Telecommunications Policy xxx (2017) 1–12

Contents lists available at ScienceDirect

Telecommunications Policy

journal homepage: www.elsevier.com/locate/telpol

Vision of future e-government via new e-government maturity model: Based on Korea's e-government practices

Jin Sangki

National Assembly of Korea, South Korea

ARTICLE INFO

Keywords:
E-government
Highly-advanced information society
Smart city
E-government maturity model

ABSTRACT

This paper analyze that the social paradigm shift caused by the new IT has brought the current highly-advanced information society following the industrial and information societies, and proposes a new e-government development model called as "E-Government Maturity Model based on Socio-political Development" that incorporates the level of social maturity based on e-democracy and the maturity level of civic society with statistic model. The new model classifies e-Government development into four stages: "Bureaucratic model", "Information management model", "Participatory model", and "Governance model". This paper also attempted to apply this model to e-government practices in Korea on the flow of time. E-government in Korea has mainly shown features of one distinct type at a time among four stages, as so far explained above. In this case, the former stage developed to the next level after going through the process of maturation in advancement of ICT and social maturity and political stability. This paper defined the 'smart society' as the highly-advanced information society from the Korean case study. Instead of literally interpreting the term 'smart', it should be comprehensively re-interpreted as a new academic term that reflects perspectives of social and technological changes, introducing new meanings. The definition and concept or the maturity level of the smart society shall be left for the future study suggestions. We have so far analyzed the characteristics of progressing toward the smart society based on Korea's cases of e-government development. The analysis, though started from certain cases of Korea, will be an applicable model to other countries as well, since Korea is in the leading group in terms of informatization. This paper is distinguished from the other studies because it is an analytical study on the non-technological factors of e-government development: especially focused on the political, socio-economic aspects of e-government. Despite the contribution mentioned above, this paper also has an academic limitation on the generalization of findings because of its a single case study on the Korea. So we will try to explain and analyze the other countries' cases with the research framework: E-Government Maturity Model based on Socio-political Development of this paper in the next studies. So, this model will be expected to be generally expandable and applicable to e-government cases of other countries.

1. Introduction

Many researchers highlight ICT's role in and impact on the progress of human history after the Industrial Revolution (Northrop, 2000). The rapid development of information and communications technologies (ICTs) evokes the paradigm shift of human society. Technologies, best understood as a means of better communication, improved processing and exchange of information, now impact

E-mail address: wooyul10@gmail.com.

https://doi.org/10.1016/j.telpol.2017.12.002
Received 24 July 2017; Received in revised form 4 November 2017; Accepted 2 December 2017
Available online xxxx
0308-5961/© 2017 Elsevier Ltd. All rights reserved.

Please cite this article in press as: Sangki, J., Vision of future e-government via new e-government maturity model: Based on Korea's e-government practices, Telecommunications Policy (2017), https://doi.org/10.1016/j.telpol.2017.12.002

every aspect of our lives, constantly revolutionizing the way we communicate with each other, comprehend our environments, and interact with government. ICTs have played an important role in fostering improved connectivity as well as socio-economic development throughout the world[1] (Jin, Yoon, & Kim, 2015; UNESCAP, 2011).

Influenced by the global ripple effect from the release of smart-technology (e.g., smart phone) and with new information technologies spreading through in form of social networks such as the Facebook and Twitter, Korea also has witnessed a rapid development of the new smart society,[2] which led to great influence and change to our social spheres such as politics, administration, economy and culture, and also to our daily lives. Especially, the government is improving to a partnership-based framework upon which individuals and the government are working together beyond bilateral participation. Demands are also increasing for e-government services to comply with the new changes in interactive services on social networks. However, academic research on the social impact of smart technologies is a few, if not, very weak in that only part of technological or social changes is taken to show and discuss fragmentary effect or influence.

To fully understand of human society development, some recent researches (Jin & Cho, 2015; Reddick, 2005; Rifkin, 2011) emphasized to the consilience perspective and approaches between socio-economic and technical viewpoints. In this line, we need new approaches to the government development, because now almost countries are trying to develop and innovate their government with ICT what is called e-government. So this study aims to propose a new e-government development model based on the paradigm shift in the smart society and to explain the changes in e-government level and services and diagnose the current status by applying Korea's e-government practices in a time-series based on the new development model from the comprehensive viewpoint embracing both technological and social paradigms while overcoming fragmentary thinking and difference in views.

This model is expected to contribute a lot in terms of academic research on e-government, along with benefits in other terms such as spreadability and applicability of the smart society to other advanced countries and capability to develop alternative policy measures like solving adverse effects, for Korea has faster IT receptive capacity than other countries and has well-established wired and wireless Internet environment such as the broadband network.

This paper discusses the social paradigm shift and the change of government roles and introduces the analytic framework and methodologies. And this paper also introduces application and verification of the development model via Korea's practices, and provides the conclusion and policy implications. So this paper tries to design the academic and practical approaches on e-government evolution or development with consilience perspective and approach between socio-economic and technical viewpoints and to statistically explain and empirically verify this model with Korean case study.

2. Theoretical review

2.1. Social paradigm shift in Korea

The history of human society has been marked by paradigm shifts caused by technological advances, changes in social values, and other core driving factors (Keeley, 2007). In the agricultural society, a variety of methods were developed using the basic human labor to overcome natural disasters, thereby placing physical industriousness first among all other required qualities. The industrial revolution shifted the human history from the agricultural society to the industrial society. In the industrial society, technicians or skilled factory workers emerged as indispensable and under the uniform bureaucracy, these workers were forced to bear an enormous amount of labor hours. Such society, again, evolved to the information society, where the emergence of computers and communications technology led to increased significance on knowledge and information. A wide variety of knowledge and information became the core resources in the information society, while opening and sharing such resources became important social values (Drucker, 2002).

Viewpoints toward the information society vary depending on scholars from P. Drucker's knowledge society (1969), Daniel Bell's post-industrial society (1973), and Brezenki's technetronic society (1970). Summing up these viewpoints leads to the fact that the mainstream here are the technology-driven viewpoints, which emphasize the development of information and communications or new technologies that are combinations of information processing and communication technologies, and which aim to utilize information and communication technologies.[3] The information society and the smart society as described so far, therefore, can be considered the outcomes of the changing environment and shifting social paradigms such as the IT evolution (Cho & Jin, 2016).

The need and strategy for preparing for the advanced information society have been recently discussed. Don Tapscott (2012) explained that the emergence of the N-generation grown up in the digital environment brought macro-wikinomics, which is the age of innovation based on collaboration and openness, or the age of networked collective intelligence. Knowledge and information are becoming more intelligent; we have come to pursue convergences between ICT and the traditional industry technologies; social values in

[1] ICTs have provided the region's population with new opportunities and resources; e-Government extends the reach of public services, social media provides voices to those social groups most often marginalized, e-Health brings medical practitioners to rural communities and online learning provides access to education for those outside traditional hubs of learning.

[2] The word ‘smart’ is an adjective having the meaning of intelligent, bright, clever, efficient in speech, and thorough in transactions, etc. However, in real life, it is combined with other words such as in smart phone, smart-learning, and smart office and is used as a practical term delivering convenience and benefits. The term ‘smart society’ was first introduced in Korea, because the number of smart phone users in Korea reaches 28.3 million (as of end-June 2012) and a wide variety of Internet services are used via smart phones.

[3] In other words, the social and economic paradigm shifts are caused by increasing significance of information and development of information and communications technologies. Advancing toward the smart society has added more variety to industry types including the mobile industry and one-man companies and also made attempts to innovate our lifestyles such as in the Smart Work scheme where one can work regardless of time or place (Rifkin, 2011).

the information society where sharing and openness were considered as core values now came to demand high creativity based on such values. Compared to the past information society, the smart society can be characterized by more efficient, productive and economical social systems and processes, which are enabled by smart technologies. In addition to such increased efficiency and productivity, this society highly respects human dignity and creates values through combining technologies and other various sectors (National Information Society Agency, 2011).

From the 1980s, Korea began to computerize major administrative data such as resident, vehicle, and real-estate information that served as the base for government control and taxation. This allowed turning of the manually-written paper-based business process of government workers to application of integrated forms through online database, further enabling more efficient management of the administrative affairs. In terms of infrastructures, Korea constructed the national backbone networks regarding five areas that make up the national operation framework including government administration, finance and national defense as part of its preparations for the information society, which led to the foundation of a safe network operation framework. By the end of 2000, Korea constructed the nationwide broadband network with fiber-optic cables and came to be fully prepared for the Internet age (National Information Society Agency, 2010a).

By the late 1990s, many Koreans owned a computer (40.1% in 2000) and had access to the Internet (44.7% in 2000). With the emergence of the World Wide Web (1995 in Korea), Korean government agencies were able to make public announcements through homepages. These websites, however, were initially used as mere means to publish announcements, government news, phone numbers or directions to government offices but upon further use and development, detailed information about formalities and documents required to apply for government services, as well as downloadable forms were made available. Technological progress and the maturing of Korea's democratic institutions eventually transformed government websites from simple online information portals to service portals. Citizens could now handle online businesses for which they previously needed to visit a government office, such as paying taxes, consulting real estate-related records and obtaining resident registration transcripts and other government documents. In short, the era of online government-to-citizens services began in earnest (National Information Society Agency, 2010b).

In time, with further progress in informatization and democratic development, government websites came to be used as convenient channels of communication between the government and citizens. Citizens were not only informed of government policy undertakings and news, but they also provided feedback.[4] They submitted their ideas and proposals while voicing complaints and addressing issues through the various government websites. By facilitating citizens' participation in public issues and government affairs, electronic media made considerable contributions toward the advancement of democracy in Korea.

2.2. *Review of literature (analysis of E-Government development stages)*

We can easily find papers on research on the effect of e-government with a variety of effects: anti-corruption (Andersen, 2009; Cuillier & Piotrowski, 2009), and with service delivery effectiveness (Moon, 2002). More specifically, the e-government system has been recognized for its potential administrative efficiency and effectiveness (Heeks, 2001), interactivity (DiCaterino & Pardo, 1996), interconnectivity (McClure, 2000), and its capacity to reduce administrative burdens (European Commission, 2014). In response to the changing environment and government roles caused by citizen demand and participation, e-Government policies are also constantly changing and evolving together like an organism. This means that e-Government interacts with environmental elements to evolve. Based on this concept, this study reviews the e-Government evolution by developmental stages and proposes a comprehensive research framework for analyzing Korea's e-Government evolution based on the developmental stages. Tools for categorizing e-Government by developmental stages can vary – there can be three, four, five or more than six stages and they can differ based on scholars such as Moon, on business consulting institutions such as Deloitte Research (2003) or Baum and Di Maio (2000), on international organizations such as UN (2003) or OECD (2003) and on technologies or participation.

Here, we use three categorization methods – e-Government based on the method of service delivery, e-Government based on citizen participation, and e-Government based on government innovation or services. First of all, there is the set of developmental stages categorized based on the Web or the Internet - This method can be represented by the UN study, in which UN came up with five stages of e-Government evolution (emerging, enhanced, interactive, transactional, and connected) while assessing the e-Government readiness, based on how efficiently government websites express and deliver government services and information. In the 'connected' stage, the most sophisticated level, government services are requested, processed and delivered in a seamless manner, through entirely networked and integrated government organizations using web technologies. Studies by Moon (2001) and Cho and Kwon (2002) also fit in here using this method.

The second method is categorization based on government innovation and services, as represented by the OECD study (2003). Using the model of the OECD (2003), Siau and Long (2005) and Layne and Lee (2001) categorized the e-Government into four stages according to service type or quality – they are stages of simple information provision, information provision through interaction between the government and citizens, transaction, and information sharing. It is reported that in the stage of information sharing, the most sophisticated level, simplified public administration innovates the process and at the same time increases efficiency, further leading to decrease of citizens' application procedures for government services. Besides the OECD study, this method includes studies by Bang (1998), Jeong (2009), Yoon (2003), etc.

[4] Further, they require opening and sharing unveiled information and data of government for making business or enhancing their life convenience.

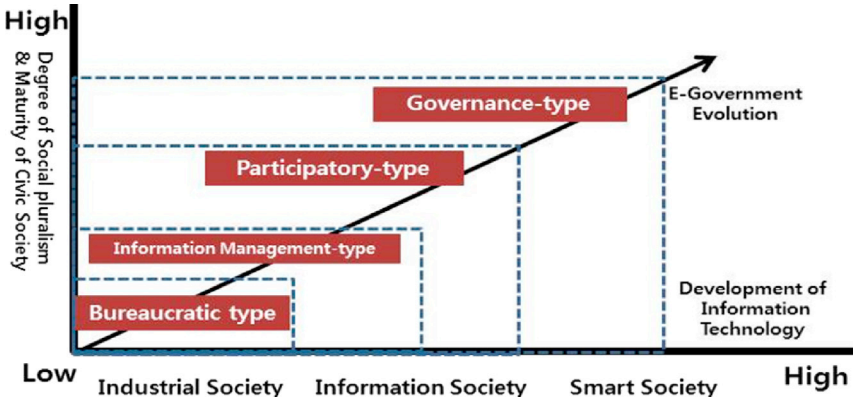

Fig. 1. Research Framework: "E-Government Maturity Model based on Socio-political Development". Source: redesign the Kim (2007).

The third method is based on citizen participation and this is used in studies by Baum and Di Maio (2000), and Jin et al. (2015). Ramsey (2004) classified digital government into four stages or 'waves'[5] according to the ultimate goal that the government plans to achieve. The customized government achieved from government transformation offers the most integrated stage of digital government in both horizontal and vertical terms, encompassing integration of the entire value chain from internal businesses to external customer affairs toward procurement suppliers, private-sector partners and the general public.

This paper moves the viewpoints on the e-government from technology-driven viewpoints which it has the limitation to view on the e-government in smart city, to consilience perspective between socio-economic and technical viewpoints to fully understand on the process of government evolution in Smart society. So we can suggest the vision of future e-government via new e-government maturity model via Korea's e-government practices.

3. Research framework for the study

Many studies on e-government development stages in the past have limitations in that they often deal with only part of e-government development, rather focuses on evaluation of some representative websites that are officially exposed, or recognizes the development model as a fixed framework that is unchangeable.

In this regard, a new e-government development model is suggested to comprehensively understand the technologies, services and citizen participation. The new model classifies e-government into 'bureaucratic', 'information management, 'participatory' and 'governance-type' by identifying the development stages based on the social paradigm shift such as the industrial, information, and smart societies on one hand, and identifying the changes in government roles based on the level of social pluralism and civic society maturity, both of which make up the e-government democracy, on the other hand. As for the relationship between e-Government development and e-Democracy, attention should be given to their application to political and administrative process and their main players – how they are related to or different from each other (Hong, 1999). From the perspective of this study, e-Democracy refers to the use of information technology and networks for the expression of political opinions across the entire political process from political association to the exercise of influence by interest groups, lobbying and participation in elections through an electronic vote (Freedom house, 2016).

E-Government, on the other hand, is the integration of information technology to shorten the process of decision-making in the government, share information between its various sections or disclose public information to citizens for free access, and increase the efficiency of government-to-citizen services. Given that efficiency and democracy are the two main goals of both e-democracy and e-government, and that the latter promotes democracy by widening citizens' direct participation in the political process, this binary view serves no real purpose. But, e-government, in its broad meaning, refers to both dimensions of the policy process, which are, in fact, practically and conceptually, inseparable from one another and must be regarded as two parts of the same process. It may be useful to picture the shift in the social paradigm based on the relationship between e-democracy and e-government. The new model classifies e-government by identifying the changes in government roles based on the level of social pluralism and civic society maturity on one hand, both of which are related to e-democracy, and identifying the development stages based on the social paradigm shift on the other hand. In terms of social paradigm shift, Korea has undergone more compact growth time-wise compared to the United States and other EU countries (UNESCAP, 2011).[6]

In Fig. 1, the horizontal axis shows social paradigm shift related with IT development. Along the vertical axis are the varying levels of social pluralism and civic maturity from low to high and these levels can be classified in relation to features of e-democracy as follows.

[5] 1) putting existing services online; 2) developing portals from the basic to the sophisticated; 3) simplifying regulations and services through information integration; and 4) government transformation.

[6] Whereas the United States and EU countries have taken as long as 2 centuries to come through modernization, industrialization and informatization, Korea, since its independence in 1945, experienced the industrial society during the 1970–1980s and has entered the information society, which is an amazing growth in such a short time of 40–50 years.

The types of e-government suggested here are based on the conceptual model of e-government, which can be classified according to shifting social paradigm as follows (Kim, 2007):

The bureaucratic e-government: This is a stage where e-democracy is within the bureaucratic system under a very low level of social pluralism and passive civic society. In this stage, attempts are made to apply e-democracy only to the process of decision-making within government organizations.

The information management e-government: This stage can be found under a low level of social pluralism and still rather passive civic society. This stage emphasizes information disclosure to government organizations and the civic society, though in a passive way, and citizens' right to know.

The participatory e-government: This stage can be found in an active civic society with a significant level of social pluralism. This stage focuses on facilitation of information disclosure from within government organizations to citizens and active participation of citizens in government decision-making. Bilateral communication between the government and citizens is also facilitated in this stage.

The governance e-government: This is a stage with a high level of social pluralism and can be found in an active civic society. Not only government organizations but also various members of the society exchange information with each other through electronic communication means and influence transparent and democratic decision-making, all of which further facilitate communication network throughout the entire society. The governance-type e-government is widespread in the smart society.

This paper measured the degree of social pluralism & maturity of civic society by Political Rights, Civil Liberties Ratings and freedom status from Freedom house.[7] Political Rights and Civil Liberties Ratings based on its total scores for the political rights and civil liberties questions. Each rating of 1 through 7, with 1 representing the greatest degree of freedom and 7 the smallest degree of freedom corresponds to a specific range of total scores. And social maturity was measured by Corruption Perceptions Index (CPI) according to point out of it can be a good evidence of social governance advance level (Jin & Oh, 2012).[8]

Another axis of this model, the degree of ICT advance was measured by the internet user rate which is a meaningful indicator of how well organized ICT environment (ITU, 2016). The ITU (2010) defines ICT as an efficiency parameter of technological advance that revolutionizes production, logistics process and decision making. The effects of the information revolution are reaching a whole range of daily activities, bringing changes in the role and scope that the government, business and individuals play (Jin, 2008).

This paper also points out economic growth a major variable because many academic research papers emphasize the strong correlations between national economic development and high-tech development (including ICT) (Jin & Cho, 2015). And this paper defined e-government maturity as the increment of e-government system users because e-government user's satisfaction comes from system and operation maturity and it can be showed in user incensement (Jin, Kang, & Gam, 2016) so this paper measured it by the user of "Government 24" which is a Korean major e-government system[9] (see Table 1).

Table 1
Dimension of e-government development and measurement indicates.

Dimension	Measure indicates	Definition/explain	Sources
Social pluralism & maturity	Political Right	Political Rights and Civil Liberties Ratings based on its total scores for the political rights and civil liberties questions	Freedom house
	Corruption Perception Index	Each year's corruption perception index as surveyed	TI
ICT development	Internet user rate	Internet users per 100 person	ITU
Economic development	GDP growth	Annual GDP growth of Korea	World bank
E-government maturity	"Government 24" users	The user number of "Government 24" which is a major e-government system in Korea	Korea Government

Source: Freedom house (2016), TI (2016), ITU (2016), The World Bank (2016), Ministry of the Interior and Safety of Korea (2016).

In this study, attempts are made to analyze major projects and services for each stage by applying them to Korea's cases based on the e-government development model. The time scope of this study is from the early 1990s when the term e-government was first used in Korea and the scope covers projects for bureaucratic, information management, participatory, and governance e-government.

4. Analysis of e-government maturity model

4.1. Bureaucratic e-government model: establishment of the initial infrastructure for computerizing government affairs

The first time the term, e-government, was used in Korea was around 1985 when the tax system of public water in Seoul began its operation (Jin, 2017). The transparency and efficiency of the system could be enhanced from this invention of information management

[7] They published the ratings on the guarantee of political rights and civil rights in all countries worldwide. Data available from 1972 onward and yearly updated.
[8] Since 1995, Transparency International (TI) has published the Corruption Perceptions Index (CPI) every year. The organization defines corruption as "the abuse of entrusted power for private gain."
[9] This initiative aims to integrate a wide range of civil services, and provide a single access point across all levels of government through an online portal, Minwon 24(now it called a name of Government 24). Although an online civil services system was set in motion in 2002 as one of the core initiatives designed to promote e-government, the portfolio of services accessible online was limited. Thus, most users were required to physically visit multiple government agencies and bring various supporting documents with them. The Government 24 offers citizens the possibility to access 71% of public services online. The platform reduces opportunity and travel costs for citizens as well as government expenditure on personal service delivery.

system in local public administration. Computerized bill issuing system made the government more trustable by the citizens than man's manual bill issuing system did. As it is described in the table below, the ratings of political rights, civil liberties, and free status increased since 1989 when Korean government started to internally adapt and use the information management system with PC in public administration affairs. This trend, increasing the efficiency of public administration affairs, enhancing the trust on government and freedom in society by information management system, also positively impacted on Korea's economic growth (National Information Society Agency, 2009a) (see Table 2).

Table 2
Era of Bureaucratic e-Government in Korea.

year	PR	CL	Status	GDP growth rate	year	PR	CL	Status	internet user per 100	GDP growth rate
1974	5	6	3	9.38191	1985	5	5	2	–	7.47097
1975	4	6	2	7.33745	1986	4	5	2	–	12.2398
1976	5	6	2	13.4557	1987	4	5	2	–	12.266
1977	5	5	2	11.8178	1988	4	4	2	–	11.6604
1978	5	6	2	10.2976	1989	2	3	1	–	6.75206
1979	5	5	2	8.3897	1990	2	3	1	0.02327	9.29733
1980	4	5	2	−1.8907	1991	2	3	1	0.04612	9.71289
1981	4	5	2	7.40405	1992	2	3	1	0.0984	5.76524
1982	5	6	2	8.29131	1993	2	3	1	0.24995	6.32939
1983	5	5	2	12.182	1994	2	2	1	0.31136	8.77189
1984	5	6	2	9.85907	1995	2	2	1	0.81969	8.93062

Source: Freedom house (2016), TI (2016), ITU (2016), The World Bank (2016), Ministry of the Interior and Safety (2016).

Web was introduced in Korea at 1995 and e-government along with the widespread use of the term, full-scale e-Government projects also started around this time. In the first place, a framework system to take full control in information and communications affairs. The Ministry of Information and Communication (MIC) and the Framework Act on Informatization Promotion was also first enacted around this time to provide the blueprint of informatization throughout Korea every five years. Upon such legal base, the 1st Master Plan for Informatization Promotion was established in 1996, which set as its first project, achieving 'small, yet efficient e-government'. This was the first time in Korea that an e-government policy was adopted as the national strategy. Some of the projects include the construction of the national backbone networks regarding five areas that make up the national operation framework including government administration, finance, education and research, national defense and security. The information super-highway was also established, serving as the foundation for information and communications and informatization, through the broadband network construction project that connected the entire country with optical cables. These projects paved the way for Korea to be praised as a country with the fastest speed of Internet use and penetration.

Construction of national basic database in the areas of resident registration, real-estate, and vehicles and computerization of their affairs were carried out, where the focus was on computerization, or bringing offline administrative businesses online. This time can be seen as the starting point toward the bureaucratic informatization or the age of e-government where the government leads the social and economic growth.

4.2. Information management e-government model: establishment of the early E-Government for enhancing administrative productivity

A more accurate view would be that the e-government practices in Korea had not started until the late 1990s and in 2000 when President Kim Dae-Jung administration came up with the 11 e-Government initiatives. The goal of carrying out the 11 initiatives as e-government projects was to continue bringing offline documents to online and ensure efficiency in government administration. In order to build a government-wide integrated computing environment, e-seal and e-signature systems were developed; to provide convenience to government workers, four systems were developed as part of the project – national finance information system, educational administrative information system, standard personnel management system, and e-approval and e-document exchange system; and to bring offline government businesses to online, local government informatization schemes were developed.

The national finance information system (G2G) is a budget management system that allows real-time monitoring of all spending of all public institutions that use the government budget or funds. The educational administrative information system is an online distribution system for academic and educational administrative data, connecting schools, educational offices, and Ministry of Education and Human Resources Management. The standard personnel management system attempted to establish paperless and efficient personnel administration by computerizing HR affairs, while the e-approval and e-document exchange system aimed to improve productivity in administration through making it compulsory to prepare, approve, distribute and store all official documents electronically. National president was a leader and big supporter to e-government project and national assembly drew up bill, act for e-government, because they think e-government can be a strong strategy and a method to innovate for bureaucratic government in Korea which was suffer from economic crisis. Consequentially Korea overcame the economic crisis (GDP growth rate become to +4–10 from −5.71 at 1998) and made enhancement of national transparency, CPI (corruption perception index) point was consistently increased from 3.9 in 1997 to 5.1 in 2005 (see Table 3).

Table 3
Era of Information Management-centered e-Government Model in Korea.

year	PR	CL	Status	CPI	internet users	GDP growth rate	year	PR	CL	Status	CPI	internet users	GDP growth rate
1996	2	2	1	4.2	1.624	7.186	2001	2	2	1	4.3	56.6	4.525
1997	2	2	1	3.8	3.601	5.767	2002	2	2	1	4.5	59.4	7.432
1998	2	2	1	4	6.782	−5.71	2003	2	2	1	5	65.5	2.933
1999	2	2	1	4.2	23.55	10.73	2004	2	2	1	5.1	72.7	4.9
2000	2	2	1	4.5	44.7	8.831	2005	1	2	1	5.1	73.5	3.924

Source: Freedom house (2016), TI (2016), ITU (2016), The World Bank (2016), Ministry of the Interior and Safety (2016).

During the President Roh's administration that took off in 2002, efforts to streamline and foster information management were undertaken through the 31 e-government roadmap projects involving digitalization of the entire document processing, informatization of national/local finance information, establishment of local e-government, e-audit framework, e-national assembly, integrated criminal justice framework, comprehensive informatization of HR management administration, informatization of foreign affairs and trade, real-time management of national affairs, extended sharing of administrative information, BRM development, etc. This period, being the transformation stage from the bureaucracy-based e-government to administrative management based e-government, holds significance in that attempts were made to innovate the way government worked. Electronic business processes were stabilized by transforming paper documents to electronic documents, and department-based businesses to service flow-based businesses; administrative information sharing was expanded; and business processes were re-engineered for government services. Backed up with the president's enthusiastic support, legislative advocates from the National Assembly, and financial help with citizens' interests, e-government projects made a huge contribution to turn Korea into a more transparent and economically energetic nation with a steady increase of its internet users (73.5% by 2005).

Despite such efforts, limitations can still be found in this stage: the government still provides one-way services centered around large portals where it publicize itself unilaterally; it provides supplier-oriented services using certain methods of its own choice; there are limitations on time and place; hand-written documents and online documents are used at the same time; and the government provides back-office based services that are far different from front-office based services (National Information Society Agency, 2009b).

4.3. *Participatory e-government model: maturation through increased participation of citizens*

E-government practices for citizen participation can be mainly found under the President Roh's (2005–2007) and Lee's (2008–2012) administration. Also titled as the 'participatory government', the administration stressed citizen participation, and saw extensive increase in the size of council organizations of private-sector members and experts throughout the entire areas of the society including the government and administration. The mainstream e-government projects were also the ones involving citizen participation.

Under the Roh administration, the 31 e-government roadmap projects were carried out and more than 12 e-government projects were mainly implemented for increasing online participation of citizens; improving Internet civil services; providing comprehensive services on national safety management, national welfare information, food and drug information, job information, and national logistics information; integrating and improving construction/land/registration information; and providing Internet-based service for administrative appeals, single-window G4B service, e-trade service and support service for foreigners. Citizen participation based services no longer required personal visits or face-to-face interviews but rather facilitated online services through a single window under restrictive participation. 'Civil service innovation' has emerged as a new agenda for improving services for citizens and businesses and increasing electronic participation of citizens. One of the examples can be the project called 'e-People' service expansion, which aims to facilitate citizen engagement in policy-making process by allowing them to file complaints, give opinions and discuss policies on a single channel. The entire central and local government bodies and 14 public institutions are connected onto the 'e-People', where complaints and suggestions are filed and processed and the results provided for review. Citizens can also raise their voices regarding unfair administrative measures, infringement of rights or interests, suggestions for improvement, and other opinions on various policies through the integrated online channel[10].

Anti-corruption and Civil Rights Commission classifies requested services and distributes them to the institutions or departments in charge. More functions that 'e-People' provides are management of public suggestions and system improvement, corruption reporting, e-hearings, policy forum agenda requests and discussions, surveys, etc. After this system was established, the average time required in processing a simple civil application was reduced by 6.7 days, from 12 in 2005 to 5.3 in 2011, whereas for processing a complex civil application, the time was reduced by 26.8 days from 36.1 to 9.3. Moreover, for better service quality, applicants can ask for additional feedback if they are not satisfied with the first one, and rate the satisfaction level again with the additional feedback.

Practical use of e-government increased considerably by year, allowing a lot of citizens to issue a variety of public certificates through "Government 24" systems, a well-known e-government system in Korea, which has offered 1209 different kinds of government services since 2002. People in Korea have been able to watch various government events and participants of such through the internet and e-government services (Andersen & Henriksen, 2006; Jin & Cho, 2015). The demand by the citizens to examine the government's

[10] The procedures of applying for major civil services are: filling out application forms → selecting responsible institutions → application → processing → completion → satisfaction level assessment. There are distinct functions of 'e-People', where civil service applicants only submit requests without having to check which department is in charge of the service (Jin et al., 2016).

information or even its confidential ones naturally enhanced the national and political transparency in Korea. Indeed, the statistics shown in the table below clearly demonstrate the increase in national CPI from 3.8 1in 1998 to 5.6 in 2015 as well as the ratings of civil liberties from 78.1 in 2006 to 8.53 in 2015 (see Table 4).

Table 4
Era of Participatory e-Government Model in Korea.

year	PR	CL	Status	CPI	Civil liberties	internet users	GDP growth rate	e-gov. user ("Government 24")
2006	1	2	1	5.6	7.94	78.10	5.176	22,467,762
2007	1	2	1	5.5	8.09	78.80	5.463	30,124,713
2008	1	2	1	5.6	8.24	81.00	2.829	53,503,010
2009	1	2	1	5.5	8.53	81.60	0.707	63,131,924
2010	1	2	1	5.4	8.82	83.70	6.497	62,347,405
2011	1	2	1	5.36	8.53	83.76	3.682	68,261,760
2012	1	2	1	5.6	8.53	84.07	2.292	68,735,863
2013	1	2	1	5.5	8.53	84.77	2.896	64,406,624
2014	2	2	1	5.5	8.53	84.33	3.310	63,435,386
2015	2	2	1	5.6	8.53	84.55	3.103	65,191,141

Source: Freedom house (2016), TI (2016), ITU (2016), The World Bank (2016), Ministry of the Interior and Safety (2016).

Public attention and interests on the e-government and the participation on the policy process have become another key role for Korea to understand the impact of the e-government under strong leadership of the president and timely legislation in the era. E-government has now become a tool for the citizens to monitor the overall process of the work government pursuing to public services.

From 2002, when e-Government service ("Government 24") was put in its operation in Korea, to 2016, according to previously suggested scheme, e-government development based on social paradigm shift, political right, corruption perception index and internet users rate were statistically analyzed to find out how such factors affect to the maturity of e-Government.

Using Pearson's correlation coefficient analysis method, the following results in the chart below were found. As in Korea, since the beginning of the operation of e-government service in 2002, as usages of internet and e-government increased, participation in political matters increased (P.R. values from 7 to 1, low value means high rate of political participation). Also, from the result, the increase in citizens' participation in the usage of e-government was found to have high correlation with the usage of internet. Thus, as in Korea, maturity of e-government and society could be explained through using the E-Government Maturity Model based on Socio-political Development scheme (see Table 5).

Table 5
Correlation analysis.

		Political Right	Corruption Perception Index	Internet Users rate	GDP growth	e-government use	Log(e-government use)
Political Right	Pearson coefficient	1	−0.574*	−0.566*	0.191	−0.451	−0.573*
Corruption Perception Index	Pearson coefficient	−0.574*	1	0.942**	−0.447	0.767**	0.947**
Internet user rate	Pearson coefficient	−0.566*	0.942**	1	−0.424	0.896**	0.984**
GDP growth	Pearson coefficient	0.191	−0.447	−0.424	1	−0.505	−0.499
e-government use	Pearson coefficient	−0.451*	0.767**	0.896**	−0.505	1	0.910**
Log(e-government use)	Pearson coefficient	−0.573*	0.947**	0.984**	−0.499	0.910**	1

*. $P < 0.05$, **. $P < 0.01$.

The next analysis is aimed to find out whether the relationship between the usage of e-government and social maturity (political participation and national transparency) and the effect of IT technology could be explained based on the E-Government Maturity Model based on Socio-political Development scheme. To avoid excessive amounts of variables when calculating the number of e-government users, logarithm variables were used and then changed them into dependent variables to make regression analysis. Dependent variable, the number of e-government users, may be the most useful factor to illustrate development of e-government on this research. When the factors (technology, content, and convenience) relating to e-government are all well-appointed, satisfaction from e-government users will increase. Therefore, the maturity or development of e-government depends on utilization by the citizens. For such reason, this research statistically measured the development of e-government as a dependent variable by the utilization of e-government (see Table 6).

Table 6
Regression analysis table.

Model	R	R^2	Adj. R^2	error estimation value
1	0.789	0.779	0.771	0.10793

Model	Unstandardized coefficient		Standardized coefficient	t	Sig.
	B	Std. error	Beta		
Constant	1.280	0.569		3.408	0.007
Political Right	**−0.027**	**0.070**	**−0.022**	**−2.840**	**0.079**
Corruption Perception Index	**0.208**	**0.215**	**0.135**	**3.966**	**0.035**
Internet user rate	**0.054**	**0.009**	**0.806**	**5.886**	**0.000**
GDP growth	−0.034	0.019	−0.092	−1.796	0.103

*Dependent Variable: Log(e-government use).

In the regression analysis, it can be observed that chosen variables for this research, Political right ($p < 0.01$.) and National transparency(CPI, $p < 0.05$.) which affect to the utilization of e-government and represent to the development of e-government, statistically have a positively[11] influencing relation to the development of e-government. Also, spread of ICT technology, which is an indication of internet usage (Internet user rate, $p < 0.1$.), as well was statistically proven to be positively impacting to the development of e-government.

So this paper can empirically say that e-government advancement is depended by ICT advance, social maturity and political pluralism aside from economic growth. And the findings of this analysis can point out a meaningful message that social paradigm shift or smart city come true not only the ICT advance but also social and political mutuality. So this paper can empirically verify the theoretical assumption of the research framework: E-Government Maturity Model based on Socio-political Development. As regression model's adjusted R^2 value is 0.771, the result appears to be trustable.

4.4. Governance e-government model: improvement toward governance-based E-Government

It can be said that the governance e-government in Korea has gradually emerged since the launch of the Park's administration in 2012. Many researchers are forecasting that the Internet, once a passive information repository (Web 1.0), after going through user-created and user-participating system (Web 2.0), will become an intelligent companion (Web 3.0) of humans by building the capacity to understand the meaning of stored information and argue based on the knowledge. The Web 2.0 information society, based on the core values of participation, communication and sharing, has progressed to a point where citizens can actively participate in and communicate with the government (O'Reilly, 2012). Beyond the stage of one-way service provision from the government, the government and citizens communicate with each other and even participate altogether as partners in the policy- and decision-making process. Especially, in Korea, where 4 out of 5 citizens are using smart phones, the age of social network has come, where they can exchange information on a real-time basis through access to the Internet anytime and anywhere. In response to such technological and social paradigm shifts, e-government services are also changing. One of the examples is the 'Flood Damage Community Map' service (launched on 31st of May 2012). In the past, government institutions made schemes to prevent flood damages in the rainy season, inspected poor ground facilities, required citizens to provide against potential embankment collapse, and provided campaigns. However, now with the Flood Damage Community Map, which is a new governance-type e-Government service developed by the Seoul Metropolitan Government, citizens report on potential damage spots, upon which government workers follow procedures to solve problems. In other words, it is the interactive e-government service that is developed by both the city and citizens. It can be considered as a preventive service, citizen participation-based interactive service, location-based spatial information service, and a problem-solution service that focuses on the field rather than the back office.

To realize the governance-type, this paper wants to treat two critical issues which are best well known dark side of information society. In recent decades, the rapid development of ICTs and their proliferation into all sectors of society have opened up new opportunities for socio-economic progress, poverty reduction and environmental sustainability. Yet, among different areas, communities and socio-economic groups, there remains noticeable disparity in the access to ICTs and people's capacities to use them. Without adequate access and capacity to utilize ICTs marginalized populations risk falling further behind the rest of the world and will face great difficulties catching up, thus widening the digital divide (UNAPCICT, 2012). To bridge the digital divide is the one of the best way to realize the e-democracy (Jin, 2008), so policy for bridging the digital divide can be a critical success factor to realize the governance e-government.

For governance-type, all governments also must effort to enhance the cyber-security. Because advanced e-governments have a huge critical data and important and sensitive information, e-government system and database center can be a good attack target from cybercrime. As different types of cyber-attacks are on the rise, cyber-security threats are also growing rapidly. And more than ever, cyber-security vulnerabilities in government and critical information infrastructure are becoming sources of risks to national security, public safety and economic prosperity. Cyber-security encompasses all the necessary elements required to defend and respond to cyber-threats in cyberspace (UNAPCICT, 2012). Cyber-security has been recognized as one of the important tools that can support the

[11] Political right rating of 1 through 7: with 1 representing the greatest degree of right and 7 the smallest degree of it.

provision of secure Governance-type e-government services. Thus, it is critical to design proper arrangements for steering and coordinating the whole process of policy planning, implementation, monitoring and evaluation among various levels of government authorities and agencies.

4.5. Sub-conclusion: intensifying services of governance-type

As so far explained above, e-Government in Korea has mainly shown features of one distinct model at a time among the bureaucratic, information management-centered, citizen participatory and governance-type models. However, in some stages of development, features of both bureaucratic and information management-centered models, or information management-centered and citizen participatory models were concurrently displayed. In this case, the former stage developed to the next level after going through the process of maturation.

As the ICT develop, and the advancement toward the information society accelerates, the technologies are widespread into our daily lives and are internalized as the social infrastructure. On such infrastructure, the possibilities brought by the technologies are expected to move on as social innovation in the future and will expand its role in the society. ICTs are creating new possibilities beyond human limitations, facilitating co-existence of the reality and the virtual world, and are being actively utilized in seeking for solutions to various social issues. In addition, they change the government roles along with the economic growth and democratic maturity, from being the 'decision-maker' that manages, controls and decides upon policies to the 'mediator' that settles conflicts and mediating different views among interest groups by collecting the public opinions. Under such an environment the evolution of Internet technologies are changing the service paradigm of the government as well as the rest of the public sector.

The Internet is the medium having the greatest influence in history on globalization, democratization, and economic growth. As it evolved from Web 1.0 to Web 2.0, the government sector is also experiencing a new paradigm shift based on the technology (Palmisano, 2010). The Internet, once a passive information repository (Web 1.0), has gone through collective intelligence based on participation, openness and sharing to step up user creation and participation systems (Web 2.0). While the Web 1.0 e-Government mainly consisted of facilitated transformation of offline information to online information, limited amounts of information disclosed, and one-way information provision for PR purposes, the Web 2.0 e-Government in the information society is the stage of increased active citizen participation and two-way communication with the government through interactive channels. The following Web 3.0 e-Government in the smart society[12] provides social network-based interactive services and supports personalized and customizable services rather than supplier-oriented services, and preventive schemes rather than temporary or post-event measures (Jee, 2007; Lee, 2007).

5. Conclusion

This study defines that the social paradigm shift caused by the new IT brought the current smart society following the industrial and information societies, and proposes a new e-government development model that incorporates the level of social pluralism based on e-democracy and the maturity level of civic society. The new model classifies e-government development into four stages: bureaucratic model, information management model, participatory model, and governance model. The study also attempted to apply this model to e-government practices in Korea on the flow of time.

Korea is expected to experience more intensified and mature governance-type e-government services from development of the smart society. In the smart society, people can access to the Internet and enjoy government services using smart phones or wired devices regardless of time and place; foundations are made for them to demand new and a diverse range of services from the government; and information exchange on SNS is becoming part of their everyday lives. In this regard, the ultimate goal of achieving the smart society is to establish a society where challenging issues are solved 'in a smart way' and all members are happier through application of smart technologies to almost everything – humans, systems, process, etc. In other words, through the means of smart information technologies and the digital revolution, the current society is expected to evolve into a value-oriented society where humans are put first as the purposeful being.

Implications of the governance-type e-government maturation and overcoming of limitations under the smart society and some considerations to be practiced are described below:

First, the e-government in the smart society should develop new roles as an open stage for collecting a variety of knowledge and wisdom for solving social issues and creating new values. It is important that the government establish an open collaborative framework, in which it deploys better policies and seeks for alternatives, together with the citizens. According to the statistical analysis, this paper can explain the importance of the social factor and political factors in advancement of e-government in smart society of Korea. Sometimes the citizen participations have to be a core factor better than technical factors for 'service-type government' as used here, means the core foundation of the smart society that creates new values through open innovation of service infrastructures such as networks and systems, along with social infrastructures such as future prediction and governance. They are a set of value-oriented ecosystem strategies that produce new services, where technologies, systems, and cultures are included. As the collective power accumulates on the platform, the platform itself will use the influence.

Second, more public information should be disclosed and an open government built on openness, sharing and collaboration should

[12] To establish the foundation for national informatization under this type of society, Korea has established a series of national strategies including 'Plans for Smart Work in the Public Sector (July 2010)', 'Plans for Smart Government (Jan. 2011), and 'Plans for National Development in the Smart Age (Oct. 2011)' (President's Council on National ICT Strategies, www.csi.go.kr).

be pursued based on information sharing between the public and private sectors. The government should contribute to making the future society a reliable space and make efforts for co-existence and integration with each and every player of the society. This paper can explain it in the regression analysis of this paper that government of smart city, governance type e-government come from the political variety and social maturity with e-government development.

Fourth, smart work, meaning the smart way of working, should be facilitated. There should be a framework where citizens can work freely anytime and anywhere without restraints on time and place. Smart government and smart business frameworks should be established upon smart services and social infrastructures. Smart culture should be stabilized based upon such efforts as to facilitate smart work. In order to help the government sector with the process of adaptation to the smart society, there should be efforts to change the organizational culture of government agencies and strengthen the capacities of government employees. Aside from the integration of smart technology, some of the obstacles stem from face-to-face report or meetings and the closed organizational culture of the public sector. Rather than a social culture more conservative and closed than that of a corporation, a more open and flexible organizational culture must be nurtured and cultivated. For this purpose we must realign practices and systems with the smart society, innovate in the way government employees work, and improve intra-governmental communication and collaboration systems and developing smart capacities of individual government employees. The implementation of updated e-government systems for creating a smart government, in other words, should be coupled with an effort to shape a culture and systems conducive to collaboration and sharing.

Finally, this paper is distinguished from the other studies because it is an analytical study on the non-technological factors of e-government development: especially focused on the political, socio-economic aspects of e-government. Despite the contribution mentioned above, this paper also has an academic limitation on the generalization of findings because of its a single case study on the Korea. So we will try to explain and analyze the other countries' cases with the research framework E-Government Maturity Model based on Socio-political Development of this paper in the next studies. So, this model will be expected to be generally expandable and applicable to e-government cases of other countries.

References

Andersen, T. B. (2009). “E-government as an anti-corruption strategy”. *Information Economics and Policy, 21*, 201–210.
Andersen, K. V., & Henriksen, H. Z. (2006). “E-Government maturity models: Extension of the Layne and Lee model”. *Government Information Quarterly., 23*(2), 236–248.
Bang, S. H. (1998). *“E-government models and assessment of the Korean e-government”. Collection of treatises on public administration*. Graduate School of Public Administration, Seoul National University.
Baum, Christopher H., & Di Maio, Andrea (2000). *Gartner's four phases of e-government model.* Gartner Group.
Brezenki, Zbigniew (1970). *Between two ages: America's role in the technetronic era.* New York: Viking Press.
Cho, J. M., & Jin, S. K. (2016). *Creating the smart society: Social and economic development through ICT applications*. Telecommunication Development Sector Study Groups. Third meeting of ITU-D Study Group 2, Geneva, 26–30 September 2016.
Cho, D. H., & Kwon, Y. H. (2002). *Study on web-based e-government development model. Thesis presented in 2002 summer symposium*. Korea Association for Public Administration.
Cuillier, D., & Piotrowski, S. (2009). Internet information-seeking & its relation to support for access to government records. *Information Quarterly, 26*(3), 441–449.
Daniel Bell. (1973). *The coming of post-industrial society: A venture in social forecasting*. New York: Basic Books.
Deloitte Research. (2003). *At the dawn of e-government: The citizen as customer*. New York: Deloitte Consulting, c2000.
DiCaterino, A., & Pardo, T. A. (1996). *Overview: The world wide web as a universal interface to government services*. Center for Technology in Government.
Drucker, Peter F. (1969). *The age of discontinuity: Guidelines to our changing society*. , Oxford: Butterworth-Heinemann.
Drucker, Peter F. (2002). *Managing in the next society*. New York: St. Martin's Press.
European Commission. (2014). *Study on e-government and the reduction of administrative burden. A study prepared for the European commission*. DG Communications Networks, Content & Technology.
Freedom house. (2016). *Freedom in the world 2016*. retrieved from https://freedomhouse.org/sites/default/files/FH_FIW_2016_Report_Final.pdf.
Heeks, R. (2001). *Understanding e-government for development. i-government working paper No. 11. Institute for development policy and management (IDPM)*. University of Manchester.
Hong, S. G. (1999). “Electronic democracy and politics and government administration in Korea”. *Journal of the Korean Association of Public Policy, 5*(5), 81–102.
ITU. (2010). *Measuring the information society*. Geneva: International Telecommunication Union.
ITU. (2016). *Measuring the information society report 2016*. ITU retrieved from https://www.itu.int/en/ITU-D/Statistics/Documents/.../misr2016/MISR2016-w4.pdf.
Jee, E. H. (2007). *Government 2.0: Public services in the era of web 2.0. SW insight policy report*.
Jeong, G. H. (2009). *Accelerating public-private sector cooperation for the creation of advanced e-government systems and the division of roles and responsibilities*. Korea Information Society Development Institute.
Jin, S. K. (2008). *A study on the policy network of bridging the global digital divide. Dissertation*. SungKyun Kwan University in Seoul.
Jin, S. K. (2017). A study on the regional informatization policy implementation system in Korea. *Journal of ICT Policy, 24*(3), 1–24.
Jin, S. K., & Cho, J. M. (2015). Is ICT a new essential for national economic growth in an information society? *Government Information Quarterly, 32*(3), 253–260.
Jin, S. K., Kang, S. B., & Gam, D. E. (2016). A Study on the Measurement of e-Government Application Index: Policy Marketing and Information System Performance Perspective. *The Journal of Regional Information Society, 19*(2), 123–148.
Jin, S. K., & Oh, C. H. (2012). “Revisiting effects and strategies of official development assistance (ODA): A panel analysis”. *International Review of Public Administration, 17*(3), 139–167.
Jin, S. K., Yoon, S. Y., & Kim, S. T. (2015). A study on the policy performance of government 3.0 innovation Model: Case study on the higher-education loan policy in Korea. *Journal of ICT Policy, 22*(4), 66–90.
Keeley, Larry (2007). *The greatest of innovations of all time. Business week, feb*.
Kim, S. T. (2007). Converging e-democracy and e-government model toward evolution model of e-governance: The case of the Republic of Korea. *Regional Development Dialogue, 2*(2). Autumn 2006 UNCRD & UNDP.
Layne, K., & Lee, J. (2001). Developing fully functional e-government: A four stage model. *Government Information Quarterly, 18*(2), 122–136.
Lee, H. J. (2007). *e-Government to u-Government: Government 3.0. Ubiquitous Society Studies Series 29. Jul*.
McClure, D. (2000). *Electronic Government: Federal Initiatives are evolving rapidly but they face significant challenges*. http://www.gao.gov/assets/110/108459.pdf.
Ministry of the Interior and Safety. (2016). *The report on the user number of “government 24” system in Korea. The sourcebook of Korean parliamentary inspection of the administration in 2016*.
Moon, S. Y. (2001). The internet for facilitating electronic administrative services – utilization and tasks. *Korea Public Administration Studies, 10*(2).
Moon, M. J. (2002). “The evolution of e-government among Municipalities: Rhetoric or reality”. *Public Administration Review, 62*(4), 424–433.
National Information Society Agency. (2009a). *Reading future information society Trends: Nine books from overseas. IT & future strategy report, nov*.
National Information Society Agency. (2009b). *Five characteristics of the future society according to current trends and tasks ahead. IT & future strategy report, oct*.

National Information Society Agency. (2010a). *New possibilities of the future society and the role of ICT. IT & future strategy report, apr*.
National Information Society Agency. (2010b). *Predicting the paradigm shift in the smart age and the ICT strategy, dec*.
National Information Society Agency. (2011). *IT issues and strategies for achieving the smart society, mar*.
Northrop, A. (2000). The information age: Which countries will benefit? In G. D. Garson (Ed.), *Handbook of public information systems* (pp. 265–280). NY: Marcel Dekker.
OECD. (2003). *The e-Government imperative: Main findings*. retrieved from http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN015120.pdf.
O'Reilly, Tim (2012). *Coexistence 2.0: Global brain brings together humans and technologies. 9th annual Seoul digital forum*.
Palmisano, Samuel J. (2010). *Welcome to the decade of smart. IBM corporation*. retrieved from http://online.wsj.com/public/resources/documents/palmisano_decadeofsmart-jan12.pdf.
Ramsey, T. (2004). *On Demand Government: Continuing the e-government Journey*. IBM Press.
Reddick, C. G. (2005). Citizen Interaction with e-Government: From the Streets to Servers. *Government Information Quarterly., 22*, 38–57.
Rifkin, Jeremy (2011). *The third industrial Revolution: How lateral power is transforming energy, the economy and the world*. Palgrave Macmillan.
Siau, K., & Long, Y. (2005). Synthesizing e-Government Stage Models - a Meta-synthesis based on Meta-ethnography approach. *Industrial Management Data Systems, 105*(3/4), 443.
Tapscott, Don (2012). *Implementing the rules of macro-wikinomics. 9th annual Seoul digital forum*.
The World Bank. (2016). *World development indicators 2016*. World Bank Group.
TI. (2016). *Corruption perceptions index 2016*. retrieved from https://www.transparency.org/news/feature/corruption_perceptions_index_2016.
UN. (2003). *Global e-Government Survey 2003*. retrieved from https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2003-Survey/Complete-Survey.pdf.
UNAPCICT. (2012). *Knowledge sharing series – cyber security*. retrieved from http://www.unapcict.org/ecohub/apcict-knowledge-sharing-series-cybersecurity/at_download/attachment1.
UNESCAP. (2011). *Primer 1: An introduction to ICT for development*. retrieved from http://www.unapcict.org/ecohub/primer-1-an-introduction-to-ict-for-development.
Yoon, S. O. (2003). Study on citizen participation in e-government. *Korea Policy Science Journal, 7*(1), 79–103.

JIN Sangki earned a Ph.D. in Public Administration from Sungkyunkwan University in Seoul and served as principal researcher in the National Information Agency, Seoul, Korea. He worked as principal researcher in the Korea Student Aid Foundation (KOSAF), and as an adjunct professor ofSungKyunKwan University Seoul, Korea. He has written many articles on ODA policy, information policy, and performance evaluation in the public sector, and is also co-author of Audit System of Korea Local Government.