Determinants of
Local Open Government
- Focusing on Openness of Government Information -

지방정부의 개방성에 대한 결정요인:
정부의 정보 개방성을 중심으로

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Abstract

One important underlying condition of a properly functioning local democracy is an informed citizenry, which can be satisfied when the active opening of government information is possible. In many countries, central governments have led initiatives to promote the release of government information and data in public organizations, including local governments. However, despite the central government's efforts, local governments' level of openness varies greatly. Therefore, this dissertation focuses on this variation at the local level and attempts to identify the determinants of openness of government information (OGI).

A review of the OGI-related literature found several research gaps. Firstly, most OGI studies have emphasized the external influence of local government in explaining the determinants of OGI. Accordingly, overlooked is the importance of the internal force of local governments in OGI. Secondly, the literature recognizes the importance of local citizens but has failed to empirically verify their impact on OGI in local governments. Thirdly, previous literature fails to consider the dynamic policy environment at the local level. The extant literature neglected spatial attributes of local governments and has yet to address the possibility of interactions among neighboring local governments on OGI. To fill these gaps in the literature, this study establishes and verifies a TOEN framework based on the Technology-Organization-Environment (TOE) framework. For analysis, the author collected a five-year panel data (2015–2019) of Korean local governments (226 lower-level governments, Sejong, and Jeju). The author measured the OGI, this dissertation's dependent variable, with the disclosure rate of administrative documents (DRAD) and the number of open data sets. The empirical analysis was performed through two models for each of the two dependent variables. First, <Model 1> comprises technology-related factors (technical capacity, information communication technology (ICT)-related resource, and the

technology utilization planning level of government), organization factors (government size, financial autonomy, and political ideology of the government's leaders), and environmental factors (influence from local politics, a local election year, political competition, influence from local citizens, organized local citizens, and individual citizens, and local legislation). Panel linear regression with the fixed-effects model is employed to verify the influence of these factors. Next, <Model 2> validates the impact of neighboring local governments. <Model 2> includes all the variables in <Model 1> and also uses a panel spatial regression (spatial lag model) with fixed effects as an estimation method.

The findings for each dependent variable are summarized as follows. First, in terms of the opening internal administrative activities (DRAD), the political ideology of the government leader, information communication technology (ICT) personnel, financial capability, political competition, citizens' voice (complaints), related local ordinance, and interaction between adjacent governments were significant. Notably, the DRAD is determined within the relational dynamics between local government and external actors. Local governments raise the openness level when their local political condition is favorable and decrease openness when facing unfavorable political pressure. For example, when political competition with local councils is high, and citizens' voices are high, DRAD is lowered. These findings show that local governments still exert control over their administrative information and seem to make strategic adjustments according to their political interests. On the other hand, the enactment of the local ordinance related to openness and the influence of neighboring governments positively affected the DRAD. The spatial interaction between local governments regarding the DRAD shows the possibility of a regional spill-over effect on the OGI. Among internal factors, the local government with a progressive government leader and lower financial capability actively discloses their internal administrative documents.

As for the opening of public data sets that provide opportunities for citizens to participate, the technical capacity, plan for technology utilization, government size, citizens' voice, and interaction between neighboring governments were the significant determinants. Unlike the DRAD model, the effects of internal drivers are quite apparent in this model. In particular, the influences of technology-related factors are prominent. The local government with higher technical capacity and higher willingness to utilize technology in the organization are actively opening their public data to the public. Moreover, government size measured with the number of public officials positively affects the opening data. This finding implies that opening public data can accompany a certain level of administrative capacity. The local governments open more data when confronted by more citizens' voices, interpreted to mean that local governments provide open data to collaboratively address such dissatisfaction employing the local communities' capability. Similar to the DRAD model, the open data model identified the positive influence of neighboring governments. If local media shared the excellent performance of open data of neighboring governments, local government could be positively stimulated.

These results have the following theoretical implications. First, this study conceptualized and measured two dimensions of "open government." In particular, this dissertation encompasses the core concept of the "old open government" paradigm centered on transparency and right-to-know and the core concept of the "new open government" centered on citizen participation and collaboration. This study investigated the two concepts measured in hard data. Second, this research examined and verified systematic contexts that explain OGI at the local level. Third, the TOEN framework for the local open government, expanded from the TOE framework, filled the research gaps in the open government literature. The TOEN framework contains the influence of local citizens and neighboring governments mentioned in previous studies as limitations or for future study. Fourth, this study illuminated the role of

local government as an active actor in opening government information, revealing local governments' strategic actions and intentional efforts to raise openness of government information.

Policy implications derived from the findings are as follows. To increase the level of opening the internal administrative process of local government, consider the following measures can. First, local government needs to introduce stricter management on DRAD. The performance of local governments' DRAD can be reflected in the annual local government assessment so that they are provided advantages or disadvantages depending on their opening level. Second, the group subject classification to the current local government's information disclosure evaluation should be by region. Through this, the effect of spatial interaction between local governments on OGI can be maximized. Third, based on the key determinants from the results of this study, the areas need to be continuously monitored where the expectation is that DRAD is low. To promote data openness that can enhance citizen participation, the study suggests the following measures. First, provide technical support or retraining public officials to small local governments. Second, streamline the workload for filtering personal information and copyright issues when opening public data. Third, consistently publicize open data performance and share best practices for open data at the local level.

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CHAPTER 1. INTRODUCTION

1.1. Background and Purpose of This Dissertation

One essential underlying condition of a properly functioning democracy is access to information (Harrison & Sayogo, 2014). Informed citizens are better able to contribute to democratic processes, to understand and accept the decision-makings affecting them, and to shape the situations in which they live (Birkinshaw, 2006; Meijer, Curtin, & Hillebrandt, 2012; Ruijer et al., 2017). Past administrative secrecy allowed only the government and its internal members to hold or utilize government information to lead the government's administration (Rourke, 1960; Relyea, 2003; Lee & Jung, 2011). However, due to the growth of civic society and the spread of local autonomy, the participation of local citizens in the administrative process was highlighted. Consequently, several systems were established to provide government information to citizens, such as the Freedom of Information Act (FOIA), based on the people's right to know.

Furthermore, attempts have been made to provide government-owned information and data to the public (Kassen, 2013; Moon, 2018; Sandoval-Almazan & Gil-Garcia, 2016) to collaboratively solve the wicked problem (Rittel & Weber, 1973). In this regard, several scholars have pointed out that releasing government information and data online contributes to promoting transparency and provides opportunities to participate in policymaking actively and solving public problems (Attard et al., 2015; Janssen, 2011; Lorenco, 2015; Verhuslt & Young, 2016). The phenomenon of opening government information and data to citizens via digital government platforms, often summarized as the "open government movement," has been a compelling agenda

worldwide since the Obama administration's announcement of the "Open Government Directive" (OGD) in 2009.

Recently, the unprecedented outbreak of the COVID-19 pandemic has further highlighted the significance of open government. Opening government information on the COVID-19 situation and the response of a transparent government alleviates public anxiety arising from questioning the public sector's role and capability[1] (Moon, 2020). Furthermore, the data-based agile response to COVID-19 occurred through the opening of public data and collaboration with the private sector (Moon, 2020). For instance, public mask apps that show the real-time mask inventory check are an example of the dramatic reduction in inconveniencing citizens through collaborative governance with open data.[2]

The open government movement, initially led by the central government's initiatives, gradually spread and has been implemented at the local government level (Wirtz & Birkmeyer, 2015). The local government, the closest government unit to the residents, also produces and manages meaningful government information and data. They usually understand local issues better than central governments (Seo & Myeong, 2015). The local government could also react and meet local citizens' needs in a more productive and cost-efficient manner by harnessing the collective wisdom of the local communities, such as their knowledge and visions of local challenges (Kassen, 2013: 508).

Although the open government movement started under the leadership of the central government, the level of openness of

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[1] For example, a public health center in Gwanak-gu, Seoul, is releasing its vaccine daily record online (www.open.go.kr). Since vaccinations started, Gwanak-gu has disclosed cases of adverse reactions and the degree of post-monitoring.
[2] https://www.korea.kr/news/policyNewsView.do?newsId=148875968

government information (abbreviated as OGI) at the local level shows quite a different (Tejedo-Romeo & Araujo, 2020). The gap in OGI in decentralized local autonomy systems is a weighty matter as is securing central government openness. South Korea, with its 30-year history of local autonomy, has encountered difficulties with monitoring and checking the local governments' performance and quality of administrative services due to continuous devolution. Moreover, the combination of local government leaders' growing power and the local closed social culture also made it difficult to monitor and check the local government's policy activities (BAI Korea,[3] 2013; Cho, 2017; Kang, 2010; Jang, 2010). The different levels of OGI in local government might cause deviations in the external monitoring level and local administrative service quality by region, and the subsequent damages unavoidably can affect the local citizens. From a long-term perspective, the persistent regional imbalance of OGI hinders the maturity of the entire local autonomy and might cause it to diminish the meaning of local autonomy. Thus, the following research question is raised: Which factors determine the openness of government information (abbreviated as OGI) in local government?

The literature explains this question in two aspects: external and internal influences. Several studies focus on the external forces on OGI. Based on institutional theory, these researchers believe that the worldwide open government phenomenon is a "myth" and exists as external pressure so that government leaders promote their OGI to obtain legitimacy (Albalate Del Sol, 2013; Altayar, 2018; Chen & Han, 2019; Janssen, Charalabidis, & Zuiderwijk, 2012; Melin, 2016; de Araujo et al., 2015; Grimmelikhuijsen & Feeny, 2017; Grimmelikhuijsen &

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[3] The Board of Audit and Inspection of Korea (2013).

Meijer, 2015; Kim et al., 2009; Tejedo-Romero & Araujo, 2020). Accordingly, these researches have emphasized institutional and environmental factors such as political conditions and socio-demographic characteristics. On the other hand, a relatively small number of studies have highlighted the internal attributes of government for the OGI. They found their theoretical backgrounds in the diffusion of innovation theory and resource-based theory and explain that the OGI can be determined by internal resources, technical capacity, and the characteristics the organization's members (Chatfield & Reddick, 2018; Kim & Eom, 2019; Wang & Lo, 2016; Yavuz & Welch, 2014; Zhao & Fan, 2018; 2021). These studies have noted that organizational resources are significant challenges for governments to open government information and data (Zhenbin et al., 2020).

As a social actor, however, local government not only adapts to the institutional pressures to survive in an institutional environment but also intentionally strives to achieve its goals by strategically utilizing its resources (Meyer, 2010; King, Felin, & Whiten, 2010). Hence, the OGI of local government needs to be understood from a balanced perspective: local governments' intentional and active efforts are as critical as external factors for understanding the OGI of local government. In particular, considering that the open government initiatives posit opening and sharing digitalized connectable and reusable data and information via the public by government portal (Moon, 2020), the organization's technical condition does matter to the OGI. But, most previous studies do not focus on internal forces in local government. In other words, the literature views the OGI of local governments in a somewhat biased perspective. To address this limitation, Grimmelikhuijsen and Feeny (2017) attempted to develop an

integrative framework for OGI in local governments that considers both internal and external factors. Yet, their study lacks the theoretical background to explain the internal determinants of OGI, and still emphasizes external pressure to explain the driving forces of open government. In this regard, this study explores determinants of OGI in local governments based on the Technological-Organization-Environment framework (Tornatzky & Fleisher, 1990), which considers both internal and external factors but values the organization's technical context. This study seeks to shed light on local governments' intentional and active role in OGI by focusing on internal drivers.

Moreover, this study attempts to identify the critical external influences relatively neglected in the OGI literature: local citizens and neighboring governments. As essential sources of power and finance of local governments and actors in local governance (Jung, 2012), local citizens serve as consumers and actual users of local government information and data. The local citizen factors are explicit demand-side factors rather than other factors that focus on the supply-side effect. However, their influence on OGI are somewhat overlooked in previous studies, probably due to a lack of empirical data to verify local citizens' impact on OGI. Besides, unlike at the national level, local governments face a dynamic policy environment because they are adjacent to several local governments. They perform policy activities through interactions such as learning, mimicking, and competing; thereby, the local autonomy system is a necessary condition for policy diffusion (Shipan & Volden, 2012: 792). Since the open government movement has spread worldwide as an innovative value (Ruijer & Meijer, 2020), the influences from the neighboring government on OGI might affect the local government's OGI. Several researchers have discussed this effect

(Grimmelikhuijsen & Feeny, 2017; Tejedo-Romero & Araujo, 2020), although, they did not use geographical information while measuring and verifying the effects of geographically adjacent governments.

Under the main research question, "Which factors make the local government open information and data?" the purposes of this dissertation are threefold: Firstly, this dissertation aims to highlight the intentional effort of local government in opening government information and data. This study will provide a balanced perspective to deepen understandings of the OGI at the local level. Secondly, the new influences that matter at the local level, but relatively neglected in the literature, are examined. The impacts from local citizens and neighboring governments are verified. Influences from both organized and individual local citizens are demonstrated. While estimating the neighboring effect, this study uses the geographical data of each local government and employs the appropriate estimation method to avoid bias. Lastly, this study attempts to suggest the relevant policy implications to enhance the OGI at the local level based on the empirical findings of this research.

1.2. The Scope and Method of This Research

1.2.1. Research Subject and Scope

The empirical context of this study is lower-level local governments in the Republic of Korea (hereafter referred to as Korea). Like most countries worldwide, the Korean government also joined the Open Government Partnership (OGP), a multilateral cooperation project launched in 2011 after President Obama's speech at the UN in 2010 (Yoon, 2020). The Korean government has established the institutional foundation to open information and data from all public organizations, including central and local governments. Since the Park Geun-Hye administration announced "Government 3.0" in 2013, the central government worked to open the original government documents and public data sets to the public. To legally support these initiatives, the Korean government amended *Official Information Disclosure Act* and enacted the *Act on Promotion of the Provision and Use of Public Data* in 2013. Accordingly, the government strongly recommended that all public organizations in Korea, including local governments, proactively open their information and data even if without public disclosure requests from the public.

Among public organizations subject to the above two laws, the lower-level local government is the closest government unit to the local resident and greatly influences their daily lives (Lee, 2013; Ha, 2010). They are not only the main providers of various administrative services that citizens encounter in their living environment but also the policymakers of local policy (Pratchett, 1999). The lower-level government, which delivers services that can directly affect the quality of life of residents, produces much information and data during

administrative activities. Korea's lower-level local governments are also subject to the two laws and have released government information obtained and managed their duties through an integrated online platform.[4]

In this context, this study selected lower-level governments in Korea to research subjects. All 226 lower-level governments were included. However, Sejong City and Jeju island do not contain any lower-level government, so they are included as the research subjects. In total, 228 local governments of Korea are the research targets. The time scope is from 2015 to 2019; thereby, five-year panel data were collected and analyzed.

1.2.2. Research Method

This study views the openness of government information (OGI) as twofold: (1) the extent to which citizens can monitor the government's internal workings and (2) the extent to which citizens can have opportunities to participate in policymaking through the government information and data provided via government portal. This dissertation measures the quantitative and observed level of OGI in local government. Thus, the former is measured with the disclosure rate of the original administrative documents, and the latter with the number of open datasets in each local government.

To accomplish the purposes of this dissertation, two models are analyzed. In <Model 1>, the influence of technology-related factors, organization factors, and environmental factors on local government's

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[4] Representatively, there are two official platforms:
(1) Information Disclosure Portal (http://open.go.kr) and (2) Public Data Portal (http://data.go.kr).

OGI is verified with panel linear regression analysis (fixed-effects model). <Model 1> is based on its theoretical foundation on the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990). The model is designed to overcome the limitations of previous research that overlooked the internal drivers of local government to enhance OGI and the impact of the local citizens as a major environment of local governance.

    <Model 2> verified the influence of the neighboring government factor. <Model 2> is created and analyzed to add the neighboring government factor to <Model 1>. Hence, the integrative model, including technology-related factors, organizational factors, environmental factors, and neighboring government factors, is developed and tested. To identify the impact of geographically adjacent governments, the spatial effect on OGI is visualized with the quantile map to identify the spatial dependence among local governments. Then, spatial panel regression (spatial lag model), which can estimate the spill-over effect among local governments, is employed.

1.3. Plan of This study

In addition to these introductory remarks, this study has five chapters. In <Chapter 2>, this study conducted a thorough review of the relevant literature relating to the definition of openness of government information (OGI), expected effects of OGI, and related theories. The empirical contexts of OGI in Korean local governments were also reviewed. <Chapter 3> includes the research framework, hypotheses, and a description of the data and measurements used to test research hypotheses. The detailed analysis plans are also demonstrated. <Chapter 4> shows the empirical results of this dissertation. This study demonstrated descriptive statistics of research variables, annual quantile maps visualizing OGI distribution in geographical approach. The author presented and discussed the empirical results and main findings of models 1 and 2. In <Chapter 5>, a brief recapitulation of the study's main results is presented. Also, the author suggests theoretical and policy implications, some limitations of this research, and questions relevant to future research are presented.

CHAPTER 2.

Theoretical Backgrounds and Literature Review

2.1. Openness of Government Information: Conceptual Definition and Backgrounds

2.1.1. Defining Government Information

Governments and public administrations worldwide generate vast amounts of information during their policy activities and numerous interactions with citizens and other private organizations (Yannoukakou & Araka, 2014). In this sense, Cleveland (1986) suggested that "government is information" because its raw material is information inputs and its product is those inputs transformed into policies, which are an authoritative form of information (Cleveland, 1986: 605). The government bodies at all levels of administration collected, managed, and stored this type of information, both in electronic and in printed form (Yannoukakou & Araka, 2014). What, then, is government information? In general, government information is "the information generated, collected, maintained, managed and held by public organizations during the performance of their operational tasks" (Allen, 1992; Birkinshaw, 1997, OECD, 2005; Yannoukakou & Araka, 2014: 333).

  Government information encompasses an extensive range of information. According to Allen (1992), two major types of information are covered under the umbrella of "government information." For the first type of information, the government requires the collected,

created, and distributed information to perform its statutory functions. Federal departments and agencies create the second type of information for a purpose other than directly related to other performance (Allen, 1992: 67).

In practice, government information is information generated, compiled, or published by the government, at government expense, or as required by law, and it applies to all government publications, regardless of format (American Library Association; ALA). In the Korean context, the definitions of government information are found in various laws. For example, the *Electronic Government Act* defines administrative information, interchangeably used with government information, as "data prepared or acquired and managed by administrative agencies, etc." (Article 2). In the *Official Information Disclosure Act*, government information is defined as "matters recorded in documents (including electronic documents; hereinafter the same shall apply), drawings, pictures, films, tapes, slides, and other media corresponding thereto that are made or acquired, and managed by public institutions for the performance of their duties" (Article 2). In addition, the *E-learning Industry Development Act,* government information is defined as "documents, drawings, photographs, films, tapes and slides managed by public institutions which have prepared or acquired such information in the course of performing their duties, or matters recorded in a medium, etc. processed by a computer" (Article 2), To sum up, although the focusing point of each definition is slightly different, **government information refers to every form of record that is produced, published, acquired, and managed by the government or public agencies in line with their duties**.

Government information has distinct characteristics that differ from other general information (Lee, 1988: 466). Firstly, government information serves to assist in making decisions necessary to achieve public administrative objectives more reasonably and efficiently. This characteristic is the biggest attribute distinguishing government information from private-sector information. Also, it implies that government information should not be used for personal interests.

Secondly, government information is exclusive (monopolistic). Public authorities exclusively operate and manage government information, and therefore it is not readily available for purchase, such as business information from private organizations. In other words, access to government information is limited.

Thirdly, government information has legality. Unlike information from the private sector, government information legality means that in principle its collection, processing, utilization, and delivery must comport with relevant laws.

Lastly, government information is quite political. Particular government information may, if deemed to have had a profound impact on, or is likely to have an impact on the public, or if it is known so, the government shall assume political accountability for that information (Lee, 1988: 466–467).

2.1.2. Defining Government Openness: From the Perspective of the Open Government

Government openness is not a new concept. Historically, the concept arises in various contexts, including freedom of information, anti-corruption, and transparency (Nam, 2012; Wirtx & Birkmeyer, 2015), which although not yet conceptualized, indicates that government openness originated from democratic values. *Democracy in the Administrative State* (1969), Emmette Redford's work, discusses how democratic morality centers on the individual relationship with the administrative state. He emphasizes individual participation and explains that participation requires "access to information, based on education, open government, free communication, and open discussion" (Redford, 1969: 8). Access to government information is a central prerequisite of public participation that is the core of democracy.

The extant literature on public organizations had not operationally well-defined government openness (Demchak, Friis & La Porte, 2000). La Porte et al. (2002) noted an absence of a definition in government openness and thus defined it as "the extent that an organization freely and universally provides comprehensive information about all of its attributes and maintains timely communications directly to all key public audiences." This definition is close to the other democratic value, transparency, often understood as the extent to which the government permits citizens to know what it is doing through public information (Florini, 2002). Transparency is the most remarked upon pillar of open government, and even most government openness focuses on this aspect (Wirtz & Birkmeyer, 2015). So, openness and transparency are frequently used interchangeably (Bertot et al., 2010;

Heald, 2006: 25). For example, Piotrowiski (2008) suggests that government transparency can equate government openness through avenues such as government records. Yoon (2004) also understands openness as a quantitative aspect of transparency in terms of the provision and distribution of government information.

However, some scholars have tried to distinguish between those concepts (Meijer et al., 2012). Heald (2006) conceptualizes openness as a characteristic of organizations, while transparency also needs an external presence capable of processing the information. On the other hand, the literature on decision-making regards openness as access of other actors to management choices about complicated projects (Klijn et al., 2008) so that openness is equated with the accessibility of the decision-making arena (Meijer et al., 2012).

During the last decade and to date, the concept of government openness has encountered new trends and its meaning expanded in the name of "open government," become popular among politicians and policymakers and has even been hailed as a new governance paradigm (OECD, 2006). In the following sections, this study will examine the background of the emergence of the open government concept and investigate the definition and dimension of government openness from the perspective of open government. In sum, I will propose a definition of "Openness of Government Information," which is this dissertation's main keyword and used consistently throughout.

2.1.2.1. The Open Government Movement

In 2009, on his first day in office, U.S. president Barack Obama issued the OGD, which encouraged governments and public agencies to

"establish a system of transparency, public participation, and collaboration" (McDermott, 2010; White House, 2009). The government issued the OGD, which required public agencies to take actions that could promote a culture of transparency into how agencies work (McDermott, 2010).

In order to become an "open government," the OGD required public agencies and executive departments to take several steps. McDermott (2010) summarizes the main idea and actions of the OGD as follows. First, publish government information online. To promote accountability and enhance the public's informed participation, the OGD required each agency and the department to take immediate actions to increase the access to information available on the internet in open formats (McDermott, 2010: 402). Next, improve the quality of government information. The information published online had to meet the criteria of information quality that OMB provided. Moreover, the OGD encouraged them to create, promote, and institutionalize a culture of open government. The government expected senior leaders to strive to integrate the value of open government, transparency, participation, and collaboration into their organizational culture and structure (McDermott, 2010: 402). The strong recommendations were into effect promptly. By January 2010, public agencies and executive departments had to create three high-value data and make them available to the public through data portals, Data.gov. The OGD also expected them to create new data sets and upload them to the portal so that the available government data complied with up to 100,000 new sets. In February 2010, agencies had to establish open government web pages located at www.agency.open. By April 2010, they were also

required to have and post their Open Government Plan (McDermott, 2010: 402).

In 2011, the Obama administration launched the Open Government Partnership (OGP) at the U.N. General Assembly, which became a global trend in public administration. The OGP aims to "secure concrete commitments from governments to promote transparency, empower citizens, fight corruption and harness new technologies to strengthen governance" (Elgin-Cossart et al., 2016: 2). Today, 78 countries are members of OGP[5], and they work together with numerous nongovernmental and international organizations that wish to promote government openness globally (Schnell & Jo, 2019). Even aside from the OGP initiative, national and local governments are adopting various open government (OG) measures such as open data portals and other online tools that help to consult and involve citizens and policymakers (Wirtz & Birkmeyer, 2015).

2.1.2.2. The Concept and Dimension of Government Openness (Open Government)

Recent, previous studies considered government openness under the context of the open government paradigm, and applied government openness as the measuring concept of open government so that they are even used interchangeably in the literature (Correa et al., 2014; Gianluca., 2011; Ingram, 2020; Meijer et al., 2012; Schmidthuber et el., 2020; Schnell, 2020; Schnell & Jo., 2019; Yavuz & Welch, 2014). Reflecting on recent research trends, this study understands

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[5] Referred to the official website of OGP (https://www.opengovpartnership.org/our-members/). Search date: 2020-11-13.

government openness as a concept of measuring open government and develops further discussion.

Despite the tremendous popularity of open government, there is no agreement on its definition (Veljković et al., 2014; Schnell, 2020). The latest dominant stream focuses on the online release of data sets in the form of allowing easy analysis and reuse (Attard et al., 2015; Bongdanovi & Stoimenov, 2014; Janssen et al., 2012; Ruijer et al., 2020; Wang & Lo, 2016; Yang et al., 2015). Others have emphasized increased utilization of social media tools to better openness to citizen input (Chun et al., 2010; Gunawong, 2015; Jaeger & Bertot, 2010; Lee & Kwak, 2012; Mergel, 2012).

Although government openness is defined in diverse ways, Meijer et al. (2012) suggested a seminal framework for its conceptualization. In their study, they defined government openness as **"the extent to which citizens can monitor and influence government process through access to government information and decision-making arenas."** Based on its definition, this study can conceptualize government openness with two components: vision and voice (Meijer et al., 2012).

In their study, the call transparency and participation, the main conceptual pillars of the Open Government Movement, vison and voice, respectively. **Vision (transparency) reflects the citizens' ability to see what is going on inside the government, while voice (participation) refers to citizens who have access to many kinds of decision-making arenas** (Meijer et al., 2012; Schnell, 2020). Figure 2.1 presents the relation between vision, voice, and government openness. Researchers adopting Meijer and his colleagues' conceptual framework

include Ingram (2020), Cingolani (2020), Ingram et al. (2020), Schnell (2020), Schnell and Jo (2019), and Ruvalcaba-Gomez et al. (2018).
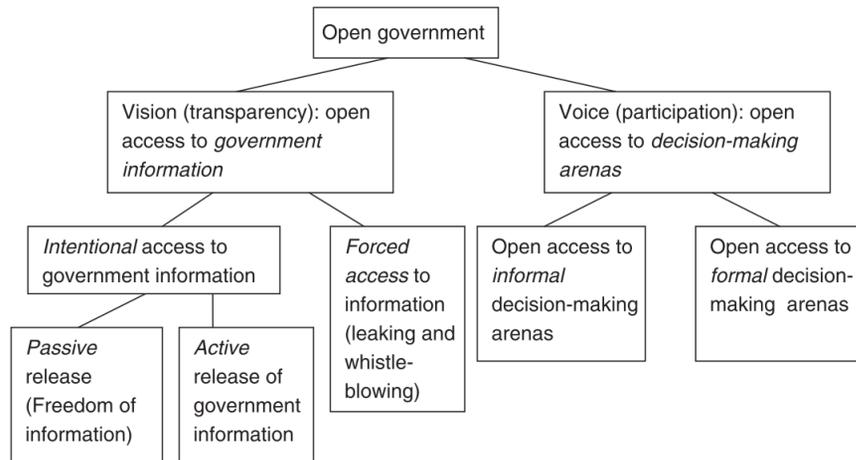
Figure 2.1. Dimensions of Government Openness: Vision and Voice
(Meijer, Curtin, & Hillebrandt, 2012: 14).

However, the two central dimensions of government openness might sometimes overlap. Access to information may be the precondition for access to decision-making because when citizens are willing to participate, they need to know the information about participation such as the time, place, and procedure. Conversely, access to the decision-making arena might be a precondition of access to information because government documents may be released at a public meeting (Meijer et al., 2012). In this light, these two components are not discrete but interactive.

The above approach divides government openness into two large components in the context of the Open Government paradigm, which subsequent studies develop and understand in more granular ways. For example, Velkjkovic et al. (2014: 280) suggested a conceptual model for open government, which consists of five components: **open data, government transparency, data transparency, participation, and**

collaboration. Open data refers to governmental data of public interest and data that can be easily located and accessed. Also, it is desirable when open data has the following characteristics: complete, primary, timely, accessible, machine-readable, and license-free (Open Government Working Group, 2007). Transparency can be divided into the transparency of government procedures and tasks (government transparency) and transparency of government-held data (data transparency). Letting people know the government's internal workings and examining whether their representatives have met their expectations is an important step in becoming an accountable government (Velkjkovic et al., 2014: 280). Participation refers to including citizens in the democratic processes (Parycek & Sachs, 2010), which is achieved by interactive communications. Lastly, collaboration's aim is toward more responsive decision-making based on collaborative work and feedback information.

Recent research by Gil-Garcia, Gasco-Hernandez, and Pardo (2020) developed and identified the dimension of open government. Their research suggested five elements of open government consistently found in the previous literature: **information availability, transparency, participation, collaboration, and information technology (IT)**. Transparency, participation, and collaboration, which are the main pillars of OG, are also important and included in the study's conceptualization. But two additional elements are better highlighted. Notably, the first dimension emphasizes information availability in the conceptualization of OG because it is an important initial step in achieving an authentic open government policy (Fierro & Gil-Garcia, 2011; Lourenco, 2015; Noveck, 2009; Gil-Garcia, Gasco-Hernandez, & Pardo, 2020). Moreover, it argues that government

information availability is the foundation of open government (Janssen et al., 2017; Lee & Kwak, 2012; Gil-Garcia, Gasco-Hernandez, & Pardo, 2020).

IT is also much underlined in the study as a key element of OG. According to Gil-Garcia et al. (2020), IT is increasingly playing a very important role, and even may serve as a crosscutting dimension that could promote or hinder any of the other dimensions. IT is represented by websites, mobile applications, and other smart technologies that provide access to information and platforms for participation and collaboration. In addition, through the use of technology, dissemination and publication of information becomes easier and less costly (Fierro & Gil-Garcia, 2012; Kim et al., 2015; Porumbescu, 2016; Gil-Garcia et al., 2020). Although government openness existed before the internet era, it seems clear that in the current environment, government and citizens should consider the role of information technologies (Gil-Garcia et al., 2020: 488). Summing up, IT is a powerful tool for providing citizens with access to information, the basis of OG, and also helps them to interact more effectively with the government, to make better decisions in their daily lives, and to potentially innovate (Chun et al., 2010; Gil-Garcia et al., 2020).

However, Schnell (2020) casts doubt on the importance of IT in OG and suggested that technological measures for openness are not by themselves sufficient to ensure systemic government openness to social inputs. In this regard, Schnell (2020) classified government openness with a narrow and broad perspective. In a narrow perspective, government openness refers to "specific measures (tools)" to promote accessibility of information and chances for civic participation. This approach emphasizes the use of information communication

technology (ICT) and online tools such as data portals and social media and encourages citizens to utilize government information to engage more with the government. On the other hand, in a broad perspective, OG can be understood as a "system of governance" in which governments inform citizens selectively about public decisions and citizens can determine what to do with the government information and how to engage with public institutions.

Moon (2020) advanced an interesting framework with four dimensions of open government. Moon (2020) argued that the paradigm of open government has shifted in four dimensions: policy focus, nature of information, primary value, and role of citizens. He defines the current open-data-initiatives-based open government as "new open government," which differs from the "old open government" that is a conventional open government movement for right-to-know. Notably, he considers the role of citizens as one of the critical dimensions in open government framework. In his view, the role of citizens has changed from passive informed and service recipients (old open government) to active co-producers of public services and users of open data. Table 2.1 summarizes Moon's (2020) framework with its four critical dimensions.

Table 2.1. Old open government vs. New open government (Moon, 2020, p.538)

Dimension	Old open government	New open government
Focus of policy	Freedom of information policy, Right to know	Open government initiatives, Open data initiatives
Nature of information and data	Traditional segregated information	Digitalized connectible and reusable information (Data, APIs)
Primary administrative values	Transparency, accountability	Interactivity (participation and collaboration), accountability
Role of citizens	The informed information receivers	Coproduction (co-designers, and co-delivers) and networked collaborative governance

Scholars' perspectives and discussions on the OG concept and its components of OG vary. Table 2.2 summarizes and classifies the OG dimensions in accordance with the vision-and-voice framework (Meijer, Curtin, & Hillebrandt, 2012).

Table 2.2. The Dimensions of Open Government

Dimensions of Government Openness			Reference
Vision (transparency)	**Voice (participation)**	**Other components**	
Transparency, accessibility	Responsiveness		OECD (2006)
Transparency	Participation, collaboration		White house (2009)
Vision (transparency)	Voice (participation)		Meijer, Curtin, & Hillebrandt (2012), Ingram (2020), Schnell & Jo (2019)
Transparency	Participation collaboration		McDermott (2010) Moon (2020)
Access, government information	Decision-making arena		Grimmelikhuijsen & Feeny (2016)
Data transparency, government transparency, open data	Participation, collaboration		Velkjkovic et al. (2014)
Vision (transparency)	Voice (participation)	Technology	Schnell (2020)
Information availability, transparency	Participation, collaboration	Information technology	Gil-Garcia, Gasco-Hernandez, & Pardo (2020)
Transparency	Collaboration	Information technology	Park et al. (2020)
Information availability, transparency	Collaboration	Information technology	Chen et al. (2020)

2.1.3. Definition of Openness of Government Information in This Dissertation

Reviewing various conceptual discussions on government openness in the extant literature, this study noted that recent, related research has shown that government openness and open government are closely related and even equated interchangeably. Accordingly, this study understands government openness from the perspective of the OG.

Moreover, this study focuses on the importance of information availability as a foundational and core aspect of OG and IT as an enabler of OG in practice. Gil-Garcia, Gasco-Hernandez and Pardo (2020) emphasize this approach. As a result, this dissertation defines openness in government information (abbreviated as OGI) as **"the extent to which citizens can see and influence government workings and have opportunities to participate in public policymaking through the government information provided via government portal."** This definition encompasses the core concepts of open government, which are vision (transparency) and voice (participation) that Meijer et al. (2012) suggested. Also, this definition is similar to the narrow perspective of open government from Schnell (2020), which refers to online tools such as the open-data portals considered a direct manifestation of open government worldwide (Cahlikova & Mabillard, 2020). However, this dissertation named it "openness of government information," not "government openness" because it highlights more on the availability of government information (data) and embeds the limitation that it cannot encompass the concept of collaboration, which is one of the main components of open government. Under this definition, the move toward greater openness of government information is expected to narrow the gap

between governments and citizens by reducing the asymmetry of information exchange between them (Cahlikova & Mabillard, 2020; Pasquier, 2013; Wijnhoven, Ehrenhard, & Kuhn, 2015) and providing more opportunities for citizens to participate in public matters.

2.2. Expected Effects of Openness of Government Information

How will the openness of government information affect society? Normative perspectives on government openness distinguish it in two aspects (Heald, 2006): intrinsic value and instrumental value. Regarding intrinsic value, researchers have considered government openness a core value for governance, an alternative paradigm for overcoming market and government failure (Lee, 2016). Governance, understood as a multiple-stakeholder process of policymaking through active discussion among policymakers (Kim et al., 2005; Kooiman, 2003), works well with reciprocally sufficient information and greater openness in public issues (Vishwanath & Kaufman, 2001). However, scholars have focused much more on the instrumental value of OGI, and abundant studies on its effects have accumulated. In the following sections, the possible effects of OGI discussed in the literature is explored, including positive and negative effects.

2.2.1. Positive effects of Openness of Government Information

Ruijer, Grimmelikhuijsen, and Meijer's (2017) study claimed that OGI fosters the democratic processes: monitorial, deliberative, and participatory. They argued that opening government data and its use enhances monitoring government behavior (monitorial democracy), feeding public debate (deliberative democracy), and enables joined action (participatory democracy) (Ruijer et al., 2017: 50). Released information and data ensures transparency by accessing data, promoting the communications between government and citizens, and facilitating

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collaboration with government and stakeholders such as refining the solutions and working together in public problems (see Table 2.3).

Table 2.3. Effects of OGI on the democratic process

	Monitorial democracy	Deliberative democracy	Participatory democracy
Object	Government performance	Public problem	Public problem
Role of citizen	Watchdog	Partner in dialogue	Partner in collaborative governance
Role of government	Provider of information and data	Facilitating dialogue	Partner in action
Outcome	Critical view on government behavior	Contribution to debate about public problem	Joined actions regarding public problem

*Revised contents from Ruijer, Grimmelikhuijsen, and Meijer, 2017, p.50.

Other empirical studies attempt to examine and verify the relationship between OGI and other administrative values. Many researchers also attempt to explain the relationship between government openness and trust (Bennister et al., 2011; Caterberg & Moreno, 2006; Cucciniello & Nasi, 2014; Grimmelikhuijsen et al., 2013; Kim & Lee, 2012; Lee, 2016; Mason et al., 2014; Meijer et al., 2014; Porumbescu, 2015; Schmidthuber et al., 2020; Sternstein, 2010). They have argued that positive assessments of citizens toward the transparency of government can serve as a key variable that affects public trust in government (Kim & Lee, 2012; Vigoda-Godot, 2007; Wang & Wan Wart, 2007). The premise of the belief that greater transparency enhances greater trust in government is the assumption that the more objective information citizens have about their government, the more positively they will perceive their government (Buell & Norton, 2013; Mettler, 2011).

Several studies have discussed OGI's effect on accountability (Bordignon & Minelli, 2001; Meijer, 2003; Lourenco, 2015; Pina et al.,

2010; Janssen et al., 2015). They note that government openness promoted by the use of ICT will positively enhance government accountability. Lourenco (2015) analyzed global open government portals and explained that the open government portal is one of the manifestations of open government initiatives that promotes the accountability of each government.

The level of OGI also positively influences citizen satisfaction (Eskildsen & Kristensen, 2007; Park, 2017; Welch et al., 2005). So far, public sectors are increasingly inclined to conduct sample surveys on citizen satisfaction to measure the performance of their services and to collect feedback from customers on service delivery (Hatry et al., 1992; Miller & Miller, 2000). On the one hand, the literature also recognized citizen satisfaction as one of the government's performance indicators. Park (2017) empirically verified the relationship between information disclosure of public agencies in South Korea and determines that the level of opening information of public agencies is positively related to citizen satisfaction.

A substantial amount of studies is paying attention to the positive effects of OGI on corruption (Azfar & Nelson, 2007; Bertot et al., 2010; Lindstedt & Naurin, 2010; Peisakhin, 2011; Bauhr et al., 2019; Michener & Bersch, 2013). Piotrowski and Borry (2010) highlighted that openness prevents misappropriation and conflicts of interest when the public can monitor how public money is spent. This monitoring is possible when the public can obtain information about internal government information. The previous study on whistleblowing stressed that information is a foundation of power, so information can, in turn, offset abuses of power (Skivenes & Trygstad, 2010). In this

regard, opening government information is one of the most important antidotes to corruption (Bauhr et al., 2019; Michener & Bersch, 2013).

Besides, various studies investigate other positive effects of OGI. For example, several researchers examined the impacts of OGI on political participation (Benito & Bastida, 2009; He et al., 2020), better governance (Islam, 2006), and quality of public service (Bauhr & Carlitz, 2020).

2.2.2. Negative effects of Openness of Government Information

Although the literature highlights the many positive effects of OGI, some unintended or even adverse effects might exist (see Table 2.4). First, the literature increasingly examines the negative effects of openness, such as decreased government trust. Some studies advocate that more government openness would increase government trust. Several studies, like those of Grimmelihuijsen (2012), Grimmelikhuijsen et al. (2013), and Porumbescu (2017), insisted that the effect of transparency should not be overstated: The more the government is open to the public, they argue, the less trust the citizens could have in their government due to the discrepancies in expectations that citizens had in the government. Matheus and Janssen (2020), who present the result of a meta-analysis on the open government literature, also showed the possibility of the two-way influence of government openness on government trust. They summarize that government openness can result in more credibility and trust, but occasionally, a decrease in trust can result from this government openness and seeing

how the government works or does not work (Matheus & Janssen, 2020: 512).

Another topic frequently discussed as a negative impact of OGI is privacy. In the process of opening the vast amount of government held data, the data can include privacy-sensitive information (Harrison et al., 2012; Janssen & van den Hoven, 2015; Matheus & Janssen, 2020). Because sovereignty of government data resides with citizens, citizens' privacy concerns can serve as an important potential risk factor for the accumulation and management of government data from a long-term perspective. Indeed, according to Park (2020), citizens' concern about their privacy has an empirically negative impact on the accumulation of government data to prevent crime.

In addition, the literature pointed out that OGI might result in information overload and errors (Grimmelikhusen, 2012) which may harm an administration's efficiency of administration (Prat, 2005). Also, the low quality of information (accuracy or manipulated) might worsen or fail to contribute to resolving information asymmetry.

Table 2.4. Expected effects of OGI

Expected effects	Reference
Government trust	Bennister et al., 2011; Caterberg & Moreno, 2006; Cucciniello & Nasi, 2014; Grimmelikhuijsen, 2009; Grimmelikhuijsen et al., 2013; Grimmelikhuijsen & Meijer, 2014; Lee, 2016; Mason et al., 2014; Meijer et al., 2014; Porumbescu, 2015
Accountability	Bordignon & Minelli, 2001; Lourenco, 2015; Meijer, 2003; Pina et al., 2010
Corruption	Azfar & Nelson, 2007; Bertot et al., 2020; Kurtzman, Yago, & Phumiwasana 2004; Lindstedt & Naurin 2010; Montinola & Jackman, 2002; Peisakhin, 2011
Civil satisfaction	Eskildsen & Kristensen, 2007; Kim & Lee, 2012; Park, 2017; Welch et al., 2005
Political participation	Bauhr & Grimes, 2014; Benito & Bastida, 2009; Dahlberg & Solevid, 2016
Quality of public service	Hood & Heald, 2006; Islam, 2006

2.3. What factors make the governments open their information?

This section overviews the related theories explaining the influence of OGI in previous research. This section will examine institutional theory, which emphasizes the external and institutional pressure on OGI. The author also discusses the diffusion of innovation theory, the resource-based theory that focus on the internal influence of organization. And we verify the TOE framework, which especially values the technological (internal) context of the organization but considers external contexts. After reviewing the related theories, this section will identify the influential factors of OGI identified in previous literature.

2.3.1. Related Theories

2.3.1.1. Institutional Theory

Institutional theory has progressed over the decades in multiple disciplines like political science, economics, history, and sociology. Each discipline has its own perspective, but all are commonly skeptical toward the rational-actor model, once dominant in the study of human behavior in social science (Hassan & Gil-Garcia, 2011). Regardless of academic field, researchers generally agree that institutions and the social processes surrounding their evolution, maintenance, and transformation matter in the fashioning of social life (Scott, 2003). What is an institution? Scholars conceptualize institutions in diverse perspectives but they are often guidelines for human action or appropriate behavior in society (March & Olsen, 2010). These

guidelines are produced and reproduced historically and therefore taken-for-granted (Zucker, 1977). Thus, an institution is a rule of behavior based on several important foundations like culture, legislation, social norms, and political structure. Scott (2001) summarized the foundations and concepts into three pillars that support institutions: cultural-cognitive, normative, and regulative. The core logic of institutional theory, then, is that organizations conform to dominant institutional pressure in the institutional environment and acquire social legitimacy for the survival and success of the organization (Meyer & Rowan, 1977; Zucker, 1977). These discussions later came into the spotlight when Dimaggio and Powell (1983) used the concept of isomorphism to explain that three institutional pressures lead organizations have similar tendencies (Jung, 2012). DiMaggio and Powell (1991) identified the three institutional pressures that could affect organizations as coercive pressures, mimetic pressure, and normative pressures.

According to institutional theory, legitimacy seems is a core concept. Although Zucker (1977) only mentioned legitimacy once in passing, Meyer and Rowan (1977) made it their central focus (Deephouse & Suchman, 2008). Suchman (1995: 574), who synthesizes the diverse research on organizational theory, defined legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions." The OGI literature often uses organizational legitimacy as a motivation mechanism for organizations to open their internal information (Deegan, 2002; Lee, 2013; Munoz et al., 2015; Rodríguez-Bolívar et al., 2013; Serrano-Cinca et al., 2009). If an organization's legitimacy is threatened, the

organization will disclose information to promote organizational legitimacy (Deegan, 2002). Information disclosure about organizations' activities is a way to legitimate actions to their stakeholders (Archel et al., 2009) and award legitimacy to organizations (Patten, 1992). Heald (2006) and Roberts (2006) pointed out that openness positively affects public perceptions of political decisions and decision-makers. In this respect, scholars found out that "transparency can indeed increase the legitimacy of representative decision-making" (De Fine Licht et al., 2011). Opening government information may enhance citizens' sense of control by making politicians accountable for their actions and increase their understanding of public decisions. Moreover, it may be used to regain the confidence of citizens and change their perceptions of the organization, enhancing the legitimacy of elected public officials. In addition, offering an image of good governance in response to public pressure is a way to secure legitimacy and enhance municipalities' reputation (de Araujo et al., 2016; Pina et al., 2010).

Among recent open government research, substantial studies explain the driver of widespread open data initiatives with a concept from institutional theory (Altayar, 2018; Janssen, Charalabidis, & Zuiderwijk, 2012; Melin, 2016); namely, the benefits from open data are a "rationalized myth" that contributed to the rapid institutionalization of open data policy (Altayar, 2018; Janssen et al., 2019). For instance, open government initiatives have prevailed worldwide, and several developed countries have institutionalized the initiatives very well and receive enormous interest among policymakers, professionals, politicians, industry, and public agencies. Furthermore, measures for OGD are desirable alternatives that promote transparency, improve access to government information, have economic value, and support

the function of public administration (Altayar, 2018; Janssen et al., 2012; Melin, 2016). In Janssen et al.'s (2012) study, they identified fives myths of open data initiatives: (1) The publicizing of data will automatically provide benefits, (2) all information should be unrestrictedly publicized, (3) it is a matter of simply publishing public data, (4) every constituent can make use of open data, and (5) open data will result in open government (Janssen et al., 2012: 264-266).

With these "myths" of open government, studies have demonstrated that institutional pressure led to open data adoption among government agencies (Sayogo et al., 2014; Hossain & Chan, 2015; Wang & Lo, 2016). Sayogo et al. (2014) argued that normative pressures encouraged data providers to increase their transparency through the open data portal. Hossain and Chan (2015) also discussed how institutional pressures affected the organization's adoption of open data. And Wang and Lo (2016) explained that external pressure such as great emphasis from the high-level agencies and social expectation affected the adoption of open data initiatives among public agencies (Altyar, 2018).

2.3.1.2. Diffusion of Innovation Theory

Diffusion of Innovation theory (DOI), developed by Rogers (1962), explains how over time, innovation, like a new idea, behavior, or product, spreads and diffuses through a specific population or social system (Rogers & Shoemaker, 1971). This theory views the individual as possessing different degrees of willingness to adopt innovations, and thus it is generally observed that the portion of the population adopting innovation. Hence, DOI suggests five adopter categories based on the

relative time of innovation adoption and can be plotted on an S-shaped curve of adoption: innovators, early adopters, early majority, and laggards (Rogers & Shoemaker, 1971). Innovators are individuals, groups, or organizations that are the most agile in exploring and adopting innovative ideas, while laggards are individuals, groups, or organizations that are the most reluctant and traditional in innovativeness. And some will fall in between the two extremes based on the relative time of innovation adoption (Chatfield & Reddick, 2018).

Based on DOI theory at the organization level (Rogers, 1995), Rogers (1995) summarized several factors affecting the level of innovativeness of an organization (see Figure 2.2) based on the results of numerous empirical studies on organizational innovativeness. According to Rogers (1995), organizational innovativeness is related to such independent variables as individual (leader) characteristics, internal organizational structural characteristics, and external characteristics of the organization. (a) Individual characteristics describe the leader's attitude toward change. (b) Internal characteristics of organizational structure include observations according to Rogers (1995) whereby: "centralization is the degree to which power and control in a system are concentrated in the hands of a relatively few individuals;" "complexity is the degree to which an organization's members possess a relatively high level of knowledge and expertise;" "formalization is the degree to which an organization emphasizes its members' following rules and procedures;" "interconnectedness is the degree to which interpersonal networks link the units in a social system;" "organizational slack is the degree to which uncommitted resources are available to an organization;" and "size is the number of employees of the

organization." (c) External characteristics of organizational refer to system openness, and it refers to the extent to how linked the organization members are to the people external to the organization (Lundblad, 2003; Oliveira & Martins, 2010).
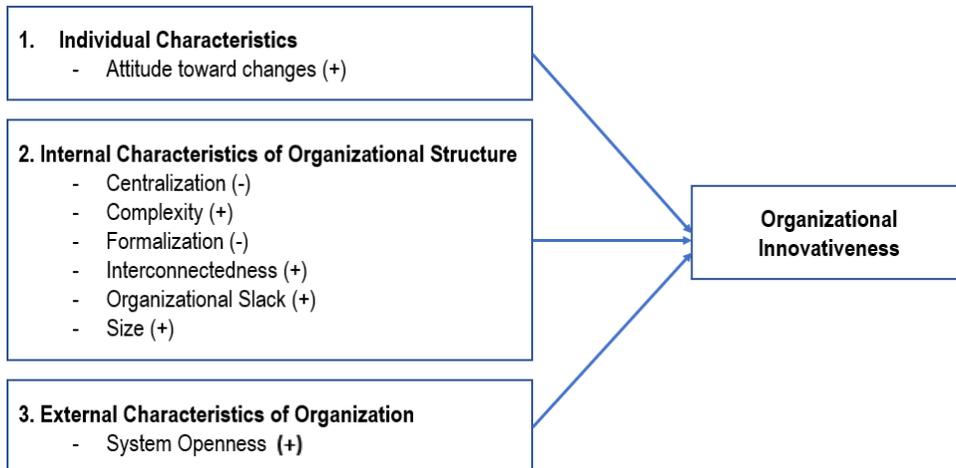
Figure 2.2. Independent Variables Related to Organizational Innovativeness (Rogers, 2003).

While the theory is one of the most widely used in social science, a main criticism of diffusion of organization theory is that it ignores the characteristic of technology (Lee, 2017) and neglects the influence of the external and institutional pressures (Chatfield & Reddick, 2018). Reflecting these criticisms, Davis (1986) presented the Technology Acceptance Model (1986) with the premise that the most influential factor is the characteristics of the technology itself. Nevertheless, Davis's (1986) model also failed to integrate the influences of the institutional and environmental context surrounding the organization.

2.3.1.3. Resource-based Theory

Resource-based theory (RBT) explains how different resources affect organizational performance. The RBT posits that organizations possessing valuable and rare resources attain competitive advantage, which leads to better performance (Barney, 1991; Lee & Whitford, 2013; Hansen, Perry, and Reese, 2004). In more detail, resources refer to "all assets, capabilities, organizational processes, firm attribute, information, knowledge, etc., controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Barney, 1991:101). Resources are the tangible and intangible assets that organizations use to develop and implement their strategies (Ray, Barney, & Muhanna, 2004). This theory provides a theoretical understanding of how resources can be employed for better outcomes and has been widely employed in diverse fields (Zhao & Fan, 2018).

Organizations contain many kinds of resources according to RBT. For example, Rainy and Steinbauer (1999) suggested three types of resources: financial, human, and technology. Hansen, Perry, and Reese (2004) classified an organization's resources into two broad concepts based on Penrose's (1959) argument: productive resources (needed for achieving goals) and administrative resources (to govern the use of productive resources). Grant (2005) classified resources into three groups: tangible, human, and intangible resources. Tangible resources include financial resources that determine a firm's resilience and capacity for investment and physical resources that reflect the firm's production potential. Human resources are productive services that organizational members offer to the firm in terms of skills, knowledge, and decision-making ability. Intangible resources include

technology-related intangibles and reputation. Information systems and e-government research widely uses Grant's (2005) classification (Bharadwaj, 2000; Chae, Koh, & Prybutok, 2014; Santhanam & Hartono, 2003).

In OGI literature, several studies ground their theoretical background to RBT. Zhao and Fan (2018), who explored the government agency's determinants of open government capacity (OGDC), adopted the RBT framework. Their study identifies organizational resources that can enhance OGDC with Grant's (2005) classification: tangible, human, and intangible resources. Zhao and Fan (2018) showed that organizational arrangement and technical capacity are directly related to the OGDC of government. Kim and Eom (2019), examined the factor on open data success to focus on the managerial capability and capture its importance in open data success. They also employed the resource-based theory in their research model and found out that financial resources significantly impact open data success. The OGI researches employing RBT seems to focus on internal factors within the organization as a determinant of OGI. In other words, organization capability such as technical capacity or financial resources positively impacts the OGI.

2.3.1.4. Technology-Organization-Environment Framework

Tornatzky and Fleischer (1990) introduced the TOE framework in their *The Processes of Technological Innovation*. They developed the framework to explain how the firm context influences the adoption and implementation of innovations. It is an organization-level theory that demonstrates how three different elements affect the firm's adoption decisions (Baker, 2011). This framework is consistent with the diffusion of innovation theory, emphasizing individual characteristics and the organization's internal and external characteristics as drivers for organization innovativeness (Oliveira & Martins, 2010). Furthermore, it seeks to identify the impact of the external environment faced by organizations adopting innovation (Lee, 2017).

The TOE framework's premise is that technological, organizational, and environmental contexts all affect the adoption of innovation in the organization. Technological context includes the characteristics of technology that may influence the adoption process based on the TAM model of Davis (1983). Organizational contexts contain elements of organizational factors based on Rogers's (1983) DOI. However, the biggest shortcoming of the DOI and TAM is that they do not consider the impact from the external environment faced by organizations seeking to introduce technology (Lee, 2017).

Organizations functioning under a social system cannot determine the acceptance of innovative technologies based solely on their internal factors within the organization. In other words, the external environment like competitors and institutions surrounding them inevitably influence organizations (Tsai et al., 2013; Lee, 2017). Thus, the influence of the system and isomorphism that organizations must consider when introducing the technology to their organization,

and in this sense, adding environmental factors is an attempt to integrate and develop models of DOI and TAM (Hsu et al., 2006; Oliveria et al., 2011; Lee, 2017). In this light, the TOE framework is consistent with institutional theory, which focused on the external and institutional pressures surrounding the organizations, and the DOI theory that focuses on the internal characteristics of organizations.

This TOE framework has three elements: *technological context*, *organizational context*, and *environmental context*. All three influence the adoption of technological innovation in the organization (Baker, 2011). In more detail, the technological context includes all the technological characteristics relevant to organization (Tornatzky & Fleischer, 1990). An organization's existing technologies are essential in the adoption process, as they set a limit on the scope and pace of technological change that an organization can undertake (Collins et al., 1988). The organizational context refers to the organization's characteristics and resources, including linking structures among employees, communication process, size of the organization, and the amount of slack resources (Baker, 2011; Tornatzky & Fleischer, 1990). The environmental context relates to the industry structure, competitions, the presence or absence of technology service providers, and the regulations. In sum, these three elements explain both constraints and opportunities for technological innovation (Baker, 2011; Tornatzky & Fleischer, 1990). Figure 2.3 demonstrates this framework visually.
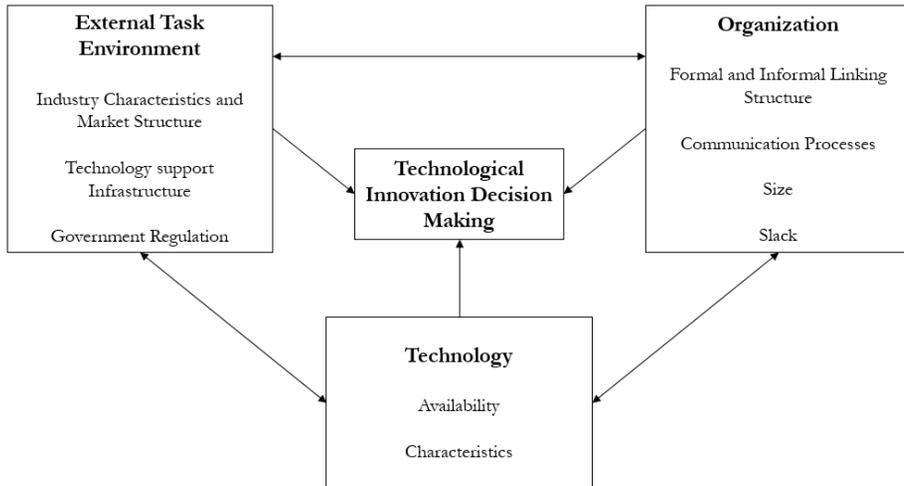
Figure 2.3. Technology-Organization-Environment (TOE) Framework.

Scholars applied the TOE framework widely to explain innovation adoptions in private sectors (Kuan & Chau, 2001; Mishra et al., 2007; Zhu & Kraemer, 2005). It can also explain the adoption of public sector innovations. For example, researchers use the TOE framework to study the open government data initiative (Wang & Lo, 2016; Yang et al., 2015; Zhao & Fan, 2021) and to understand e-government adoption at the local level (Moon & Norris, 2005; Yavuz & Welch, 2014) and intranet adoption within the government (Welch & Pandey, 2006). The framework's wide application is due in part to the fact that it contains various elements to encompass the complexity and diversity of reality better, and that it is a flexible model that can add new variables or modify existing variables. Although previous studies used slightly different factors to measure technological, organizational, and environmental influences, the core proposition of the framework remains: innovation is the result of the conflated influence of context (Chen et al., 2018).

Recent studies have focused on the phenomenon of enhancing government openness through ICT and understood it as one of the innovation activities in the public sector (Chen et al., 2019; Esteller-More & Polo Otereo, 2012; Wang et al., 2016; Yang et al., 2015). In the process of exploring the factors on the level of openness of government information or transparency, several researchers founded their theoretical backgrounds on the TOE framework.

 Chen et al. (2019), who examine the factors influencing the openness of fiscal information, explain that promoting online fiscal transparency with IT is like an innovative activity of state government. Their study classified the determinants into technological factors, organizational factors, and external environmental factors based on the TOE framework. Besides, they found that e-government level (technological); budget surplus (organizational); and educational attainment, Internet infrastructure, and legislation of state (environmental) were significant to the openness of government financial information.

Similarly, Wang et al. (2016), who explore factors affecting open government policy, also used the TOE framework to figure out that organizational readiness (organizational) and external pressure (environmental) influence adopting open government policy.

Yang et al.'s study (2015), which identified the determinants of open government initiatives in Taiwan by the interviews, also set the factors from the TOE model and added the legislation and perspective factor as new ones. They found that data format and information system and the level of informatization (technology context), the culture of the organization (organizational context), and media effect

(environmental context) have a significant impact on adopting open government initiatives.

Zhao and Fan (2021), the most recent study, also explored the key factors on open government performance with fuzzy-set analysis. They identified the determinants of open government performance under the resource-based view and the TOE framework. Even if they utilized the TOE framework that emphasizes internal factors, the study results indicated that the effects of external factors were significant. In particular, this study highlights the role of the policy and legal support and public's (citizen) demands.

2.3.2. Prior Studies of Openness of Government Information

2.3.2.1. Measuring Openness of Government Information

Before examining how the literature identifies influencing factors for OGI, we also need to look at how the literature measures and ueses OGI, or related concepts. This section will uncover the basis for the proper measurement of the OGI, which is set as a dependent variable in this dissertation. Measurements of OGI can vary because the concept of open government on which OGI is based is quite multi-faceted. After investigating the extant literature (see Table 2.5), this study discovered that the literature measures OGI in three ways: (1) the integrated index, (2) the content provided on the official website of the government, and (3) the information disclosure level.

Firstly, many studies have measured OGI with an integrated index. Due to the global interest in open government, international organizations and countries have developed and used the index for evaluation. Several researchers utilized these indexes in their studies. For instance, Lee et al. (2016), who attempt to examine the effect of government data openness, used Open Data Barometer (ODB) published by the WWW foundation (2015). Seo (2017) also used the same data to measure the openness of government information of national governments and to explore its determinants. Open Data Barometer (ODB) published by the WWW Foundation is frequently used to measuring openness. Kim and Eom (2019), who explore the factors affecting open data success of Korean local governments, measured open data success with the overall evaluation score of the evaluation index developed by the South Korean Government. The

index is based on the following criteria: (1) whether the open data registered in the official open data portal were actually disclosed; (2) whether each local government tried to discover new data and disclose such data to the public; (3) whether open data requested for disclosure by the public were registered in the official open data portal; (4) the ratio of open-format data to the total in the official open data portal; (5) whether each local government complied with the cyclical and periodic provision of open data in the official open data portal (Kim & Eom, 2019: 6758). On the other hand, several studies have developed the assessment index. For instance, Schnell and Jo (2019), in exploring the determinants of government openness, developed an Open Government Partnership (OGP) eligibility criteria based on diverse sources, which they measured with budget transparency (open budget index from IBP), access to information, asset disclosure (World Bank's Public officials' financial disclosure database), and citizen engagement (EIU's democracy index). Correa et al. (2014) also developed their own assessment criteria for open data, including search and access, multi-format, machine-readable, data structure, updated data, contact information, and accessibility. With this assessment tool, they evaluated openness in Brazilian municipalities. Thorsby et al. (2017) also integrated diverse indices to analyze the open data portal in American cities. They used the open data portal index (ODPI), data content index (DCI), and a compilation of the two (overall index).

Secondly, there have been attempts to measure government openness through the analysis on the government website. The administration website is one of the important channels in which citizens can come into and access diverse information about government (Villeneuve, 2014). Wong and Welch (2004) have tried to

analyze the openness of countries with website data. They understand openness as a linear sum of transparency and interactivity so that they measure website quality in five areas regarding transparency (ownership, contacts, organizational information, citizen data, and timeliness of data) and four areas regarding interactivity aspects (ownership, reachability, issue or organizational information, and citizen consequences). Villeneuve (2014) also analyzed the federal websites of Switzerland and evaluates the openness (transparency) by the degree of information exposure regarding the Access to Information (ATI) laws. Yavuz and Welch (2014), who explore the factors affecting the openness of local government websites, measured the website openness and qualities with the following seven areas; 1) provision of employee contact information, 2) provision of department documents of interest to the public, 3) opportunities for publics to ask questions online, 4) information about what our department does, 5) information about the decisions that their department makes, 6) clarity of information assessing or analyzing activities that their department is responsible for, and 7) information about department meetings, including agendas, minutes, and other postings (Yavuz & Welch, 2014). Likewise, da Cruz et al. (2016) also examine the information availability on the local government websites in Portugal. They evaluated how visible and easy to access the information regarding the seven dimensions of information, which are organizational information, plans and planning, local taxes, rates, and regulation, relationship with citizens, public procurement, economic and financial transparency, and urban planning and land use management.

Thirdly, quite a few researchers of Korea have measured the openness of government information through the information

disclosure rate. In general, they measured it by the actual disclosure rate compared to the number of requests made by the citizens (Kim, 2014; Lee, 2013; Lee & Jung, 2011; Lee & Moon, 2010; Park, 2017). The Korean government is strongly recommending that public organizations open their internal documents to the public. And the disclosure rates of all Korean public organizations are posted on the official website of information disclosure (http://open.go.kr). Besides, Kim and Eom (2018) have attempted to measure data openness by the percentage of data shared to total data provided by the Open Data Strategy Council of South Korea.

Table 2.5. Measuring Openness of Government Information in Prior Studies

Measuring Method	Literature
Integrated index	AlRushaid & Saudagar (2016), Lee et al. (2016), Seo (2017), Schmidthuber et al. (2020), Kim & Eom (2019), Schnell & Jo (2019), Correa et al. (2014), Harrison & Sayogo (2014), Styrin et al. (2013), Thorsby et al. (2017)
Content analysis on Government website	Wong & Welch (2004), Borry (2012), Villeneuve (2014), Yavuz & Welch (2014), Lorenco (2015), Musa et al. (2015), da Cruz et al. (2016); Taveres & da Cruz (2014); Grimmelikhuijsen & Feeny (2016)
Information disclosure rate	Lee (2013); Lee & Jung (2011); Lee & Moon (2010); Park (2017), Tejedo-Romero et al. (2020)

2.3.2.2. Determinants of Openness of Government Information

Along with the growing interest in open government from both national and local governments, numerous researchers have attempted to explore the determinants of open government's related concepts such as openness, transparency, open data, and information disclosure. This part will discuss the factors facilitating or constraining government openness explored in the previous literature. The findings from the literature review generate empirical hypotheses in the next chapter and to build a conceptual model of the factors involved in the openness of government information. According to the literature review (see Table 2.6), the three factors most frequently discussed as determinants of open government are (1) institutional and environmental, (2) organizational and managerial, and (3) technological factors.

Institutional and environmental factors

Governments tend to resist openness provisions because they meet with strong incentives for secrecy (Darch & Underwood, 2010; Roberts, 2006). Administrative secrecy provides several incentives to public officials (Stiglitz, 1999). Firstly, information scarcity creates an environment favorable to incumbent bureaucrats because it increases the cost of transition by increasing information asymmetry. Secondly, administrative secrecy causes bureaucrats to avoid being accused of making a mistake (Stiglitz, 1999). However, information disclosure makes it difficult to conceal their mistakes in the administrative process (Lee, 2013; Stiglitz, 1999). Thirdly, secrecy allows bureaucrats to cover up corruption and provides opportunities for special gains such as bribery (Stiglitz, 1999). In addition, for executives and public organizations, openness means giving up a certain degree of control by

increasing their vulnerability to scrutiny by the public and increasing time and costs to smooth decision-making (de Graaf & Paanakker, 2015; Schnell & Jo, 2019: 946). Thus, without compulsory institutions, political leadership, and pressure, government innovation initiatives such as open government are difficult to work properly.

In this regard, many researchers have highlighted the institutional and environmental context to successful transparency and open government initiatives in the public sector. Political factors, such as political power of government leader, political competition in the nation or local region, the political orientation of the majority party of council, political coalition incumbent, and turnout, are considered important in the literature (Dowley, 2006; Esteller-Moore & Pole-Otereo, 2012; Sol, 2013; Caamano-Alegre et al., 2013; Garcia-Sanchez et al., 2013; Lee, 2013; Justice & McNutt, 2014; de Araujo & Tejedo-Romeo, 2016; Annisa & Murtini, 2018; Schnell & Jo, 2019; Ingram, 2014; Tavares & da Cruz, 2014; Wang & Lo, 2015; Tejedo-Romero & Araujo, 2018).

The regulatory factors, which are laws and regulations that support the initiatives, are also significant determinants of the adoption of open government policy and initiatives (Chen et al., 2019; Yang et al., 2015; Berliner & Erlich, 2015; Kim & Eom, 2018; 2019; Lee, 2013; Zhao & Fan, 2021). For example, Chen et al. (2019) found that the enactment of statewide transparency legislation is positively associated with government's openness of fiscal information. Zhao and Fan (2021) insisted that government should pay more attention to strengthening institution construction. They found rules and regulations regarding open data do matter on its performance.

Socio-demographic conditions surrounding the government are also important environmental factors. For instance, the model includes total population, elderly population, rural population, unemployment rate, income level of citizens, and education level, which are various socio-demographic contexts surrounding the government, to explore the determinants of openness of government information (Serrano-Cinca, 2009; Sol, 2013; Schnell & Jo, 2019; Lee, 2013; Tavares & da Cruz, 2014; De Araujo & Tejedo-Romeo, 2016; Borry, 2012; Munoz & Bolivar, 2015).

Organizational and managerial factors

Organizational and managerial factors are important internal factors of OGI in the research. Researchers generally include organizational characteristics, capacity, resources, structure, and relations as influencing the degree of government openness (Gil-Garcia, 2012; Kim & Eom, 2019; Mergel, 2015; Zhao & Fan, 2018).

Regarding organizational and managerial factors, the most frequently mentioned in the literature is the size of government, which stands for administrative capacity (Laswad et al., 2005; Dowely, 2006; Serrano-Cinca, 2009; Garcia-Sanchez et al., 2013; Annisa & Murtini, 2019; Schnell & Jo, 2019). Opening government information requires administrative capacity for record-keeping, information management, and processing and responding to information requests (Darch & Underwood, 2010). Generally, large-sized organizations have more qualified staff, which may make it easier to prepare and present information (Navarro et al, 2010; Garcia-Sanchez et al., 2013).

The literature often explains fiscal features such as budget size, fiscal balance, financial independent rate, budget surplus, and debt level

as determinants of the openness of government (Chen et al., 2019; Serrano-Cinca, 2009; Esteller-Moore & Pole-Otero, 2012; Caamano-Alegre et al., 2013; Garcia-Sanchez et al., 2013; De Araujo & Tejedo-Romeo, 2016; Annisa & Murtini, 2018). Government fiscal features are one of government's performance indicators (Kang, 2009; Kim et al., 2008). Applying principal-agent theory, the voting preference of citizens (principal) may change depending on the financial status of local government (agent) (Kim et al., 2008; Choi & Lee, 2006). Hence, local governments with a good financial status may disclose more of their internal information in terms of performance promotion. In contrast, governments with poor financial status may open their information to restore the trust of citizens and stakeholders. Thus, since both explanations are possible, the inference is that fiscal features are interesting factors engendering their use in OGI research.

In addition, previous studies have utilized the political orientation of leaders of government (Sol, 2013; Lee, 2013), organizational culture (Yang et al., 2016), and organizational readiness (Wang & Lo, 2016) as organizational and managerial factors that can affect OGI.

Technological factors

As discussed above, in the dimension of open government, open government initiatives assume opening and sharing digitalized connectable and reusable data to the public (Moon, 2020). Internet and mobile technology not only have significantly reduced the cost of collecting, generating, and managing information for governments (Roberts, 2006) but also delivered government information and data to citizens through a web-based platform so that technology factors have a considerable impact on the OGI. In this regard, several researchers have

noted the factors related to internet access, such as internet accessibility, personal computer retention rate, and the level of internet infrastructure (Lowatcharin & Menifield, 2015; Justice & McNutt, 2014; Esteller-More & Pole-Otereo, 2012). Thus, a reasonable inference is that researchers who use these factors in their model focus on the technological environment in which government information and data that is easily opened, delivered, and distributed.

On the other hand, researchers utilize digitalization levels in public organizations or government as determinants. Digitalization levels contain e-government performance, level of informatization, technical capacity (Grimmelikhuijsen & Feeny, 2016; Zhao & Fan, 2018; 2021), and technical interoperability (Kim & Eom, 2018; Chen et al., 2019; Yang et al., 2015). These studies generally hold that the level of digitalization across an organization affects the production and management of digitalized information and data with good quality and thus the overall understanding of open government initiatives. For example, Grimmelikhuijsen and Feeny (2016), who analyzed the level of open government with the content analysis of 500 city government websites, discovered that technical capacity is the most consistent and strong predictor of open government dimensions. This empirical result implies that open government is closely related to the digitalization or technical capacity of the organization. Also, it proves that IT is one of the core dimensions of open government.

The literature also holds that resources to implement open data or promote transparency policy are significant factors of openness of government information (Kim & Eom, 2019; Tavares & da Cruz, 2014; Lee, 2013; Chen et al., 2019; Zhao & Fan, 2018). With IT-based resources characterized as tangible resources (IT infrastructure, IT

human resources) and intangible resources (knowledge asset, customer orientation, synergy), tangible resources are more often used as the determinants of OGI in the literature than intangible. Kim and Eom (2019) discuss and categorize the IT-based resources with executive leadership, human resources (IT personnel), financial resources (total amount of IT-related budget), and operational experience (experience of IT-related projects). Their study found that the financial resource of the local government is a significant factor in the success of open data initiatives.

Table 2.6. Literature review on determinants of openness of government information

Category	Factors	Reference
Institutional & Environmental Factors	political power of government leader, political competition in the nation or local region, political orientation of majority party of council, political coalition incumbent, and turnout	Dowley, 2006; Esteller-Moore & Pole-Otereo, 2012; Sol, 2013; Caamano-Alegre et al., 2013; Garcia-Sanchez et al., 2013; Lee, 2013; Justice & McNutt, 2014; de Araujo & Tejedo-Romeo, 2016; Annisa & Murtini, 2018; Schnell & Jo, 2019; Ingram, 2014; Tavares & da Cruz, 2014; Wang & Lo, 2015
	Laws, policy (initiatives), regulations	Chen et al., 2019; Yang et al., 2015; Berliner & Erlich, 2015; Kim & Eom, 2018; 2019; Lee, 2013
	Socio-demographic condition; total population, elderly population, rural population, unemployment rate, income level of citizens, and education level	Serrano-Cinca, 2009; Sol, 2013; Lee, 2013; Tavares & da Cruz, 2014; De Araujo & Tejedo-Romeo, 2016; Borry, 2012; Munoz & Bolivar, 2015

Organizational & Managerial Factors	Administrative capacity- government size	Laswad et al., 2005; Dowely, 2006; Serrano-Cinca, 2009; Garcia-Sanchez et al., 2013; Annisa & Murtini, 2019; Schnell & Jo, 2019
	Fiscal features- budget size, fiscal balance, financial independent rate, budget surplus, and debt level	Chen et al., 2019; Laswad et al., 2005; Serrano-Cinca, 2009; Esteller-Moore & Pole-Otero, 2012; Sol, 2013; Caamano-Alegre et al., 2013; Garcia-Sanchez et al., 2013; De Araujo & Tejedo-Romeo, 2016; Annisa & Murtini, 2018
	(etc.) political orientation of leader, organization culture	Sol, 2013; Lee, 2013; Wang & Lo, 2016; Yang et al., 2016
Technological Factors	Internet access; internet accessibility, personal computer retention rate and the level of internet infrastructure	Lowatcharin & Menifield, 2015; Justice & McNutt, 2014; Esteller-More & Pole-Otereo, 2012
	Technical capacity of organization: e-government level	Grimmelikhuijsen & Feeny, 2016; Zhao & Fan, 2018
	Technology-related resources: IT personnel, IT budget	Kim & Eom, 2019; Tavares & da Cruz, 2014; Lee, 2013; Chen et al., 2019; Zhao & Fan, 2018

2.4. Openness of Government Information in Local Government Context

Many countries have attempted to decentralize the administrative work between central and local governments through local government capacity building. Furthermore, with widespread globalization, the rapid opening to the outside has put a heavy burden on central governments' foreign relations. Hence, the central government has been adopting a strategy to focus on management and response, to decentralize its internal affairs, and to deliver public services to the local level (Lee, 2004). Accordingly, local governments' role and authority have increased, and they serve as "empowered social actors" in the context of the proliferation of various global actors, not just as agencies performing central government authority (Jung, 2012; Jung, 2016; Meyer, 2000). Moreover, they can now act as somewhat independent polities from the central government and show dynamic behaviors as core actors in local governance (Jung & Jang, 2013).

In this regard, this section will discuss role and characteristics of local government, which is the research subject of this dissertation. Furthermore, this section also looks at the influences of actors surrounding the local governments on their OGI levels. In this process, this study discusses the influences of citizens and adjacent local government, which has been neglected in the OGI literature.

2.4.1. Local government as a Social Actor

Local governments as organizations as part of society must adopt various roles with changes in the environment, such as globalization and localization. Meyer (2010) argues that various organizations other

than the national state can be perceived as actors with legitimacy in globalization. In other words, existing agents, including the various private enterprises, civil society, and even local government, could be viewed as social actors empowered with a more active status (Eom & Shin, 2019). Once recognized as an agent of the national government, local governments could serve as socially empowered actors (Jung, 2012).

Local governments struggle to attain legitimacy and cannot free themselves from other actors and local contexts that comprise local governance. They secure their legitimacy by accepting socially constructed norms or values within a relational network (Meyer & Rowan, 1977; Jung et al., 2009). However, the environment does not unilaterally affect them. They strive to manage the environment to garner justification within the social system and establish their identity (Moore, 1995; O'Toole et al., 2005; Lee, 2005; Jung, 2012). Local government as organizations observe and prepare for environmental changes and interact with primary stakeholders and institutions to acquire resources needed for organization (Meyer & Rowan, 1977; Jung, 2012).

King, Felin, and Whetten (2010) adopted the premise of organization as social actor. They discussed organization as a social actor that has external attribution and internality. The external attribution assumption means that organizations' attributes must include that others view them as capable of acting, particularly by their stakeholders. The organization's status derives from the expectation of others, including the states, individual members of organizations, and other stakeholders (King et al., 2010: 292). This idea derives from sociological works like those of Goffman (2002), Coleman (1982), and

Czarniawska (1997). The internality assumption means that actors are capable of deliberation, self-reflection, and goal-directed action (King et al., 2010). That is, organizations have intentions that are partially independent of their members' beliefs, preferences, and goal so that they choose a direction to go (King et al., 2010).

King et al.'s (2010) assumptions can be applied to the local government as an organization and provide plausible explanations that local government can consider as a social actor (Jung, 2012). Local governments are inevitably influenced by the norms and values that their surrounding environment requires. They are also simultaneously influenced by the stakeholders and audience such as local citizens, local civic society, higher government level, and neighboring local governments. Otherwise, obtaining legitimacy from the surrounding environments is not easy. Concurrently, local government endeavors to establish and develop their own policy direction in order to improve the quality of life of local citizens and regional development (Jung, 2012).

As a social actor, how are local governments handling the wave of open government? As discussed in the previous chapter, several open government initiatives sprung up around the world and became the fashion in both national and local governments (Attard et al., 2015). The movement of open government worldwide seems to function as a "myth" to local governments and provides them considerable legitimacy for two reasons (Altayar, 2018; Janssen et al., 2019; Jung, 2012). Firstly, participating in the open government movement by opening government information and data are an advancement and innovation of local governments (Jung, 2012). Secondly, local governments can transform into desirable local governments that the times require by embracing open government paradigms, policies, and

values that prevailed globally (Jung, 2012). Local governments are gaining legitimacy by responding to external pressure from the environment to become more open. This explanation might be consistent with King et al.'s (2010) external attribution of an organization as a social actor and explain why many urban governments are engaging in open government initiatives.

With respect to the intentionality of OG by the local government as a social actor, they make their local ordinances, set goals for OG initiatives, and participate in global partnerships such as OGP in order to lead worldwide. Rather than merely responding to the environment, individual local governments want to take the lead in the global OGI paradigm and create a leading identity with their respective goals. This idea is proven with the current participation of various local governments as well as national governments in the OGP.[6]

In this regard, this study assumes both the organizations' external (environmental) contexts and internal contexts can influence OGI levels for local governments, as social actors. While external contexts require local governments to increase the OGI level, the organization's interior characteristics, such as capability, resources, and willingness, also matter to their OGI level.

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[6] Fifteen city and state governments are participating in the OGP.

2.4.2. Institutional Contexts of Korean Local governments

2.4.2.1. Empirical contexts: Korean Local Governments

South Korea's local autonomy history is somewhat short. South Korea started local autonomy with the fourteenth amendment of the Local Autonomy Act of 1995, which made possible the election of all levels of chief executives in local government throughout the country (Yoo, 2002). Due to the relatively short history of local autonomy, Korea remains a relatively centralized country compared to other developed countries. Korea has put real effort into decentralization since the Roh Moo-hyun government (2003–2008). Currently, interest in the role of local autonomy and local governments has been rapidly increasing with the national government's structural initiatives.

The local government in Korea has a clearly defined structure, comprising two tiers of 17 upper-level and 226 lower-level governments. According to the Local Autonomy Act (LAA), all residents in Korea are under a local government jurisdiction, either the upper-level, which includes Seoul Metropolitan City, other metropolitan cities (gwang-yeok-si), and provinces (do); or the lower-level, which includes cities (si), counties (gun), and autonomous districts (jachi-gu). As the lower level is held accountable to upper-level local governments, cities are within the jurisdiction of provinces, counties within the jurisdiction of metropolitan cities or provinces, and autonomous districts within the jurisdiction of either of the metropolitan cities of Seoul Metropolitan City. Geologically, Korea's land area is small, so even if a local area belongs to other metropolitan or province governments, it is often bound to the same life zone. Accordingly, many local areas (lower-level) are highly adjacent to each other.

While countries in Europe and the Americas have several different forms of local government, all local governments in Korea have the same governing structure, which is referred to as the mayor-council form. The mayor-council form of local government consists of the chief executive (governor for the province, mayor for the metropolitan city, municipal city, county, and district government) and local council. In particular, the local government in Korea adopts a strong mayor-council form so that the government's executive leadership is quite powerful compared to the local council. The local council still expects to exert monitoring power over local administration (Lee, 2005).

However, skepticism exists in the power balance between the mayor and the local council (Lee & Lee, 2010; Song, 2001; Park, 2004; Kim, 2001). Korea designed its local governments to check and balance local councils and elected executives. In reality, while elected mayors dominate local government and politics, the local council has not performed its expected roles (Choi, Choe, & Kim, 2012). Although several institutional measures have been introduced to enhance local councils' capacity, the measures have not satisfied local citizens (Choi, Choe, & Kim, 2012; Song, 2001; Park, 2004; Kim, 2001). Recently, institutional efforts aimed to strengthen local councils' role and to assess its function based on the public's criticisms (Kim, 2018).

In addition, Korean local governments adopted an array of citizen participation measures. Included are a citizen initiative, referendum, and recall, a citizen request for audit and investigation, and a resident's lawsuit. In addition, citizen participatory budgeting has been recently employed to strengthen citizens' control over the local government budgeting process. These institutional measures continue to strengthen

citizen engagement in local government operations (Choi, Choe, & Kim, 2012).

2.4.2.2. OGI Systems in Korean Local Governments

Concerning the OGI, the Korean government is making efforts to open government information and data to citizens based on the *Official Information Disclosure Act* and *Act on Promotion of the Provision and Use of Public Data.* The Acts apply to all public organizations in Korea, including local governments and they aim to increase administrative transparency and strengthen democratic values in Korea. In the following, this study will briefly examine the content of each Act and how each is applied to the local government context.

Official Information Disclosure Act

The *Official Information Disclosure Act* is meant "to ensure people's rights to know and to secure people's participation in state affairs and the transparency of the operation of state affairs by prescribing matters necessary for people's requests for the disclosure of information kept and controlled by public institutions and the obligations of public institutions to disclose such information" (Article 1). This Act is one of the core mechanisms of democracy as it realizes "the right to know" of the public. This system is expected to ensure people's effective access to government information and not only satisfies the citizens' desire to participate but also makes the policy process transparent (Eom et al., 2020). After the Act's introduction, the government developed an online information disclosure platform (http://www.open.go.kr) for citizens' convenience in 2006 (MOIS, 2014). Moreover, the platform

developed into a proactive information disclosure system that preemptively provides government information through several revisions in the law (Eom, 2020).

Korea's Ministry of the Interior and Safety (MOIS) is in charge of the information disclosure system and has consistently published an annual report on the information disclosure behaviors of public organizations, including local governments. Consequently, the information disclosure rate of public organizations has accumulated and is frequently studied in academia (Lee & Moon, 2010; Lee & Jung, 2013; Kim, 2013; Lee, 2013) as a measure of observed transparency of the public sector. Furthermore, the integrated platform (http://www.open.go.kr) has released not only the public information disclosure rates (2014–2019) but also the number of downloads of the original administrative document by citizens (2014–2019) and pre-released documents from public organizations, including local governments. With these efforts, citizen now know the level of OGI of all local governments, including low-level local governments (cities, counties, and autonomous districts) as well as metropolitan and provincial governments. And with these indices, the public easily understood the public sector's endeavors to enhance administrative transparency.

Lately, the Ministry of Interior and Security (MOIS) of Korea has been conducting a comprehensive assessment of information disclosure since 2018 and publishes these results to the public. The evaluation field consists of four areas: the level of openness in preliminary disclosed information, disclosure on the original administrative documents, the timely process of disclosure request, and customer satisfaction.

The four grades depend on the overall performance of information disclosure (MOIS, 2021). Table 2.7 shows the results of the assessment of information disclosure in 2020. In 2020, the MOIS assessment ranked 15 local governments with the highest grades.

Table 2.7. The results of the assessment of information disclosure in 2020 (MOIS, 2021)

등급	2020년 결과
최우수	거제시, 김해시, 부천시, 사천시, 상주시, 서산시, 성남시, 양주시, 여수시, 의정부시, 익산시, 전주시, 정읍시, 진주시, 충주시, 고창군, 곡성군, 보은군, 순창군, 완도군, 완주군, 임실군, 진천군, 창녕군, 하동군, 대구 중구, 대전 대덕구, 대전 서구, 대전 중구, 부산 금정구, 부산 남구, 부산 진구, 부산 북구, 부산 사하구, 부산 수영구, 부산 연제구, 부산 영도구, 서울 종로구, 인천 연수구
우수	구미시, 군포시, 김포시, 나주시, 동두천시, 동해시, 목포시, 보령시, 수원시, 안동시, 안산시, 안양시, 양산시, 오산시, 용인시, 원주시, 제천시, 창원시, 춘천시, 태백시, 통영시, 파주시, 포천시, 강진군, 거창군, 고성군(경남), 고흥군, 구례군, 금산군, 남해군, 달성군, 부여군, 서천군, 양구군, 양양군청, 양평군, 연천군, 영광군, 영덕군, 영동군, 영월군, 예산군, 예천군, 옥천군, 음성군, 의성군, 진안군, 함안군, 함양군, 함평군, 합천군, 해남군, 홍성군, 화순군, 광주 남구, 대구 서구, 대구 수성구, 대전 동구, 부산 강서구, 부산 동구, 부산 동래구, 부산 사상구, 부산 서구, 서울 관악구, 서울 광진구, 서울 동대문구, 서울 서대문구, 서울 송파구, 서울 양천구, 서울 영등포구, 울산 남구, 울산 중구, 인천 계양구, 인천 미추홀구, 인천 중구
보통	강릉시, 경산시, 경주시, 계룡시, 고양시, 공주시, 광명시, 광양시, 광주시, 구리시, 군산시, 김제시, 김천시, 남양주시, 남원시, 논산시, 문경시, 밀양시, 삼척시, 속초시, 순천시, 시흥시, 아산시, 안성시, 여주시, 영주시, 영천시, 이천시, 천안시, 청주시, 평택시, 포항시, 하남시, 화성시, 가평군, 강화군, 괴산군,군위군, 기장군, 단양군,담양군, 무주군, 보성군,봉화군, 부안군, 산청군, 성주군, 신안군, 영암군, 울릉군, 울주군, 울진군, 의령군, 장성군, 정선군, 증평군, 진도군, 청도군, 청송군, 청양군, 칠곡군,태안군, 평창군, 광주 광산구, 광주 동구, 광주 북구, 광주 서구, 대구 남구, 대구 달서구, 대구 동구, 대구 북구, 대전 유성구, 부산 중구, 부산 해운대구, 서울 강남구, 서울 강동구, 서울 강북구, 서울 강서구, 서울 구로구, 서울 금천구, 서울 노원구, 서울 도봉구, 서울 동작구, 서울 마포구, 서울 서초구, 서울 성동구, 서울 성북구, 서울 용산구, 서울 은평구, 서울 중구, 서울 중랑구, 울산 동구, 울산 북구, 인천 남동구, 인천 동구, 인천 부평구, 인천 서구
미흡	과천시, 당진시, 의왕시, 고령군, 고성군(강원), 무안군, 영양군, 옹진군, 인제군, 장수군, 장흥군, 철원군, 홍천군, 화천군, 횡성군

Act on Promotion of the Provision and Use of Public Data

The purpose of the *Act on Promotion of the Provision and Use of Public Data* (abbreviated as Public Data Act) is "to prescribe matters for promoting the provision and use of data held and managed by public organizations to guarantee citizens' right to access public data and to contribute to improving their quality of life, and to develop the national economy through the utilization of such public data in the private sector" (Article 1). The Act, implemented in 2013 for all public organizations, including local governments, is considered the basis for Korea's open data policy. Specifically, in the Act, the meaning of "openness" is to provide re-usable data to users and empower users to use the data commercially and non-profitably. This Act shares with the information disclosure system the idea of opening government information and data. While Korea's information disclosure system aims to satisfy the right to know of the public and promote administrative transparency, the Public Data Act aims to improve the convenience of the people through the public use of public data and to create new business and jobs.[7]

In addition to the Act, the Korean government enacted guidelines[8] on the management principles and standards that public organizations should comply with to manage and provide public data efficiently. The MOIS (2019) guideline explains the five management stages of public data in Korea, from data generation and collection to follow-up management. Each stage includes the management criteria and principles that each organization should comply with. For instance, the first stage of public data generation and collection is necessary to check whether the data includes personal information to prevent

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[7] The official website of Open Data Strategy Council of Korea (http://odsc.go.kr/).

[8] Guidelines for Public Data Management (Ministry of Interior and Safety, 2019). 대한민국 행정안전부 고시 제 2019-71 호.

privacy issues (see Figure 2.4). They also need filtering procedures to avoid copyright infringement. Likewise, opening data goes beyond simply publishing data online held by public entities but implies significant tasks that accompany the organization's intentional efforts and administrative capacity.

\<Procedure for filtering personal information\>

\<1단계\> 개인정보 등 비공개 대상정보 포함여부 확인	포함 →	\<2단계\> 개인정보 등 비공개 대상정보의 기술적 분리 가능 여부 확인	분리 불가 / 비식별화 가능 →	\<3단계\> 개인정보 등 비공개 대상정보의 비식별 조치 가능여부 확인
미포함 ↓		분리 가능 ↓		비식별 조치 불가 ↓
제공대상 1차 확정		부분제공대상 1차 확정		미제공대상 최종 확정

\<Procedure for filtering copyright issue\>

\<1단계\> 저작권 등 제3자 권리 포함여부 확인	포함 →	\<2단계\> 저작권 등 제3자 권리의 제공 이용허락 확보여부 확인	허락 미확보 / 허락 확보 →	\<3단계\> 저작권 등의 권리자로부터 제공 이용허락 확보 추진	허락 미확보 / 분리 가능 →	\<4단계\> 저작권 등 제3자 권리의 기술적 분리 가능여부 확인
미포함 ↓		허락 확보 ↓				분리 불가 ↓
제공대상 최종 확정				부분제공대상 최종 확정		미제공대상 최종 확정
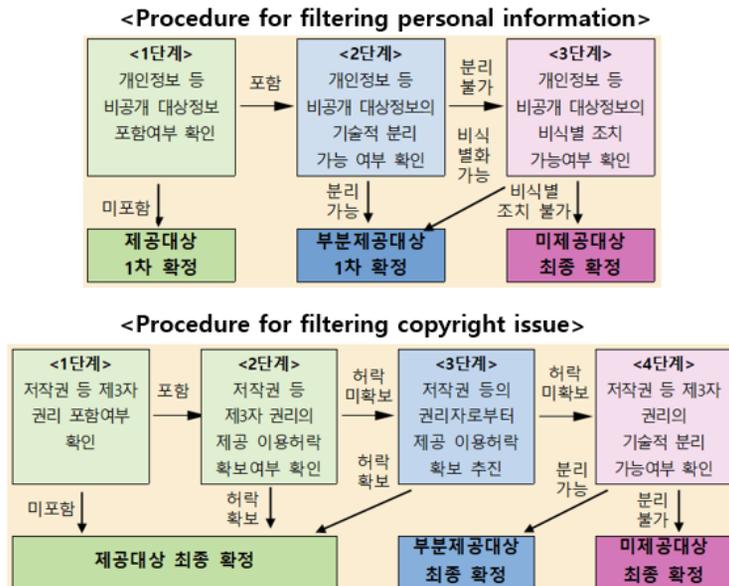
Figure 2.4. Process for public data generation and collection (MOIS, 2019).

Based on legislative support and explicit instructions, Korean local governments appear to open public data actively. In the initial stage of the implementation, the performance of open data by the central government had been emphasized. However, the performance of local governments has been highlighted more recently (Song & Hwang, 2014). In particular, open data of local governments is considered important in that it reflects local issues and is closely related to the daily life of residents (Song & Hwang, 2014). As of 2021, a total of 55,413 open data sets are in the Public Data Portal of Korea (https://www.data.go.kr/), of which local governments created and released 32,869 data sets. That is, about 60% of public data in Korea

belongs to local governments. According to Shin et al. (2021), who analyzed the contents of open data of Korean local governments, Korean local governments are mainly opening data regarding the environment, culture and tourism, and the social welfare sector. In addition, they provided data from the social welfare sector with the Open API format, a highly available format for users (Shin et al., 2021).

On the other hand, since 2018, Korea has been conducting an annual assessment of public data provision and operation on public organizations, including all levels of local governments. MOIS, which is in charge of this assessment, evaluates all 520 public organizations in five areas: data management system, the level of openness, utilization of data, quality of data, and other areas (see Figure 2.5). They publish the results of the assessment annually in three grades, and the evaluation results of all local governments are released to the public. The results of the most recent 2019 assessment on local governments are shown in Table 2.8.
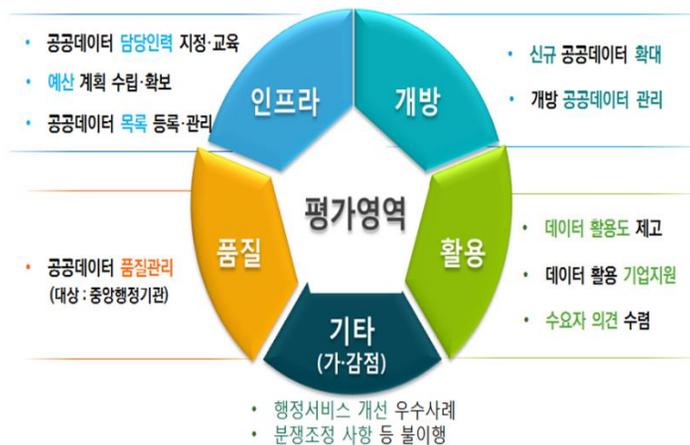
Figure 2.5. Assessment dimensions on open data utilization by the Korean government (2020).

Table 2.8. Results of Open Data Utilization Assessment on Korean Local governments (2020).

등급	기초자치단체 (226개 기관)		
	시	군	구
우수 (49 개)	경기 광명시, 경기 부천시, 경기 성남시, 경기 수원시, 경기 안산시, 경기 안성시, 경기 양주시, 경기 의왕시, 경기 이천시, 경기 파주시, 경북 구미시, 경북 포항시, 전북 정읍시, 충북 제천시	경북 예천군, 부산 기장군, 전남 담양군, 전남 영광군, 전남 화순군, 전북 임실군, 충남 청양군, 충북 단양군, 충북 음성군	광주 서구, 대구 남구, 대구 달서구, 대구 북구, 대구 수성구, 대전 대덕구, 대전 서구, 대전 중구, 부산 금정구, 부산 남구, 부산 동구, 부산 동래구, 부산 부산진구, 부산 북구, 부산 서구, 부산 수영구, 부산 연제구, 부산 영도구, 서울 강남구, 서울 송파구, 서울 양천구, 서울 영등포구, 서울 은평구, 인천 계양구, 인천 연수구, 인천 중구
보통 (72 개)	강원 동해시, 경기 고양시, 경기 광주시, 경기 군포시, 경기 김포시, 경기 동두천시, 경기 안양시, 경기 여주시, 경기 평택시, 경기 하남시, 경기 화성시, 경남 거제시, 경남 김해시, 경남 양산시, 경남 통영시, 경북 경산시, 경북 문경시, 경북 안동시, 전남 광양시, 전북 군산시, 전북 남원시, 전북 전주시, 충남 공주시, 충남 보령시, 충북 청주시, 충북 충주시	강원 인제군, 경기 양평군, 경남 거창군, 경남 남해군, 경남 의령군, 경북 영덕군, 대구 달성군, 울산 울주군, 인천 강화군, 전남 강진군, 전남 무안군, 전남 신안군, 전남 함평군, 전북 완주군, 전북 진안군, 충남 서천군, 충남 예산군, 충북 옥천군, 충북 증평군	광주 광산구, 광주 남구, 광주 북구, 대구 동구, 대구 서구, 대구 중구, 부산 강서구, 부산 사상구, 부산 사하구, 부산 중구, 부산 해운대구, 서울 강동구, 서울 강북구, 서울 강서구, 서울 관악구, 서울 구로구, 서울 금천구, 서울 동대문구, 서울 동작구, 서울 서초구, 서울 성동구, 서울 중랑구, 울산 남구, 울산 동구, 인천 남동구, 인천 동구, 인천 미추홀구
미흡 (105 개)	강원 강릉시, 강원 삼척시, 강원 속초시, 강원 원주시, 강원 춘천시, 강원 태백시, 경기 과천시, 경기 구리시, 경기 남양주시, 경기 시흥시, 경기 오산시, 경기 용인시, 경기 의정부시, 경기 포천시, 경남 밀양시, 경남 사천시, 경남 진주시, 경남 창원시, 경북 경주시, 경북 김천시, 경북 상주시, 경북 영주시, 경북 영천시, 전남 나주시, 전남 목포시, 전남 순천시, 전남 여수시, 전북 김제시, 전북 익산시, 충남 계룡시, 충남 논산시, 충남 당진시, 충남 서산시, 충남 아산시, 충남 천안시	강원 고성군, 강원 양구군, 강원 양양군, 강원 영월군, 강원 정선군, 강원 철원군, 강원 평창군, 강원 홍천군, 강원 화천군, 강원 횡성군, 경기 가평군, 경기 연천군, 경남 고성군, 경남 산청군, 경남 창녕군, 경남 하동군, 경남 함안군, 경남 함양군, 경남 합천군, 경북 고령군, 경북 군위군, 경북 봉화군, 경북 성주군, 경북 영양군, 경북 울릉군, 경북 울진군, 경북 의성군, 경북 청도군, 경북 청송군, 경북 칠곡군, 인천 옹진군, 전남 고흥군, 전남 곡성군, 전남 구례군, 전남 보성군, 전남 영암군, 전남 완도군, 전남 장성군, 전남 장흥군, 전남 진도군, 전남 해남군, 전북 고창군, 전북 무주군, 전북 부안군, 전북 순창군, 전북 장수군, 충남 금산군, 충남 부여군, 충남 태안군, 충남 홍성군, 충북 괴산군, 충북 보은군, 충북 영동군, 충북 진천군	광주 동구, 대전 동구, 대전 유성구, 서울 광진구, 서울 노원구, 서울 도봉구, 서울 마포구, 서울 서대문구, 서울 성북구, 서울 용산구, 서울 종로구, 서울 중구, 울산 북구, 울산 중구, 인천 부평구, 인천 서구

2.4.3. Relatively Neglected Influences on OGI at the Local Level

2.4.3.1. Influence from Local Citizens

Citizens have been one of the major actors in local governance, thus local society becomes an important system to transcend local politics toward local autonomy (Cuthill & Fien, 2005; Lee, 2004). For local governments, local citizens are an important source of power (voting) and finance, thus providing a basis for local government's survival and existence (Jung, 2012). On the other hand, local citizens and communities often require support from local governments to effectively participate in local issues (Cuthill & Fien, 2005). They need relevant information and materials to engage in local issues, so they request such information from local governments. Based on the understanding that providing citizens with government information they need to know is the most important first step toward legitimate citizen participation (Arnsetin, 1969), local governments satisfy citizens' right to know by opening their information to citizens (Piotrowiski & Van Ryzin, 2007).

Reviewing the research discussing the impact of citizens on the OGI, the premise seems to be citizens as demanders (consumers) of government information. For example, Dowely (2006), who emphasized social capital formation regarding the OGI in local society, explained that a vibrant civic community will demand and consequently experience the openness of government information from its local government. Piotrowski and Van Ryzin (2007) conducted research on requests for information from local governments, discussed how local citizens have a demand for government transparency, and that their

demands vary from citizens' characteristics. Bearfield and Bowman (2017) also argued that the community demand could determine the local government's transparency. They noted that if city managers believe that citizens do not want the information, segments of the population lack access to technology, or the information is too complex to be easily understood, the city would be less likely to place the data online. In this regard, they found that local community demand plays a vital role in fostering transparency, regardless of city size.

However, compared to the importance of local citizens in the local context, local citizens' impact on OGI in local governments has been less highlighted than expected in the literature. But research on the OGI at the local level has recognized that environmental factors, especially the political environment can affect OGI in the local context. For example, the political power of government leaders, political competition in the local region, the political orientation of the majority party in the council, political coalition incumbent, and turnout are important in the literature (Esteller-Moore & Pole-Otereo, 2012; Sol, 2013; Caamano-Alegre et al., 2013; Garcia-Sanchez et al., 2013; Lee, 2013; Justice & McNutt, 2014; Annisa & Murtini, 2018; Ingram, 2014; Tavares & da Cruz, 2014). Only a few studies such as Dowely (2006), Piotrowiski and Van Ryzin (2007), Bearfield and Bowman (2017), Lee and Jung (2011), and Amerikaner (2020) attempt to recognize the influence from local citizens and include the civic factors in their research model.

To address this gap in the literature, this study illuminates the impact of the local citizens, who are the major actor in local governance and primary consumers of government information. Therefore, this study will examine the impact of local citizens as the major

environment in local politics and assume that the more local citizens are interested in municipal administration, the more local governments will open their information and data.

2.4.3.2. Influence from Adjacent Local Governments

Policy diffusion is based on the concept of innovation diffusion, in which innovation refers to something new to a particular subject (Mohr, 1969; Walker, 1969; Rogers, 1995) and diffusion means an increase in the number of subjects adopting the new one (Lee, 2013). In this regard, policy diffusion can be understood as when the government adopts an innovative policy, the other governments will increasingly introduce it (Eyestone, 1977). Various academic fields of social science present diverse policy diffusion mechanisms such as learning, competition, imitation, and coercion (Berry & Berry, 2018; Braun & Gilardi, 2006; DiMaggio & Powell, 1983; Elkins & Simmons, 2005).

The spread of a policy innovation from one government to the next tends to bring to mind spatial imagery (Shipan & Volden, 2012). Academic fields study policy diffusion as "regional diffusion," and according to this model, encompasses local governments' acceptance of geographically adjacent government policy (Walker, 1969; Berry, 1994; Sharkansky, 1970; Lee, 2004). That is, the model assumes that government exists as a spatial unit so that the closer they are to each other, the easier the interactions between governments can occur (Lee, 2014). This idea is consistent with *"the first law of geography"* by Tobler (1970: 236): "everything is related to everything else, but near things are more related than distant things." Thus, this kind of correlated phenomenon occurring between geographically adjacent organizations

is often named the "neighboring effect" (Guimaraes, Figueiredo, & Woodward, 2011).

Karch (2007: 57) explained the reasons for how geographic proximity could affect policy diffusion. First, it can facilitate the development of communications networks among policymakers through which information about public policy spreads (Crain, 1966). Officials in nearby states are likely to discuss policies and other political issues with one another (Foster, 1978). Second, overlapping media markets may alert citizens and government officials to the existence of political forms and policies in nearby regions. Third, government officials might be most inclined to use nearby states as policy models because they are likely to be culturally and demographically similar to their own region.

Since the late 2000s, the open government initiative has spread worldwide as a national reform paradigm and is a government innovation value (Piotrowiski, 2007; Ruijer & Meijer, 2020). Currently, 78 countries are participating in the OGP to advocate the open government movement internationally.[9] This agreement has been reached in a short period, and as a result, the trend is that many countries are actively promoting and developing an action plan. In this context, several researchers consider open data policy as a case of policy diffusion (Grimmelijkuijsen & Feeney 2016; Ruijer & Meijer, 2020; Wang & Lo, 2016). Schnell and Jo (2019) also claim that global policy diffusion is a key driver of transparency and open government reforms across nations (Berliner, 2014; Roberts, 2006), but they noted their limitation in their study because they could not include diffusion-related factors in their model.

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[9] Retrieved December 23, 2020, from https://www.opengovpartnership.org/about/.

What about the local level? As innovative policies, transparency and open data initiatives have been institutionalized as central government-led policies. Subsequently, the central government encourages local governments across South Korea to open their data and information. Whereas the efforts to enhance the openness of government information have been centrally institutionalized at the national level, the level of openness of each government may be similar or different. With the lens of regional diffusion, geographically adjacent local governments are in an environment in which they can easily interact with each other. So, if the neighboring government is highly opened in terms of government information, they are likely to make efforts to increase their level of openness.

Grimmelikhuijsen and Feeny's (2017) study is notable in that it viewed the open government initiative as a policy diffusion in the local government context. In presenting an integrative framework for open government adoption in local governments, Grimmelikhuijsen and Feeny (2017) suggest the idea of policy diffusion in the local government context. They do include policy diffusion mechanisms such as learning, competition, coercive and normative pressure, but neglected the spatial characteristics of local governments and the possibility of spatial dependence among local governments regarding government openness. Thus, this study attempts to verify the effect of neighboring governments regarding the level of OGI, which has yet to be examined properly, and expects to build empirical knowledge to advance the OGI literature.

2.5. Summary and Review

2.5.1. Summary

The results of reviewing previous studies concerning the conceptualization, expected effects, related theories, determinants, and measurements of OGI are as follows. Firstly, openness is not a new concept, having been discussed in various historical contexts, including freedom of information and transparency (Nam, 2012; Wirtz & Birkmeyer, 2015). Accordingly, the topics of openness and transparency have continued to overlap (Ingram, 2017). Although the conceptualization of openness is not elaborated well in the public administration field, openness originated from democratic value because access to information is the underlying condition of citizen participation (Redford, 1969; Ruijer et al., 2017). Since the announcement of President Obama's *Memorandum on Transparency and Open Government* in 2009, the concept of openness has received considerable academic and practical attention globally.

The OGI is known for enhancing the monitoring of government behavior, enriching public debates about a public issue, and facilitating civic engagement and collaboration (Ruijer et al., 2017). The research widely explored the diverse effects of the OGI finding the relationship between government trust (e.g., Bennister et al., 2011; Cucciniello & Nasi, 2014; Grimmelikhuijsen, 2009; Grimmelikhuijsen et al., 2013; Lee, 2016; Porumbescu, 2015), accountability (e.g., Bordignon & Minelli, 2001; Lourenco, 2015; Meijer, 2003; Pina et al., 2010), civic participation (e.g., Bauhr & Grimes, 2014; Dahlberg & Solevid, 2016; Ruijer et al., 2017), and civil satisfaction (e.g., Eskildsen & Kristensen, 2007; Kim & Lee, 2012; Park, 2017; Welch et al., 2005).

Several researchers pointed out that no grand theory is an explanatory model of the OGI in terms of its theories and determinants (Bearfield & Bowman, 2017; Grimmelikhuijsen & Feeny, 2017; Tejedo-Romero & Araujo, 2020). However, the extant literature summarizes the OGI into two categories: external and internal influence. Several studies have emphasized the external factor of government based on institutional theory. The studies underline the surrounding institutional pressure that makes government open their information and data (e.g., Altayar, 2018; de Araujo et al., 2015; Pina et al., 2010; Janssen, Charalabidis, & Zuiderwijk, 2012; Melin, 2016; Sayogo et al., 2014; Hossain & Chan, 2015; Wang & Lo, 2016). Accordingly, the government's political environment and socio-demographic factors are frequently emphasized. However, several studies highlight the internal influence based on the diffusion of innovation and resource-based theory such as the administrative capacity (e.g., Laswad et al., 2005; Dowely, 2006; Serrano-Cinca, 2009; Garcia-Sanchez et al., 2013; Annisa & Murtini, 2019; Schnell & Jo, 2019) and members' characteristics (Sol, 2013; Lee, 2013). One stream of recent studies also emphasizes the organization's technical condition as a significant factor (e.g., Grimmelikhuijsen & Feeny, 2017; Kim & Eom, 2019; Tavares & da Cruz, 2014; Esteller-More & Polo-Otero, 2012; Zhao & Fan, 2018).

The research also shows diverse methods for measuring OGI. Firstly, scholars widely use the integrated index for openness and transparency to measure the OGI (e.g., Lee et al., 2016; Schmidthuber et al., 2020; Kim & Eom, 2019; Schnell & Jo, 2019; Thorsby et al., 2017). Secondly, several studies have measured OGI by analyzing the content of local government websites and government portals (e.g., Wong & Welch, 2004, Borry, 2012; Villeneuve, 2014; Yavuz & Welch,

2014; Lorenco, 2015; da Cruz et al., 2016; Taveres & da Cruz, 2014; Grimmelikhuijsen & Feeny, 2016). Lastly, Korean researchers have utilized the information disclosure rate to measure openness and transparency in public organizations (e.g., Lee, 2013; Lee & Jung, 2011; Lee & Moon, 2010; Park, 2017).

2.5.2. The Limitations of Prior Studies and Significance of This Dissertation

Reviewing the related literature on OGI, several limitations of previous studies are identified. Based on the limitations of previous studies, this study's significance derives from **research content** and **method**.

First, in **research content**, the literature explaining the influence on OGI is far outweighed in explaining the external factors such as political and socio-demographic factors. Because previous research on OGI focused on transparency issues and assumed that local governments regard OGI as a means of external monitoring and check-and-balance. A small number of recent studies, which understand local government's OGI from the perspective of the open government, have focused on internal factors such as local administration capacity and member's characteristics. However, they still fail to present a balanced perspective to understanding local government's OGI. In particular, considering the emphasis on IT as a key conceptual component of open government, the impact of technical factors plays a crucial role among the internal factors of local government. Thus, this dissertation illustrates the determinants of OGI in the local government using the TOE framework (Tornatzky & Fleischer, 1990), which values technical

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contexts but also considers the external environmental context. With this approach, this study aims to provide a more balanced view of understanding the OGI of local governments.

Furthermore, this study identified the major gaps in previous studies, primarily focusing the external factor on understanding the OGI. First, the impact of citizens, whose role has been highlighted in the open government paradigm, has not been adequately verified through empirical methods in previous research. Existing studies have sought to measure and verify the impact of citizens on OGI so that citizens' pressure is measured through proxies and indirect methods such as the education level of citizens, internet penetration, or turnout. The lack of empirical data needed to measure relevant public pressure on local authorities might account for this limitation. To overcome this limitation, this study attempts to verify the impact of local citizens in two aspects: organized local citizens and individual citizens. In so doing, the author aims to shed light on the role of citizens as consumers and actual users of government information.

Next, the existing studies failed to consider the spatial context regarding the OGI at the local level. If OGI is the normative and practical value in local governments, the awareness of OGI might proliferate in the region. Yet, the literature only refers to the possibility of regional diffusion of OGI in a few studies (Grimmelikhuijsen & Feeny, 2017; Schnell & Jo, 2019; Tejedo-Romero & Araujo, 2020) and not yet properly validated. Hence, this study seeks to identify the possibility of regional diffusion regarding the OGI among neighboring local governments.

In terms of **research method**, previous research has measured the openness of government information with soft data (survey and

interview) and content analysis on the local government website. These measurements have shortcomings, including being prone to researcher's subjectivity. In this regard, this study utilizes Meijer et al.'s (2012) conceptual dimension on OGI, dividing it into two aspects: (1) the extent to which citizens could monitor the internal activity of governments (2) the extent to which citizens are provided with opportunities to engage in public policymaking. This dissertation measures two conceptual dimensions with observable and hard data, correspondingly: (1) DRAD and (2) the number of open data sets.

In addition, the author constructed five-year panel data for every lower-level local government of Korea. Most local government OGI studies have targeted specific and partial local governments or regions (e.g., Bearfield & Bowman, 2017; Conradi & Choneni, 2014; Gasco-Hernandez & Gil-Garcia, 2018; Grimmelikhuijsen & Feeny, 2017; Lowatcharin & Menifield, 2015; Thorsby et al., 2017). In this research, the author selected and analyzed all lower-level local governments. Moreover, this study could address the limitations of cross-sectional data by setting the five-year panel data to consider a greater degree of the heterogeneity that characterizes individuals (local governments) over time (Hsiao, 2003).

Lastly, geographic information is used to identify the impact of neighboring local governments, and a spatial panel regression model is performed. The study verifies the spatial autocorrelation that may exist in the OGI of local governments and produces sophisticated analysis results through spatial panel regression analysis. Most studies related to OGI in local governments overlooked the possibility of spatial autocorrelation and used a linear regression model to estimate the supposed spatial independence. However, if spatial autocorrelation

exists in the OGI of local governments, the results of existing studies might be biased (Lee, 2021). Therefore, this dissertation considers the existence of spatial dependence and simultaneously estimates the impact from neighboring local governments regarding the OGI.

CHAPTER 3. METHODOLOGY

3.1. Research Framework

The main purpose of this dissertation is to identify the key determinants of the openness of government information (OGI) in local governments and contribute to a balanced understanding of local governments' OGI. This study views local governments, which are the main agents of opening government information and data, as social actors (King, Felin, & Whetten, 2010; Scott, 2003). As actors participating in local governance, local governments struggle to secure their legitimacy by accepting socially required values within a network (Meyer & Rowan, 1977; Jung et al., 2009). Besides, they make intentional efforts toward their own policy objectives (King, Felin, & Whetten, 2010) to improve local citizens' quality of life and regional development. In this regard, the activity of local governments' opening information can be understood as not only attributed to the institutional environment but also intentional and internal efforts to enhance a higher level of openness.

Based on this understanding, this study holds that local governments' both external (environmental) and internal factors, simultaneously shape OGI. Hence, this study employs the TOE framework by Tornatzky and Fleischer (1990), which values internal contexts but also considers the environmental contexts in accepting organizational innovation. The TOE framework is a practical framework consistent with both DOI theory (Rogers, 1995), which emphasizes the internal factors, and the institutional theory, which highlights the external pressure regarding innovative policy (Sun et al., 2018; Oliveria et al., 2011; Wang and Lo, 2015; Lee, 2017). This

framework is expected to serve as an overarching theoretical foundation for this research. Moreover, the TOE was selected because its three contexts encompass the OGI's determinants examined in the previous literature.

Above all, the dependent variable of this dissertation is the OGI, defined as "the extent to which citizens can see and influence government workings and have opportunities to participate in public policymaking through the government information provided via the government portal." This definition applies Meijer, Curtin, and Hillebrandt's (2012) perspective on open government and sees OGI as to the level of providing citizens with original documents and machine-readable data of government in order to know the internal workings of government and give a chance to co-produce and participate in a policymaking arena. Accordingly, the OGI level, a dependent variable in this study, is measured as the rate of disclosure on original administrative documents and the number of open data sets.

This study classified the independent variables into two categories: internal factors and external factors. Internal factors specify t*echnology-related factors* and *organizational factors*. External factors include (local) *environmental factors* and *neighboring government factor*. The *Neighboring government factor* is part of *Environmental factors* with the lens of TOE but was derived as a separate factor to highlight the factors as contribution points in this dissertation. In addition, although most environmental factors are bound to each local region, the neighboring government factor is concerned with outside of the region's boundaries, and the methodology for identifying the effect is differentiated, so the factor is classified separately. The whole research model is demonstrated in Figure 3.1.
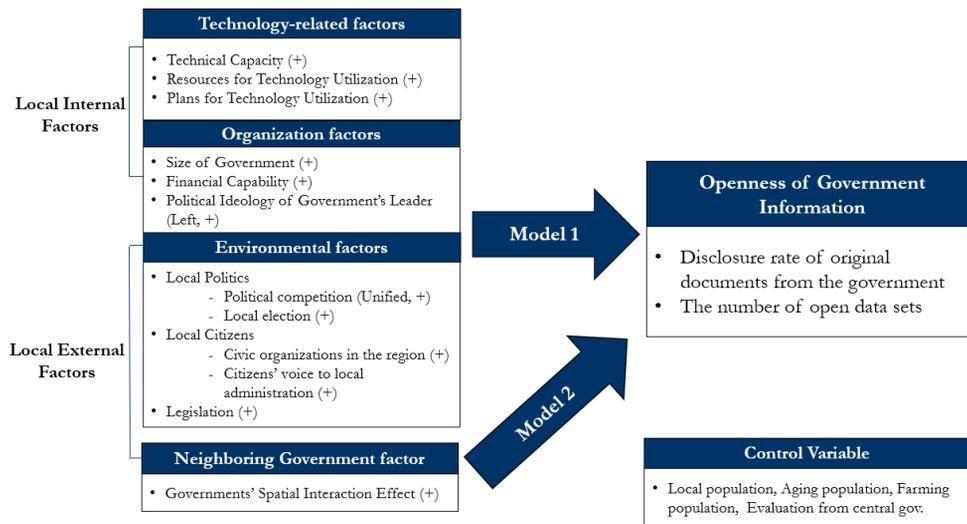
Figure 3.1. Conceptual Model of This Study.

Technology-related factors, *organization factors*, *environmental factors*, and the *neighboring government factor* were set up as independent variables. To be specific, *technology-related factors* is defined as the technology-related characteristics in each local government. Government openness and transparency are currently enhanced through IT, and IT is considered a catalyst for open government (Gil-Garcia et al., 2020). Hence, *technology-related factors* are the first explanatory factors of this research and expected to influence the local government's OGI positively. Technical capacity, resources for technology utilization in the government, and willingness of internal digitalization are included as sub-variables of *technology-related factors*.

Secondly, *organization factors* is defined as the internal characteristics of each local government. *Organization factors* indicating the internal available resources and conditions for each local government itself includes administrative, financial, and political conditions that might affect the level of OGI (Gil-Garcia, 2012; Kim & Eom, 2019; Mergel, 2015; Garcia-Sanchez et al., 2013; De Araujo &

Tejedo-Romeo, 2016; Annisa & Murtini, 2018; Sol, 2013; Lee, 2013). *Organization factors* include the administrative capacity, financial capability, and the political ideology of the leader as sub-variables. If the local government has abundant administrative resources and favorable financial and political conditions, it will likely open its information and data to the public.

Thirdly, *environmental factors* refer to local environments that local government is confronting and find difficult to control. This study assumes that the local environments such as local politics, local citizens, and legislation would not be controlled and altered by local governments' effort. Instead, the local surrounding environment might exist as an institutional environment to local governments and exert considerable pressure on disclosing their internal information and data. Particularly, among the environmental factors, this study identifies the impact of local citizens as a consumer of government information neglected in previous research. This is an attempt to overcome the limitations that many OGI studies have constructed models focusing on the supply-side of OGI. Local citizens, one of the core participants of local governance, can affect the OGI level of local government. The local government might open its internal information and data to attain legitimacy and citizens' trust to respond to these demands. *Environmental factors* include the influences from local politics, local citizens, and legislation as sub-variables.

Lastly, the *neighboring government factor* means the effect of interaction within geographically adjacent local governments. Understanding local government as a spatial unit, this study introduced this factor under the assumption that there would be some interaction between spatially adjacent governments. The effect of neighboring

governments will show the possibility of regional diffusion of OGI (Walker, 1969; Berry, 1994; Sharkansky, 1970; Lee, 2004). That is, if the adjacent governments have a high level of OGI, the local government is likely to have a similar level of OGI. This is the first attempt to verify the spatial effect of OGI and is considered to be another contribution point in the existing OGI literature.

To develop an integrative explanatory framework for OGI in local government, this study established two research models: <Model 1: TOE>, <Model 2: TOEN>. Firstly, <Model 1> validates the *technology-related*, o*rganizational*, and *environmental factors* on the OGI level in local governments. In <Model 1>, a panel linear regression analysis with fixed-effects model is conducted to eliminate the bias from the correlation between the unobserved time-invariant effect, and the included explanatory variables (Hsiao, 1985). However, government openness is known to increase more participation and self-empowerment of citizens (Janssen, Charalabidis, & Zuiderwijk, 2012). Hence, a bi-directional relationship might exist between local citizens' impact and the level of OGI. Accordingly, this study presents the results with the time-lagged measures (t-1) on local citizen variables to identify the prior impact of local citizens on the level of OGI.

<Model 2> includes all factors presented in <Model 1> but adds a *neighboring government factor*. A spatial panel regression analysis that reflects the spatial characteristics of local governments is employed. By considering the impact of neighboring local governments are overlooked in OGI literature, it solves the omitted variable problem and verifies the spatial effect on the OGI level. First, this study visually first checks spatial dependence among adjacent local governments through exploratory spatial data analysis (ESDA). Subsequently, spatial

panel regression analysis verifies the spatial effects on the OGI of local governments. It confirms an interaction between geographically adjacent local governments in terms of OGI level occurred. Figure 3.2 visualizes the analysis framework of this dissertation.

Purpose of Dissertation	Exploring Key Determinants of Openness of Government Information

<Model 1>   <Model 2>

Analysis Model	**Technology-related Factors**	**Technology-related Factors**
	Organization Factors	**Organization Factors**
	Environmental Factors	**Environmental Factors**
		Neighboring Government Factors

Model Estimation Method	• **Panel Linear Regression (fixed-effects)**
	  - Time lagged measures on local citizen variables
		• **Exploratory Spatial Data Analysis**
		• **Panel Spatial Regression (fixed-effects)**
		  - Spatial Lag Model

Analysis Subject	• **Unit of Analysis: 228 Korean Local governments** **(city, county, and district government)** • **Time Scope: 5 year (2015-2019)**

Figure 3.2. Analysis Framework.

3.2. Research Hypotheses

3.2.1. Internal factors

3.2.1.1 Technology-related factors

a. Technical capacity

The literature expects technology to bring about changes in political culture and structure through the application of practical and functional methods (Abramson et al., 1988; Hollander, 1985; van de Donk & Tops, 2006). IT could have the potential to encourage interaction between government and society as well as to achieve greater collaboration that establishes the basis for a participative democratic government (Attard, Orlandi, Scerri, & Auer, 2015; Fierro & Gil-Garcia, 2012; Piotrowski & Liao, 2011; Gil-Garcia et al., 2020).

IT constitutes a major dimension for OGI (Chen et al., 2019; Gil-Garcia et al., 2020; Wirtz & Birkmeyer, 2015). Through the use of technology, dissemination and publication of information is easier and less costly (Fierro & Gil-Garcia, 2012; Kim et al., 2015; Porumbescu, 2016; Gil-Garcia et al., 2020). Hence, technology greatly enhanced citizens' access to public records and increased the government's proactive release of information (Cullier & Piotrowski, 2009; Jager & Bertot, 2010). Indeed, many governments are adopting ICT to enhance information availability and transparency (Bertot et al., 2010; Jaeger & Bertot, 2010).

In line with these perspectives, technical capacity such as technical expertise and capabilities available in the government might be crucial to increase openness of government information (Grimmelikhijusen & Feeny, 2017; Wirtz & Birkmeyer, 2015; Yavuz &

Welch, 2014). An organization's existing technical capacity can play an important role in determining the level of OGI, as it can limit an organization's scope and pace of change caused by technology (Collins et al., 1988). With this understanding, Grimmelikhijusen and Feeny (2017), Zhao and Fan (2018), Ingram (2017), and Chen et al. (2019) consider government's technical capacity as a significant driver for the openness of government information.

In reviewing these discussions, this study assumes that the higher the technical capacity of local government, the better it could open and distribute information and data held by the government itself. Therefore, this study could establish the following hypothesis:

H 1.	Technical capacity of the local government is positively associated with its level of OGI. (+)
H 1-1.	Technical capacity of the local government is positively associated with its level of opening the original administrative documents.
H 1-2.	Technical capacity of the local government is positively associated with its level of opening public data.

b. Resources for technology utilization

Opening government information and data requires a certain level of investment in resources to identify and prepare the information and data held by the government (Zhao and Fan, 2018). Also, the government must sort out the data resources, transform them into a machine-readable format, release the data on the required open data platform, and provide daily updates and maintenance (Zhao and Fan, 2018). Similarly, Evans and Campos (2013) also argued that public managers face ongoing challenges to respond to the demand for open government constrained by financial and human resources.

The resources, referring to tangible and intangible assets that organizations use to develop and implement their strategies (Ray,

Barney, & Muhanna, 2004), can be necessary for implementing opening government information and data. Resource-based theory explains how distinctive organizational resources affect better performance (Barney, 1991; Lee & Whitford, 2013; Hansen, Perry, & Reese, 2004). In order for government information and data to be opened, the data are accumulated through the internal e-government platform and converted into digital format, and finally uploaded and managed. This process would require a certain level of human and financial resources, especially related to technology.

Thus, sufficient human resources and budget for the organization's ICT utilization can facilitate the government's opening, recording, and browsing of information, thereby enhancing the level of OGI. Accordingly, the following hypothesis is proposed:

H 2.	ICT resources of government are positively associated with its level of OGI. (+)
H 2-1.	ICT resources of government are positively associated with its level of opening the original administrative documents.
H 2-2.	ICT resources of government are positively associated with its level of opening public data.

c. Plan for technology utilization

If IT promotes government openness and transparency (Margetts, 2006; Oliver, 2004; Fung et al., 2007; Grimmelikhijusen & Feeny, 2017; Zhao & Fan, 2018), governments that make plans for the establishment and utilization of IT strategically in advance are likely to show a higher level of openness. The literature discusses planning for IT implementation as a success strategy for the government's IT initiatives (Irani et al., 2005; Gil-Garcia & Pardo, 2005; Smith et al., 2001; Brown, 2000; Kim, 2019). Accordingly, the local governments that have developed and then revised their implementation plan for technology

utilization might accomplish a higher level of openness and transparency in government information and data. Therefore, the following hypothesis is derived:

H 3.	The effort to revise the plan for technological utilization within the organization is positively associated with its level of OGI. (+)
H 3-1.	The effort to revise the plan for technological utilization within the organization is positively associated with opening the original administrative documents.
H 3-2.	The effort to revise the plan for technological utilization within the organization is positively associated with its level of opening public data.

3.2.1.2. Organization Factors

a. Size of Government

Previous literature has shown that organization size is an important capacity factor in opening an organization's information (Grimmelikhuijsen & Feeny, 2017; Saxton, Kuo & Ho, 2012; Verbruggen, Christiaens & Milis, 2011). Large-sized organizations have more qualified staff, which may facilitate the preparation and presentation of information and data (Arshad et al., 2013; Garcia-Sanchez et al., 2013). Thus, Rogers (2003) also explained that an organization's size has a positive impact on its innovation adoption and that the larger the organization, the more available resources it has to leverage to innovate. Likewise, Grimmelikhuijsen and Feeny (2017) argued that organizations with higher capacity can more easily afford innovations and have more freedom to experiment with innovation. They found that an organization's size, which is a proxy for organizational capacity, is the most powerful influential factor for government openness.

Inversely, if the size of the organization increases, it might constrain innovative activity such as opening government information and data. A meta-analysis of innovation and organization size (Camisón-Zornoza et al., 2004) reported a negative relationship between the size of the organization, often measured as the organizational complexity (Damanpour, 1996) and innovation. Large organizations are less committed to innovation because their formalized structure and bureaucratic environment within the organization negatively affects the culture that fosters innovation (Hitt et al. 1990; Camisón-Zornoza et al., 2004). Applying this idea to the OGI, a large organization could have too much information to manage and too many veto points to open government information and data, which might impede the favorable culture for openness and transparency. Summing the contradict discussion on the effect of the size of government, this study presents the following hypothesis and attempts to verify the relation between the size of government and OGI.

H 4.	The size of local government is positively associated with its level of OGI. (+)
H 4-1.	The size of local government is positively associated with its level of opening the original administrative documents.
H 4-2.	The size of local government is positively associated with its level of opening public data.

b. Financial capability

The ability to mobilize financial resources can be desirable and helpful to adopt within the organization (Tornatzky and Fleischer, 1990). According to the TOE researchers, a slack resource is widely studied within the organizational context (Baker, 2012). Based on this perspective, several OGI studies consider financial status as an explanatory variable in their research model (Garcia-Sanchez et al.,

2013; Justice & McNutt, 2013; Chen et al., 2019). They posit that a government with better financial resources would also invest in developing OGI or transparency websites and other support facilities. On the other hand, the inverse explanation can be possible in that the government, under poor financial conditions, might be forced to open its internal information and data from watchdog groups (Chen et al., 2019; Lowatcharin & Menifield, 2015). Based on these mixed arguments, this study tries to verify the effect of the financial resources of OGI and build another empirical result to contribute to this debate. Hence, this study establishes the following hypothesis:

H 5.	The degree of financial capability of local government is positively associated with its level of OGI. (+)
H 5-1.	The degree of financial capability of local government is positively associated with its level of opening the original administrative documents.
H 5-2.	The degree of financial capability of local government is positively associated with its level of opening public data.

c. Political Ideology of Government' Leader

The ideology of the governing party, especially the leader of the government, may influence the level of OGI in local governments (Piotrowski & Van Ryzin, 2007; Albalate Del Sol, 2013). The literature also examines ideology of the governing party as one of the determinants of OGI in the local government studies (Araujo & Tejedo-Romero, 2016; Cicatiello et al., 2017; Saez-Martin et al., 2019; Bras & Dowley, 2021).

Many studies have discovered that left-wing municipality governments are more transparent than those ruled by right-wing parties (Albalate Del Sol, 2013; Caamano-Alegre et al., 2013;

Grimmelikhuijsen & Welch, 2012; Guillamon et al., 2011; Tejedo-Romeo & Araujo, 2016).

Left-wing governments are associated with higher information openness than right-wing governments because they defend a larger public sector; thereby, researchers expect left-wing governments to make information readily available and accessible to all the citizens (Ferejohn,1999). On the contrary, several studies, such as Araujo and Tejedo-Romeo (2016) and Tolbert et al. (2008), show that right-wing governments tend to show greater transparency at the local level in Spain. Even Esteller-More and Otero's (2012) study concluded that political ideology does not seem to affect transparency. Likewise, the existing literature emphasizes and includes the political ideology factor as the major determinant of OGI at the local level, yet unsuccessful in forming a consensus on the effect and direction of political ideology. Reviewing these discussions, this study attempts to verify the effect and direction (left-wing vs. right-wing) of political ideology regarding the OGI at the local level. Thus, the following hypothesis is proposed:

H 6.	Local governments with left-wing ideology are more positively associated with OGI level of local government. (+)
H 6-1.	Local governments with left-wing ideology are more positively associated with its level of opening the original administrative documents.
H 6-2.	Local governments with left-wing ideology are more positively associated with its level of opening public data.

3.2.2. External factors

3.2.2.1. Environmental Factors

a. Local Politics

Local election

Local election, one of the significant institutional environments for local government, is held periodically and considered to be an evaluation of the existing local administration. Through local elections, residents can express their preference and credibility on the local administration. Quite a few researchers who studied the relationship between government trust and OGI reported the positive association between the OGI and government trust (Bennister et al., 2011; Caterberg & Moreno, 2006; Cucciniello & Nasi, 2014; Mason et al., 2014; Meijer et al., 2014; Porumbescu, 2015; Schmidthuber et al., 2020). That is, increasing the availability of information can increase public trust (Araujo & Tejedo-Romero, 2016), reduce the information asymmetry problem, and enhance the legitimacy of local administration (Roberts, 2006).

Several researchers also examined the relationship between the local election and the local government's OGI (Munoz et al., 2018; Tejedo-Romero & Araujo, 2020). They explained that opening the internal information of local government such as deficit spending and fiscal balance may enhance the credibility of the government's management of public resources (Munoz et al., 2017) and promote citizens' confidence in local administration (McNeal et al., 2008). If citizens, as voters, appreciate the government's transparency and openness, politicians may be more willing to commit to the disclosure of information and data (Tejedo-Romero & Araujo, 2020).

In a similar perspective, when a local election is held in the year, citizens may demand a higher level of openness of government information and data to judge the accountability of the local administration. Local governments that want to regain power will strive to promote openness to gain a better evaluation in the year of a local election. Therefore, the following hypothesis is formulated:

H 7.	The year of the local election is positively associated with the OGI level of local government. (+)
H 7-1.	The local election year is positively associated with the local government's level of opening the original administrative documents.
H 7-2.	The local election year is positively associated with the local government's level of opening public data.

Political competition

Political competition—although measured with different indicators, such as the percentage of seats held by the minority political party or the gap of turnout between the first and second place—consists of another factor widely discussed in the academic literature as a variable accounting for public official incentive to satisfy citizens' demand (Evans & Patton, 1987; Munoz & Bolivar, 2015). Opening government information and data may be a signal from the ruling party of a public commitment to transparency and openness and seeking to gain support from the public (Tejedo-Romero, Araujo, 2020). And it can be an incentive for reelection because it can yield crucial support or at least foreclose potential avenues of criticism (Beliner, 2014). However, without the competition, the governing party, especially the local government, has little incentive to open their information (Bearfield & Bowman, 2017). In this light, this political competition structure may exist as another institutional environment for local government to

require a higher level of openness of internal information and data (Munoz & Bolivar, 2015).

The empirical results based on this idea are nonetheless somewhat mixed. Tejedo-Romero and Araujo (2020) argued that competitive political environments might create more uncertainty over the future for the ruling political party, and so the higher political competition would increase the level of transparency: but their work failed to obtain significant results. Munoz and Bolivar (2015) found that political competition has a positive relationship in non-Anglo-Saxon municipalities, while Bearfield and Bowman (2017) verified that political competition influences transparency in large cities. Based on the arguable results of previous literature, this study assumes that the presence of strong opposition to monitor the local governments may affect the OGI level of local government. Thus, the following hypothesis is presented:

H 8.	Political competition is positively associated with the OGI level of local government. (+)
H 8-1.	Political competition is positively associated with the local government's level of opening the original administrative documents.
H 8-2.	Political competition is positively associated with the local government's level of opening public data.

b. Local Citizens

Civic organizations

The literature often considers local citizens the demand side of government openness (Amerikaner, 2020; Bearfield & Bowman. 2017; Schnell & Jo, 2019; Piotrowski & Van Ryzin, 2007). They attempt to engage in local issues and require support from the local government (Cuthill & Fien, 2005). However, in the process of engagement, even in

developed countries, individual citizens face considerable limits like the lack of time, knowledge, and skill to exert enough pressure to gain government support (Schnell & Jo, 2019). This perspective highlights the role of intermediate organizations such as civic organizations (Worthy, 2015; Schnell & Jo, 2019).

Civic organizations play a key role in progressing other global transparency initiatives (Brockmyer & Fox, 2015) and advocate greater citizen participation (LeRoux, 2007). In the process of citizen participation, they actively request the information and data in the public interest (Lee, 2013). Dowely (2006) also found that the more vibrant civic organizations will lead to higher demand for transparency from their local governments. And Bearfield and Bowman (2017) include the community demand for transparency as one of the explanatory factors of their research model and found its positive effect. Schnell and Jo (2019), who examine the determinants of government openness at the global level, found that the number of civic organizations in the nation is positively associated with the country's budget transparency.

Although few studies have been working on this relationship, whether these results are robust must be checked because of the relative lack of research on the impact of citizens on OGI. Thus, the following hypothesis is proposed:

H 9.	The number of civic organizations in the region is positively associated with the OGI level of the local government. (+)
H 9-1.	The number of civic organizations in the region is positively associated with the local government's level of opening the original administrative documents.
H 9-2.	The number of civic organizations in the region is positively associated with the local government's level of opening public data.

Citizens' voice to local administration

Local citizens, who are the important sources of power (voting) and finance of local government (Jung, 2012), show their preference and satisfaction in various ways. For example, citizens evaluate the performance of local governments by voting as the most direct and active form of participation or attend public open-meetings to deliver their opinion. However, as discussed above, individual citizens were limited in effectively communicating their preferences and opinions to the government due to their lack of time, knowledge, and skills (Schnell & Jo, 201). Therefore, intermediary organizations such as civil society organizations (CSO) and local media served as representatives of local citizens' voice (Worthy, 2015; Schnell & Jo, 2019)

On the other hand, ICT effectively delivers individual citizens' voice to the administration. Through various online platforms such as online petitions and complaints, citizens can suggest and express their satisfaction and opinion about the local administration. Now, individual citizens can deliver their influence than in the past, so the local citizens' voice and power became one of the important institutional environments local government must consider.

The voice of citizens expressing dissatisfaction with the government (Hirschman, 1970) can be a significant peril to the government's legitimacy and reelection. The number of ordinary citizens' votes is much greater than the number of votes from special interest groups, and hence citizen dissatisfaction reduces the likelihood of politicians' reelection (Yamamura & Kondoh, 2013). Accordingly, the more that the citizens' voice is expressed, the more the government will try to secure their legitimacy by pursuing values that are considered

socially desirable (Meyer & Rowan, 1977). In particular, several studies reported that the increase in openness and availability of government information is positively associated with citizen's trust toward the government (Kim & Lee, 2012; Vigoda-Godt, 2007; Buell & Norton, 2013; Mettler, 2011). Thus, local governments facing more voices from citizens might show higher openness in government information and data to mitigate citizens' dissatisfaction. With this understanding, this study presents the following hypothesis:

H 10.	The voice from citizens toward local government is positively associated with the OGI level of the local government. (+)
H 10-1.	The voice from citizens toward local government is positively associated with the local government's level of opening the original administrative documents.
H 10-2.	The voice from citizens toward local government is positively associated with the local government's level of opening public data.

c. Legislation

The legal environment includes the laws, regulations, and norms that put formal and information limitations on the organization's activity (Mashaw, 1990). Regarding the OGI, freedom of information (FOI) laws and the Public Data Act (in the Korean context) allow public organizations to open their information and data (Ingrams, 2017). Quite a few studies highlight the role of the legal environment. A recent study that explores the determinants of open government performance, Zhao and Fan's (2021), noted that the rules and regulations play an essential role in the implementation of OGD and are the necessary conditions to produce a high-level OGD performance. Similarly, Yang and Lo (2015) identified legislation as the most critical point and prerequisite for implementing open data projects. Similarly, Ingram (2017) argued that

the legal constraints making conflicts such as regulation for protecting personal information could hinder the open data use in public organizations and found a statistically negative relationship between them. Inversely, Kim and Eom (2019), exploring the factors for open data success in the Korean context, regarded the IT-related laws and rules as the favorable institution for open data success and identified the positive relationship between them. These results are indicating that the legal environment can affect the openness of government information and data.

Building on this literature, this study attempts to examine the positive effect of legislation on the OGI in the local government and proposes the following hypothesis:

H 11.	The legislation status regarding OGI is positively associated with the OGI level of local government. (+)
H 11-1.	The legislation status regarding OGI is positively associated with the local government's level of opening the original administrative documents.
H 11-2.	The legislation status regarding OGI is positively associated with the local government's level of opening public data.

3.2.2.2. Neighboring Government Factor

Interaction with adjacent governments

Decentralization offers favorable conditions for policy innovation and diffusion (Shipan & Volden, 2012). With the lens of policy diffusion theory, many scholars have emphasized the advantage of decentralization as a polity structure that gives chances for policy experiments and innovation. In a decentralized polity structure, the policymakers decide based on the results of enacted policies in other regions. Thus, policymakers systematically assess the policy experience

of other local governments (Gilardi & Wasserfallen, 2019). As a consequence of interaction with other governments, the new, successful policies gain acceptance and then spread (Meseguer, 2006; Giliardi et al., 2009). The research on policy diffusion began with empirical studies identifying policy adoption and implementation influenced by the decision of neighboring governments to introduce the new policies (Berry & Berry, 1990; Jensen, 2003; Walker, 1969). Regional proximity seems to be one of the pillars of policy diffusion studies.

According to Karch (2007), geographical proximity facilitates a communication network of policymakers, and neighboring governments have high similar politics and cultures, so policymakers tend to refer to neighboring governments' policies as a model. That is, adjacent governments are likely to implement similar policies based on interactions like Tobler's (1970) "*the first law of geography*": "everything is related to everything else, but near things are more related than distant things."

This study thus highlights the "neighboring effect" among local governments in terms of the level of openness in government information and data. Open government, as an innovative value in government (Piotrowiski, 2007; Ruijer & Meijer, 2020), might show the regional diffusion in the local government context. This study assumes that local governments that exist in a spatial unit may be affected by the level of OGI in neighboring local governments. Therefore, the following hypothesis is established:

H 12.	The level of OGI in neighboring governments is positively associated. (+)
H 12-1.	The level of opening the original administrative documents in neighboring governments is positively associated.

| H 12-2. | The level of opening public data in neighboring governments is positively associated. |

3.3. Measurements and Data Collection

3.3.1. Dependent Variables

The dependent variable is the level of openness of government information (OGI) in local government. This study conceptually defines the level of OGI as "the extent to which citizens can see and influence government workings and have opportunities to participate in public policymaking through the government information and data provided via government portals." This definition is originally grounded in Meijer, Curtin, and Hillebrandt's (2012) definition of open government. They suggest that open government consists of two dimensions: vision (transparency) and voice (participation). The former refers to open access to government information, and the latter indicates open access to decision-making (Meijer, Curtin, & Hillebrandt, 2012). This study emphasizes "vision" but still encompasses the "voice" in that open data provides citizens with opportunities to co-produce the policies regarding the policy problem that government could not solve (Sicilia et al., 2015; Moon, 2018). With this conceptual definition, this dissertation adopts two approaches to measure OGI: DRAD and the number of open data sets. These two measures are the quantitative indicator of the most representative system for promoting openness in the South Korean context. They well reflect the administrative value of transparency (DRAD) and participation (open data), respectively, emphasized from an open government perspective.

3.3.1.1. Disclosure rate of administrative documents

As the first measurement of OGI, this study selected the disclosure rate of original administrative documents. Korean researchers often use the disclosure rate to measure observed transparency and information availability (Lee, 2013; Lee & Jung, 2011; Lee & Moon, 2010; Park, 2017). However, previous research measured the rate of information disclosure as the ratio of disclosure to the number of requests for information disclosure by citizens. This indicator measures the level of passive release of information (Meijer, Curtin, & Hillebrandt, 2012, Oliver, 2010), including disclosure offline. Thus, it is not an appropriate measurement for the OGI for this study, which assumes online-based OGI.

Instead, this study utilizes government's DRAD and refers to the active release of government information (Meijer, Curtin, & Hillebrandt, 2012) in that government preemptively opens the originals of administrative documents they held without the citizens' request. DRAD is significant in that it is close to active disclosure, which is a concept advanced beyond the passive disclosure based on FOI (Oliver, 2010). With the Korean government's revision of the *Official Disclosure Act* in 2013, local governments' original administrative documents are released through the Information Disclosure Portal (http://open.go.kr) in advance of citizens' request. The new act is an effort to increase government transparency by opening original administrative papers, except for those that do not meet the non-disclosure criteria specified in the statute (MOIS, 2014).

In this regard, this study uses the disclosure rate of local government's administrative documents (original). The rate is calculated as the ratio of the number of disclosure in original administrative

documents in the portal (official website to information disclosure) to the number of original administrative documents registered by local governments. This study collected the five-year (2015–2019) disclosure rates of 228 local governments from the Korean Information Disclosure Portal (http://open.go.kr).

3.3.1.2. The number of open data sets

Another measurement is the number of open data sets released by the local government. Open data, understood as the digitalized, connectible, and reusable information, data, and APIs, pursues participation and collaboration in public administration perspective (Moon, 2020). Citizens can have opportunities to co-produce (co-design or co-deliver) public services using government data and APIs (Moon, 2020) and to actively participate in the decision-making process. Hence, open data portal, which publishes open data online, has been frequently studied as a direct output of the open government movement (Correa et al., 2014; Cahlikova & Mabillard, 2020; Gasco-Hernandez & Gil-Garcia, 2018; Ruijer et al., 2020).

The literature measuring OGI with the open government portal only comprehensively and indirectly evaluates the OGI level through open data portals but fails to assess the OGI level more objectively. This study uses the number of open data sets published by each local government on the open data portal to address this limitation in the existing literature. This measurement is expected to provide a quantitative and objective approach for open data itself, a direct manifestation of open government initiatives only measured comprehensively and qualitatively.

In order to identify the number of open data sets of each local government, this study utilized the list of 31,567 public data sets published and managed by local governments since 2014 in Korea. The author obtained the raw data from the National Information Society Agency (NIA), an affiliate of the MOIS of Korea, through an information disclosure request. The number of open data sets for each local government were directly coded and measured in 2015–2019 from the list.

3.3.2. Independent Variables

3.3.2.1. Technology-Related Factors

a. Technical capacity

This study defines technical capacity as the ability to effectively change or innovate the organization through technological means (Kim & Bretschneider, 2004). Technical capacity was measured as the overall level of online service of the organization (Grimmelikhuijsen & Feeny, 2017), the presence of supportive IT human and financial resources in the organization (Yavuz & Welch, 2014), or the presence of IT expertise, IT knowledge, and IT skills in the organization (Zhao & Fan, 2018). Technical capacity encompasses a wide range of ability for IT utilization within the organization. This study emphasizes technical capacity as the skills and ability to apply technology to implement services (Grimmelikhuijsen & Feeny, 2017) so that the level of management of public mobile applications (apps) is evaluated as local governments continuously developing technical capacity. The Korean government evaluates public mobile apps on their operation and

performance since 2017 under articles 23 and 68 of the Electronic Government Act. The government strengthened performance management on public mobile apps by assessing its utilization and management level and measured in three stages: disposal, needs improvement, and continuance (MOIS, 2019). Current Korean research used the data as a measurement variable (Kim, 2019; Lee, 2020).

However, since not all local governments develop public apps, local governments also have no records. However, the development of apps itself can substantiate the technical capacity of local governments. Therefore, in this study, referring to the third-phase performance measurement of MOIS (2019), 0 is no public apps developed, 1 is app is recommended for "disposal," 2 is app is assessed as "needs improvement," and 3 points are awarded for "continuance" apps. In the case of local government with multiple public apps, they were measured as the level utilizing the arithmetic average of the apps' evaluation scores.

b. Resources for technology utilization

The resources supporting technology utilization are measured in two ways: financial and human. Whereas financial resources can be defined as the scale of financial resources spent by local governments in informatization (Kim & Eom, 2019) and measured by the budget (log value) invested by local governments in ICT projects. Human resources are defined as the scale of human resources that support technology utilization and is measured by the ratio of the personnel exclusively responsible for information services to the total public officials in the government (Kim & Eom, 2019). This study collected this data collected through the "Local Informatization White Paper" published

by the Korea Local Information Research and Development Institute (KLID).

c. Plan for technology utilization

The implementation plan for technology utilization within local governments is measured by the number of amendments to the local government's informatization master plan. It is literally a task of drawing a big picture of the organization's technology utilization, and as the ICT environment changes, each local government may revise the plan several times to reflect and respond to the changes. Plans that have undergone revisions may represent more effort by local governments to utilize technology. In this regard, this study measures that if the plan has not been revised since the first establishment, it is coded as 1 and if there is a fifth plan, it is coded as 5. This study collected the current status of local governments' informatization master plans through the "Local Informatization White Paper" published by KLID.

3.3.2.2. Organization Factors

a. Size of government

The size of the government is measured by the log value of the total number of public officials in each local government (Saxton, Kuo & Ho, 2011; Verbruggen, Christiaens, & Milis, 2011). The annual number of local government officials was collected directly from the website (https://www.mois.go.kr/) of the MOIS.

b. Financial capability

One of the features that represent the capability of financial capability is financial autonomy (Jung, 2010; Kim, 2010). Financial autonomy refers to the ability of local governments to utilize their financial resources. In this study, it is measured with the financial independence rate{(local tax+non-tax revenue)*100/general accounts size}, which is officially measured and published annually by MOIS of Korea. The data were collected from the website (http://kosis.kr/) of the Korean Statistical Information Service (KOSIS), provided by Statistics Korea.

c. Political ideology of a government's leader

The political ideology of a government's leader is measured as a categorical variable: 0 for the conservative, 1 for the progressive. The measurement is made through the political orientation of the governor (state), the metropolitan mayor (metropolitan city), the mayor (city and county), and the head of the district (Gu). The data were collected directly from the electoral statistics system of the National Election Commission of Korea.

3.3.2.3. Environmental Factors

a. Influences from Local Politics
Local election

Korea holds local elections every four years. They elect provincial governors, mayors, education superintendents, and local councilors through local elections. Considering the time scope of our study (2015–2019), this study measures it with the year of local election in a categorical variable (Tejedo-Romero & Araujo, 2020). This variable

takes up the value of "1" in the local election year and "0" otherwise. The data were collected directly from the electoral statistics system of the National Election Commission of Korea (http://info.nec.go.kr/).

Political Competition

Political competition was measured with various indicators such as the index of political competition, the percentage of seats held by the minority political party, the ratio of candidates to position, and the difference between the percentages of votes gained by the parties that first and seconds (Laswad et al., 2005; Munoz & Boliviar, 2015; Tejedo-Romero & Araujo, 2020). Among various relevant indicators, this study selected the form of government to measure political competition (Kim, 2017; Jang, 2010). When the party of the head of the local administration's leader and the majority party of the local council coincides (the unified government), the level of political competition between local administration and the local council is low so that the political pressure on local administration might be low (Jang, 2010). While the parties are different (the divided government), the level of political competition between local administration is high so that the political pressure on local administration might be high (Jang, 2010).

This variable is measured with categorical variables taking up the value of "1" in the divided government and "0" otherwise. The data were directly collected from the electoral statistics system of the National Election Commission of Korea (http://info.nec.go.kr/).

b. Influences from Local Citizens

Civic organizations

The influence from civic organizations is measured using Grimes's (2013) measure of the number of NGOs per million inhabitants in each local area. Considering that civic organizations' participatory activities require government information and data related to local issues, civic groups based in the local area were measured (Dowley, 2006; Lee, 2013). It is a direct measure of civic organization density rather than that of the environment for civil society, such as freedom of association (Schnell & Jo, 2019). The data were collected from the list of the annual registration status of non-profit organizations published by MOIS of Korea.

Citizens' voice to local administration

Assuming that the voice of citizens is expressed based on the dissatisfaction with the government (Hirschman, 1970), the citizens' voice to local administration is measured with the number of complaints per million inhabitants in each local area. The annual data were collected directly from the Petition big data system (https://www.epeople.go.kr/), an integrated online public complaint platform operated by the Anti-Corruption and Civil Rights Commission Korea.

c. Legislation

The influence of the legislation is measured with the presence of a local ordinance supporting the OGI. The most related and fundamental law concerning dependent variables is the Official Information Disclosure Act (the first dependent variable) and the Public Data Act (the second

dependent variable). Considering these legal environments, this study measures the impact of legislation by the presence of related local ordinance based on the two laws. It is measured in categorical variables: if the local government has the ordinance, it is coded "1", otherwise "0". The data were collected from the Korean representative legal information website (https://www.law.go.kr/) run by the national law information center of the Korean government.

3.3.2.3. Neighboring Government Factor

Existing studies have defined neighboring governments using contiguity, distance, socio-economic similarity, and geopolitical boundary (Hwang & Eom, 2012). Among them, geographic contiguity is frequently used as a criterion for neighboring local governments, as adjacent areas are more likely to have similar industries or populations and exposed to common economic conditions and shocks (Bae, 2009; Bordignon et al., 2003; Lee, 2014; Schneider, 1989; Kim, 2020).

Measuring geographic contiguity is categorized by two main approaches: contiguity and distance. Contiguity criterion considers the border and vertices between the regions. The literature discusses this criterion in three methods: Rook contiguity (contiguity based on the shared border only), Bishop contiguity (contiguity based on vertices), and Queen contiguity (contiguity based on shared border or vertices) (see Figure 3.3). Distance-based criterion considers the threshold distance between the regions.

	<Rook Contiguity>			<Bishop Contiguity>			<Queen Contiguity>	
1	2	3	1	2	3	1	2	3
4	5	6	4	5	6	4	5	6
7	8	9	7	8	9	7	8	9
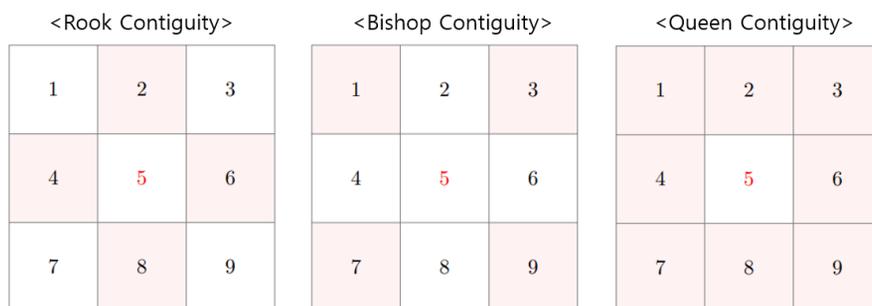
Figure 3.3. Type of contiguity

In general, researchers use the contiguity-based criterion to measure geographical proximity. When measuring the local governments of different size using a threshold distance criterion, the influence of neighbors with large sizes might be underestimated. While the influence of neighbors with small size might be overestimated (Anselin, 2003; Kim, 2020). Therefore, this study defines and measures the neighboring government by using the Queen contiguity criterion, which measures spatial contiguity more comprehensively (Ali et al., 2015; Drewnowski et al., 2007; Tsi et al., 2009). In other words, this study defines local governments that share corners and boundaries as neighboring governments.

The neighboring government effect is manipulated to be a spatially lagged dependent variable, measured with the average value of OGI levels in neighboring governments and calculated by the spatial weight matrix (Anselin, 2013).

3.3.3. Control Variables

a. Local population

The influence from the local population is measured with the size of the local population per million inhabitants. The annual data for the local population was collected through MOIS's official website (https://www.mois.go.kr/).

b. Aging population

The aging population is measured by the ratio of the elderly population of each local area. It is measured as the ratio of people aged 65 or older to the total population of the region. The proportion was collected directly through KOSIS (http://kosis.kr/), provided by Statistics Korea.

c. Farming population

The farming population is measured by the percentage of the population engaged in agriculture to the total population in each region. Data were collected through KOSIS (http://kosis.kr/), provided by Statistics Korea.

d. Evaluation from central government

The evaluation from the central government (Ministry of the Interior and Safety) measurement is twofold: In primary models, the author measured the year in which the central government conducted its OGI evaluation. This variable takes up the value of "1" in the evaluation year and "0" otherwise.

Table 3.1. Measurements and Data Sources

Variables			Measurement	Data Source
Dependent variable	**The Openness of Government Information**		Disclosure rate (%) of original administrative documents	Information Disclosure Portal of Korea (http://open.go.kr)
			The number of open data sets	Obtained from NIA Korea by information disclosure
Independent Variable	**Technology-related factors**	**Technical capacity**	The number of public mobile apps * Average evaluated value of public mobile apps from MOIS Korea (0~3)	"2016-2019 Public App Maintenance Results" published by MOIS Korea
		Resources for technology utilization	The size of ICT budget (log value)	2015-2019 Local Informatization White Paper
			The percentage (%) of ICT personnel to the total public officials	
		Implementation plan for technological utilization	The number of revisions of informatization master plan of local governments	2015-2019 Local Informatization White Paper
	Organization Factors	**Size of government**	The total number of public officials	The official website of MOIS (http://www.mois.go.kr)
		Financial capability	Financial autonomy={(local tax + non-tax revenue) /general accounts size} X 100}	Korean Statistical Information Service (http://kosis.kr)
		The political ideology of	The political orientation of the affiliated party	The electoral statistical

		a government's leader	(0: conservative 1: progressive)	system of the National Election Commission of Korea (http://info.nec.go.kr/)
	Environmental Factors	**Local Politics**	**Local election**	Local election held year (0: NO 1: YES)
			Political competition	The accordance of affiliated party of local government's leader and the majority of political parties in local council Unified=0, Divided=1
		Local Citizens	**The influence from civic org.**	The number of NGOs per 1,000 inhabitants in each local area	2015-2019 Annual registration status of non-profit organization (by MOIS)
			Citizens' voice to local administration	The number of complaints raised by citizens on the local administration (per 1,000 inhabitants)	국민신문고 (http://www.epeople.go.kr)
		Legislation		The presence of local ordinance regarding OGI laws (0: No 1: Yes)	Korean representative legal information web site (https://www.law.go.kr/)
	Neighboring Government Factor	**Interaction with adjacent governments**		The average value of OGI levels in neighboring government *neighboring government – sharing borders or vertices (Queen contiguity)	National Spatial Data Infrastructure Portal (http://www.nsdi.go.kr/)
Control Variables		**Local population**		The number of local populations per million inhabitants (logged)	Korean Statistical Information Service (http://kosis.kr)
		Elderly population		The percentage of people aged 65 or older to the total population of the region	
		Farming population		The percentage of the population engaged in	

	agriculture to the total population in each region (%)	
Evaluation from central government	<Primary models> The year of evaluation on OGI by the central government (0: No 1: Yes)	The Ministry of the Interior and Safety (MOIS) of Korea

3.4. Analysis Plan

This dissertation has two models using five-year balanced panel data. <Model 1: TOE> is the most basic model and mainly consists of factors from the TOE framework. <Model 2: TOEN> is a model that adds a neighboring government factor to <Model 1: TOE>. All models contain the TOE factors of <Model 1>. However, the principal analytic methodologies used for each model are different.

<Model 1> employed the panel linear regression with the fixed-effects model that controls the potential effect from unobserved individual characteristics of local government. <Model 2> performed spatial panel regression model to verify the effect of interactions among geographically adjacent local governments.

3.4.1. Model 1: Panel Linear Regression Analysis

Panel data, blending the inter-individual differences and the intra-individual dynamics, has several advantages over cross-sectional and time-series data (Hsiao, 2011): (1) panel data models can consider a greater degree of the heterogeneity that characterizes individuals (local governments) over time; (2) panel data models provide more information, greater variability, less collinearity among the variables, a larger number of degrees of freedom, and more efficiency (Baltagi, 2008); (3) panel data can better detect and measure effects that simply cannot be observed in pure cross-sectional data; and (4) panel data can be used, at least under certain assumptions, to obtain consistent estimators in the presence of omitted variables (Wooldridge, 2010; Tejedo-Romeo & Araujo, 2020: 537).

With panel data, the two models can be selected depending on assumptions dealing with unobserved heterogeneity: The fixed effects (FE) model and the random effects (RE) model (Hsiao, 2011: 10). The FE model addresses unobserved heterogeneity by using unit-specific intercept, while the RE model assumes the intercept to be some random deviation from the underlying mean intercept. In addition, researchers usually use the Hausman test to evaluate the consistency and efficiency of the FE and RE specification (Zhu, 2012: 400–401).

In <Model 1>, the Hausman test result indicates that the fixed model is more suitable for our analysis, so the panel linear regression analysis by fixed effect model is employed.[10] <Model 1> is empirically tested using the following model to examine our hypotheses:

$$OGI_{it} = \alpha + \beta_1 Tech\_factor_{it} + \beta_2 Org\_factor_{it} + \beta_3 Environ\_factor_{it} + \mu_i + \varepsilon_{it}$$

$$(i = 1, \dots, 228, t = 2015, 2016, 2017, 2018, 2019)$$

$$\mu_i = \text{unobserved individual effect of local government}$$

OGI depends on a linear combination of explanatory factors (technology-related factors, organization factors, and environmental factors[11]) concerning the unobserved individual local government's characteristics. For analysis, the author used the STATA 16.1 statistical software package.

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[10] The result of Hausman test is reported in Chapter 4.

[11] Considering the nature of openness promoting citizens participation (Meijer, Curtin, & Hillebrandt, 2012), the increase in openness may increase local citizens' influence on local government simultaneously. The concern for possibility of reverse-causality in this relationship could be raised. In this case, consider utilizing the instrument variable (IV) method, but, finding a good IV is not that easy in practice (Brookhart et al., 2006). Thus, this study tried to control this issue by setting the time difference of one stagen (t-1) on local citizens variables (environmental factors) (Allen et al., 2020; Choi, Keum, & Oh, 2015; Eoh, 2020).

3.4.2. Model 2: Panel Spatial Regression Analysis

The purpose of <Model 2> is to verify the effect of geographically neighboring governments. Local government, existing as a spatial unit, might be influenced by the spatially adjacent government's decision-making. This phenomenon can be explained statistically as spatial dependence (LeSage, 1999; Lee, 2014). In other words, it is highly correlated with events occurring in one location in a particular space and those surrounding areas. This autocorrelation may be caused by aggregation of data or spillover effect caused by the space proximity (Lee et al., 2013).

To verify the spatial effect, the presence of spatial dependence should be identified by several methods in advance. ESDA, which visualizes the spatial dependence on the map, is conducted. ESDA is an auxiliary analysis for the visual and intuitive identification of spatial dependence (Anselin, 1999; Lee, 2014). In this study, a quantile map is used to visually demonstrate the OGI level of each region and the presence of spatial dependence among local governments. Moran's I, a measure of spatial autocorrelation developed by Moran (1950), is also calculated and tested statistically. Moran's I is calculated by the following formula:

$$\text{Moran's I} = \frac{n}{s}\left[\frac{e'We}{e'e}\right]$$

W: spatial weighted matrix
n: the number of observations
s: sum of elements
e: residuals of OLS

The value and significance and scatter plot for Moran's I will be presented in Chapter 4.

After verifying the spatial dependence among observations, the panel spatial regression analysis can be employed. To perform panel spatial regression, several prior procedures are required. In reflecting the neighbor effects (relation) on the model, the spatial weight matrix is made up of the Queen contiguity criterion in this study and added as a linear sum to the model. However, the spatial regression model can be outlined with two classes of specifications for models with spatial dependence: The spatial lag model (SLM) and the spatial error model (SEM). The SLM posits that the residuals could be the result of autocorrelation in the dependent variable, and the SEM considers autocorrelation in the error term (Anselin, 1988). The equations for spatial panel regression models are as follows.

(1) Spatial Lag Model: $y_{it} = \rho W y_t + X_{it}\beta + \mu_i + \varepsilon_{it}$

(2) Spatial Error Model: $y_{it} = X_{it}\beta + \mu_i + v_{it}$ with $v_{it} = \lambda W v_t + \varepsilon_{it}$

In the SLM, ρ indicates the autoregression parameter, and Wy refers to the spatial weight matrix made up by the contiguity criterion. In the SEM, spatial dependence is included in the error term. λ indicates the parameter for spatial autoregression on the error term (Anselin, 1988).

According to Anselin (1995), selecting a more appropriate model depends on Lagrange Multiplier (LM) diagnostics and Robust Lagrange Multiplier (robust LM) diagnostics. If the test statistics of LM-Lag is significant at 5%, it is proper to select SLM. When LM-error is significant, SEM is selected. If both statistics are significant, the robust LM diagnostics are used. If both statistics are significant again, the more statistically significant model is selected. This process is demonstrated in Figure 3.4.
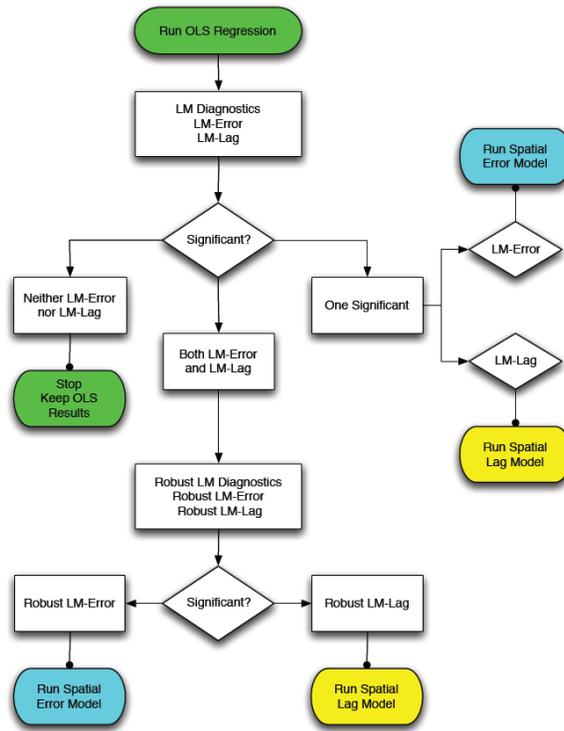
Figure 3.4. Spatial regression decision process.

Additionally, this study utilized five-year panel data, so the Hausman test is performed to select between fixed effects and random effects model after all.

In sum, <Model 2> adopts the spatial panel regression model as a primary methodology to verify the spatial effect regarding OGI. Prior to the main analysis, various ESDA results such as quantile map, Moran's I statistics, and scatter plot on OGI are presented. After LM and Robust LM-test, the main model is selected (SLM vs. SEM). Finally, the Hausman test results choose the better proper model between the FE and RE model. For analysis, GeoDa, an open-source geographic information system, is used for ESDA, LM, and Robust LM test. STATA 16.1 is also utilized for panel spatial regression.

CHAPTER 4. RESULTS

4.1. Descriptive Statistics

This section presents the descriptive statistics of research variables. The five-year overall summary statistics of the two dependent variables (DRAD and the number of open data sets) are presented. Descriptive statistics by year, upper-level local government, and quantile-map for dependent variables are also presented. For independent variables (technology-related, organization, environmental, and civic factors), the five-year summary statistics are demonstrated. With respect to Neighboring government factors, information on spatial adjacencies among local governments and statistics of spatial autocorrelation statistics are also shown in this section.

4.1.1. Disclosure Rate of Administrative Documents

Table 4.1. shows summary statistics of five-year panel data of DRAD. DRAD is calculated as the percentage (%) of the number of preemptive disclosure in original administrative documents on the portal (www.open.go.kr) to the number of registered original administrative documents. The five-year overall mean is about 56.72%. On average, local governments have opened about 56% of their original administrative documents to the public. The variation on DRAD is quite large. The minimum value is 11.1% and the maximum value is 90.4%, showing a somewhat large deviation (Std. Dev.=14.35) among observations. Figure 4.1. demonstrates the distribution of the value of all observations and seems close to normal distribution.

Table 4.1. Five-year summary statistics of DRAD

	Mean	Std. Dev.	Min	Max	Obs.
Overall	56.727	14.358	11.1	90.4	N=1140
Between		9.618	28.72	83.56	n=228
Within		10.675	19.267	86.147	T=5
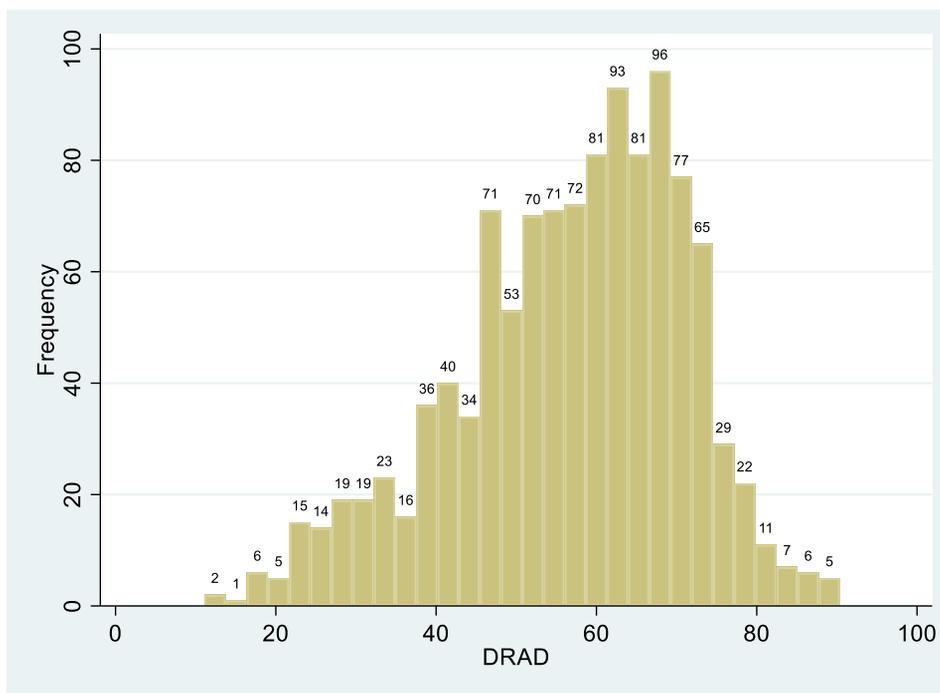
Figure 4.1. Distribution of DRAD.

Figure 4.2 shows the mean of DRAD and its change by the year. The bars on the graph refer to the 95% confidence interval (CI). DRAD shows as exceeding 60% in 2015 and 2016 but decreased from 2017 with to average of about 50% in 2019. Considering that the government established the system for DRAD at the end of 2013, the public interest may have been high in the initial stage of enactment and gradually decreased by the time change. Otherwise, as of 2018, when the disclosure rate dropped the most, local governments might have been passive in voluntarily providing their internal documents, given the local election in 2018.
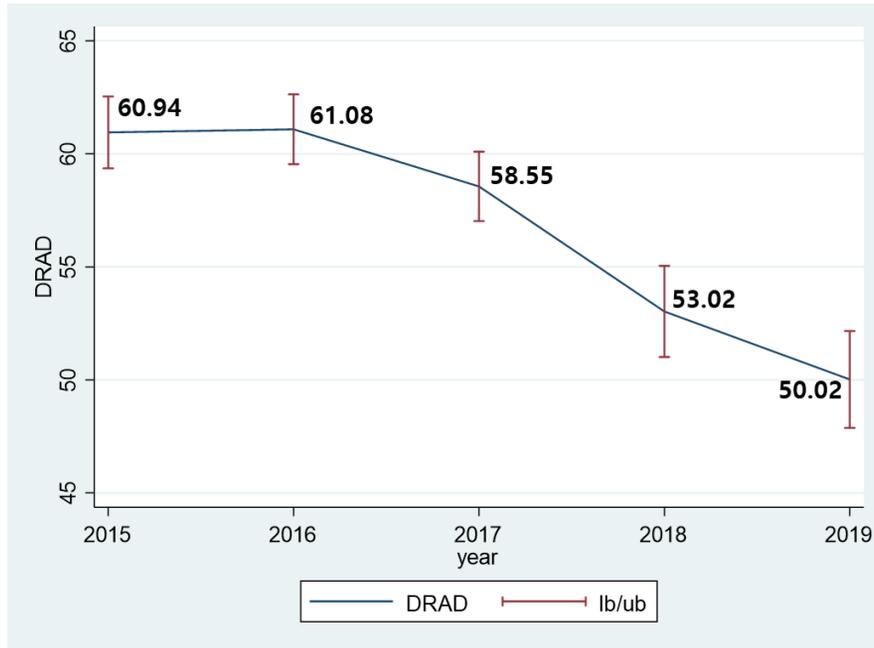
Figure 4.2. Changes in the Mean of DRAD Over the Year.

On the one hand, every Korean lower-level local government belongs to metropolitan and provincial (upper-level) governments. Table 4.2 shows the summary statistics derived by grouping observations by upper-level governments. Except for Jeju-do and Sejong,[12] Jeollanam-do (*M*=65.1), Busan (*M*=64.4), and Chungcheongnam-do (*M*=62.3) are highly ranked. The bottom three regions are Ulsan (*M*=41.2), Gangwon-do (*M*=46.4), and Gyeongsangbuk-do (*M*=51.9). As found in Table 4.1., the maximum value of total observations was 90.4, and the minimum was 11.1. According to Table 2, the maximum (90.4) of the total is included in Daejeon, and the minimum (11.1) is included in Gangwon-do.

Table 4.2. Average grouped by upper-level governments: DRAD

Region	Obs	Mean	Std. Dev.	Min	Max
Seoul	125	53.2	16.0	12.5	84.8

[12] Descriptive statistics of Jeju and Sejong shown in Table 2 are not the results of regional grouping, as they are the upper-level governments themselves. That is, each is treated as a single ID in this study.

Busan	80	64.4	7.2	47.2	83
Daegu	40	61.3	8.3	38.1	76.1
Incheon	50	57.1	12.5	31.4	80.6
Gwangju	25	55.0	15.7	23.4	78.7
Daejeon	25	62.0	14.5	42.6	90.4
Ulsan	25	41.2	12.6	17.3	62.2
Sejong	5	70.9	2.72	67.7	74.2
Gyeonggi-do	155	55.5	11.2	28	78.2
Gangwon-do	90	46.4	14.7	11.1	73
Chungcheongbuk-do	55	55.6	12.3	21.7	72.9
Chungcheongnam-do	75	62.3	11.5	29.3	85.6
Jeollabuk-do	70	58.2	9.01	26.9	77.7
Jeollanam-do	110	65.1	13.3	24.4	89.3
Gyeongsangbuk-do	115	51.9	16.5	16.5	79.4
Gyeongsangnam-do	90	56.7	15.2	17.9	88
Jeju-do	5	74.5	2.27	72.2	78.1

Figure 4.3. is a quantile map visualizing the annual DRAD level and their regional distribution through the GIS program GeoDa. This map is the result of ESDA, which provides visual and intuitive information on spatial dependencies of the dependent variables. ESDA is utilized as an auxiliary method for identifying spatial dependency in advance of spatial regression (Lee, 2014). As shown in Figure 3, the DRAD levels of each local government seem similar among geographically adjacent regions. For example, in 2015, local governments located in Chungcheongnam-do, Jeollanam-do, Gyeongsangnam-do, and parts of Gyeonsangbuk-do show the highest quartile DRAD in general. This trend continued until 2017 but changed in 2018. Prior to 2018, local governments, located in the southern part of the country, had the highest DRAD; however, since 2018, local governments, mostly located in the central part such as Gyeonggi-do and Chungcheongnam-do shows the highest quartile.

Regardless of the change in time, the local governments located in Gangwon-do shows a low level of DRAD (1~2 quartile) in five years. Local governments located in Gyeonsangbuk-do also shows low levels of DRAD during 2018 and 2019. Although some changes have occurred over the year, the spatial dependency of DRAD seems to be visually identified.

<2015>

<2016>

<2017>

<2018>
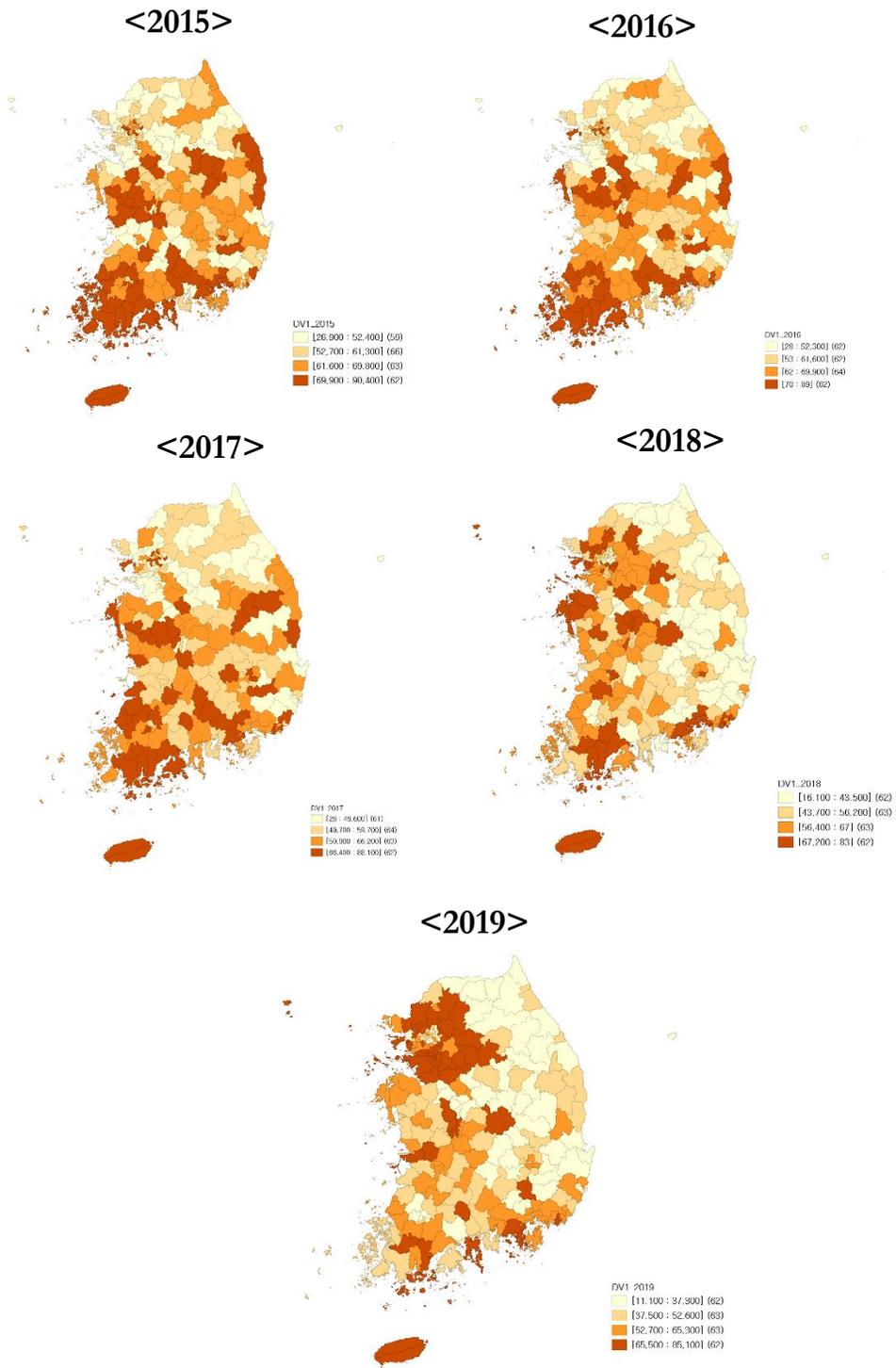
<2019>

Figure 4.3. Quantile map for DRAD (2015–2019).

4.1.2. The Number of Open Data sets

Table 4.3 shows summary statistics of five-year panel data of the number of open data sets of Korean local governments. The five-year overall mean is 85.03, indicating that Korean local governments have opened an average of 83 data sets to the public over the past five years. The variation between observations is somewhat large. As we can see in Table 4.3, the minimum value of the number of open data sets is "0," while the maximum is 739. This variation does not seem attributed to the time change but rather the difference that exists among local governments. The standard deviation between individuals is about 67.97 and within the individual is about 30.46.

Table 4.3. Five-year summary statistics

	Mean	Std. Dev.	Min	Max	Obs.
Overall	85.03	74.38	0	739	N=1140
Between		67.97	20.8	716.6	n=228
Within		30.46	156.96	428.03	T=5
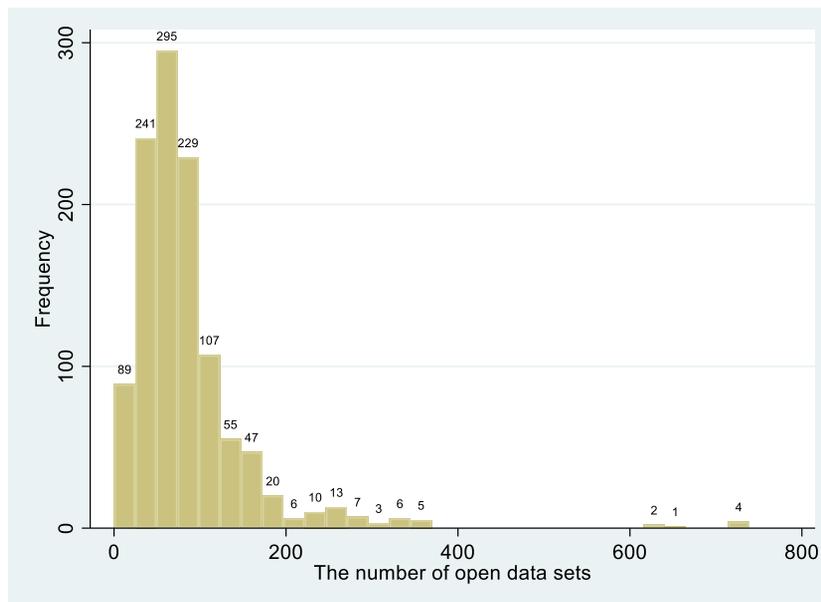
Figure 4.4. Distribution of the number of open data sets.

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Figure 4.4 shows the distribution of the number of open data sets. Unlike DRAD, it shows right-skewed distribution with a long right tail. Most observations open less than 200 data sets; seven outliers open more than 600 data sets. Few local governments are opening more than 600 data sets.

Figure 4.5 shows the yearly average of the number of open data sets and its change by the year. The bars on the graph refer to the 95% CI. The number of open data sets has been increasing over time. In 2015, the initial stage of the Public Data Act in Korea, local governments opened about 52 data sets on average. In 2018, nearly twice the number of datasets were opened compared to 2015. Once released to the public, the open data tend to be modified and updated frequently. Hence, the number of open data sets might not have decreased over time but rather have continuously increased.
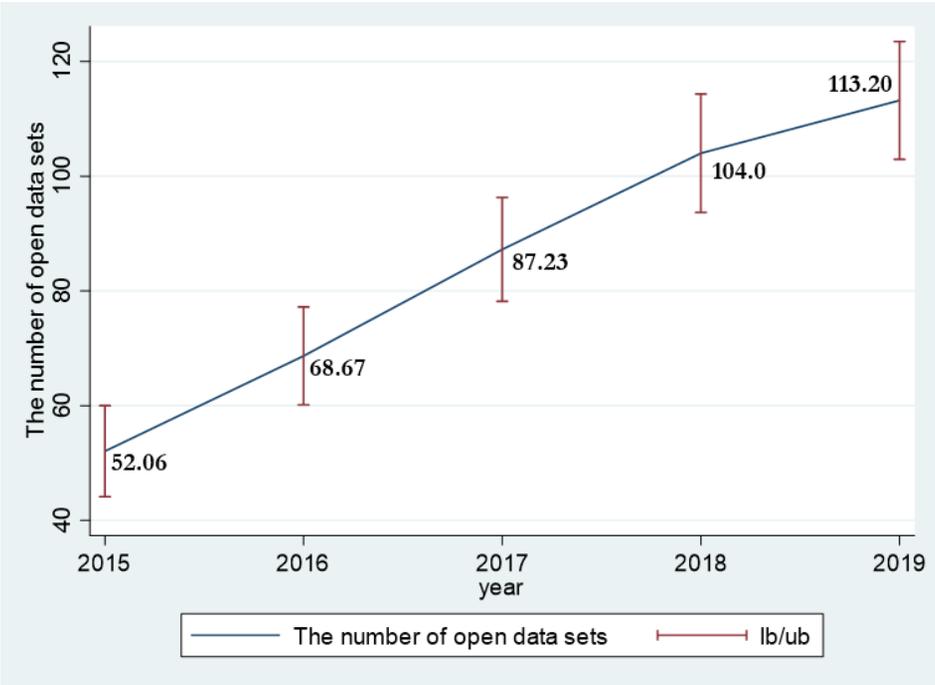
Figure 4.5. The yearly average of open data sets.

Table 4.4 shows the summary statistics derived by grouping upper-level governments. Except for Jeju-do and Sejong,[13] Busan (*M*=137.8), Gyeonggi-do (*M*=115.48), and Gyeongsagnam-do (*M*=97.62) show the highest average in the number of open data sets, while Daejeon (*M*=54.88), Gangwon-do (*M*=56.37), and Ulsan (*M*=59.88) show the lowest average among local governments. In particular, local governments in Busan, which were the second-highest in DRAD, are generally and often opening their data to the public. It indicates that local governments in Busan region have a high level of OGI. On the other hand, Gangwon-do and Ulsan, which had the lowest average in DRAD, also open their data less to the public and had low OGI levels overall.

Table 4.4. Average grouped by upper-level governments: Open data sets

Region	Obs	Mean	Std. Dev.	Min	Max
Seoul	125	73.7	45.2	0	233
Busan	80	137.8	73.06	29	323
Daegu	40	88.4	23.28	49	150
Incheon	50	85.16	38.35	18	165
Gwangju	25	73.92	39.25	4	153
Daejeon	25	54.88	18.33	29	90
Ulsan	25	59.88	22.63	26	106
Sejong	5	82.8	22.02	61	112
Gyeonggi-do	155	115.48	101.92	1	640
Gangwon-do	90	56.37	48.35	2	261
Chungcheongbuk-do	55	75.63	36.65	1	184
Chungcheongnam-do	75	67.81	41.62	6	212
Jeollabuk-do	70	73.27	39.64	7	174
Jeollanam-do	110	64.72	36.92	3	159
Gyeongsangbuk-do	115	60.27	32.02	0	157
Gyeongsangnam-do	90	97.62	69.29	19	369
Jeju-do	5	716.6	30.23	664	739

[13] Descriptive statistics of Jeju and Sejong shown in Table 4 are not the results of regional grouping, as they are the upper-level governments themselves. That is, each is treated as a single ID in this study.

Figure 4.6. shows the regional distribution of the number of open data sets of local governments. As shown in Figure 4.6., several regions show a similar level of releasing open data sets from geographically adjacent governments. Particularly, governments located in Gyeonggi-do, Gyeongsangnam-do, and Busan tend to release their data often and belong to the highest quartile. In general, governments located in the eastern part of the country, for example, under the jurisdiction of Ulsan and Gyeongsangbuk-do, show fewer data openings (1-2 quartile).

However, and arguably, these tendencies cannot simply belong to the same upper-level government. In the 2019 map, local governments in the southeastern part of the country show a high level of open data releasing (3-4 quartile). Considering that Busan is actively opening their data (see Table 4.4), not only governments belonging to Busan but also governments in Gyeongsangnam-do, adjacent to Busan, have a high level of open data releasing. On the other hand, other local governments (e.g., Hamyang-gun and Hadong-gun), which belong to Gyeonsangnam-do but are located far from Busan, show the lowest quartile. Yet, and not as clear as DRAD, spatial dependencies are detected in the map of the number of open data sets in general.
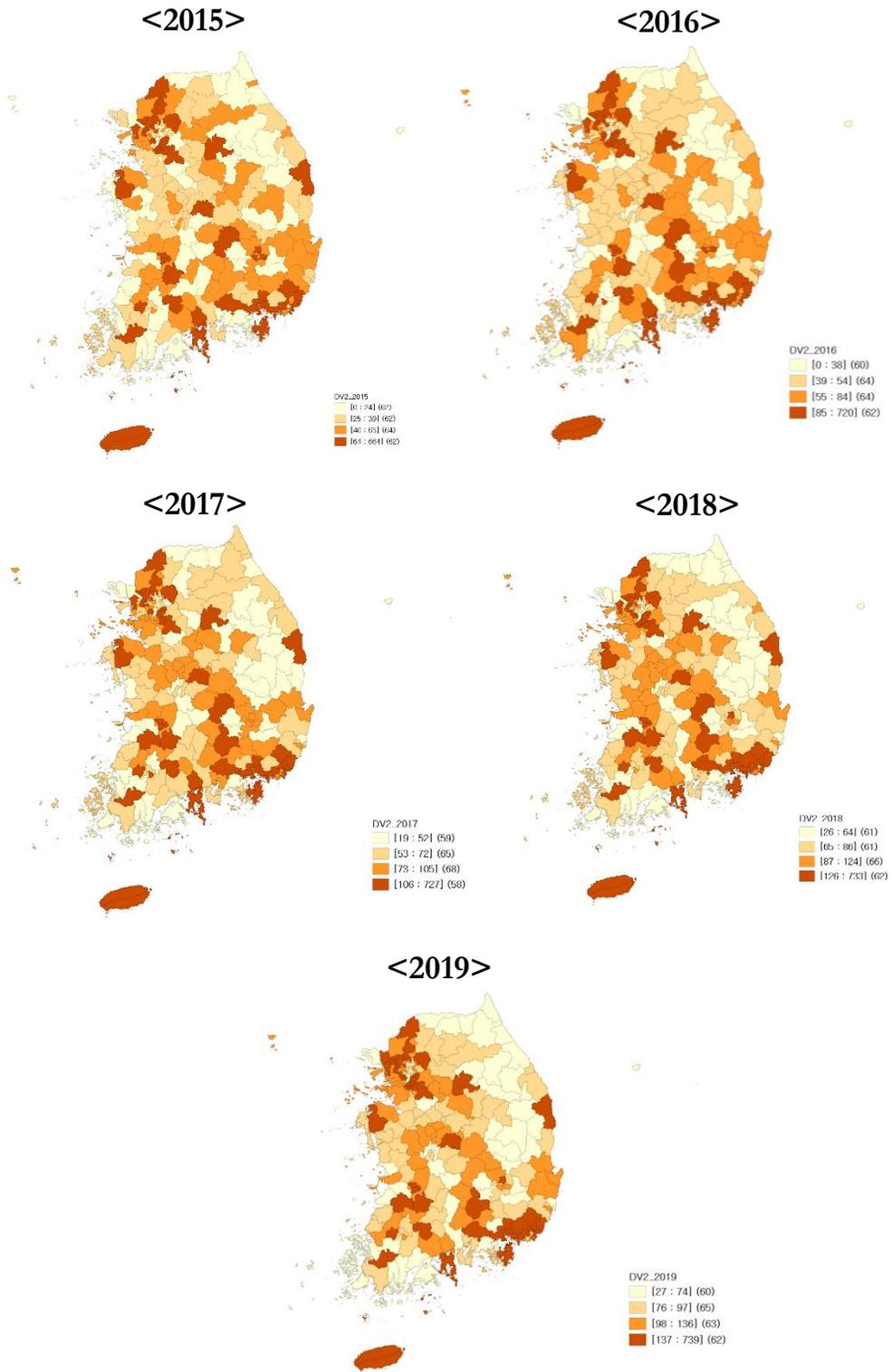
Figure 4.6. Quantile map for open data sets (2015-2019).

4.1.3. Descriptive Statistics for Independent Variables

4.1.3.1. Technology-related Factors

The first sub-variable of technology-related factors is technical capacity (see Table 4.5). The overall mean of technical capacity is 1.55. The minimum value is 0 and maximum is 20. The minimum value of 0 is because the variable is calculated from the performance of developing mobile apps. If the local government has no experience of developing mobile apps, it was calculated at zero. In 2017, the mean value is the highest and it decreases over the years. In 2017, since the central government (MOIS) started the annual assessment and suggested disposal of the local governments' mobile apps with low utilization rates, the mean value can be decreased in 2018 and 2019.

The second sub-variable is resources for technology development and it includes ICT budget (log) and ICT personnel. The five-year overall mean of ICT budget (log) is 17.01. The minimum value is 10.02 and the maximum is 23.03. ICT personnel is calculated as the percentage of ICT personnel to the total public officials in local governments. The five-year overall mean of ICT personnel is 2.24. In local governments, ICT personnel accounts for about 2.24% of all public officials.

The last sub-variable is the implementation plan for ICT utilization, which is calculated as the number of informatization master plan reform of local government. The five-year overall mean is 2.5, which indicates that the local governments amend their master plan for ICT utilization 2.5 times on average. The minimum value is 1 and increased over the years.

Table 4.5. Five-year summary statistics for Technology-related factors

Variable	Year	Mean	Std. Dev.	Min	Max	Obs
Technical capacity	2015	0.89	1.43	0	11	228
	2016	1.15	1.70	0	12	228
	2017	2.39	3.51	0	20	228
	2018	1.70	2.45	0	14	228
	2019	1.59	2.45	0	14	228
	Overall	1.55	2.47	0	20	228
ICT budget (log)	2015	20.55	1.58	10.02	22.87	228
	2016	20.54	1.58	10.02	23.03	228
	2017	14.25	2.34	10.02	17.22	228
	2018	14.80	0.855	10.02	17.26	228
	2019	14.90	0.89	12.96	17.56	228
	Overall	17.01	3.28	10.02	23.03	228
ICT personnel	2015	2.27	0.81	0.71	6.89	228
	2016	2.27	0.82	0.68	6.99	228
	2017	2.25	0.82	0.68	6.38	228
	2018	2.35	0.91	0.81	7.96	228
	2019	2.06	0.86	0.81	5.38	228
	Overall	2.24	0.85	0.68	7.96	228
Plan for ICT utilization	2015	2.21	0.93	1	4	228
	2016	2.35	0.99	1	4	228
	2017	2.52	1.09	1	5	228
	2018	2.66	1.13	1	5	228
	2019	2.75	1.16	1	5	228
	Overall	2.50	1.08	1	5	228

4.1.3.2. Organization Factors

Size of government, the first sub-variable for organization factors, is calculated as the number of public officials of each local government (see Table 4.6 for summary statistics for organization factors). The overall mean is 983 and the minimum value is 335 and the maximum is 6,023. The annual average and both minimum and maximum value show a gradual increase over time and it indicates the size of local government has increased annually.

Financial autonomy is calculated as the percentage of (local tax + non-tax revenue) to general accounts and indicates the ability to utilize the local governments' financial resources. The five-year overall mean is about 26.7, the minimum value is 7.4, and the maximum is 72.7. The annual average has been on the rise until 2017 and on the decline since 2018.

Table 4.6. Five-year summary statistics for Organization factors (1)

Variable	Year	Mean	Std. Dev.	Min	Max	Obs
Size of government (the number of public official)	2015	930.49	568.42	335	5,219	228
	2016	952.15	582.78	339	5,367	228
	2017	986.05	650.65	339	5,492	228
	2018	1,007.40	631.94	353	5,862	228
	2019	1,041.917	657.25	368	6,023	228
	Overall	983	619.43	335	6,023	228
Financial autonomy	2015	25.77	13.48	7.4	66.2	228
	2016	26.68	13.45	9.6	65.2	228
	2017	27.57	14.12	8.6	72.2	228
	2018	27.05	13.39	8.5	69.2	228
	2019	26.42	13.45	7.7	72.7	228
	Overall	26.70	13.57	7.4	72.7	228

As the political ideology of the government leader is measured with categorical variables, the summary statistics are separately presented in Table 4.7. Until 2017, over half the leaders held a right-wing orientation. In 2018, Korea held a local election, and a number of left-wing leaders were elected. From 2018, about 69% of local government leadership is left-wing.

Table 4.7. Five-year summary statistics for Organization factors (2)

Variable	Year	Left	Right	Obs
Political ideology of government leader (Left / Right)	2015	98 (42.98%)	130 (57.02%)	228 (100%)
	2016	96 (42.11%)	132 (57.89%)	228 (100%)
	2017	96 (42.11%)	132 (57.89%)	228 (100%)
	2018	159 (69.74%)	69 (30.26%)	228 (100%)
	2019	159 (69.74%)	69 (30.26%)	228 (100%)

4.1.3.3. Environmental Factors

Table 4.8 shows the summary statistics for Environmental factors measured with categorical variables. First, the political competition is measured as the accordance of the political party affiliation between local government leader and the majority party of the local council. By 2017, the percentage of unified government accounts for 79.3%, and it slightly decreased from 2018. This change might be the result the local election held in 2018. Secondly, the local election is held every four years, but several by-elections were also held in 2016.

The legislation is measured with the enactment of the local ordinance regarding the two institutions for OGI. With respect to the ordinance from the Official Information Disclosure Act has been gradually enacted. As of 2019, 75% of local governments set up regarding ordinance. However, most local governments (98.68%) have not established a local ordinance related to Public Data Act. In the case of the Official Information Disclosure Act, the history is quite long, dating to 1998, so Korea established many local ordinances related to this Act. However, the history of the Public Data Act, which started in 2014, is fairly short. Thus, so far, the legislative support for open data is still weak at the local level.

Table 4.8. Five-year summary statistics for Environmental factors (1)

Variable	Year	Unified	Divided	Obs
Political competition	2015	181 (79.39%)	47 (20.61%)	228 (100%)
	2016	181 (79.39%)	47 (20.61%)	228 (100%)
	2017	181 (79.39%)	47 (20.61%)	228 (100%)
	2018	171 (75%)	57 (25%)	228 (100%)
	2019	171 (75%)	57 (25%)	228 (100%)
Variable	**Year**	**Yes**	**No**	**Obs**
Local Election	2015	0	228 (100%)	228 (100%)
	2016	8 (3.51%)	220 (96.49%)	228 (100%)
	2017	0	228 (100%)	228 (100%)

Variable	Year	Yes	No	Obs
	2018	228 (100%)	0	228 (100%)
	2019	0	228 (100%)	228 (100%)
Legislation 1 (Official information Disclosure Act)	2015	157 (68.86%)	71 (31.14%)	228 (100%)
	2016	161 (70.61%)	67 (29.39%)	228 (100%)
	2017	166 (72.81%)	62 (27.19%)	228 (100%)
	2018	169 (74.12%)	59 (25.88%)	228 (100%)
	2019	172 (75.44%)	56 (24.56%)	228 (100%)
Legislation 2 (Public data Act)	2015	2 (0.88%)	226 (99.12%)	228 (100%)
	2016	3 (1.32 %)	225 (98.68%)	228 (100%)
	2017	3 (1.32 %)	225 (98.68%)	228 (100%)
	2018	3 (1.32 %)	225 (98.68%)	228 (100%)
	2019	3 (1.32 %)	225 (98.68%)	228 (100%)

Regarding the first sub-variable of local citizens factors, the civic organization is measured with the number of NGOs in the region. The five-year overall mean is 53.2, and the minimum value is 2, and the maximum value is 426. In Korea, every lower-level local society has at least two NGOs. The yearly average slightly increased over the years, and the maximum value decreased in 2016 but increased right after that year. The average of citizens' voice to local administration, measured with the number of complaints, has increased since 2015, and increased sharply in 2018 and 2019. In 2019, they witnessed about five times more complaints than in 2015. A fair inference is that the integrated online platform for complaint (http://bigdata.epeople.go.kr) was launched in 2019, so the accessibility to delivering citizens' voices might be enhanced in that year. The following Table 4.9 demonstrates the five-year summary statistics of civic factors.

Table 4.9. Five-year summary statistics for Environmental factors (2)

Variable	Year	Mean	Std. Dev.	Min	Max	Obs
Civic organization	2015	49.11	57.98	2	412	228
	2016	51.87	60.43	2	406	228
	2017	52.96	61.96	2	408	228
	2018	55.25	64.01	2	417	228
	2019	56.81	65.82	2	426	228
	Overall	53.20	62.05	2	426	228
Citizens' voice to local administration	2015	7,762.86	9,546.37	0	64,651	228
	2016	10,296.96	12,766.84	0	72,067	228
	2017	13,463.95	17,096	0	89,932	228
	2018	19,445.35	37,349.24	0	414,366	228
	2019	33,321.29	68,071.35	0	664,443	228
	Overall	16,858.08	37,329.26	0	664,443	228

4.1.3.5. Neighboring Government Factors

Figure 4.7 is a histogram demonstrating the spatial contiguity among Korean local governments. The Queen criterion of contiguity is employed, which defines neighbors as spatial units sharing a common edge or a common vertex (Anselin, 2003). The mean value of contiguity is 5.12, which indicates that lower-level governments are geographically adjacent to about five other local governments on average. Eight regions are not adjacent to any other region (the minimum=0), while regions are also adjacent to up to eleven regions (the maximum=11).

From	0	1	2	3	4	5	6	7	8	9	10	11
To	1	2	3	4	5	6	7	8	9	10	11	12
#obs	8	7	10	16	45	51	55	38	10	7	2	1
% of total	3.2	2.8	4	6.4	18	20.4	22	15.2	4	2.8	0.8	0.4
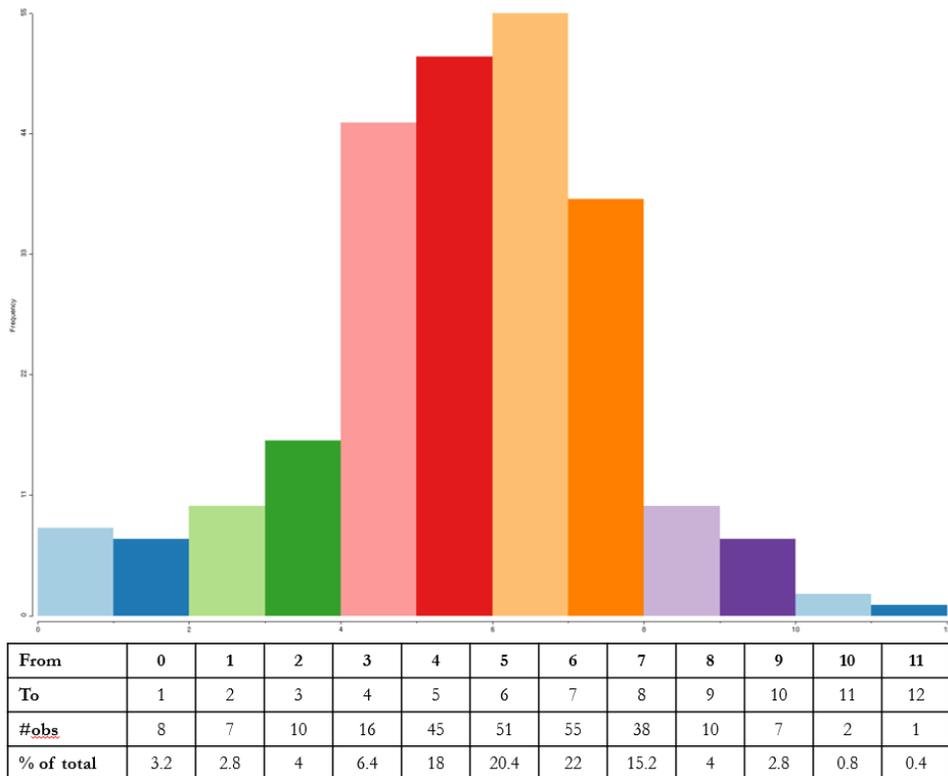
Figure 4.7. Spatial Contiguity Histogram.

Figures 4.8. and 4.9. are the scatter plots for Moran's I. Moran's well-known I statistics (Moran, 1948) gives a formal indication of the degree of linear association between a vector of observed values y and a weighted average of the neighboring values (Anselin, 1996). The Moran scatterplot can be augmented with a linear regression, which has Moran's I as slope, and can be used to indicate the degree of fit, the presence of an outlier, and so on (Anselin, 1996). In figures 4.8 and 4.9, the y-axis is the calculated influence of the neighborhood. As we can see in the two plots, both dependent variables show a positive relationship between spatial lag variables. The Moran's I statistics of DRAD is 0.403 (p<0.01) and open data is 0.536 (p<0.01). These results

explain the presence of spatial autocorrelation among local governments.
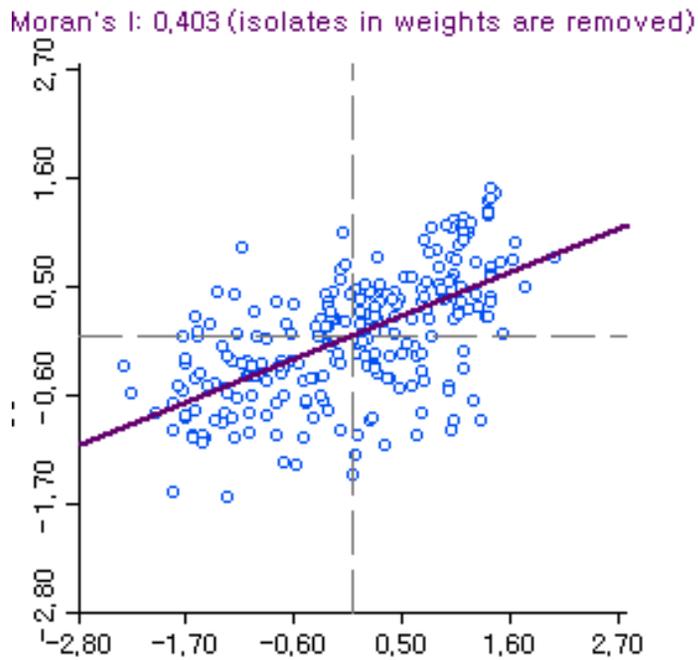
Figure 4.8. Moran scatter plot for DRAD.
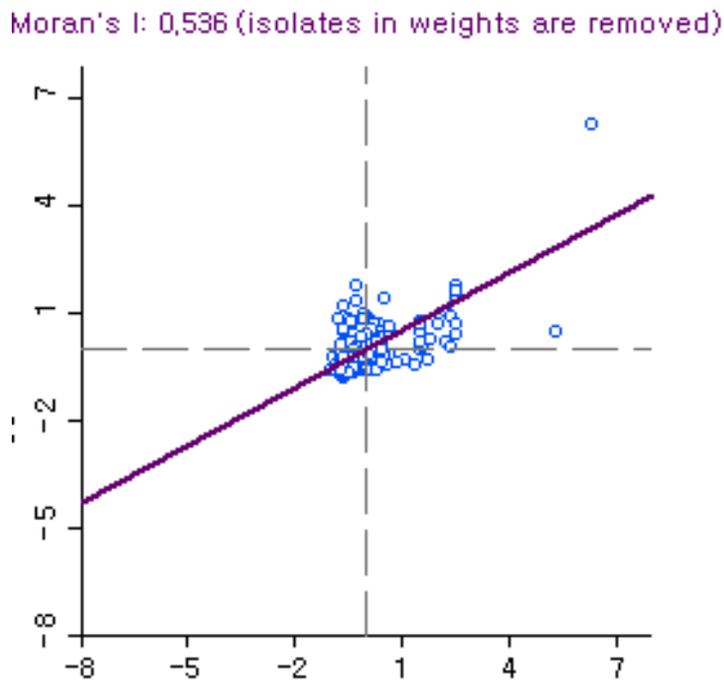
Figure 4.9. Moran scatter plot for the number of open data sets.

4.2. Determinants of Disclosure Rate of Administrative Documents (DRAD)

In this section, key determinants of the first dependent variable, DRAD, are verified with two main analysis models: <Model 1> and <Model 2>. <Model 1> validates the impact of technology-related, organizational, and environmental factors on DRAD of local government based on the TOE framework of Tornatzky and Fleischer (1990). This study performed the panel linear regression with fixed-effects model in <Model 1>.

<Model 2> focuses on verifying the effect of spatial interaction between local governments on DRAD but containing all factors of <Model 1>. The panel spatial regression model with the spatial lag model (fixed-effects) was used to verify the effects of four main factors (technology-related, organizational, environmental, and neighboring government factor). In the following section, the results of <Model 1> and <Model 2> are presented.

4.2.1. Results of <Model 1>

Table 4.10. shows the results of <Model 1> estimated by the panel fixed effects model.[14] The first column includes only internal factors (technology-related, organizational factors) and control variables in the model. The second column is the full model containing both internal and external factors. This section will report the result interpretations

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[14] Because this study utilized five-year panel data, the Hausman specification test was employed to select a more appropriate analysis method between random and fixed effects models. As a result of the test, the fixed effects model is more appropriated than the random-effects model. The results for Hausman test are as follows:
- DRAD model: chi²(12) =69.26, Prob> chi² = 0.0000

focusing on the full model (the second column). Regarding the technology-related factors, ICT personnel is negatively significant (β=-4.328, p<0.01). This result is contrary to our research hypothesis (H 2-1). The assumption was that the more ICT personnel who worked in the organization, the easier it would be to change and upload their internal documents into digital formats accessible to the public. However, the impact of ICT personnel on the openness of government administrative procedures and documents either does not exist or has a negative impact. Unlike open data, opening administrative documents may not require much ICT expertise to convert and upload government documents in digital format.

Among the organizational factors, this study verified financial autonomy and the political ideology of government leaders as significant determinants. Financial autonomy, which stands for the ability of local governments to utilize their financial resources, is like slack for an organization's innovation (Tornatzky & Fleischer, 1990). However, it negatively affects the DRAD (β=-0.671, p<0.01). Under poor financial conditions, the local government might be forced to open their information and data from watchdog groups (Chen et al., 2019; Lowatcharin & Menifield, 2015). On the other hand, the political ideology of the government's leader has a significant effect (ref.=left-wing, β=4.295, p<0.05) on the OGI level. As our research hypothesis (H 6-1) suggests, the administration leader with left-wing ideology is more positively associated with its level of opening original administrative documents than with right-wing ideology. Consistent with Ferejohn's (1999) discussion, then, left-wing governments defend a larger public sector and is thereby expected to make information readily available and accessible to all citizens.

With respect to environmental factors, political competition, one of the local politics variables, is significant (ref.= divided gov. β=-2.602, p<0.05). It means that the local governments under low political competition (unified government) tend to open their internal documents and information. In other words, under a high level of political competition, the government is reluctant to disclose its information because the opposition party might use the internal documents and administration information to blame the existing administration.

Regarding the influences of local citizens, citizens' voice, which stands for expressing dissatisfaction with their local government, is negatively significant (β= -0.302, p<0.1). Individual citizens' dissatisfaction can be a peril to the government's legitimacy and reduce the reelection in the future (Yamamura & Kondoh, 2013). The author expects that citizens' voices against the government would increase the disclosure level of government internal documents and information (based on Hypothesis 10-1). The government might put their efforts into explaining what they are doing and eventually secure legitimacy. According to our findings, the local government seems to choose the opposite strategy of concealing their internal workings when they are threatened by confronting many complaints from local citizens instead of opening their internal information. As the original administrative documents can be the fundamental material for the watchdog groups (Chen et al., 2019; Lowatcharin & Menifield, 2015), the local governments seem reluctant to open their documents when the dissatisfaction from local citizens is high. However, the influence from civic communities is not verified to be significant. As intermediaries for local citizens, civic organizations do not play a key role in promoting

government openness effectively. This result is not consistent with the result of Schnell and Jo (2013), who found the density of civic society organization's positive effect on government openness at the global level. Moreover, it may be because the level of organized civic participation at the local level has not yet fully matured in the Korean context.

Several control variables such as local population (β=0.0001, $p<0.01$), farming population (β=-0.736, $p<0.1$), and evaluation year (β=-12.886, $p<0.01$) are verified as significant. The local government, with a large population and less farming population, opens its internal administrative documents more than those that do not. However, the central government's evaluation year has a negative effect on the DRAD. This result contradicts the general expectation that performance would be improved by performing the central government's assessment.

Table 4.10. <Model 1> results (DRAD)

Variables		DV: Disclosure rate of admin. documents	
		(1)	**(2)**
Technology-related factors	**Technical capacity**	-0.211	-0.184
		(0.244)	(0.241)
	ICT budget (log)	0.034	0.309
		(0.187)	(0.204)
	ICT personnel	**-3.962***	**-4.328***
		(0.707)	(0.071)
	Plan for tech. utilization	0.010	0.261
		(1.068)	(1.057)
Organizational Factors	**Size of government (logged)**	15.822	15.511
		(9.211)	(8.919)
	Financial autonomy	**-0.577***	**-0.671***
		(0.174)	(0.173)
	Political ideology (1=left-wing)	**4.835***	**4.295***
		(1.230)	(1.222)
Environmental Factors	**Local Election (1=yes)**		-3.803
			(4.135)
	Political competition (1=divided)		**-2.602****
			(0.151)
	Civic communities (t-1)		-8.321
			(149.607)
	Citizens' voice (t-1)		**-0.302***
			(0.167)
	Legislation (1=yes)		3.050
			(2.716)
Control variable	**Local population**	**0.0001***	**0.0001***
		(0.000)	(0.000)
	Elderly population	-1.632	0.392
		(0.662)	(0.800)
	Farming population	**-0.927****	**-0.736***
		(0.376)	(0.380)
	Evaluation year (1=yes)	**-8.012***	**-12.886***
		(1.231)	(1.745)
Constant		-68.977	**-171.697***
		(57.909)	(61.288)
Number of observations		1,140	1,140
Number of groups		228	228

Notes: ***p<0.01, **p<0.05, *p<0.1

Standard errors in parentheses

4.2.2. Results of <Model 2>

In <Model 2>, the panel spatial regression analysis is employed to verify the effect of spatial interaction on DRAD. This study follows Anselin's (2005) spatial regression model selection decision rule[15] to select a more appropriate approach between spatial lag and spatial error model. Table 4.11 shows the test statistics for Moran's I and the spatial dependence on residual of the non-spatial model (OLS). The results of Moran's I statistics for DRAD (I=4.651, p<0.01) confirmed that DRAD of local government has spatial dependence, thereby requiring the estimation that considering spatial autocorrelation.

Table 4.11. Test statistics for spatial dependence on OLS residual

Test	DRAD	
	Test statistics	P-value
Moran's I	4.651	0.000
LM test for Spatial Lag Dependence (LM test: no spatial lag)	16.368	0.000
LM test for Spatial Error Dependence (LM test: no spatial error)	15.957	0.000
Robust LM test for Spatial Lag Dependence (robust LM: no spatial lag)	5.249	0.021
Robust LM test for Spatial Error Dependence (robust LM: no spatial error)	4.839	0.027

Despite the slight differences, the robust LM test statistics of DRAD are statistically more significant in the spatial lag model (Robust LM_{lag}=5.249, p<0.021) than in the spatial error model (Robust LM_{error}=4.839, p<0.027). Moreover, the purpose of this analysis is to verify the spatial interactions between local governments

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[15] Model selection follows the LM test results first, and if all LM test results are significant, the model is selected according to the robust LM test results. If the robust LM test results are also all significant, consider selecting a more statistically significant model (Anselin, 2005; Hwang & Eom, 2012).

on OGI employing a theoretical approach. Thus, the spatial lag model, including the spatial dependence as an explanatory variable in the model, is more reasonable to explain the spatial diffusion (Lee, 2014: 56). Given that this study employs panel data analysis, the Hausman specification test is performed. The results show that the fixed-effects model is more appropriate to estimate the effects.[16] Finally, <Model 2> is analyzed in the spatial lag model (SLM) with the fixed-effects model.

Table 4.12 shows the results of <Model 2> in DRAD. The results for the non-spatial model (the first column) and spatial lag model (the second column) are parallelly presented. In the spatial lag model (SLM), interaction with adjacent governments is positively significant on DRAD ($\rho=0.163$, $p<0.01$). This result indicates that the DRAD of the neighboring government positively affects the DRAD of the local government. In other words, if geographically adjacent governments disclose a considerable number of original administrative documents, the local government also increases their openness.

Although the specified mechanism of interaction results in this neighboring effect are not certain, Karch (2007) provides a useful explanation of this phenomenon. Government officials in nearby governments are likely to discuss policies. Also, overlapping media markets may alert citizens and government officials to the existence of policies in nearby regions. For these reasons, government officials who open the originals of administrative documents are likely to discuss whether or not to open the documents to citizens with other government officials in neighboring areas and take relatively similar actions. Also, local governments that show high DRAD promote their "transparent administration" through local media. In fact, Korean local

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[16] DRAD model: chi^2(12) = 81.07, Prob > chi^2 = 0.0000.

governments release reports to publicize their performance.[17]
Accordingly, local governments that encounter the same media
coverage in a similar region can increase DRAD to keep up with other
local governments.

Compared to the non-spatial model (the first column), the effects
of other factors and statistical significance are quite similar in the spatial
lag model—only the legislation ($\beta=5.264$, $p<0.05$) is newly verified as
significant. As far as the author knows, these results might be due to the
heterogeneity of local governments. When controlling the spatial
effects, the influences from the legislation on OGI might be further
highlighted. It can be interpreted as follows. Among local governments,
there may be ones that open more documents when they have a local
ordinance regarding the information disclosure and others that do not.
Local governments that rarely open their internal documents but have
related local ordinance may have characteristics easily affected by
neighboring governments. After controlling the impact from
neighboring governments, the impact of the governments that rarely
open documents but have related ordinance might be diminished.
Hence, the influence of related legislation might be turn out to be clear
and apparent.

Among control variables, local population ($\beta=0.000$, $p<0.01$) and
central government's evaluation ($\beta=-10.744$, $p<0.01$) are significant and
the tendency of effects is quite similar with the non-spatial model.

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[17] Maeil-Ilbo (2021. 2.14.). "Incheon, satisfying citizens' right to know. Disclosure rate of administrative documents ↑ ". Cha, Yeonhwan.
https://www.m-i.kr/news/articleView.html?idxno=793820
 Yeonhap-news. (2019.1.1.). "Seoul is top-ranked in disclosure rate of administrative documents." Yoon, Goeun.
https://www.yna.co.kr/view/AKR20190121013600004

Table 4.12. <Model 2> results (DRAD)

Variables		DV: Disclosure rate of admin. documents	
		Non-Spatial	Spatial Lag
Neighboring Government factor	**Interaction with adjacent gov. (ρ)**		**0.163***
			(0.038)
Technology-related factors	**Technical capacity**	-0.184	-0.373
		(0.241)	(0.272)
	ICT budget (log)	0.309	0.212
		(0.204)	(0.136)
	ICT personnel	**-4.328***	**-4.099***
		(0.071)	(0.557)
	Plan for tech. utilization	0.261	1.084
		(1.057)	(0.872)
Organizational Factors	**Size of government (log)**	15.511	19.239
		(8.919)	(16.350)
	Financial autonomy	**-0.671***	**-0.708***
		(0.173)	(0.139)
	Political ideology (1=left-wing)	**4.295***	**3.236***
		(1.222)	(1.035)
Environmental Factors	**Local Election (1=yes)**	-3.803	-5.127
		(4.135)	(4.962)
	Political competition (1=divided)	**-2.602**	**-2.764***
		(0.151)	(0.904)
	Civic communities (t-1)	-8.321	-1.113
		(149.607)	(130.971)
	Citizens' voice (t-1)	**-0.302***	**-0.244***
		(0.167)	(0.143)
	Legislation (1=yes)	3.050	**5.264**
		(2.716)	(2.122)
Control variable	**Local population**	**0.0001***	**0.000***
		(0.000)	(0.000)
	Elderly population	0.392	-0.021
		(0.800)	(0.541)
	Farming population	-0.736	-0.722
		(0.880)	(0.826)
	Evaluation year (1=yes)	**-12.886***	**-10.744***
		(1.745)	(1.362)
Constant / Variance		**-171.697***	**83.281***
		(61.288)	(3.337)
Number of observations		1,140	1,140
Number of groups		228	228
Notes: ***p<0.01, **p<0.05, *p<0.1 Standard errors in parentheses			

4.2.3. Summary and Discussion

DRAD is a quantitative indicator for "vision (transparency)," which is one of the conceptual pillars of open government (Meijer et al., 2012). In total, five significant determinants for DRAD were verified with <Model 1> and <Model 2>. Political ideology (progressive), local legislation, interaction with the adjacent government have positively affected the DRAD. ICT personnel, financial autonomy, political competition, and citizens' voices have negative impacts on DRAD. Table 4.13 summarizes the results of verification on the DRAD model.

Table 4.13. Summary of Results (DV: DRAD)

Factor	Variable	Predicted	Result
Technology-related factors	Technical capacity	Positive	.
	ICT budget (log)	Positive	.
	ICT personnel	Positive	Negative
	Plan for tech.	Positive	.
Organization factors	Size of gov. (log)	Positive	.
	Financial capability	Positive	Negative
	Political ideology (progressive)	Positive	Positive
Environmental factors	Local Election	Positive	.
	Political competition	Positive	Negative
	Civic communities	Positive	.
	Citizens' voice	Positive	Negative
	Legislation	Positive	Positive
Neighboring government factor	Interaction with adjacent governments	Positive	Positive

Based on these findings, opening internal workings of local government is affected by both internal and external influences; however, the impact from the external environment was noteworthy. Mostly local environmental factors related to local politics are shown to have a major impact on the DRAD. For public organizations, opening their internal activities means giving up strong incentives for secrecy

and increasing vulnerability to scrutiny by the public (Schenll & Jo, 2019). Hence, the government might be more sensitive to external influences such as local politics and institutions. In a similar vein, the efforts to alleviate secrecy in the public sector (e.g., FOIA) have been composed from the external side rather than the introspection of the public sector. Thus, the level of government openness that enables the monitoring of internal government activities seems determined by external influences.

The findings of this study are the empirical evidence demonstrating the relational dynamics between government and watchdog groups. The results show that when the political environment of local government is favorable to the existing regimes, local government provides more information on their internal workings to the public. The results also show that local governments restrain their openness level when the political competition with the local council is high or the local citizens' voices (negative to local administration) are increased. This result implies that secrecy can allow the existing regimes to use government information to maintain their political power (Robertson, 1982; Stiglitz, 1999). However, several studies analyzing the openness measure in the United States held that government with a divided government has lower corruption issues (Alt & Lassen, 2008), policymaking processes reflect greater transparency (Cowhey, 1995; Geddis, 1994), and parties tend to compete and strengthen transparency reforms in order to claim credit (Michener, 2015). Yet, considering the local autonomy context of Korea adopted a strong mayor-council form in which the government's executive leadership is powerful compared to the local council (Lee, 2005), the Korean local administration seems to control the level of OGI quite strongly. In other words, it increases

secrecy if political competition is severe or if complaints by citizens toward existing regimes continue to be faced.

Although the local council is not properly pressuring the local administration to open internal information, the local legislation (ordinance) related to openness seems to raise the level of OGI (DRAD) based on the result of <Model 2>. This result is consistent with the discussion of a previous study (Zhao & Fan, 2021), which emphasized the importance of legislation regarding openness. Local administration, which enacted a local ordinance related to open government, has shown more openness in its internal workings. This result means that even if public organizations and government officials prefer secrecy, the behavior can be alleviated with appropriate legislation at the local level.

Interactions with adjacent governments regarding the openness are also found to be a significant impact. According to the results of this study, local governments tend to be conscious of neighboring government's openness activities (DRAD). Transparent administration and disclosure of government administrative activities can affect trust in the government (Kim & Lee, 2012; Vigoda-Godot, 2007; Wang & Wan Wart, 2007) and, in the long run, the quality of administrative services (Hood & Heald, 2006; Islam, 2006). If the local government recognizes neighboring local governments as competitors, the great openness level of other local governments publicized through local media could be a stimulus to the local government. Furthermore, local citizens exposed to this information may prefer a more transparent, open government in other areas. Considering that local citizens are the financial and political source for the local government (Jung, 2012), local governments might

be aware of the level of openness in other areas and make efforts to raise openness level to attract their citizens.

With respect to internal influence, the local government with a left-wing ideology mayor opens its internal administrative workings more than those without. Ferejohn (1999) argued that left-wing governments seek a large public sector, thereby making internal government information readily available and accessible to all citizens. In the Korean local autonomy context, the power and influence of the executive leader are quite strong so that the progressive leader might promote openness or transparency initiatives. Thus, the openness level of local administration might have been greatly influenced by the political ideology of local governments leader.

On the other hand, the results show that financial capability has negative impacts on DRAD. Financial capability can be assessed as having high financial performance (Kang, 2009; Kim et al., 2008). Local governments with low financial capability can be assessed as poor financial performance and in need of more financial support from the central government. Thus, the local governments with low financial capability tend to increase openness of DRAD promoted by the central government's initiatives, while local governments with high financial capability are not influenced by the central government. Although the benefits of secrecy outweigh the costs of openness and transparency (Michener, 2015), in this case, the local government might decide that financial condition is important as administrative secrecy and political power. In other words, for local governments with poor financial conditions, the benefits of secrecy may not be so great.

4.3. Determinants of the Number of Open Data Sets

In this section, key determinants of the second dependent variable, the number of open data sets, are examined with two models: <Model 1> and <Model 2>. The analytical model and method are the same as the model of the first dependent variable (DRAD).

4.3.1. Results of <Model 1>

Table 4.14 shows the results of <Model 2> estimated by a panel fixed effects model.[18] The first column includes only internal factors (technology-related, organizational factors) and control variables in the model. The second column is the full model containing both internal and external factors. This section will report the result interpretations focusing on the full model (the second column). Among technology-related factors, technical capacity has a positive influence ($\beta=1.790$, $p<0.01$) on the number of open data sets. This result is consistent with our research hypothesis (H 1-2) and previous research, which maintains that technical capacity is a significant driver for government openness (Chen et al., 2019; Grimmelikhijusen & Feeny, 2017; Zhao & Fan, 2018; Ingram, 2017). The implementation plan for technology utilization also has a positive impact ($\beta=15.994$, $p<0.01$) on the number of open data sets. It indicates that the more prepared and planned governments in technology utilization are more actively opening their data to the citizens. This result is similar to the digital government literature, which considers planning for IT implementation as a success

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[18] The Hausman specification test was employed to select a more appropriate analysis method between random and fixed effects models. As a result of the test, the results show that the fixed effects model is more appropriated than the random-effects model (chi²(14) =106.06, Prob> chi² = 0.0000).

strategy for the government's IT initiatives (Irani et al., 2005; Gil-Garcia & Pardo, 2005; Kim, 2019). This finding indicates that the local government with more willingness to promote IT utilization might set related plans more actively, and this effort might be reflected as an active open data policy.

The size of government, one of the organization factors, positively affects the number of open data (β=27.192, p<0.1). The large-sized organization might have more qualified staff, which could facilitate the preparation and provision of data. (Arshad et al., 2013; Garcia-Sanchez et al., 2013). This result is consistent with the result of Grimmelikhuijsen and Feeny (2017) who found organization capacity to be the most powerful influential factor for government openness.

Regarding the environmental factors, only the local citizen's voice to local administration (β =1.060, p<0.01) is verified as significant. Unlike the result of the DRAD model, citizens' voice to local administration expressing their dissatisfaction increases the level of government's open data. It can be inferred that the government is trying to explain its administrative context by opening raw data containing various administrative information to respond to complaints. Otherwise, given the nature of open data, it can be viewed as providing citizens with opportunities to engage the local issue by opening data that transformable to innovative public services. Local politics such as local elections, political competition within the local council, and local legislation have no impact on local government's open data. These results are quite contrary to the DRAD model, which was somewhat determined by the local political condition.

Except for the civic factor, the number of open data sets in local governments is largely influenced by internal factors such as technology

and organizational factors. Unlike DRAD, which was affected by both internal and external local environments, the number of open data sets is generally found to be determined by the internal capability and intentional efforts of the local governments.

Among control variables, the evaluation year is verified as significant (β=15.045, p<0.01). This result may be mixed with annual effects, but it implies the sensitivity of local governments to central government evaluation. Unlike the DRAD model, other control variables indicating the local government's socio-demographic characteristics are not significant.

Table 4.14. <Model 1> results (Open data)

Variables		DV: The number of open data sets	
		(1)	**(2)**
Technology-related factors	**Technical capacity**	**1.861***	**1.790***
		(0.447)	(0.453)
	ICT budget (log)	-1.705	-1.658
		(1.334)	(1.355)
	ICT personnel	0.853	1.790
		(1.398)	(1.444)
	Plan for tech. utilization	**16.138***	**15.994***
		(2.269)	(2.269)
Organizational Factors	**Size of government (logged)**	**37.842**	**27.192***
		(16.15)	(16.045)
	Financial autonomy	0.246	0.242
		(0.356)	(0.359)
	Political ideology (1=left-wing)	2.535	2.542
		(2.669)	(2.667)
Environmental Factors	**Local Election (1=yes)**		-2.131
			(2.481)
	Political competition (1=divided)		-2.326
			(2.344)
	Civic communities (t-1)		-596.909
			(449.62)
	Citizens' voice (t-1)		**1.060***
			(0.372)
	Legislation (1=yes)		27.467
			(19.331)
Control variable	**Local population**	0.000	0.000
		(0.000)	(0.000)
	Elderly population	6.224	6.043
		(1.223)	(1.406)
	Farming population	14.286	0.645
		(2.566)	(0.852)
	Evaluation year (1=yes)	**14.286***	**15.045***
		(2.566)	(3.467)
Constant		-327.976	**-224.439***
		(107.675)	(112.950)
Number of observations		1,140	1,140
Number of groups		228	228

Notes: ***p<0.01, **p<0.05, *p<0.1. Standard errors in parentheses

4.3.2. Results of <Model 2>

Before the main analysis, this study checked which model is more suitable for verifying between the spatial lag and spatial error model. The model selections followed Anselin's (2005) spatial regression model selection decision rule.[19] Table 4.15 shows the test statistics for Moran's I and the spatial dependence on residual of the non-spatial model (OLS). The results of Moran's I statistics for the number of open data sets ($I=6.960$, p<0.01) confirmed that open data tendency of local government has spatial dependence, thereby requiring the estimation that considers spatial autocorrelation.

Table 4.15. Test statistics for spatial dependence on OLS residual

Test	Open data sets	
	Test statistics	P-value
Moran's I	6.960	0.000
LM test for Spatial Lag Dependence (LM test: no spatial lag)	40.588	0.000
LM test for Spatial Error Dependence (LM test: no spatial error)	39.001	0.000
Robust LM test for Spatial Lag Dependence (robust LM: no spatial lag)	6.370	0.011
Robust LM test for Spatial Error Dependence (robust LM: no spatial error)	4.783	0.028

Despite the slight differences, the robust LM test statistics of DRAD are statistically more significant in the spatial lag model (Robust LM_{lag}=6.370, p<0.011) than in the spatial error model (Robust LM_{error}=4.783, p<0.028). Moreover, given that this study employs panel data analysis, the Hausman specification test was

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[19] Model selection follows the LM test results first, and if all LM test results are significant, the model is selected according to the robust LM test results. If the robust LM test results are also all significant, consider selecting a more statistically significant model (Anselin, 2005; Hwang & Eom, 2012).

performed. The results show that the fixed-effects model is more appropriate to estimate the effects.[20] Finally, <Model 2> is analyzed in the spatial lag model (SLM) with the fixed-effects model.

The last column of Table 4.16 shows the result of the spatial lag model on the number of open data sets. As with the results of DRAD, the interaction with adjacent government is positively significant on the number of open data (ρ=0.148, p<0.01). Thus, if geographically adjacent governments are actively providing open data to the public, then the local government also opens its data more actively. As discussed in the literature, the benefits from open data initiatives are a "rationalized myth," which contributed to the rapid diffusion of open data policy (Altayar, 2018; Jassen et al., 2019). Hence, government officials in neighboring local governments who are in a favorable condition for interaction and discussion on policies might view open data as the manifestation of the open government paradigm (Cahlikova & Mabillard, 2020) and show similar policy activities, such as increasing the open data level.

Compared to the non-spatial model (the first column), the tendency of verified effects of other factors is quite similar. The size of coefficients of these variables slightly decreased after estimating with the spatial lag model. The technology context of government is still significant. Technical capacity (β=1.671, p<0.01) and plan for technology utilization (β=15.434, p<0.01) are positively influenced by the number of open data sets. The size of government (β=24.224, p<0.1) is also verified as a determinant in the spatial lag model. The size of coefficient of citizens' voice (β=0.894, p<0.01), which is the only verified variable among environmental factors, has been slightly

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[20] Open data model: chi^2(15) =96.32, Prob> chi^2 = 0.0000.

decreased but still confirmed as a significant determinant. Among control variables, evaluation year (β=13.480, p<0.01) is still positively significant and the only significant control variable in all models.[21]

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[21] These results show and raise the possibility of a strong effect of the central government's evaluation pressure on the open data policy of local government. To measure and properly control the central government's evaluation pressure, this study additionally analyzed the supplementary model that contains the open data evaluation score of local government. The results of the supplementary model show the strong positive effect of evaluation score of local government. However, interaction with adjacent government, technical capacity, and size of government still remains significant when the evaluation score is controlled. The detailed results of supplementary model is attached in [Appendix].

Table 4.16. Results for <Model 2> in Open data sets

Variables		DV: The number of open data sets	
		Non-Spatial	Spatial Lag
Neighboring Government factors	**Interaction with adjacent gov. (ρ)**		**0.148*****
			(0.040)
Technology-related factors	**Technical capacity**	**1.790*****	**1.671*****
		(0.453)	(0.400)
	ICT budget (log)	-1.658	-1.425
		(1.355)	(1.319)
	ICT personnel	1.790	1.590
		(1.444)	(1.273)
	Plan for tech. utilization	**15.994*****	**15.434*****
		(2.269)	(2.004)
Organizational Factors	**Size of government (log)**	**27.192***	**24.224***
		(16.045)	(14.556)
	Financial autonomy	0.242	0.213
		(0.359)	(0.316)
	Political ideology (1=left-wing)	2.542	2.414
		(2.667)	(2.349)
Environmental Factors	**Local Election (1=yes)**	-2.131	-2.149
		(2.481)	(2.185)
	Political competition (1=divided)	-2.326	-2.167
		(2.344)	(2.064)
	Civic communities (t-1)	-596.909	-625.609
		(449.62)	(399.191)
	Citizens' voice (t-1)	**1.060*****	**0.894*****
		(0.372)	(0.331)
	Legislation (1=yes)	27.467	25.995
		(19.331)	(17.029)
Control variable	**Local population**	0.000	0.000
		(0.000)	(0.000)
	Elderly population	6.043	4.801
		(1.406)	(2.283)
	Farming population	0.645	0.838
		(0.852)	(0.752)
	Evaluation year (1=yes)	**15.045*****	**13.480*****
		(3.467)	(3.082)
Constant		**-224.439****	**435.950*****
		(112.950)	(17.469)
Number of observations		1,140	1,140
Number of groups		228	228

Notes: ***p<0.01, **p<0.05, *p<0.1 Standard errors in parentheses

4.3.3. Summary and Discussion

Open data is a key feature of new open government, which has recently attracted much attention. Open-data-based open government differs from the old open government, which emphasized transparency and right-to-know (Moon, 2020). Open data enables citizens to engage in public issues, co-produce public services, and collaborate with the government on the public problem (Ruijer et al., 2017). In this study, the number of open data sets is a quantitative measure of how actively each government is pursuing an open data policy. Based on this study's empirical results, five key determinants for local open data are found: technical capacity, the plan for technology utilization, size of government, citizens' voice, and interaction with the adjacent government. Table 4.17 summarize the results of verification on the open data model.

Table 4.17. Summary of results (DV: the number of open data sets)

Factor	Variable	Predicted	Results
Technology-related factors	Technical capacity	**Positive**	**Positive**
	ICT budget (log)	**Positive**	**.**
	ICT personnel	**Positive**	**.**
	Plan for tech. utilization	**Positive**	**Positive**
Organization factors	Size of gov. (log)	**Positive**	**Positive**
	Financial capability	**Positive**	**.**
	Political ideology	**Positive**	**.**
Environmental factors	Local Election	**Positive**	**.**
	Political competition	**Positive**	**.**
	Civic communities	**Positive**	**.**
	Citizens' voice	**Positive**	**Positive**
	Legislation	**Positive**	**.**
Neighboring government factor	Interaction with adjacent governments	**Positive**	**Positive**

Unlike the DRAD model, the internal drivers of local government are much more highlighted in the open data model. While the DRAD model was explained by the relationship dynamics between local governments and external stakeholders surrounding the local government, the open data models seem to be explained by internal factors such as technology and administrative capacity of local government. The local governments with high informatization levels and better administrative capacity are more active in opening public data than those that are not. Surely, the external influence such as the influence of individual citizens and neighboring governments also affects the local open data. Still, the internal driver seems to be more prominent in the local government's open data policy.

Why do these differences occur? The nature of the information and data being opened is the likely reason. The original administrative documents might be rather sensitive and politically usable information that could reveal the government's administrative activities. According to Lee (1988), government information is quite political in that it can have a profound impact on the public, so it connotes political accountability when it is disclosed. On the other hand, open data can be transformed into meaningful information or innovative services when secondary processing takes place. Data itself is neutral (Gitelman & Jackson, 2013), thus additional processing is required to change it into meaningful information (Bernstein, 2009). Due to this characteristic of open data, the local government can be less sensitive to external impact regarding opening data.

In this case, the role and intended efforts of local government in opening data are somewhat emphasized. Considering the emphasis on internal drivers in theories related to organizational innovation

(Tornatzky & Fleischer, 1990; Rogers, 2003), it can be inferred that local governments understand open data opening as an innovative achievement.

Further detail on the empirical findings of the open data model show that the technical capacity and plan for technology utilization play a key role in the number of open data sets. These results are consistent with the previous literature (Chen et al., 2019; Ingram, 2017; Zhao & Fan, 2018) that emphasizes the organization's technological context as a significant factor for opening government information. Open data should be machine-readable formatted (e.g., csv, Open API, linked open data), updated regularly, and published online so that citizens can easily use and transform it. Accordingly, a certain level of technological capability and intentional effort toward technology utilization of local governments play crucial role in releasing open data.

Another notable result is the impact of individual citizens on open data. Local government opens more data when it faces more voices from local citizens, quite a contrasting result when compared to the DRAD model. Unlike transparency-centered openness that views citizens as one of the watchdog groups, this result can be interpreted as a local government's attempt to solve public problems with citizens through employing their capabilities and interests. As Moon (2020) discussed, local governments regard local citizens as partners in action in open data policy. This result is also consistent with Kassen's (2013) explanation that the local government could also react and meet local citizens' needs in a more productive and cost-efficient manner by harnessing the collective wisdom of the local communities, such as knowledge and vision about local challenges (Kassen, 2013: 508).

The influence of neighboring governments is also obvious in the open data model. The local governments understanding opening public data as an innovative outcome might be conscious of adjacent government's open data performance, and it seems to raise the opening level successively. Regions that share the same local media will recognize the neighboring government as a potential competitor (Boyne, 1996; Karch, 2007; Revelli & Tovomo, 2007). Accordingly, when the other government publicizes its open-data-based services performance, the local government can be stimulated by the other government's achievement. Conversely, if the open data level is low in the neighboring area, the incentives and stimulation of open data can also be low. Therefore, it might be an effective approach to induce positive regional diffusion effects to surrounding areas by encouraging active interactions among local governments in regard to promoting open-data-based openness at the local level.

CHAPTER 5. CONCLUSION

5.1.   Summary of Dissertation

This study aims to identify the determinants of the openness of
government information in local governments. The review of the
previous literature on OGI in local governments identified three
research gaps: (1) biased perspective in understanding the determinants
of local government's OGI, (2) lack of academic interest in the
influence of local citizens as the demand-side environment at the local
level regarding the government information and data, and (3)
overlooking intergovernmental interaction at the local level.

This study analyzed two models to address these research gaps in
the literature. First, <Model 1> tested the influence of the technology-
related, organizational, and environmental factors based on the TOE
framework, which values the internal factors of government such as the
organization's technological and organizational contexts. Also, the
influence of local citizens was included as the major environmental
factor. Next, <Model 2> validated the neighboring effect regarding the
OGI to identify intergovernmental interaction at the local level. The
empirical context was Korean lower-level local governments (total 228
governments) from 2015 to 2019. <Model 1> was estimated with the
panel regression fixed effects model, and <Model 2> was tested by the
panel spatial regression model (spatial lag model with fixed effects).

Table 5.1 summarizes the principal findings of this dissertation.
Depending on the purpose of opened government information, quite
different factors are verified. Regarding the openness in government's
internal activities (DRAD), local governments open their information
when in a politically favorable condition. The analysis identified the

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negative effects of financial autonomy, political competition, and citizen's voice. The positive impact of the political ideology of local government leaders, supportive legislation regarding the OGI, and interaction with geographically adjacent local governments are verified.

Table 5.1. Summary of principal findings

	Local government's Openness of Government Information	
Tool	Opening original administrative documents	Opening public data sets to the public
Purpose	Monitoring internal workings of government	Facilitating participation in policymaking
Prominent influence (relatively sensitive)	Local political condition (external factor)	Technological condition (internal factor)
The perceived role of local citizens	Watchdog	Partner in action
Awareness of other actors (neighboring gov.)	Yes	Yes

Regarding the DRAD, the strategic behavior of local governments in opening internal information is noteworthy. Local governments view the DRAD as a means for external stakeholders to check and monitor the existing administration. They opened information that discloses the inside information only when their existing political power was not challenged. They increased their openness when political competition with the local council was low, with fewer complaints from citizens. Conversely, they curbed openness in the opposite situation. As one of the watchdog groups, local citizens exert pressure by expressing their dissatisfaction toward the local administration. In response, local governments show passive opening their internal activities. Moreover, they are influenced by the DRAD level of other neighboring local governments. This empirical result confirms that local governments are sensitive to the policy activities of neighboring local governments.

Regarding the openness facilitating participation in policymaking, the internal factors are highlighted. Remarkably, the technology-related factors such as technical capacity and plan for technology utilization positively affect openness. The size of governments referring to the administrative capacity also shows a positive impact on openness. But external influences also matter. The analysis identified the impact of local citizens' voices and adjacent local governments. With these results, it can be assumed that local governments view opening the public data as the innovative activities or outcome of their administration. Whereas local governments perceive DRAD as a monitoring system for external stakeholders, they consider opening data as an innovative outcome that can be pursued together with enhancing their technical condition. Toward citizens' complaints (voice), they release the open data sets to seek solutions for public problems in the spirit of collaboration. Moreover, the neighboring government's positive effect confirms that the value of openness has been normatively justified at the local level.

This research understands the openness of government information with the open government perspective. The empirical evidence identified the conditions under which openness can be enhanced or restrained. Furthermore, the findings of this dissertation shed light on the role of local government as active actors that strategically open their information and endeavor to enhance openness. The local government is still taking the initiative for open government information and data in relationships with stakeholders in local governance. When the local political conditions were unfavorable to the existing regimes, they tended to restrain and control the opening of internal information that could be used politically. In a situation when the incumbent government is challenged, it is hard to increase its black

box visibility and alleviate administrative secrecy. Moreover, the government's role and intentional effort is further emphasized in opening data that facilitates citizen participation. As for public data that is unlikely to be used politically by the external actors, local governments view opening data as their innovative achievement. The local governments with a high level of technology and administrative capacity showed more active data opening. In addition, local governments are quite conscious of the level of OGI of neighboring governments and affected by their behavior.

5.2. Theoretical and Policy Implications

5.2.1.   Theoretical Implications

This dissertation has several theoretical implications. First, based on a thorough review of related theories used in OGI literature, this study developed the integrative framework for determinants on "Local Open Government" based on the TOE framework (Tornatzky & Fleischer, 1990). The TOEN framework proposed in this study included factors arising from research gaps in existing empirical studies related to local open government. For instance, this study tested the impact of local citizens, which has not been adequately addressed and verified in the existing studies. Moreover, this framework included interactions between local governments that exist in the local context (Shipan & Volden, 2008). Through this framework, the effect of spatial interaction at the local level regarding the OGI that is frequently mentioned in the limitations and future study part of existing OGI literature is empirically identified. Thus, the TOEN framework for local open government has largely overcome the limitations of previous studies.

Secondly, this study conceptually divided the OGI based on Meijer et al.'s (2012) conceptual framework and discovered somewhat distinguishable determinants depending on the conceptual dimension. The two conceptual divisions encompassed the main conceptual contents of the "old open government" paradigm, which values transparency and right-to-know, and the "new open government" that values on participation and open-data-initiatives (Moon, 2020). Different determinants were identified according to each conceptual dimension, and the difference between old and new open government were empirically clarified with this study.

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Thirdly, this study detected the strategic behavior and intentional efforts of local governments toward OGI. No matter how the central government promotes open government initiatives, local political circumstances maintains administrative secrecy at the local level. On the other hand, internal competency and efforts such as technical and administrative capacity were the most illuminated determinants for data-based open government.

Lastly, the study's measurement method is expected to contribute to the accumulation of empirical knowledge on local open government studies. This dissertation measured OGI with hard data. Previous studies tried to measure OGI with soft data such as survey data (Dowley, 2006; Albalate del Sol, 2013; Caamano-Alegre et al., 2013; Song & Lee, 2015; Schmidthuber et al., 2020) or secondary sources (Thorsby et al., 2017; Seo, 2017; Schenll & Jo, 2019; Kim & Eom, 2019). However, this study tried to measure each conceptual dimension of OGI by hard data collected from diverse sources. Accordingly, the measurement method of this research is expected to be a new reference for quantitative measurements of OGI.

5.2.2.　Policy Implications

5.2.2.1. Ways to alleviate administrative secrecy and enhance citizens' right to know

Firstly, the government needs to introduce stricter DRAD management. For instance, the annual local government assessment needs to reflect the DRAD evaluation results so that local governments can receive the considerable advantages or disadvantages according to their openness outcome. This study showed that local governments could avoid disclosing administrative documents under unfavorable political conditions and selectively adjust their openness level. Nevertheless, those local governments with low financial autonomy and requiring financial support from the central government had more open internal information than those that did not. It can be interpreted that the local government's incentive for secrecy would have been less than the benefit of receiving a good evaluation from the central government by complying with the central openness policy. Therefore, the black-box visibility of local governments can be increased by providing advantages that exceed the local government's incentives for secrecy or by designing a system that maximizes the cost for secrecy.

Secondly, the government needs to encourage regional interaction among local governments regarding DRAD. This study's major findings detected the impact of the neighboring governments' activities toward DRAD. This finding indicates that positive diffusion on DRAD is possible, and the diffusion needs to be further strengthened. In the case of Korea, the central government provides benefits such as awarding excellent to local governments by evaluating their performance in promoting the openness of government information to the public. The

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evaluation categorizes the lower-level local governments into cities (si), counties (gun), and districts (gu) and then evaluates each on its open data performance. However, according to this study's empirical evidence, a more effective approach is to select best practices by "region" to induce positive spatial interaction of adjacent local governments. Providing substantial benefits for best practices in each region and steadily publicizing the performance of selected governments through local media can be expected to be more effective in promoting openness at the local level.

Lastly, continuous monitoring of local governments expected to have low DRAD needs to be considered. According to this research, the DRAD of local government is determined by the local political environment and the local government's financial capability. Each factor can be a constraint factor of DRAD at the local level. Thus, it can be more effective to target and monitor areas where the DRAD is expected to be lower. Based on this study's findings, the level of openness may be low in areas with intense political competition, conservative government leaders, consistently high level of civil complaints, or good financial capability. Hence, the local governments with these conditions need to be continuously monitored so that they do not reduce their openness level.

5.2.2.2. Ways to facilitate local-based civic engagement and innovation

Firstly, for open data, support that can enhance the internal competency of local governments is needed. According to this study's results, the effects of internal factors of local governments are apparent.

In particular, technology-related factors were the primary determinants. Supplementing ICT expertise to the local governments with low technical capabilities or retraining public officials on ICT utilization could be considered. Moreover, since the size of government has a positive effect on local governments' data opening based on the study's results, additional support needs to be focused on small local governments struggling to achieve a desirable administrative capacity.

Secondly, they need to improve the workload accompanied by opening public data. As for open data, local governments' technology capacity is required, but some other administrative inputs are also necessary due to the data filtering process prior to publishing data online (MOIS, 2019). This study's empirical evidence also supports this context in that the number of public officials was a major determinant of open data. Public data are produced and collected during the government's administrative activities, thereby inevitably containing considerable amounts of citizens' personal information. Hence, a series of processes to separate and de-identify personal information precedes the publishing of public data (MOIS, 2019). This process might cause an onerous workload for public officials in charge of open data (Kim et al., 2020) and over the long term can be a major factor inhibiting the openness of public data. However, since strict personal information filtering also relates to the trust of data providers, simplifying this filtering process is undesirable. Thus, consider several alternatives, such as assigning more public officials in charge to data opening tasks or actively utilizing reliable automated de-identification solutions.

Lastly, the leading local governments for open data can play a crucial role as regional open data hubs. In the open data model, the study also identified the spatial interaction among local governments on

open data. Therefore, the central government needs to designate the most leading government in open data for each region and support it as a regional open data hub. Similarly, the United States launched a "Big Data Regional Innovation Hub" in the local flagship region and has promoted the use of data in the surrounding areas through "Big Data Spoke" projects (Lee, 2021).[22] As a regional open data hub, the leading local government needs to be encouraged to exchange its technology and know-how with adjacent governments.

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[22] https://www.nsf.gov/cise/bdspokes/index.jsp

5.3. Limitations and Directions for Future Study

Despite the above contributions and implications, this dissertation has the following limitations: First, the study did not consider the quality of information and data opened by local governments. Quantitative openness does matter, but the quality of information and data can also be important (Park, 2001; Velijkovic et al., 2014). This study could not identify whether the opened information and data were relevant, timely, and reliable (Park, 2001). Further research can supplement this limitation by analyzing the content of administrative documents and open data sets. In addition, the quality of information and data can measure the survey of citizens' satisfaction with government information and data contents.

The effect and interpretation of ICT personnel might be disputable. This study posits that ICT personnel is a favorable condition to the OGI. However, the study verified the negative impact of ICT personnel on DRAD, and this result is consistent in all models. The author tried to interpret these results, but the explanation is not sufficient because no previous studies verified a similar effect. Hence, this part remains a major limitation of this research.

In measuring the civic factors, this study fails to include variables of citizens related to information and data needs. If studies measured the impact of citizens more directly related to the dependent variables, it would have been possible to derive more practical implications for the relationship between OGI and local citizens. A future study can overcome these limitations by investigating the public demand for information and data or checking the number of data portal downloads.

This study could not identify the mechanisms for the spatial interactions among adjacent local governments. Various mechanisms

for interactions include competition, learning, imitation, and coercion (Shipan & Volden, 2008), but this study could not specify the type of mechanism that worked. Future research will define and identify the kinds of mechanism that works on the interaction between local governments regarding the OGI.

The primary model (Model 1, Model 2) could not directly reflect central government pressure on local government openness. While the time range of this study was from 2015 to 2019, the central government's evaluation initiated in 2018, so it was difficult to construct panel data that contains the central government's evaluation score. Thus, the primary models include only the year variables for which the evaluation exists. In the future, follow-up studies can collect data related to the central government's OGI evaluation and analyze the effects of local-to-central government relationships.

This study mainly used the quantitative method on identifying determinants of OGI. The empirical results of this study could not be cross-validated by qualitative research such as an interview. If qualitative research had complemented the quantitative work here, the practical implications for this study could have been further emphasized and valued. This limitation will be addressed through future research.

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Appendix: Results for Supplementary Model

The Korean central government has assessed the open data policy for all public organizations, including local governments, since 2018. In the main research models, the effect from central government evaluation is considered and controlled with the evaluation year variable. However, this method has limitations in that it indirectly measures the central government's evaluation pressure. To measure and properly control the central government's pressure regarding open data, this study presents a supplementary model that contains the evaluation score of open data. Due to data collection limitations, this additional model covers only two years, 2018 and 2019.

Table 6.1 shows the result of supplementary models. As we can see in the second column, the evaluation score has an apparently positive effect (β=13.804, p<0.01) on the number of open data and indicates that the local government's open data is affected by the central government's evaluation score. In the supplementary model, the results of other factors are slightly different. The effect of interaction with the adjacent government is still positively significant (β=0.180, p<0.1), but the statistical significance has been somewhat weakened (p<0.01 $\rightarrow$ p<0.1). The effect of the plan for technology utilization and citizens' voice has diminished. However, the impact of local legislation has been newly verified (β=90.02, p<0.01). This result means that local government with an open-data-related ordinance opens more data than those that do not. Despite the change in the control variable, the effects and trends of technical capacity (β=6.730, p<0.01) and size of government (β=79.289, p<0.01) remained similar.

Table 6.1. Results for supplementary model (open data)

Variables		SLM, fixed effects (2015-2019)	SLM, pooled (2018, 2019)
Neighboring Government factors	Interaction with adjacent gov. (ρ)	0.148*** (0.040)	0.180* (0.096)
Technology-related factors	Technical capacity	1.671*** (0.400)	6.730*** (2.321)
	ICT budget (log)	-1.425 (1.319)	-5.603 (5.237)
	ICT personnel	1.590 (1.273)	-0.826 (5.232)
	Plan for tech. utilization	15.434*** (2.004)	-2.962 (4.401)
Organizational Factors	Size of government (log)	24.224* (14.556)	79.289*** (21.769)
	Financial autonomy	0.213 (0.316)	0.650 (0.495)
	Political ideology (1=left-wing)	2.414 (2.349)	2.588 (11.705)
Environmental Factors	Local Election (1=yes)	-2.149 (2.185)	-49.499 (14.483)
	Political competition (1=divided)	-2.167 (2.064)	5.657 (11.255)
	Civic communities (t-1)	-625.609 (399.191)	242.454 (233.209)
	Citizens' voice (t-1)	0.894*** (0.331)	5.001 (4.508)
	Legislation (1=yes)	25.995 (17.029)	90.022*** (35.741)
Control variable	Evaluation year (1=yes)	13.480*** (3.082)	
	Evaluation Score		13.804*** (4.576)
	Local population	0.000 (0.000)	-0.000 (0.000)
	Elderly population	4.801 (2.283)	2.958 (2.602)
	Farming population	0.838 (0.752)	-2.261** (0.948)
Constant		-224.439** (112.950)	omitted
Number of observations		1,140	228
Number of groups		228	N/A

Notes: ***p<0.01, **p<0.05, *p<0.1 Standard errors in parentheses

Abstract in Korean

지방자치제가 바람직하게 작동하기 위해서는 충분한 정보를 가진 시민 (informed citizenry)이 전제되어야 하며, 이 전제는 지방정부의 적극적인 정보 개방을 통해 충족될 수 있다. 시민들은 지방정부의 내부 행정활동에 대한 정보를 통해 지방정부의 행정활동을 감시하고 견제할 수 있으며, 지방정부가 제공한 데이터를 바탕으로 정부가 해결하지 못하는 지역의 수요와 문제를 해결할 수 있다. 현재 국내외적으로 지방정부의 정보 개방을 증진하기 위한 제도들이 시행되고 있지만, 정보 개방 수준은 지방정부 별로 상대적으로 큰 편차가 존재하고 있다. 이 논문은 지방정부들이 정보개방을 촉진하기 위한 같은 제도의 적용을 받고 있지만, 그 개방 수준이 서로 다르다는 점에 주목하였다. 이에 따라 지방정부의 정보개방성 결정요인을 규명하는 연구를 수행하였다.

관련 선행연구의 검토 결과, 다음과 같은 한계가 확인되었다. 첫째, 대다수의 선행연구는 지방정부의 정보개방에 대해 외부환경의 영향을 강조하고 있으며, 정보개방에 대한 지방정부의 내부적 동인에 대해서는 상대적으로 간과하고 있다. 둘째, 대부분의 선행연구들은 정부가 정보에 대한 수요자이자 실제 사용자로서의 시민의 중요성은 인식하지만, 실증적으로 그 영향을 적합한 데이터와 실증분석을 통해 규명하는 데에는 한계를 보이고 있었다. 셋째, 관련 선행연구들은 지방정부가 직면하고 있는 동태적인 상황에 대한 고려가 부족하다. 다시 말해, 지방정부의 공간적 요소를 간과하고, 지방정부의 정보개방에 대한 인접 지방정부와의 상호작용 가능성을 고려한 연구를 찾기 어렵다.

이상의 선행연구의 한계를 극복하기 위해 이 논문은 지방정부의 내부 기술요인을 강조하지만, 지방정부의 외부 환경요인을 함께 고려하는 기술-조직-환경 프레임워크(Technology-Organization-Environment Framework)를 활용하여 지방정부의 정보개방성 영향요인을 검증하고자 하였다. 분석을 위해 2015 년부터 2019 년까지의 한국의 228 개 (기초

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226 개, 세종, 제주 포함) 지방정부의 데이터를 수집하였다. 종속변수인 정보 개방성은 정부 내부활동에 대한 감시가 가능한 (1) 행정문서의 원문공개율과 시민들에게 참여의 기회를 제공하는 (2) 공공데이터 개방 셋 수로 측정되었으며, 두 종속변수에 대해 각각 두 개의 모형을 통해 실증분석을 실시하였다. 우선, <모형 1>에서는 기술 요인(지방정부의 기술 역량, 기술관련 자원, 기술 활용 계획 수준), 조직 요인(지방정부의 규모, 재정 자립도, 단체장의 정치적 성향), 환경 요인(지역 정치영향‒ 지방선거 연도, 지방의회와의 정치적 경쟁수준, 지역 시민 영향‒ 조직화된 시민, 개별 시민들의 영향수준, 법제화 영향‒ 조례 제정여부)이 독립변수로 설정되었고, 통제변수로는 중앙정부의 평가 시행여부, 지역 인구수, 지역 고령화 수준, 농가인구 비율, 연도가 활용되었다. <모형 1>의 주요 분석 방법으로는 5 개년 패널데이터를 활용한 고정효과 모형을 통해 변수들의 영향을 추정하였다. 다음으로, <모형 2>에서는 정보개방성에 대한 인접 지방정부의 영향을 중점적으로 검증하였다. <모형 2>에는 <모형 1>에 포함된 변수들을 모두 포함하였으며, 검증 방법으로는 공차모형(spatial lag model)을 활용한 패널 공간회귀분석(고정효과)을 활용하였다.

<Model 1>과 <Model 2>의 주요 분석 결과를 각 종속변수별로 요약하면 다음과 같다. 우선, 지방정부 내부 행정활동을 공개하는 개방성(원문공개율)에 있어서는 단체장의 정치적 성향(진보), ICT 인력, 재정자립도(이상 조직 내부요인), 정치적 경쟁, 개별 시민들의 목소리(민원 제기), 관련 조례 제정 여부, 인접지방정부와의 상호작용(이상 조직 외부요인)의 영향이 확인되었다. 원문공개율에는 지방정부 내부와 외부요인 모두 유의미한 영향을 미치고 있었으나, 외부 요인의 영향이 더욱 두드러졌다. 특히, 지방정부의 내부 행정활동에 대한 개방 수준은 지방정부를 감시하고 상호작용하는 외부의 행위자들의 관계 속에서 결정되는 것으로 확인된다. 지방정부는 그들이 직면하고 있는 지역의 정치적 환경이 우호적일 때 개방 수준을 높이고, 지역의 정치적 환경이 비우호적일 때에는 개방 수준을 낮추는 것으로 나타났다. 예를 들어, 지방의회와의 정치적 경쟁이 낮을 때, 개별 시민들의 목소리가 높을 때 내부 정보에 대한

개방을 낮췄다. 지방정부는 여전히 행정정보에 대한 통제력을 행사하며, 그들의 정치적 이해관계에 따라 이를 전략적으로 조정하는 모습이 나타났다. 반면에, 정보 개방과 관련한 조례의 제정과 인접한 다른 지방정부들의 개방성 수준에는 긍정적 영향을 받는 것으로 나타났다. 지방정부가 그들이 직면하고 있는 정치적 환경에 따라 원문공개율을 조정하지만, 지역에 정보공개와 관련한 조례가 제정되어있을 시에는 원문공개 수준이 전반적으로 높은 것으로 나타났다. 또한, 지리적으로 인접한 지방정부들 간에는 원문공개율과 관련하여 정부 간 상호작용을 하는 것으로 나타나 정보개방성에 대한 지역적 확산효과(spill-over)의 가능성을 엿볼 수 있었다. 지방정부 내부 요인 중에서는 단체장의 정치적 성향이 진보적일수록, 재정자립도가 낮을수록 개방성 수준을 높이는 것으로 나타났다. 재정자립도가 낮은 지방정부의 경우 중앙정부에서 권고하고 있는 원문공개의 수준을 높였을 것으로 해석이 가능했다. 이 경우, 지방정부가 원문공개 수준을 낮춤으로써 받을 수 있는 비밀주의의 이득(incentives) 보다 원문공개율을 높여 중앙정부로부터 좋은 평가를 받아 중앙으로부터의 재정 지원에 긍정적 상황을 구성하는 것이 더 큰 이득이 되었기 때문으로 추론이 가능했다.

다음으로, 시민들의 참여의 기회를 제공하는 공공데이터 셋 개방에는 지방정부의 기술적 역량, 정보화계획 수준, 정부의 규모(이상 조직 내부요인), 개별 시민들의 목소리, 인접 지방정부와의 상호작용(이상 조직 외부요인)이 유의미한 영향을 미치는 것으로 나타났다. 오픈데이터 모형에서는 원문공개율 모형과는 다르게 조직 내부요인의 영향이 더욱 두드러졌다. 특히 내부 요인 중 기술 관련 요인의 영향이 명시적이었다. 조직의 기술적 역량이 높을수록, 조직의 기술활용 의지가 높을수록 공공데이터 개방에 더욱 적극적인 것으로 보인다. 또한, 공무원 수로 측정된 정부의 규모 또한 긍정적 영향을 미치고 있었는데, 이는 지방정부가 공공데이터를 개방하기 전 공공데이터를 생성하고 수집할 시 조직의 행정력이 소요될 수 있음을 시사하는 결과였다. 예를 들어, 공공데이터 개방 전에 데이터에 포함된 민감 정보를 분리, 비식별화해야하며 저작권 등의

문제를 검토해야 하는 등의 절차들로 인해 공공데이터 개방에는 일정 수준의 행정력이 필요한 것으로 보인다. 또한, 공공데이터의 개방에는 개별 시민들의 목소리(민원 제기)의 유의미한 영향이 검증되었는데, 원문공개율과는 달리 오히려 시민들의 목소리가 높게 표출될 때 데이터를 더 많이 개방하는 양상을 보였다. 이에 대해서는 지방정부가 해결하지 못하는 지역의 문제에 대해 데이터 개방을 더 적극적으로 실시함으로써, 지역 시민들과 문제를 공동으로 해결하려는 모습으로 해석할 수 있었다. 또한, 원문공개율 모형과 유사하게 공공데이터 개방에도 인접 지방정부의 긍정적 영향이 확인되었다. 인접 지방정부의 우수한 공공데이터 개방 성과가 지역의 언론에 공유되었을 경우, 지방정부는 이에 대해 긍정적 자극을 받았을 수 있다. 또한, 인접 지방정부들의 공무원들의 상호작용을 통해 이러한 지역적 확산효과가 일어났을 가능성이 존재한다.

이상의 분석결과는 다음과 같은 이론적 함의를 갖는다. 첫째, 본 연구는 "열린 지방정부"에 대한 개념적 차원을 두 가지로 개념화하고 측정하였다. 특히, 투명성과 알권리를 중심으로 하는 과거 열린 정부 패러다임의 핵심적 내용과 시민참여와 협력을 중심으로 하는 2009년 이후 대두된 새로운 열린 정부 패러다임의 핵심적 내용을 개념적 차원으로 구성하고 이를 각각 경성 자료로 측정을 시도했다. 둘째, TOE 프레임워크를 바탕으로 열린 지방정부에 대한 구조적인 결정요인을 검토했다. 셋째, 본 연구가 제안한 TOEN 프레임워크는 지역 시민의 영향, 인접 지방정부의 상호작용을 포함함으로써 지방 수준의 열린 정부 선행연구에서 존재하던 학술적 공백을 해결하였다. 넷째, 정보개방에 대한 행위자로서 지방정부의 역할을 조명할 수 있었다. 내부정보에 대한 지방정부의 통제, 데이터 개방에 필요한 조직 내부의 역량 등 정보 개방에 대한 지방정부의 전략적 행위와 의도적 노력에 대해서 확인할 수 있었다.

논의를 종합하여 도출한 정책적 함의는 다음과 같다. 지방정부의 내부 활동 정보에 대한 개방수준(원문공개율)을 높이기 위해서는 다음과 같은 방안이 고려될 수 있다. 우선, 원문공개율과 지방정부 평가지표의 연계가 필요하다.

이를 통해 원문공개율 실적에 따라 지방정부가 체감할 만한 보상 혹은 불이익을 제공해야한다. 또한, 현재 진행되는 지방정부의 정보공개 평가 대상 집단의 구분이 지역별 혹은 권역별로 이루어져야한다. 이를 통해 정보 개방에 대한 지방정부들간 공간적 상호작용의 효과를 극대화해야한다. 또한 본 연구의 결과를 통해 나온 결정요인들을 바탕으로, 원문공개율이 낮을 것으로 예상되는 지역에 대한 꾸준한 모니터링이 필요하다. 시민들의 참여를 높일 수 있는 데이터 개방을 촉진하기 위해서는 다음과 같은 방안이 고려될 수 있다. 우선, 행정력 규모가 작은 지방정부에 대해 기술적 지원을 하거나 공무원을 재교육하는 등 조직 내부요인을 중심으로 지원하는 것이 필요하다. 또한 데이터 개방에 소요되는 행정력 소요를 효율화하는 방안을 강구해야 한다. 마지막으로 높은 공공데이터 개방 수준을 보이는 지방정부에 대한 지속적인 성공사례 발굴과 성과 확산을 통해 자율적인 개방성 증진 노력이 필요하다.