for autonomous vehicles and smart mobility in the autonomous district with the introduction of *Smart Mobility Living Lab: London (SMILL)*.

The RBG's population has continued to increase since the 2011 census; in 2028, it is estimated that the population of the autonomous district will increase by 34% compared to 2011. However, the district's burden is increasing due to the rising number of elderly people over 65 years old (more than 57%). Also, as a tourist destination, the local economy relies on relatively low-skilled, low-wage service occupations, with 38% of the RBG residents working in the Level 2 jobs of the UK's NVQ (National Vocational Qualification) that would be jeopardized by the introduction of the automation system [167].

In fact, RBG's informatization and digital transformation strategies have not been driven by the public sector, such as e-government. Rather, the independence and autonomy of RBG has produced various outcomes. A brief mention of citizen-centered coordination of public services through a pilot project is almost the only statement that RBG officially has to do with the digitization of the public sector [168].

4.1.2. Smart City

This part shows a general overview of RBG [169]. London, the UK, where RBG belongs, is adopting a smart city strategy as a countermeasure to the population concentration in the city. It is expected that London residents will increase to more than 1 million over the next 10 years, and demand for public services such as water and sewage treatment, garbage, energy, medical services, and relevant urban problems will be intensified. Therefore, for the purpose of efficiently solving and managing these issues, the *Smart London Board* was established (March 2013), and its long-term plan, *Smart London Plan* was announced (September 2019) [170]. A recent smart city-related report on London includes the London Mayor's Smart City Roadmap [171].

Clear Smart City Vision and Goals *Our Comprehensive Smart City Strategy* in 2015 stated that it is very important for RBG to join and operate global projects for urban infrastructure, and to secure information and lead digital infrastructure ahead of other boroughs [172]. As such, it is pursuing long-term goals for implementing smart city initiatives and roadmaps for digital transformation using the innovation fund, without fixed end

time. In particular, RBG emphasized a strong vision of the future centered on the RBG Congress instead of the administration. In other words, to innovate from below rather than by the leader, it has formed an in-house team with a separate subsidiary, *DG City Ltd.*, working to apply new technologies and approaches from a city-wide integrated perspective.

Local Base and Civic Participation RBG shares low-carbon energy and transportation service experiments and data with local industry-academia-government partners and consults with residents on the installation sites and designs of electric vehicle ramps. The data acquired from the test bed is stored in the *London City Datastore*, not RBG's own separate data platform, and used for analysis and monitoring evaluation. This is to utilize the existing e-government infrastructure without interruption and to combine the smart city strategy together. In addition, *Smart Mobility Living Lab: London* as a test bed for SMLL, RBG is funded by *Innovation UK* and industry. TRL (the UK's Transport Research Laboratory) and a consortium of public and private sector partners lead the way and a wholly owned subsidiary of *dg cities (dgcities.com)*, which leads the facility design and construction of the test bed and defines connectivity infrastructure requirements, and the interface of local authorities to support the operation of the test bed. It identifies the impact of new technologies and business models on the district and tests the development of beneficial integrated solutions that benefit the entire city.

Governance Including Stakeholders *The Smart Mobility Living Lab (SMLL)*, London's flagship program, has provided RBG with an open-style test bed to test more experimental trials in real spaces. One example is the *GATEway project*, which shares a series of services such as the driverless shuttle bus to the public, gains insights on new mobility solutions, and seeks ways to overcome cultural, social, and technological barriers that driverless vehicles would face. By providing a smart mobility test bed for the general public to test the safety and responsiveness of connected and autonomous vehicles (CAVs) in everyday life, it drives the expertise and experience of various stakeholders, including technology providers, academia, and the community [173] (pp.19–21).

Smart City Initiative and Importance of Sectors or Clusters' Selection It was a data-driven analysis that established RBG as a test bed for smart city plans. In evaluating the resilience to technology changes and globalization among the boroughs in London, among the boroughs in comparison, RBG had insufficient office and commercial spaces, weak information, and communications infrastructure fiber to the premises (FttP) connectivity, a small number of creative companies or high-value startups, the lowest gross value-added (GVA) per employee. In addition, according to the measure of environmental resilience, it had the highest proportion of residents working in the area and commuting by self-owned vehicle (44%). These challenges were the reason why RBG was designated as one of two test beds in the city center in operation in the UK to provide new ways to increase accessibility of public transportation and test spaces for connected and autonomous vehicles (CAVs) [174].

Political and Institutional Networking Served by Technologies In Greenwich's smart city strategies, well-known experts from a variety of fields (i.e., economists, architects, planners) participated in the program from the early stage and built the collaborative relationships with a variety of organizations related to smart transportation, such as driverless vehicles. Greenwich as a smart transportation test bed has played a major role by accelerating the speed of commercialization, reducing development cost burden and cybersecurity risk [175].

Financial and political support and governance Based on the smart city strategy in 2015, a team called Digital Greenwich was formed to promote the smart city development of RBG. This emphasized on securing infrastructure and services and environmental changes for urban innovation by utilizing technology and data. RBG works with key actors in various forms, not by passively providing a test bed but by establishing active partnerships. It plans to spread the program to other partner cities in the future and continues cooperation with various sectors. The Data Trust project, launched in conjunction

with the *Open Data Institute* and the *Great London Authority*, is a joint venture with the UK government's AI Secretariat, which encompasses the Department of Digital Culture, Media and Sports (DCMS) and the Department of Economic and Energy Industry Strategy (BEIS) to define and test the concept of data trust. The data trust project further develops from simply securing sensor data such as the Internet of Things and plans pilot projects and trust utilization for legally independent data management responsibilities.

As a demonstration area in London (along with Milan and Lisbon) that has led *Sharing City*, an EU Horizon 2020 project worth 25 million euros since 2016, RBG is pursuing a sustainable pilot research and demonstration project for urban service improvement. It promotes digital innovation, such as the development of an energy management system (SEMS) and connection to the city data platform. Indeed, RBG is one of the municipal autonomous districts that operate by designating a test bed to solve the problems facing the city. The UK's Smart City Index 2017 measuring 20 UK cities in 2017 evaluated RBG as a borough with a highly developed smart city program in London, which was also evaluated as a leading smart city in the UK. This comprehensively emphasized partnerships for improving the environment and services, strengthening the local economy, and increasing the efficiency of urban infrastructure in order to broaden the interests of local residents and businesses. It has secured investment as a test bed and is recognized as the solid base of transportation innovation projects. Digital Enterprise Greenwich undertook RBG's CRM (Customer Relationship Management) activity using the IBM solution system and served as the host of the UK government's first National virtual incubator developed by Cisco.

Success Story Sharing and Problem-Solving Goal In addition to the cooperation with partner cities such as Lisbon and Milan, which are working with the *Sharing City* project, RBG shares relevant experiences so that follower cities such as Bordeaux, Burgas, and Warsaw can learn the projects and implement smart city urbanization suitable for each environment and context. RBG operates smart city strategies in which the autonomous district's smart city promotion experiences are created and shared as global best practices. It also aims to secure smart infrastructure for changes in smart neighborhoods and local communities, including RBG local companies, and to galvanize the local economy and employment.

Test, Demonstration, Living Lab GATEWay (Greenwich Automated Transport Environment)' is being operated as a test bed project in which academia, government, and industry participate for automated vehicle research with a sponsor from TRL, a UK transport research center. It sets a variety of goals to enable the safe and efficient use of automated transport systems in smart city environments. RBG receives £8 million in grants from the UK government to conduct this project, which studies the use of autonomous transport techniques, and technical, legal, cultural and social understanding, and challenges in the adoption of autonomous transport and related technologies.

4.2. Seongdong-Gu (SDG)

4.2.1. General Overview

It consists of a general overview of SDG [176]. Seongdong-gu refers to the east of Seoul and fortress surrounding Seoul. From ancient times, it served as a gateway for food and goods to move through the *naru* along the Han River. Reading halls at mountains and hills of the district were homes for noblemen and scholars in the Joseon Dynasty [177]. These characteristics were also reflected in modernization, developing into a complex district with fairly convenient transportation with semi-industrial, commercial, and residential areas. With regard to major industries and employment, wholesale and retail industries account for the largest share, followed by manufacturing. The significant share of the manufacturing industry and the mix of semi-industrial and residential areas have created

high demand for traffic safety. Seongdong-gu has the advantage of convenient transportation between downtown Seoul and its suburbs, and good access to medical, sales and educational facilities, relevant demand for public services is expected to increase as well.

SDG's e-government has been recognized for its high standards, for instance, as being awarded as the best autonomous district in Seoul and as an excellent institution by the Ministry of Government Administration and Home Affairs [178,179]. In particular, according to the *Seoul Administrative Information System Utilization Evaluation*, which evaluates the improvement of the efficiency of administrative work processing and digitalization of public services in the municipalities of Seoul, SDG did an excellent job in minimizing redundant business between local governments using the utilization rate of the common local administration information system and providing accurate public services through the implementation of e-government.

Moreover, the civil-elected ward office head of SDG, who has expressed great interest in e-government and the smart city and wrote a relevant book himself, actively promotes the vision of SDG as a smart city.

4.2.2. Smart City

The city of Seoul, to which Seongdong-gu belongs, has set *Inclusive City* as its main vision, which is grounded in the policy direction of universal access to urban space and services, sharing benefits in urban development and economic growth, and civic participation in the policy process. Seoul announced the *Smart City Seoul Promotion Plan* (August 2018) to expand citizen-centered smart city governance, and is actively pursuing related policies [180,181].

Clear vision and sharing SDG's pledge of the 7th civil-elected ward office head was *Smart Inclusive City Seongdong*. He introduced the ordinance related to the smart city vision (Basic Ordinance for the Realization of Smart Inclusive City) for the first time by local governments and showed a strong will of the public sector for the smart city. The ordinance declared the concept of *Inclusive City* where everyone is respected without discrimination in addition to the convenience of using smart technology. Currently, SDG uses smart technology in seven areas, including the economy, education, welfare, and safety, and promotion of the improvement of residents' lives. The concept of *Smart Inclusive City* set by SDG is derived from the vision of the city first proposed in the *UN Human Settlement Program* in 1999: "a place where everyone, regardless of class, gender, age, race, or religion, is productively and positively engaged in the opportunities the city offers" [182]. This urges a smart city where no one is excluded from the city's opportunities and benefits, a city in which everyone participates, and city that everyone can enjoy.

Local Base and ICT Problem-Solving and Technical Competence SDG designates the *Wangsimni Station* site, where 5 subway lines and roads are intertwined in a complex way, as a key area for solving traffic problems, participated in a variety of project competitions aiming for Smart City establishment for residents, and launched the *Big Data Center*, a dedicated organization that utilizes local traffic data and civil petition data for city management. Also, *Hanyang University* within SDG and the SDG government signed a business agreement with the aim of revitalizing the local industrial economy through exchange of infrastructure, technology, and human resources; the university is providing courses for faculty and graduate students at the College of Engineering and working on projects for local community innovation and sustainable cities [183].

Citizen's Participation and Governance including Stakeholders Based on the Basic Ordinance for the Realization of Smart Inclusive City (12/2018), SDG institutionalized the Smart City Committee and residents' council to guarantee civic participation in the policy-making process. Notably, it limits the participation to decisions, execution, and evaluation, and thus relatively emphasizes the role of the ward office in the planning stage. Regarding other stakeholders, the ordinance stipulated efforts to expand participation and improve competence in the process of smart city policymaking. Therefore, it is promoted to share the burden of decision-making by including citizens and stakeholders in the final

decision-making rather than allowing their involvement in governance in an equal position.

Smart City Initiative It was the main theme of the election campaign of the mayor of the district elected by popular vote in 2018. He set the smart inclusive city as his vision, published relevant books, and preoccupied related issues; in 2019, SDG drafted a master plan containing the plans and vision for a smart trans-city and secured an additional budget for the public offering project. The project is currently being operated.

Citizen's Participation SDG opened the *Seongdong-gu Civil Office* [184], an online Living Lab for civic participation in urban policy, where a resident can suggest a policy idea. If more than 50 people agree to the proposal, the SDG ward office head decides whether to implement the idea and share the process. The installation of smart security lights was the first achievement proposed in the Living Lab. SDG residents of various ages and groups can participate in civic activities organized by the SDG government, such as introducing a *Living Lab* system in the *Wangsimni Square zone master plan* to disclose related information and forming a participation team for each elementary school in safe commute projects [185].

Political and Institutional Networking Served by Technologies SDG is currently operating a *Living Lab* site to collect the public ideas and providing *Seongdong-gu Big Data Policy Map*, a service that maps GIS (geographic information system)-based policy issues by linking, collecting, storing, and analyzing public data of Seoul, central government, and district offices since 2020.

Financial and Political Support SDG has aggressively participated in smart city-related public offering projects, which are invested by various levels of government redundantly, and secured the national budget of the central government and the city budget of Seoul. SDG took the smart city special zone project in Seoul in 2018 (city budget 500 million won for 3 years, district budget 300 million won), the smart city integrated platform of the Ministry of Land, Infrastructure and Transport (national budget 600 million won, district budget 600 million won), theme-type specialized complex project (national budget 225 million won), and in 2020, it took the main project for the theme-type special complex master plan support project by the Ministry of Land, Infrastructure and Transport (national budget 300 million won, district budget 150 million won). SDG has applied for the majority of public offering projects on smart cities over the past three years, secured project budgets for smart city planning and construction four times, thereby gaining a relative advantage in this domain. Its hitting rates for public offerings are very high as well; it was confirmed that SDG took a total of 225 public offering projects over the past 4 years and secured 77.6 billion won budget. At the end of his first term, SDG's civil-elected ward office head published a book, *the 4th Industrial Revolution, Smart City* [186], that showed a good level of knowledge and vision on smart city compared to other local ward office heads. Although it might be intended as a propaganda booklet published during the election period, the contents of the book were later reflected in the Smart Inclusive City Ordinance for the first time in local governments. Various investments, including reinforcing personnel in the relevant governmental organizations, proved the strong leadership and vision for this matter by an elected public official.

The Smart City Management Bureau, an organization in charge of smart city affairs in SDG, has many more employees than other autonomous districts. The difference is salient when compared to the relevant human resources in *Yangcheon-gu*, another municipality participating in the smart city test bed project in Seoul (as of October 2019). SDG has 10 times more staffs and subdivided organizations such as separate departments, teams, and centers that strengthen SDG applying for multiple public offering projects.

Importance of Sector or Clusters' Selection SDG proposed smart city strategies using the smart transportation theme of pedestrian safety, traffic accident prevention, life convenience, and integrated transportation information of a special district (1.2 km²) of the *Wangsimni Square*, a major transportation point of the Northeastern side of Seoul where 5

roads and 5 subway lines intersect. It is also seeking to present and spread a standard model for smart transportation to local governments [187].

Tests, Demonstrations, Living Labs Although SDG is participating in various public offering projects such as *the Smart City Master Plan* by the Ministry of Land and *the Seoul Smart City Special Zone Project*, it does not promote itself as a smart city test bed or brand itself in the long term. SDG's participation in public projects offered by the central and local governments helps it to secure a budget for a leap forward to the smart city and to preempt the infrastructure. SDG applied for *Smart City Integrated Platform Construction* and the *Master Plan Project* by the Ministry of Land, Infrastructure and Transport, and was designated as a special smart city district in Seoul and received investment for Seongdong-gu smart city.

Performance Indicators SDG, a local government with high rates of application and success in various public offering projects, has operated performance goal management and operation plans with its full understanding and implementation on the setting of performance goals [187].

4.3. Results

4.3.1. The Level of e-Government Readiness in a Country Affects the Transition of Local Governments to Smart City [29] (pp. xxvii–xxix, 102–111) [188] (pp. 151–175)

Since e-government and smarter city share most of the success factors, the literature review of this study revealed that a high level of e-government readiness could serve as a sufficient condition for local government's smart services or smarter city transition. The comparison between EGDI in the UK/South Korea and LOSI in London/Seoul, the cases of the study, also obtained the same results.

Local governments are interested in E-government that focuses on the transition to digital government at a national level, interacts more closely with citizens and handles citizens' daily life issues. It was found that the biggest obstacle to the development of e-government, including digital transformation at the local level and support for smart city projects, is insufficient ICT infrastructure. Conversely, it was revealed that having sufficient ICT infrastructure and appropriate hardware/software accelerates e-government development, including building a smart city, and solving problems such as air pollution and traffic congestion.

In terms of EGDI, both countries are among the highest VHs in the UN's Very High EGDI group and occupy a leading position in the EGDI among the UN member countries. Published since 2002, it has comprehensively evaluated 190 countries around the world, based on its sub-indexes of the Online Service Index, Telecommunication Infrastructure Index, and Human Capital Index. A summary of the two countries' EGDI performance is shown in the Table 5 below. EGDI's shaded cells indicate the cases with a higher score between the UK and South Korea in any given year.

Table 5. Comparative e-government status of both cases by United Nations E-Government Development Index (UN EGDI) [29]. Since 2002, the index has been assessed and published (not published in detail at 2002) and has been published every two years. In 2006, the United Nations did not evaluate the e-government index. EGDI surveys were conducted in 191 countries from 2002 to 2005, 192 ones from 2008 to 2010, and 193 ones from 2012 to 2020.

		2003	2004	2005	2008	2010	2012	2014	2016	2018	2020
E-government Development Index (EGDI)	UK	0.8140	0.8850	0.8777	0.7872	0.8147	0.8960	0.8695	0.9193	0.8999	0.9358
	Rank	5	3	4	10	4	3	8	1	4	7
	Korea	0.7440	0.8570	0.8727	0.8317	0.8785	0.9283	0.9462	0.8915	0.9010	0.9560
	Rank	13	5	5	6	1	1	1	3	3	2
Online Service Index (OSI)	UK	0.7770	0.9730	0.9962	0.6923	0.2634	0.9739	0.8976	1.0000	0.9792	0.9588
	Korea	0.6070	0.9460	0.9769	0.8227	0.3400	1.0000	0.9764	0.9420	0.9792	1.0000
	UK	0.6750	0.6930	0.6471	0.7022	0.2364	0.8135	0.8534	0.8177	0.8004	0.9195

Telecommunication Infrastructure Index (TII)	Korea	0.6750	0.6660	0.6713	0.6886	0.2109	0.8356	0.9350	0.8530	0.8496	0.9684
Human Capital Index (HCI)	UK	0.9900	0.9900	0.9900	0.9699	0.3149	0.9007	0.8574	0.9402	0.9200	0.9292
	Korea	0.9500	0.9600	0.9700	0.9841	0.3277	0.9494	0.9273	0.8795	0.8743	0.8997

Since 2018, by using LOSI, it selected pilot cities considering geographic scope and population size and conducted e-government portal evaluation. LOSI is composed of 4 sub-group items (40 cities and 60 metrics in 2018, and 100 cities and 80 metrics in 2020) of technology, content provision, and service provision and participation. London, the UK, and Seoul, South Korea, were evaluated as top LOSI groups two times (in 2018 and 2020), respectively. According to the 2020 UN EGDI report [29], Seoul and London each took a joint first place in content delivery and a joint second place in technology. However, both cities ranked 19th in service provision, relatively lagging behind in content provision and technology. Given that Seoul ranks 10th and London 15th in terms of participation and intervention, the degree of local e-government in the two cities is similar not only in the general section but also in sub-sections. Table 6 below shows the LOSI status of London and Seoul by UN DESA evaluated.

Table 6. Local Online Service Index (LOSI) status of London and Seoul by UN [29].

Category		Total Rank		Technology		Content Provision		Service Provision		Participation and Engagement	
		2018 (Sum)	2020 (LOSI)	2018 (Sum)	2020 (Rank)	2018 (Sum)	2020 (Rank)	2018 (Sum)	2020 (Rank)	2018 (Sum)	2020 (Rank)
LOSI	London	4 (51)	12 (0.7625)	10	2	25	1	11	19	6	10
	Seoul	7 (49)	9 (0.775)	11	2	25	1	6	19	8	15

Since the success factors of smarter city are differentiated from those of e-government, it was justified that it is necessary to separately identify its status as a platform and innovation agent at the national and local level. It was confirmed in the UN's E-government Survey in 2018 and 2020 that the national and local levels of e-government readiness do not necessarily coincide [8,29]. Examples of smart cities built by using the latest technology at the local government level have been found. There have been ongoing innovative attempts using big data analysis, such as designing and implementing local government policy, and incorporating digital applications to deal with pending issues such as urban public resource optimization, smart mobility, environmental pollution, and refugees.

From a technological point of view, the obstacle to building smart cities for local governments was analyzed as insufficient ICT infrastructure. Proper supply of the infrastructure and equipment of hardware (HW)/software (SW) can be used as tools for accelerating smart city construction and solving problems such as air pollution and traffic congestion [8].

4.3.2. The Success Factors of e-Government that Determine the Level of e-Government Readiness are Limited by Sociocultural Factors, which Have an Impact on the Institutional Changes for a Smart City: Institutional Overlap and Institutional Conversion.

Although the levels of national and local e-government were similar, methods of promoting smart city strategies of RBG, the UK, and SDG, South Korea, were different.

SDG's smart city strategies were officially led by the ward office head of the district and relevant organizations. More precisely, SDG reinforced human resources centering

on the vision of the leader and expanded civic participation and governance through Living Labs and government-academic cooperation. Meanwhile, *Digital Greenwich*, RBG's Greenwich in-house team, has independence (it has a reporting system directly to RBG's Chief Executive) and establishes strategies aiming for smarter city for the purpose of city innovation, and operates *Dg cities* as a subsidiary. In other words, RBG, which promotes smart city in the form of public-private governance, shows opposite ways to SDG.

SDG Smart City as Institutional Layering The will of the mayor of the district, who was an elected official, has led to the vision of the Smart Inclusive City, securing manpower for the organization in charge, and applying for multiple public offerings. The residents' participation and cooperation with local-based innovation actors also follow the top-down direction for national informatization and e-government led by the government and the public. His strategic operation is also revealed in the appointment of 32 members of staff working for the establishment of smart city strategies and master plans in the autonomous district [189], external public offering and cooperation projects, and the big data center. These public-led smart city strategies resemble a technology pull of technology commercialization strategies, which is very advantageous in quickly introducing new technologies. In the recent coronavirus pandemic, the SDG Smart Shelter Stop, which has become a YouTube viral PR (public relations) operation (opening and closing the door after checking the temperature of passengers by the heat-censor camera attached to the shelter's door) is a good example of the public-driven smart city initiatives of SDG (as of October 2020, SDG is participating in the Ministry of Land, Infrastructure and Transport's themed specialized complex contest project to transform the Wangsimni Station zone into *Transcity*, and this idea is included in the project.)

In South Korea's autonomous district unit, smart city strategies represented by Seongdong-gu, the organizations and budgets are separated from the department in charge of informatization. However, there is no difference confirmed in operation between the smart city strategies and the informatization department (i.e., e-government). In terms of the success factors of the smart city emphasizing civic participation and external cooperation, the method of creating government-led Living Labs, rather than self-sustaining civic groups, and deciding whether to implement civic suggestions depending on the support of more than 50 people per suggestion is currently applied to the public petition program run by the Blue House and the National Assembly.

Regarding the civic participation and governance expansion including stakeholders, the core of smarter city, despite the system preparation, it was passive to include citizens and stakeholders in the policy formation stage such as problem/issue setting. In addition, the participation took place in the final decision-making stage within the framework previously arranged in the public sector. This was also revealed in the process of securing project costs for smart cities; This was not to solve problems as a subject of innovation through public-private cooperation or to maintain a governance system using a cooperative network such as creating added value, but to secure additional national and city budgets as the representative of smart cities.

When sharing success stories, SDG tends to make target-oriented investments for the sake of being the first. In addition, SDG operates a separate team in charge of various public offering projects using the previous experiences of e-government support projects and u-service support projects. These efforts are analyzed to preemptively occupy a better position than other autonomous districts to promote the district management or to secure external funding for smart city than to share SDG's smart city success strategies with other autonomous districts.

The case of SDG, which executes the smart city promotion strategies by using the existing methods of the informatization project and e-government project as it is, is interpreted as an institutional overlap in institutional changes. SDG maintains the smart city promotion strategies by adding the organization in charge of the public offering projects to the e-government project and partially revising the Living Lab and government-academic cooperation channels. In addition, SDG use organizations and platforms such as

Big Data Centers related to e-government, which, in turn, intends to secure a new platform unique to SDG. It has implications that SDG has secured public-private channels to listen to residents' opinions for each smart city project with the online Living Lab for SDG residents under the name of *Seungdong-gu Civic Office*, urban regeneration project promotion team, resident participant group for the *Wangsimni Smart Transcity' project*, and the *Smart Inclusive City Committee* comprised of experts in information and communication, urban planning, design, urban regeneration, and health. However, we cannot say that they are fully accepted as key actors in the actual policy-making process.

Seoul, where Seongdong-gu belongs, is the capital of South Korea, which has a collective hierarchical culture based on Confucianism. It values family and community rather than an individual. People are generally obedient to the legal order and government and prefer the public good rather than private interests [190]. Therefore, Koreans usually petition and wait for the governmental decision, which is seen in various e-government complaint channels. Since the early 2000s, when the e-government was in its infancy, the Korean governments have had various online channels for civic participation. However, these are used as spaces for unidirectional policy delivery and complaints, as one-time measures or as second opinions [191]. This tendency is revealed not only in the modern e-government era, but also in the *Shinmungo* system [192], where the people of the *Joseon Dynasty* complained of injustice [193]. From *Shinmungo*, *Blue House Petition*, and *National Assembly petition* in the 21st century to the Joseon era, it shows that Korean people usually do not engage in direct action and activism. Therefore, the core values of smart city, civic participatory and expansion of governance, may have been achieved quantitatively, but not qualitatively, and smart city based on a public-led e-government approach is expected to continue.

In the South Korean context, the fundamental cause of the lack of citizen participation in the policy formation and execution process is that citizens are still unfamiliar with expanding governance including stakeholders and collaboration. Although there is no explicit class distinction in South Korean society, it is difficult to develop experimental and innovative services through trial and error, learning, and collaboration in a culture of collectivism that endures inequalities and accepts hierarchical order and that puts practicality as its primary principle. Considering the preference for stability as well, it is difficult for Korean smarter cities to establish themselves as leading groups. Taking into account these socio-cultural characteristics, the creation of innovative services or business models in South Korea may stem from the organizational leadership, economic practicality, and a common awareness of crisis.

Smart City of the Royal District of Greenwich as a Case of Institutional Conversions RBC's smart city strategies were promoted for public-private governance with the aim of regional innovation and economic revitalization. RBC formed an internal organization, *Digital Greenwich*, instead of strong executive leadership and top-down decision-making processes led by the authority, setting a network of cooperation with the UK and the EU as a whole and with various ministries in the public sector. As a digital test bed located at the heart of London, RBC establishes its identity and actively participate in various projects, thereby pursuing networking and governance activities with innovators. Focusing on local issues, encouraging active participation of residents in the decision-making process for problem-solving, and cooperating with fellow cities as well as leading cities to share experiences of RBC as exemplary and empirical cases utilizes the actual key success variables of smart city.

The EU's *Sharing City* project and various partnerships are carried out through *Digital Greenwich's* internal organization within RBC's administration and its subsidiary *dg cities*. This applies the smart city strategies of public-private cooperation and combines RBC's identity as a test bed for digital innovation. Therefore, this is analyzed as smart city strategies as institutional changes for innovation in the city beyond the existing system of e-government. In particular, analyzing and monitoring smart city-related data by actively utilizing the existing *London City Datastore* to disclose and share information in the public

sector is differentiated from SDG, which seeks to establish a separate data sharing platform. In addition, RBG has the identity as the only mobility test bed in the metropolitan city and takes the lead in smart city-related projects of central ministries and public-private industries. This brands RBG with regard to smart city mobility demonstration and verification and secures a cooperative network or governance to disseminate and cooperate success stories across Europe under the national and EU Horizon projects. This is differentiated from e-government for simple informatization in the public sector and online public services and has a great impact like augmented reality that combines real/virtual reality and links online/offline services. The rational culture of Western Europe has attracted interest in cooperation with civil society and the government, and it is common for its people to directly participate in the planning and operation of social public services. An example of expanding cooperation networks including citizens of the *Lambeth District* in London, UK, which continues the experiment of transferring the budget and agenda-making power from Congress to residents [194]. It helps civil society with administrative functions and provides a guide to government-led civil society activities in the UK [195]. As such, in the UK, even in smart city, public-private cooperation the direct participation of residents, not government-led, are systematically guaranteed and actualized.

In British culture, which believes in minimizing inequalities among people despite the explicit class distinction and enjoys direct participation to produce outcomes, people can be more familiar with joint collaboration by forming a cooperative network between multilateral organizations. In addition, its competition- and success-driven aspect can more freely respond and challenge social problems that are relatively uncertain and difficult to solve. This socio-cultural context may enable activities such as cooperating with various organizations, cities, and countries on the theme of smart mobility, and proactively proposing smart mobility security to the central government beyond the limits of a public organization. As analyzed above, it is concluded that the success factors of e-government influence the institutional changes to a smart city and are restricted by sociocultural factors.

5. Discussion: The Difference of Open Innovation between e-Government, and Smart City

This study began by emphasizing the role of e-government and the smart city as a platform, and the phenomenon has been revealed to enhance democracy ranging from the e-government's perspective for citizens and securing sustainability of cities to a citizen, stakeholders and cooperative network. The first point of view that can be discussed in this context is that in this study we can infer from 'how to open innovation/or what comes after open innovation' that e-government precedes smart cities. 'From e-government toward smart cities', the main idea of this study, can be challenged by their different academic backgrounds. Also, as continuity of the institutional change process is further persuasive through the implementation of open innovation under the context of both systems. The e-government focuses on the way of developing and operating as a platform that encompasses citizens and people in administration with the aim of achieving representative democracy. It is expected that the results of the policy for civic participation will be derived as a consumer-centered policy, but it does not pay much attention to the results of the actual increase in participation.

On the other hand, there is no doubt that the smart city is the front line of open innovation compared to the e-government. Providing opportunities for participation to various citizens and stakeholders is a means, not an objective, but a means to achieve practical problem resolution and sustainability. Collaborative processes for problem solving have led to co-production, and these achievements have served as key values to open innovation toward the smart city [196]. It makes a difference with e-governments'. Smarter cities' co-production has given us a practical agenda for local and institution's innovation and it emphasized several principles: people matter, changing the way of work, ripening reciprocity, importance of get-go social networking [196]. For this reason, continuous internal

and external participation, sharing experience of smart cities, and designing a course into smart cities as rolling plans have led to a change in the system of open innovation between cities and public institutions, industry/business, research/academic, and citizens and civil society. They say this is the quadruple helix participation model [197,198]. The smart city itself serves as a platform for value creation and knowledge sharing for organizations and governments [199] as well as providing leverage for open innovation [196,200,201]. It can be seen that smart cities are better at implementing their roles as platforms for open innovation than e-government.

The second issue to be discussed is the impact of social and cultural contexts on the process of smart urbanization and the corresponding strategies of each autonomous region. Although similar conditions were provided to e-government levels at the level of national and metropolitan areas, level of technological development, and theme of smart cities, it was confirmed that there were significant differences in the process. However, their opposite sociocultural attributes made the strategies very different. It is critical for each country to identify drivers and motives that lead to the institutional changes in their own sociocultural contexts: rationalism versus collectivism, individualism versus collectivism, performance-centeredness versus consensus-centeredness within the organization, acceptance of uncertainty versus avoidance of extreme uncertainty and so on [159].

The case of RBG, the UK, which introduced smart city strategies aiming at solving urban problems, emphasized community-based citizen participation and collaboration; the process for real-world problem solving could be tedious, but it is a model to be pursued if it is possible to focus on the essence of problem solving in terms of civic and cooperative governance, open innovation, and self-sufficiency. RBG operated in the same form as the living strategy of the naturally formed and functioning smart city, rather than the intending cooperation of citizens and stakeholders in administrative procedures. In particular, RBG's catchphrase of wanting to collaborate with large and small organizations, provinces, countries, or whatever organizations in the world without limits could confirm its role as a regional innovator and its confidence as a testbed. In the case of RBG, literally, social and cultural characteristics such as the UK's innovative culture were glanced. However, the bottom-up decision-making process may overlook the vision and development from a macroscopic and long-term perspective. Excessive immersion in the participation and collaboration process may take unnecessary cost and time [202]. Furthermore, there may be a large gap between national and local governments that did not or could not participate in the cooperation network. Providing standard guidelines or motivating local governments by central government may be needed for balanced development nationwide.

If the smart city development heads toward advanced technology and comparative advantage with other cities, SDG, South Korea's smart city strategies with strong leadership and government-led initiatives have strengths in terms of speed. However, since the vision and capabilities of a specific individual, not the entire system, directly affect the entire business and system, frequent ups and downs are expected depending on who is the decision maker. Also, it is difficult to assess the competence of the public sector, its own ecosystem, and self-sustainability. The level of e-government development positively affects the development of the smart city, but in the absence of active participation in the actual administration and governance of citizens, such as civic involvement and local-based problem-solving, the long-term transition to a problem-solving next-generation smart city is challenging. In addition, if the central government fails to perform its role as a rudder, it can reduce the overall competitiveness of the country, not only of the central government, but also of local governments. Until now, the government has played a limited role in civic participation and external cooperation, and the others have expected a lot of support—subsidies, transfer budget, parenting like etc.—from the government. In the Korean context, maintaining the competitiveness of the central government organiza-

tion could be a very important issue. In the Korean context, it is believed that the experience of civic participation in administrative governance, such as town hall meetings, will be important to future success.

Finally, the next one to be discussed is the direction of future research for generalization that has not been fully acquired by comparative case studies. In order to look at the process of institutional change from the e-government toward the smart city, key success factors were derived and case analysis of the two autonomous regions with different socio-cultural characteristics was promoted. Although two cases with sociocultural characteristics were selected through pattern matching techniques to generalize the results. However, there is a limitation for generalizing the result. It is necessary to develop statistical approaches such as using techniques that can quantitatively analyze many cases according to socio-cultural characteristics or develop indicators to measure the success of smart cities for future research.

6. Conclusions

Until now, a lot of investments in e-government and smart city construction have continued without a clear goal as they have only focused on the tool-oriented perspective of electronic, digital, and smart aspects and the state of technology. Likewise, the existing studies on the two institutions have expanded its concepts, scope, and themes, whereas they have hardly analyzed the process of their institutional changes. Starting from the assumption that the next generation e-government and smarter cities are required to play a role as a platform that supports problem-solving so that citizens and stakeholders can have a better life together, this study compared the key success factors of the two systems and conducted the case analysis on the process of changes between the two systems according to the theory of institutionalism. It confirmed that the process of changing the smart city system of each country was not only affected by the level of the preceding e-government but also reflected the larger socio-cultural contexts of each autonomous region.

In this regard, for the growth, spread, and establishment of smarter cities, creating implementation plans and solutions that take into account each region and socio-cultural attributes are needed rather than unconditionally following the formula of success cases.

It is a limitation of this study that personal information protection such as digital ID (Identification) and digital surveillance associated with the introduction of big data [203–205] and AI were not sufficiently addressed when deriving the success factors of smart cities. Also, it did not fully reflect regional characteristics such as local industries, foreign residents' ratio, and willingness to participate in regional innovation, and that it failed to analyze hard data and statistics to measure smart city success quantitatively. It can be supplemented in subsequent studies.

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