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경영학석사학위논문

The Evolution of Korean e-Government in the Perspective of Actor-Network Theory

Actor-Network Theory 관점에서 본

한국 전자정부 서비스의 진화

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ABSTRACT

The Evolution of Korean e-Government in the Perspective of Actor-Network Theory

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In these days, as technologies has developed, it has changed our lives in everywhere. There is no exception for a nation. Since Information Technology (IT) was a criterion for deciding the national competiveness, it has been considered as a catalyst for the rapid growth in the knowledge information society. As a result, a government uses IT as a tool for accomplishing the national goal.

E-Government is an effective tool “to improve effectiveness, to elevate the quality of public service, and to promote active public participation in governance.” (The Korean Association for Policy Studies, 2011) In order to accomplish the intended goal of e-Government, the Korean government has evolved its services and made considerable efforts. In this study, it shows the evolution of Korean e-Government services in details by using the lens of Actor-Network Theory. ANT considers that human and non-human actors are same and equal factors in its analytical view (Lee & Oh, 2006). Thus, this study focuses on the network between human actors (i.e. president and administrations) and non-human actors (i.e. law, standard and relay system).

However, due to the strategy of “top-down” in the assimilation of Korean e-Government system, it caused the inequality between the central agencies. That is, ANT has the limitation in explaining the public sector cases in terms of the imbalance between actors. According to Naidoo (2009), “Walsham (2001) made a valuable contribution by combining ANT and ST theories in the same cases, using ST to guide broader social analysis, and ANT to describe the detailed socio-technical processes that took place.” Thus, this study decides to adopt Structuration Theory to overcome the shortage of ANT.

This study involved six in-depth interviews with the key actors in the case of Korean e-Government. These interviews were conducted in face-to-face with audio recording from October 22, 2014 to November 20, 2014, and they progressed with specific and open-ended questions. The interviews with the key actors provided the overview of the evolution of Korean e-Government services process and meaningful insights on the success of e-Government in Korea.

This case demonstrates that cases in public sector can adopt not only Actor-Network Theory, but also Structuration Theory to explain in both micro and macro contexts. Practical implications are given especially for developing countries in pursuing the rapid development process of Korean e-Government services.

Keywords: Korean e-Government, Actor-Network Theory, Structuration Theory, Law, Standard, Relay system.

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TABLE OF CONTENTS

TABLE OF CONTENTS III

LIST OF TABLES IV

LIST OF FIGURES IV

CHAPTER 1 INTRODUCTION 1

CHAPTER 2 THEORETICAL BACKGROUND 5

2.1. Actor Network Theory 5

2.2 Limitations of Actor Network Theory 9

2.3. Structuration Theory 13

2.4 Standard 17

2.5 Technology Standard in Information System 19

CHAPTER 3 METHODOLOGY 23

CHAPTER 4 CASE: THE EVOLUTION OF KOREAN E-GOVERNMENT 25

4.1 Problematization (Establishment Stage: 1987 ~ 1996) 25

4.2 Domination (Promotion Stage: 1997 ~ 2002) 30

4.3 Enrollment (Advanced Stage: 2003 ~ 2009) 38

4.4 Moblization (Advanced Stage: 2010 ~ 2014) 46

CHAPTER 5 CONCLUSION 50

5.1 Findings 50

5.2 Implications and Limitations 52

REFERENCES 54

APPENDIX: PROCEDURE STANDARD IN KOREAN E-GOVERNMENT 65

LIST OF TABLES

<TABLE 1> DESCRIPTIONS OF INTERESSMENT BY THE AUTHORS 12
<TABLE 2> DESCRIPTIONS OF DOMINATION BY THE AUTHORS 16
< TABLE 3>TYPES OF STANDARD 18
< TABLE 4> SUMMARY OF INTERVIEW 24
< TABLE 5> KOREAN E-GOVERNMENT LAW 29
< TABLE 6> STANDARDS FOR ADMINISTRATIVE WORK 35

LIST OF FIGURES

<FIGURE 1> THE GOAL OF E-GOVERNMENT TO FACILITATE GOOD GOVERNANCE 2
<FIGURE 2> TOP 10 COUNTRIES IN E-GOVERNMENT DEVELOPMENT INDEX IN 2010 3
<FIGURE 3> INTERACTION OF HUMAN ACTION AND ORGANIZATIONAL PROPERTIES AS MEDIATED BY THE THREE MODALITIES OF STRUCTURATION 14
<FIGURE 4> THE FRAMEWORK OF KOREAN E-GOVERNMENT 27
<FIGURE 5> THE CATEGORY OF STANDARD IN KOREAN E-GOVERNMENT 33
<FIGURE 6> FIRST TYPE OF RELAY SYSTEM 40
<FIGURE 7> SECOND TYPE OF RELAY SYSTEM 40
<FIGURE 8> THIRD TYPE OF RELAY SYSTEM 41
<FIGURE 9> THE LIFE CYCLE OF PROCEDURE STANDARD IN KOREA 43
<FIGURE 10> THE PRINCIPLE OF TECHNICAL REFERENCE MODEL (TRM) 44
<FIGURE 11> THE VALUE OF E-GOVERNMENT EXPORTS 47

CHAPTER 1 INTRODUCTION

In these days, as technologies has developed, it has changed our lives in everywhere. According to Gartner's report, smart-phone, which is the most common device to access the web, will dominate about 80% of the handset market, and the users of smart-phone will be more than the desktop users in the near future (Predicts 2013, 2012). There is no exception for a nation. Since Information Technology (IT) was a criterion for deciding the national competiveness, it has been considered as a catalyst for the rapid growth in the knowledge information society. As a result, governments use IT as a tool for accomplishing the national goal.

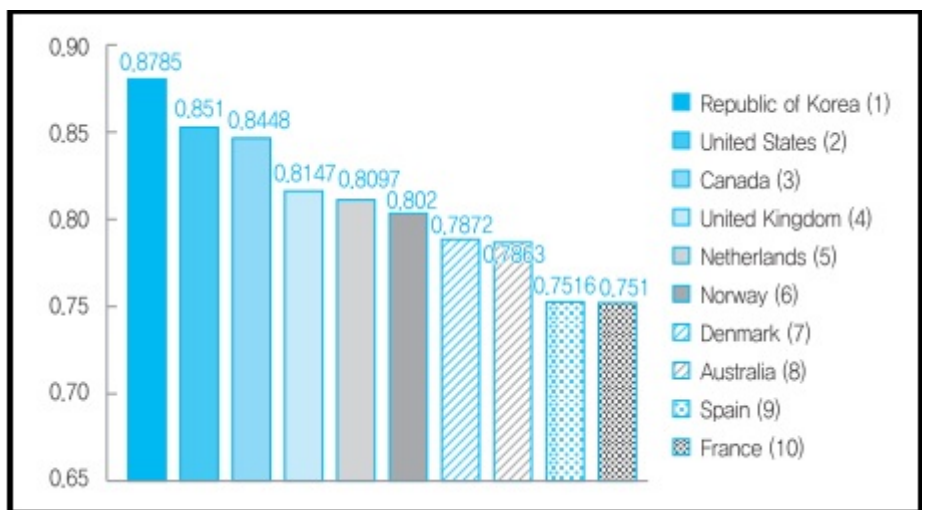
After the mid-1990s, many developed countries have implemented an e-Government system to improve the efficiency of administrative system and the quality of public service as the Internet had quickly spread (Jung, 2014). Since the Bill Clinton administration first used the term 'e-Government' in 1993, it has been widely accepted in all over the world (The Korean Association for Policy Studies, 2011). However, the definition of e-Government that people mostly use is not clearly defined among practitioners and researchers. Nevertheless, they all agree that the e-Government system exists for enhancing effectiveness, efficiency, services quality and transformation. Specifically, as shown in <**Figure 1**>, "e-Government is an effective means to improve effectiveness, efficiency, and transparency, to elevate the quality of public service, and to promote active public participation in governance." (The Korean Association for Policy Studies, 2011). "Also, it is a strategic tool for establishing a more accountable responsive and equitable governance." (The Korean Association for Policy Studies, 2011) As a

result, in case of Korean e-Government, these goals were achieved through the three major factors: law, standard and relay system. Therefore, this study shows how Korean e-Government has evolved its services in details by using the theoretical lens of Actor-Network Theory.

<Figure 1> The Goal of e-Government to Facilitate Good Governance (Source by The Introduction of e-Government in Korea, 2012)

According to Robert Schware, the specialist at World Bank, reported that the failure of adopting e-Government in developing countries are about 80%, and it is divided either totally failed (35%) or partially failed (50%) (Schware, 2004). After all, it is not easy to succeed in implementing the e-Government system especially in developing countries, and the report showed that many requirements are necessary to fulfill in order to be the top of the world in the e-Government system. After the Korean government established 'the Basic Plan for Administrative Computerization' in 1978, they had tried to change the way to work and to provide their services to electronic ways (The Korean Association for Policy Studies, 2011). In this progress, the development of e-Government in Korea can be separated into the four stages: the introductory stage (1978~1986), foundation establishment stage (1987~1996), full promotion stage (1996~2002), and advanced

stage (2003~2012). The Korean e-Government system took the 15th in the UN e-Government Readiness Index in 2001 for the first evaluation. After that, Korea had achieved the gradual improvement from 2007 to 2009 as taking the sixth place. Finally, Korea took the first prize in 2010, 2012 and 2014 for UN e-Government survey (The Korean Association for Policy Studies, 2011). The top 10 countries in e-Government Development index in 2010 in **<Figure 2>**. Therefore, the effort of implementing the best e-Government system in the world is truly recognized, and a number of countries desire to benchmark.



<Figure 2> Top 10 Countries in e-Government Development Index in 2010 (UN e-Government Survey, 2010)

It is not sufficient that only one condition is satisfied. In other words, a variety of factors are necessary to lead the e-Government system to be succeeded. Even if Korea was one of developing countries a decade ago, the centralized governmental structure in Korea enabled to establish the stable infrastructure to lead the various projects of e-Government in the future. For example, Korean e-Government law which was enacted in 2001 had been the strong legal basis for

developing the Korean e-Government system even most developed countries do not have e-Government Law, such as Canada, Singapore, Australia, and England (Ryu, 2000). Furthermore, the other main success factors, standard and relay system, gradually had evolved with the related e-Government plans.

In summary, it is worth to study the case of Korea e-Government. This is because the Korean e-Government system is a special case to investigate while the leading regions of e-Government are concentrated on Europe and America mainly (UN, 2014). Therefore, this study figures out the evolution of e-Government services in Korea as the world leader by giving a guide to the countries in which want to adopt an e-Government system. It had researched by referring the interviews (primary data) from the e-Government stakeholders such as the administrations and the private agencies mostly.

This paper is organized as follows: the theoretical background of Actor-Network Theory, the limitations of ANT, Structuration Theory, standard, and technology standard in Information System (IS) in chapter 2, the methodology of study in chapter 3, the Korean e-Government case in chapter 4, and the conclusion in the last chapter.

CHAPTER 2 THEORETICAL BACKGROUND

2.1. Actor Network Theory

Actor network theory (ANT) was originated in science and technology research fields, and it especially adopted the concept of "social interactions in networks" (Bijker & Law, 1992; Callon, 1986; Latour, 1987; Law, 1987; Aykac et al., 2009). ANT started in the belief that "the study of technology itself can be transformed into a sociological tool of analysis" (Callon, 1987). That is, ANT treats not only social aspects, but also technical aspects (Tatnall & Gilding, 1999). ANT considers that human and non-human actors are same and equal factors in its analytical view (Lee & Oh, 2006). In other words, it avoids giving a privilege in a certain actor, either human or non-human actor (Latour, 1998). After all, ANT focuses on the mutual effects on social and technical actors, and it helps to understand how actors unify as one, how actors engage in each other, and how human actors use non-human actors to make their union be stronger with keeping their interest (Lee & Oh, 2006). The key concepts of ANT such as actor, actor-network, translation and obligatory passage point (OPP) are as follows: (Callon, 1986; Callon & Latour, 1981; Walsham & Sahay, 1999)

- **Actor:** Any element which bends around itself, makes other elements dependent upon itself and translate their will into the language of its own. Common examples of actors include humans, collectivities of humans, texts, graphical representations, and technical artifacts. Actor, all of which have

interests, try to convince other actors so as to create an alignment of the other actors' interests with their own interests. When this persuasive process becomes effective, it results in the creation of an actor-network. (Callon & Latour, 1981, p.286)

- **Actor Network:** Heterogeneous network of aligned interests, including people, organizations and standards (Walsahm & Sahay, 1999, p.42). A set of relations in which an actor constantly influence other actors (Callon, 1986).
- **Translation:** The different phases of a general process during which the identity of actors, the possibility of interaction and the margins of manoeuvre are negotiated and delimited (Callon, 1986b). When an actor-network is created, consists of four stages (Callon, 1986b).
- **Obligatory Passage Point:** A situation that has to occur in order for all the actors to satisfy the interests that have been attributed to them by the focal actor. The focal actor defines the OPP through which other actors must pass through and by which the focal actor becomes indispensable (Callon, 1986).

According to Callon (1987), the four major stages of translation depict the formation of the actor network, such as problematsation, interessment, enrollment and mobilization. Each stage shows that the ways how the other actors join in the one actor. All systems' designs go through the difficulties to be implemented in the beginning. In ANT, it shows the process of negotiation between human and non-human actors in the translation shows how the systems find out their stability by

establishing the networks by themselves. The definition of four major stages of translation are as in the following: (Callon, 1986; Afarikumah & Kwankam, 2013)

- **Problematisation:** The first moment of translation during which a focal actor defines identities and interests of other actors that are consistent with its own interests, and establishes itself as an obligatory passage point (OPP), thus 'rendering itself indispensable' (Callon, 1986). The possible questions in Problematisation are: "What is the problem that needs to be solved?" "Who are the relevant actors?" "Forming obligatory passage point," and "What are the obstacles?" (Afarikumah & Kwankam, 2013, p. 79)
- **Interessment:** The second moment of translation which involves a process of convincing other actors to accept definition of the focal actor (Callon, 1986).
- **Enrollment:** The third moment of translation, wherein other actors in the network accept (or get aligned to) interests defined for them by the focal actor (Callon, 1986).
- **Mobilisation:** Mobilisation involves maintaining commitment to a cause of action and the OPP. This phase investigates whether the delegate actors in the network adequately represent the masses (Callon, 1986).

As ANT has evolved its concept, it has extended its research area even many related theories have emerged. For instance, the relatedness theories of ANT are situational theory, symbolic interactionism, socio-technical systems theory, institutional theory and network theory (Garson, 2008). Furthermore, ANT has been

studied in diverse IS contexts by considering as a dominant tool to have better understanding of IT artifacts (Hanseth et al., 2004). The articles have somewhat different aspects in IS research field through ANT: health information system, technology standardization, technology adaption, e-commerce, e-governance, information and communication technologies for development in rural communities, and public sector health information systems (Allen, 2004; Andrade & Urquhart, 2010; Atkinson, 2000; Cho, 2007; Faraj, Kwon, & Watts, 2004; Hannemyr, 2003; Heeks & Stanforth, 2007; McGrath, 2002; Ruikar & Chang, 2012; Tatnall & Lepa, 2003).

One of them is related to a standard (Hanseth & Monterio, 1997; Fomin & Keil, 2000; Yoo et al., 2005; Lee & Oh, 2006; Song et al., 2014). Hanseth and Monterio (1997) researched how the standards work in the health information system in Norway by analyzing the actors' behavior, and this study enabled to develop the future research not only the complexity of infrastructure of IS but also the process of standardization. Fomin and Keil (2000) stated the standard in the economic perspective by referring social network theories as well as ANT, and it brought a socio-economic theory of standardization after all. Yoo et al. (2005) showed how the standards influence with the diffusion of broadband mobile service in South Korea by stating the role of standards. Lee and Oh (2006) investigated the process of standard war through the lens of ANT between the stakeholders in the developing country's mobile industry, such as firms, associations in the industry, and government. Song et al. (2014) showed the detail progress of standardization in the 3D broadcasting by investigating the interactions between the actors, government, firms and technical institutions.

Another significant relatedness of IS research in ANT is e-Government (Trusler, 2003; Avgerou et al., 2006; Heeks & Stanforth, 2007; Stanforth, 2007; Johanes & Kwang, 2007; Hardy and Williams, 2008; Muganda-Ochara & Belle, 2008; Aykac et al., 2009; Gunawong & Gao, 2010; Ruikar & Chang, 2012). These studies mutually showed the trajectories of developing the e-Government system. Hardy and Williams (2008) drew the stability of e-procurement in Italy, Scotland, and Western Australia by analyzing actors, networks, events in the perspective of ANT and Colebatch's social construct of policy. Aykac et al. (2009) proposed the case study of Turkish e-Government Gateway in the perspective of ANT, and stated how the social processes were involved in Turkish e-Government Gateway.

2.2 Limitations of Actor Network Theory

According to Walsham (1997), ANT neglected social structures, moral and political factors, and "its descriptive power as opposed to power to explain". Cresswell et al. (2001) also pointed out the weaknesses of ANT such as having limited role of social factors, only focusing on the micro-context, and defining the network without a complexity. In short, ANT has been accused of disregarding social structures in macro-context as well as only concentrating on micro contexts (McLean & Hassard, 2004; Williams & Edge, 1996). Some researchers argued that there is no dissimilarity between macro and micro levels (Callon & Latour, 1981; Latour, 1999; Monterio, 2000). For these reasons, ANT still ignored macro aspects such as political, cultural, and economic factors which certainly affect to the ways of using and shaping the technologies (Cresswell et al., 2011). For example, there

are many cases dealing with top-down structures in implementing IT (Coiera, 2009; Robertson et al., 2010), and legal and regulatory challenges for e-Government initiatives (Gil-Garcia et al., 2005). Especially, the e-Government initiatives are not able to set apart from legal and regulatory issues because the majority of governments are formed by their own rules, and governmental administrations have to strive for one-year budget to process the long-term of IT initiatives. As a result, the public managers must consider all different laws and regulations when they make a decision for any kinds of project including IT (Gil-Garcia et al., 2005), hence, these circumstances make the inter-organizational power imbalance after all. Thus, these problems of ANT can resolve by incorporating "other theoretical approaches" (Creswell et al., 2011).

Using the lens of ANT in the analysis of Korean e-Government development is not enough to explain in the perspective of government lead project. Especially, the stage of interessment is defined that "the focal actor comes to play a role to help the actors build their identity and stabilize" to link each other with a strong bond (Callon 1986; Song et al., 2014). In general, many IS cases through ANT stated that the focal actor does not enforce other actors to join the network, but enticed them to new network in the interessment stage. The cases dealt with interessment in their papers in <**Table 1**>. The cases treated the government as the focal actor, and these stated that the focal actor often enacted the standards or regulations in the interessment stage (Lee & Oh, 2006; Song et al., 2014; Tilson et al., 2005). The purpose of enacting them is to create the environment in which other actors are able to get in a new network by maximizing their benefits or increasing their interests rather than to enforce other actors to do so. Therefore, these papers

support the idea of ANT that gives little attention to “the broader power and inequalities” (Knights and Murray, 1994).

Since the president and the central government agencies started the Korean e-Government system, it presents that there are inequalities within the actors. In order to overcome the limitation of ANT, Walsham (1997) proposed the structuration theory (ST) by Giddens (1984) is one way to do so. This study decides that ST is the one way to explain the case of Korean e-Government in terms of the strict enforcement of government lead project. ST will be explained in the next section in detail. In short, this study will analyze how human actors and non-human actors join the e-Government network to develop the system through the lens of ANT, translation, and overcome the limitation of ANT by incorporating other theory, Structuration Theory.

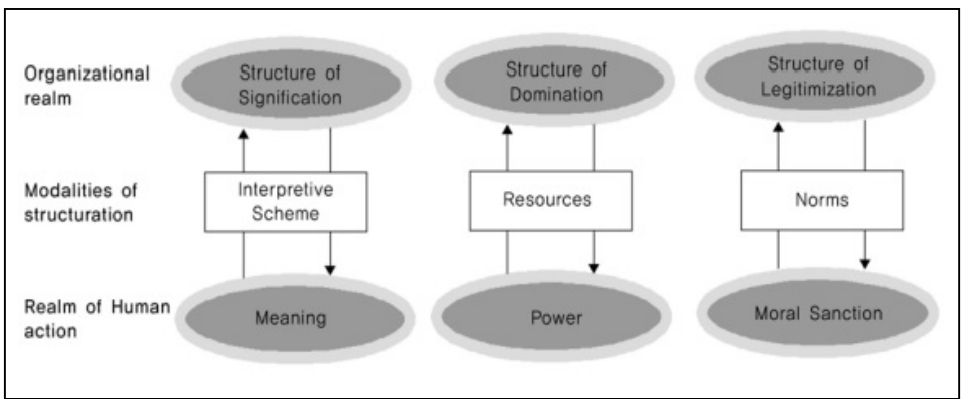
<Table 1> Descriptions of Interessment by the authors			
Authors	Cases	Focal Actor	Descriptions of Interessment
Andrade et al. (2009)	Setting up the Information Sharing System in Rural Communities in the Cajamarca	British Non-Governmental Organization (NGO)	- The focal actor engaged other international agencies and NGOs working in order not only to increase the funding sources but also to coordinate the information production and distribution effort.
Lee & Oh (2006)	China-US WAPI Case	Chinese Government	- Chinese government tried to stabilize the identity of other actors by announcing the WAPI standard. - Despite their efforts, many actors, mobile chip manufactures and finished goods producers, remained lukewarm.
Song et al. (2014)	3D Broadcasting Standardization Process	Government	- The focal actor initiated the 3D experimental group network. - The focal actor motivated and assigned interests and roles to the actors by persuading them the goal of the 3D experimental group.
Tilson et al. (2005)	The US Wireless Industry Standard Adoption	Change as standard making progresses	- Focal actor convinces other actors to accept its problematization by enacting its standardization strategy. - Other actors become aware of the problematization. - All actors participate in standard making and formulate standardization strategies to pursue their own interests and preferred imagined futures.

2.3. Structuration Theory

The British sociologist, Anthony Giddens, had interested in social and organizational research areas, and the initiated Structuration Theory (ST) in the book, *'The Constitution of Society: Outline of the Theory of Structuration'*, in 1984 (Giddens, 1984, 1979). Giddens emphasized that the mutual dependence between human action and social structure. Structure is composed of rules and resources, and these are used by human agents in their daily interaction while they mediate the human agents (Orlikowski, 1992). ST intended that "human actions are enabled and constrained by structures, yet that these structures are the result of previous actions" (Hossain et al., 2011). In other words, human agents rely on social structures by behaving themselves, and these circumstances affect to create and recreate social structures as well (Jones & Karsten, 2008). Hence, the focus of ST is a social process, which contains the reciprocal interaction between human agents and the properties of structure in organizations (Jones & Karsten, 2008; Orlikowski, 1992).

In <**Figure 3**>, it shows that the structuration model consists of three realms: Organizational realm, Modalities of structuration, and realm of Human action (Giddens, 1986). That is, these three realms can realize as a social system. According to Orlikowski (1992), there are "three ways in which organizations influence individual cognition and behaviors," such as signification, domination and legitimization. All interactions of human actions include structures of meaning (communication), power, and moral frameworks, and these elements co-occur with social action and social structure (Giddens, 1984). Giddens also represented that modalities are consisted of interpretive schemes, resources (facilities), and norms,

and they link between the realm of human action and the realm of social structure. According to Hossain et al. (2011), “these three modalities determine how the institutional properties of social system mediate deliberate human action and how human action constitutes social structure.” Therefore, “process of structuration” is linked by the realms of social structure and human action (Giddens, 1979).



<Figure 3> Interaction of Human Action and Organizational Properties as Mediated by the Three Modalities of Structuration (Source by Giddens, 1984)

As the technologies have developed as the information technologies, ST also has evolved in the IS research field widely. Structuration theory (ST) was inspired by the relationship between the general technology and organizational structures at the first time (Orlikowski, 1992). Specifically, ST has been studied at various topics of IS as follows: technology assimilation (Orlikowski & Robey, 1991; Orlikowski, 1992), the duality of technology (Orlikowski, 1992), the group decision support systems (Poole & Desanctis, 1990; Poole, Scott & Desanctis, 1989), computer conferencing systems (Robey et al., 1989), the process of structure in the development of information system (Meneklis & Duligeris, 2008), software process improvement (Allison & Merali, 2007), decision support system (Limayem et al.,

2006), and computer-mediated communication in organizations (Peters, 2006). Especially, Poole and DeSanctis (2004) expanded ST as Adaptive Structuration Theory that involved in the two points: 1) advanced technologies offer the structural types, 2) the interactions between technologies and human actions make the structures. Furthermore, Jones and Karsten (2008) reviewed 331 IS articles based on ST, and classified them in the three categories: “application of strucutration concepts, development and application of IS-specific versions of structuration theory, and critical engagement with structuration theory” (Hossain et al., 2011; Jones & Karsten, 2008). In recently, ST has been applied to the research of e-Government increasingly as well (Basettihalli et al., 2010; Coad & Herbert, 2009; Devadoss et al., 2002; Guo et al., 2009; Heeks & Bailur, 2007; Hossain et al., 2010; Meneklis & Dougligeris, 2010; Phang et al., 2008; Tassabehji et al., 2007). Basettihalli et al. (2010) presented the special case of e-Government in India through the lens of ST. Coad and Herbert (2009) examined the management of accounting practices. Devadoss et al. (2002) represented e-Government initiatives based on ST, and Guo et al. (2009) analyzed the implication of e-Government in the organizational level. Heeks and Bailur (2007) showed the research of e-Government. Hossain et al. (2010) stated the structuration of e-Government systems assimilation by analyzing a comprehensive framework development and case. Meneklis and Dougligeris (2010) evaluated the past applications of e-Government, and focused the processes of e-Government implication in order to evolve ST in the theoretical view of e-Government. Phang et al. (2008) approached ST from organizational learning process in e-Government. Tassabehji et al. (2007) focused on e-technology and e-environment.

Walsham (1997) proposed that the structuration theory (ST) by Giddens (1984, 1979) may overcome the limitations of ANT. In particular, ST applies the level of analysis from the individual to the global, and suggests “models of social action and structure at multiple levels” (Naidoo, 2009). In this study, especially the structure of ‘Domination’ is appropriate to explain the Establishment stage (1997 ~ 2002) in the Korean e-Government case in terms of ‘top-down’ instead of stating the ‘Interessment’ stage in ANT. In **<Table 2>**, it shows how authors stated the structure of Domination in their papers.

<Table 2> Descriptions of Domination by the authors

Authors	Cases	Descriptions of Domination
Basettihalli et al. (2010)	e-Government in India	- Domination addresses the constraint in the pilot project: how government communicates with citizens using resources and technology as modalities and how guidelines provided by users help in designing a more acceptable system. - Establishing the ITC department empowered to regulate, monitor and legitimize all IT activities in the state (domination). - The extension of TWINS required a huge funding for establishing new unites, technology and maintenance (facilities). - The ITC department and committed policy makers generate swift momentum for expanding eSeva (Power).
Hossain et al. (2011)	AgriX in Korean e-Government System	- Meta-structures for domination are provided by political support, human resources, and financial commitment to e-Government system assimilation and the extent to which IS innovativeness, in general, is desirable and pursued in an organization. - Top management leadership directs political support for e-Government system actions, while IT sophistication and user IT competence together reflect organizational readiness to provide technological capabilities and human resources, especially to end-users thereby promoting the assimilation of e-Government system.

Orlikowski & Robey (1991)	Information technology and the structuring of organizations	- Domination: system developers work within the constraints of time, budget, hardware, software, and authority to build information systems. - Modality: Resources - Human action: system developers build information systems through the organizational power or capabilities they wield in their organizational roles.
Orlikowski (1992)	The Duality of Technology	- *Powers* enters into human interaction through providing organizational capabilities for humans to accomplish outcomes. - *Power* is in Domination understood as "transformative capacity," the power of human action to transform the social and material world (Robert & Scapens, 1985). - Power use in organizations is mediated via the *organizational resources* that participants bring to, and mobilize within, interaction. - While these facilities are the means through which power is exercised, from the perspective of institutional properties they constitute organizational *structures of domination.* - *Domination* reflects the fact that all social systems are marked by an asymmetry of authoritative and allocative resources.

2.4 Standard

In Korean e-Government, the standard is the one of key roles in the success of the Korean e-Government system. It will be explained that the definition, the types, and the characteristics of standard. In particular, the standard in Korean e-Government is divided into two categories: standard for administrative work (procedure standard), and technology standard. In the next section, it will be given details in technology standard especially related to the IS field.

The origin of word, 'standard', is from 'stand-hard' that means an assembly area in which an officer gives an order or sets up a flag. "A standard defines a uniform set of measures, agreements, conditions, or specifications between parties (buyer-

user, manufacturer-user, government-industry, or government-governed, etc.)." (Spivak and Brenner 2001, p.16) International Standardization Organization (ISO) stated a standard as "document established by consensus and approved by a recognized body, that provides, for common and repeated use, rules guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context." (ISO/IEC Guide 2, 2004) After all, all different descriptions of standard have in common in terms of having consent from stakeholders for a guideline. Additionally, the standard is separated by two types depends on legislators: *de jure* and *de facto*. On the one hand, a certain or a standardized process from a government and an organization for standardization made *de jure* standard. On the other hand, a market power during the progress of market formation decides *de facto* standard (Korean Standard Association, 2013). The comparison between *de jure* and *de facto* standard is in **<Table 2>**.

< Table 3>Types of Standard
(Source by Korea Industrial Technology Association)

	de jure standard	*de facto* standard
Definition	The standard is enacted by an organization for standardization.	The standard is from a competition of establishing a standard in a market.
Decision-Maker	Organizations for standardization	Market
Legitimacy	Authority of an organization for standardization	A selection of standard users
Cause	Dysfunction of product if not standardized	Inexpedience if not standardized
Priority	Standardization	Commercialization
Characteristics	- Transparency - Clarity - Openness - Principles of providing a single standard	- Speed - Simultaneity of providing a standard and product - Monopoly of first-mover

De jure standard is the result that the authorized organization for standardization mediates the stakeholders' opinions through the official process. *De*

facto standard depends on the market power, so stakeholders compete for their own advantage (Korean Standard Association, 2013). Therefore, *de jure* indicates the public advantage, and *de facto* represents the private advantage. According to the book "*The future society and standard*" (2013), the characteristics of *de jure and de facto* standard shown in **<Table 3>**. *De jure* needs to take more time than *de facto* for enacting the standard because of waiting the analysis and decision of public organizations. In other words, the process of enactment is transparency, and the contents of standard are clear and open. However, *de facto* is through the fast process of establishing law because the standard created as soon as the product released. In a marketplace, the competitions realized the unification of standards, and the winner who dominates the standard first takes control of the market. Therefore, most organizations for standardization offer a single standard, and stakeholders can participate in setting up *de facto* standard freely (Korean Standard Association, 2013).

2.5 Technology Standard in Information System

Standard have taken the prominent role in the development of information and communication technology (ICT). Information Technology (IT) includes not only hardware but also software to achieve firm's objectives (Laudon et al, 2013). In order to configure these technologies, they need a number of standards. As a result, standards in IT are the basic compatibility instructions that help "the configuration of information system" (Backhouse et al., 2006). In the point of industrial perspective, technology standard includes physical properties of

technology and technical experiences from the past and shares the basic concept of a standard at the same time (Hawkins, 1995; Spivak & Brenner, 2001). Technology standards are fundamentally agreed with the idea of standard, and it contains the additional contents of "physical and performance characteristics of current or future technologies can be compared" (Hawkins, 1995; Spivak & Brenner, 2001). Over the last two decades, the role of standard has been significant as ICTs have evolved in the form of ubiquitous computing and network-oriented service. Despite of these circumstances, the IS field has not discussed the issues of standard actively. Therefore, the contributions have been insufficient. According to Lyytinen et al. (2006), only 2 percent of papers treated about the ICT standards since 1990s. Furthermore, these articles have been stated the new IT standards rather than figuring out causes and processes *how* and *why* this kind of standard either come out or fail. "Notably absent are studies of standardization concepts, processes, the impact of ICT standards on industrial coordination and strategy, or the economics of ICT standards." (Lyytinen et al., 2006). Most of the standardization research investigate how standards emerged, and what successful factors or unsuccessful causes are (Aggarwal et al., 2011; Backhouse et al., 2006; Hanseth et al., 2006; Markus et al., 2006; Millerand et al., 2009; Nickerson et al., 2006; Weitzel et al., 2006; Zhu et al., 2006)

Aggarwal et al. (2011) turned over the description that it is able to decrease the risk, a firm has, if many firms set the technology standard together. As a result, they found that the risk-adjusted abnormal return and the market risk of each firm decrease as the number of firm increase in setting the standards, but these increase the idiosyncratic risk. Backhouse et al. (2006) demonstrated how the interactions

between power and politics affect to a standard setting by using Clegg's circuits of power theory. Hanseth et al. (2006) described the case of electronic patient record system in Norway, and showed how the standardization process developed in the case. They pointed out that unexpected side effects and complexity affect to the standardization through Actor-Network Theory and reflexive moderation, so these circumstances led the electronic system to fail. Markus et al. (2006) analyzed vertical information systems (VIS) standards in the case of the U.S. residential mortgage through the lens of Collective Action Theory. Nickerson et al. (2006) analyzed the conflict among diverse stakeholders such as actors, ideas, and institutions in the workflow standardization processes that make appropriate technology standards for technologies and powerful standards in case of future implementation for institutions. After all, they figure out that creating Internet standards related to institutional ecologies is affected by not only "economic calculus" but also "other norms and values, like elegance, design spirit, or technical wizardry, count in making ecologies viable". Weitzel et al. (2006) analyzed the adoption of standard in the economic perspective. They focused on finding the causes of the diffusion of communication standards through diffusion of innovation theory and expecting various results of the diffusions from the different conditions. Zhu et al. (2006) brought up the standard problem especially in exchanging standard one IT platform to another, and presented that the network effect took the important role in the adoption of new standard as depending on adoption and switching costs of earlier standard choices.

In short, although the lack of studies in technology standard in IS field, a number of authors have tried to state the importance of standardization in many

aspects of IS as stated in above. Technical specifications, IT standards, must be treated in IS field a lot because technical products are needed the exact guidelines to follow in order to work properly (Aggarwal et al., 2011).

CHAPTER 3 METHODOLOGY

This study applied the approach of interpretive case study (Yin, 2003) to analyze the evolution of Korean e-Government services. “Case studies are very useful instruments to examine a phenomenon in its natural setting so as to gain a deeper understanding of implicit and explicit social processes.” (Benbasat et al., 1997) Furthermore, case studies allow having flexibility as using numerous data in order to support the potential findings of research (Yin, 1994). Therefore, this study used various sources to examine the case.

This study involved six in-depth interviews with key actors in the case of Korean e-Government in **<Table 4>.** These interviews were conducted in face-to-face with audio recording from October 22, 2014 to November 20, 2014, and they progressed with specific and open-ended questions. The interviews with key actors provided the overview of the evolution of Korean e-Government services process and meaningful insights on the success of e-Government in Korea, and recommended further reference of contacts for selecting other appropriate interviewees. As a result, the focus of interview was to examine the role of actors and the relationship between actors to develop the Korean e-Government system in ANT. The respondents were asked the role of procedure standard and technology standard in Korean e-Government at the first time, but it figured out that they are not the only success factors of e-Government in Korea. Thus, the study expanded to the interoperability of Korean e-Government including law and policy, standard, and relay system. After all, this study analyzed the interrelationship and interaction between human actors (organizations) and non-human actors (law and policy,

standard, and relay system) to describe the development process of Korean e-Government through the four stages of ANT, 'translation' (Latour, 1987). In order to explain the special case of Korean e-Government in the aspect of the government lead project, this study also adopted the Structuration Theory (ST) approach, especially in the structure of Domination. Finally, the archival data related to the development of Korean e-Government was referred, such as white papers, articles, and the government records.

< Table 4> Summary of Interview

Outline of the interviews

Organization	Position	Main Role	Interview Date
Ministry of Security and Public Administration	Director	e-Government Bureau and e-Government Policy Division	October 22, 2014
LG CNS	Director	e-Government Relay System Projects	October 27, 2014
GyeonGi-Do Provincial Government	Director General	Information System Planning Bureau	October 28, 2014
National Information society Agency (NIA)	Executive Director	Planning and Management in specialized ICT policy and technology	October 31, 2014
Ministry of Security and Public Administration	Deputy Director	e-Government Bureau and Information Resource Policy Division	November 20, 2014
Ministry of Security and Public Administration	Director	e-Government Bureau and Information Resource Policy Division	November 20, 2014

CHAPTER 4 CASE: THE EVOLUTION OF KOREAN E-GOVERNMENT

In this study, as human actors (i.e. president, and all central administration organizations) and non-human actors (i.e. law, standard, and relay system) have interacted as a network, Korean e-Government services approached the mobilization phase by winning the first prize for UN e-Government Survey in 2010, 2012, 2014 and exporting Korean e-Government all over the world. This study will show the process how the Korean e-Government services have been evolved in the lens of Actor-Network Theory (ANT). However, because of the centralization of power in Korean government, the inequality between the administrations was happened. According to Naidoo (2009), "Walsham (2001) made a valuable contribution by combining ANT and ST theories in the same cases, using ST to guide broader social analysis, and ANT to describe the detailed socio-technical processes that took place." As a result, Actor-Network Theory and Structuration Theory help to understand the implementation of IS in organizations (Naidoo, 2009). Thus, we described the case in 'translation' of ANT while the social structure in Korea has been changed at the same time.

4.1 Problematization (Establishment Stage: 1987 ~ 1996)

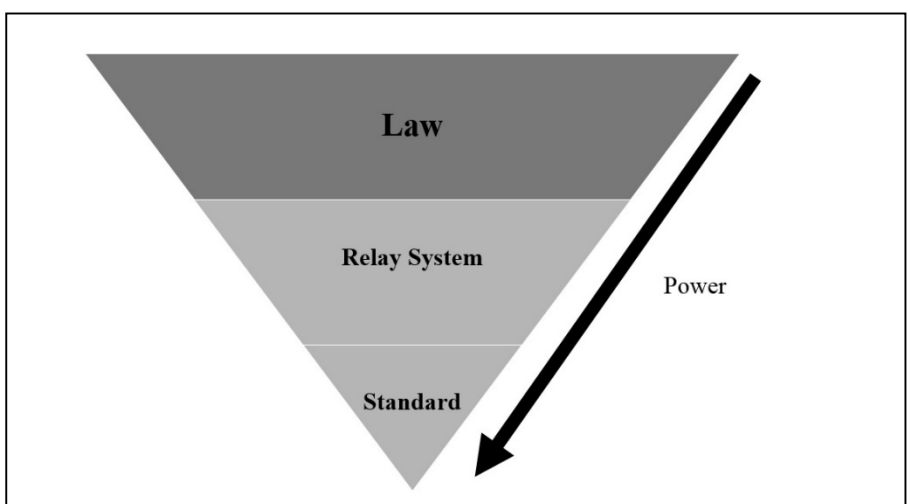
In the Problematization stage, the focal actor identifies the actor and the network by using its own resources, and indicates problems to be resolved (Callon & Law, 1982; Callon, 1995; Callon, 1999). The focal actor intends to form a

network by convincing the actors in building new network is the only way to solve the problem (Song et al, 2014). In this study, the president is the focal actor due to the special political issues in Korea, and the focal actor had tried to form the new network based on e-Government by suggesting the nation-wide plans and giving the proper direction guidance.

South Korea faced the economic crisis after IMF, and the Korean government had the burden of changing the social structure based on knowledge and information technology for the national development. As a result, the government recognized that it is necessary to transit into an information-oriented society in order to secure the national competiveness. Therefore, the president, Roh, Tae-Woo, led the first National Basic Computing Network Project that had progressed from 1997 to 1991, and the second plan was ended in 1996. These two projects are the initial e-Government business by establishing the nation-wide administrative computer network. As the utilization of computer was broadened, the president Kim, Young-Sam began to pursue the central administrations to join in the new network, e-Government, as a must by stressing the economic crisis that Korea was confronted, and setting up the Basic Plan for Informatization Promotion in mid-1990s. In other words, the focal actor started problematization by reflecting its goal that “realizing small and efficient government, improving public services for citizens, and utilizing the investment budget of the administrative computerization in the promotion of domestic information industry” (The Korean Association for Policy Studies, 2011).

Since the central administration organizations, the actors, had given the skeptical responses about the rapid informatization, the president Roh, Tae-Woo,

the focal actor, formed the Computing Network Steering Committee (later advanced to the Information Industry Promotion Committee) to mediate the different interests and perceptions between the actors. According to Callon (1986), “the focal actor forms an obligatory passage point (OPP) by using its own resources including funding, staff, and technology to lure diverse stakeholders into the network for the resolution of a problem, by which it can secure control in the network and form an alliance between the actors.” That is, the focal actor formulated OPP by organizing the Computing Network Steering Committee as a presidential advisory body. In the committee, the chief presidential secretary was appointed as the chairperson, and ten more people were assigned as the members of the committee, such as the vice ministers of some ministries and the presidential secretaries. The director of e-Government Bureau agreed that the biggest motivation that connected the actors as a one network was the focal actor was the president especially in the establishment period. ‘



<Figure 4> The Framework of Korean e-Government

Since the focal actor and the committee led the Korean e-Government assimilation, the basis of the e-Government assimilation would be the laws. It will continuously influence e-Government to implement smoothly as shown in the **<Figure 4>**.

All the laws related to e-Government are in the **<Table 5>**. In 1986, 'Computer Network Act' and 'Supply and Utilization of Computer Network Act' were legislated, and these paved the way for the information society in the future. In August 1995, the Framework Act on Informatization Promotion was enacted, and it guided "the information promotion of public, local, industrial and living areas" (The Introduction of e-Government in Korea, 2012). Finally, e-Government Act was enacted in 2001, and its purpose is as follows:

> *"Article 1 (purpose) this Act aims at fostering the project for e-Government by regulating the basic principle, procedure, and method for electronic processing of administrative tasks and raising people's quality of life by increasing productivity, transparency, and democracy of administrative agencies."*

In February 2010, as e-Government Act was amended, all contents related to administrative works and public services were included to e-Government Act in order to improve the efficiency and the effectiveness of Korean e-Government.

Consequently, e-Government Act has been the legal basis to implement the projects of e-Government in Korea, and it is one of the key success factors in the

Korean e-Government system. Furthermore, whenever new law is either enacted or amended, it is able to update the e-Government committee's role and title as well.

< Table 5> Korean e-Government Law
(Source by The Introduction of e-Government in Korean, 2012)

Name	Description	Enactment	Amendment
Computer Network Act	Paved way for the formulation of the basic plan for establishing and utilization of networks beyond the existing telephone based network.	May 1986	
Supply and Utilization of Computer Network Act	Secured technology and infrastructure to realize e-governance	1986	
Framework Act on Informatization Promotion (called Framework Act on National Informatization before the amendment)	Led to the development of a foundation upon which informatization projects are implemented in an efficient and consistent manner on a national level by consolidating and coordinating related information functions previously dispersed among various government agencies	August 1995	May 2009
e-Government Act	Carrying out the comprehensive government-wide implementation of e-Government	March 2001	February 2010
Government Organization Law	Giving jurisdiction of e-Government responsibility to MOGAHA	March 2004	
Resident Registration Law	Allowing for the development of a digitized resident registration information back-up system		March 2004

4.2 Domination (Promotion Stage: 1997 ~ 2002)

In the problematization stage, the focal actor took the central role in the development of e-Government. Additionally, the Computing Network Steering Committee, the presidential advisory body, also secured control in the network and made the alliance between the administrations while the laws established the infrastructure of e-Government. The e-Government laws, as the one of non-human actors, influenced the administrations got in the right track in terms of e-Government assimilation. Consequently, the e-Government committee and the e-Government laws affected the actors to be aligned in the network by motivating and monitoring them consistently.

In the Domination phase, the focal actor assigned the right to lead e-Government projects to the Ministry of Government Administration and Home Affairs (MOGAHA) and the Ministry of Information and Communication (MIC) mainly (Domination). On the one hand, this environment caused the inequality between the actors because the focal actor chose the certain actors to be the project leader of e-Government even conflicts between MOGAHA and MIC occurred for implementing the similar nation-wide e-Government plans. On the other hand, the governmental structure was centralized to run the e-Government assimilation.

In this period, from 1997 to 2002, the two strategies were mainly adopted: “invest first, settle later” and “top down” (The Introduction of e-Government in Korea, 2012). In the previous stage, the focal actor rapidly spread the computerization in the central administrations mainly. However, due to the strategy of “invest first, settle later”, the technical problems related to the compatibility and

the standard issues were occurred. As a result, “top down” strategy was necessary to overcome these critical problems for establishing the e-Government system successfully, and it is not enough to explain with the interessment stage in ANT. The meaning of “top down” strategy in Korean e-Government is that “six tasks including resident registration, real estate, employment, customs, automobile, and economic statistics were determined as the primary objectives of the computerization project.” (The Introduction of e-Government in Korea, 2012). The equality between the actors could not be realized by implementing the “top down” strategy. Hence, the limitation of ANT is impossible to express the inequality between the actors. In the domain of domination, it enforces the power from the control of resources (Basettihalli et al., 2010). Especially, Basettihalli et al., (2010) stated that addressing the constraints from the government is the main purpose in the domination, and they showed how the government interacts with actors by utilizing its modalities such as resources and technology, and how guidelines support in establishing a more stable system. Thus, in this study, it decided that the structural factor generated the inequalities between the actors to expand e-Government in Korea as the focal actor, MOGAHA, and MIC strongly pushed the other administrations to follow the certain standards and the computerization projects (Power) by using its resources (Facilities).

According to the director general from Information System Planning Bureau, the “top down” strategy helped the standard to settle down, and the most relevant projects were ‘Digitalizing Document Processing Procedures’. First, ‘Digitalizing Document Processing Procedures’ had progressed from October 1999 to October 2002. Although the computer network was built up, there was no way to

exchange each administration's document even paper documents were still interchanged widely in the late 1990s. For instance, most organizations used the different types of word processing programs such as Hancom Office (60%), Hunminjeongeum (18%), Arirang (17%) and Microsoft Word (4%) in 1997 (Director General of Gyeongi-Do Provincial Government, personal communication, October 28, 2014). As a result, the focal actor assigned the leader of project as the Ministry of Government Administration and Home Affairs (MOGAHA) (Domination). MOGAHA held the conference with the MIC, and related private agencies for promoting the standardization of digital document process (Facilities). Finally, they determined to set the format of e-document as XML (eXtensible Markup Language), the communications protocol as SMTP (Simple Mail Transfer Protocol) and MINE (Multipurpose Internet Mail Extensions), and the directory service protocol as LDAP (Lightweight Directory Access Protocol) in all central administrations (Power). These were able to exchange the electronic documents that have the different document formats by standardizing the unified formats and protocols. Through the standardization in the project of the 'Digitalizing Document Processing Procedure', it motivated the focal actor, MOGAHA, and MIC to have more standards that are able to support implementing e-Government stably. Then, they decided to create the standards for administrative work by classifying them into their functions (Facilitates): (A) procedure standard, (B) functional standard, (C) interface standard, (D) data standard, and (E) format standard. The standards for administrative work, procedure standard, means the criterions that are procedures for processing data, code, system, service, and these are used by the administrations when they proceeds the standardization. In **<Table 6>**, the different

kinds of standards for administrative work are shown in detail as depended on their legislation dates.

According to the director general of Gyeongi-Do Provincial Government (2014), there are three types of standards depended on their functions as stated in **<Figure 5>**. First, the standard for administrative work is the smallest category, and it was created by MOGAHA mainly. Additionally, the national standard is the second biggest and strongest standard in Korea, and making the national standard was in the charge of Telecommunication Technology Association (TTA). It has accepted some standards for administrative work. At last, the technology standard has been followed by the international standard such as XML, SMTP/MINE, and LDAP, and this is the biggest category by including the national standard and the standard for administrative work.

<Figure 5> The Category of Standard in Korean e-Government

In this period, the promotion stage, the major characteristic of procedure standard was *de jure*. *De jure* standard is made by a certain or standardized process from a government and an organization for standardization. In this context, the

standards for administrative were made by MOGAHA and MIC to achieve public advantage. Furthermore, in the domination, the procedure standard was started to produce, so the number of standard was not much. The function of standard for administrative work also focused on the guideline which each organization must follow rather than the linkage between the actors. In other words, the types of procedure standard, especially (B) functional standard, (D) data standard, were mainly emerged instead of (C) interface standard. Therefore, various kinds of standards were started to produce, and MOGAHA and MIC were in the charge of making the standards for administrative work. This circumstance naturally occurred the inequality between the actors, but the function of standards somewhat resolved the conflicts by focusing on the regulation. Giving the specific guidelines as the standards was established the infrastructure to progress the pan governmental projects in the future.

Finally, as the several types of standards started to develop, the necessity of shared service increased as well. If the standards are the ways to access into a system, the shared service can be the system that relays them as well as transferring the information (Director of Ministry of Security and Public Administration, personal communication, October 22, 2014). Especially, in the project of 'Digitalizing Document Processing Procedure', the private agency, LG-EDS, was selected to establish the infrastructure of shared system for distributing e-documents nationally. It was invested 4.5 billion U.S. dollars from June 2000 to December 2000 (Facilities). LG-EDS implemented the relay system as focusing on connecting the existing systems in the administrations. This will be the origin of the relay system in the future, and numerous types of relay systems have developed

based on this type. Consequently, setting up the standards and constructing the shared system enabled to expand the project of distributing e-documents nationally. Moreover, the distribution rate of e-document in 2002 was almost 82.3% on average (70.3% for the central administrations, and 88.7% for the local government) (Jung, 2014).

In summary, in the domination stage, the focal actor, MOGAHA, and MIC enforced the other actors to follow the e-Government plans, and the e-Government Special Committee aligned the actors in the network by motivating and monitoring them. In this circumstance, the specific types of standards were created, and the origin of shared system fulfilled the areas in which the standards were unable to satisfy, such as connecting each administration's system and relaying the information between the actors. As a result, these established the infrastructure of e-Government even more strongly, and paved the way for conducting the government-wide projects in e-Government for the future.

< Table 6> Standards for Administrative Work
(Source: National Informatization White Paper, 2011)

Stage	Type	Name	Need Relay System	Date of Enactment	Date of Amendment
Establishment Stage (1987~1996) (Problematization)	Functional Standard (B)	Administration of Multifunctional Office Equipment Standard	N	January 1992	June 2013
		Information Network System Standard (LAN & WAN)	N	March 1994	May 2000
	Data Standard (D)	Government Electronic Document Distribution Standard	N	October 1990	June 2013

		Administration Domain Name & structure of IP	N	October 1995	June 2013
Promotion Stage (1997~2002) (Domination)	Functional Standard (B)	Administration Electronic document System Standard	Y	November 1996	September 2010
		Administration Information Processing Standard for KIOSK	N	May 2000	July 2010
		Administration IC card Standard	N	December 2001	June 2013
	Interface Standard (C)	Government Electronic Document Distribution Standard	Y	October 1999	September 2010
		Administration Interworking Standard for GPKI	Y	April 2001	-
Advanced Stage (2003~2011) (Enrollment)	Procedure Standard (A)	Administration Standardization Code Standard	N	June 2004	June 2013
		E-Government Compatibility Standard	N	August 2009	June 2013
		IT Project Standard Process	N	October 2009	-
	Functional Standard (B)	Administration Record Center Automation System Standard	Y	July 2003	-
		Administration Electronic Civil Form Standard	N	October 2005	-
		Electronic Identification for KIOSK Standard	N	July 2001	January 2009
		Administration Work Management System Standard	N	January 2008	September 2010

		Integrated Complaints Dispenser Standard	N	May 2009	June 2013
		Integrated Authentication Gateway Standard	Y	December 2010	-
	Interface Standard (C)	Interface Standard between Work Management System and Electronic Document System	Y	January 2008	-
		Interface Standard between Work management system and Knowledge Management System	Y	January 2008	-
		Electronic Document Verification Service Standard	Y	Novembe r 2011	-
	Data Standard (D)	Administration Information Database System Standard	N	Novembe r 2008	
		A RFID Coding Standard to Identify Administrative and Public Agencies	N	January 2009	June 2013
	Format Standard (E)	Administration Electronic Civil Form Standard	N	January 2005	-

4.3 Enrollment (Advanced Stage: 2003 ~ 2009)

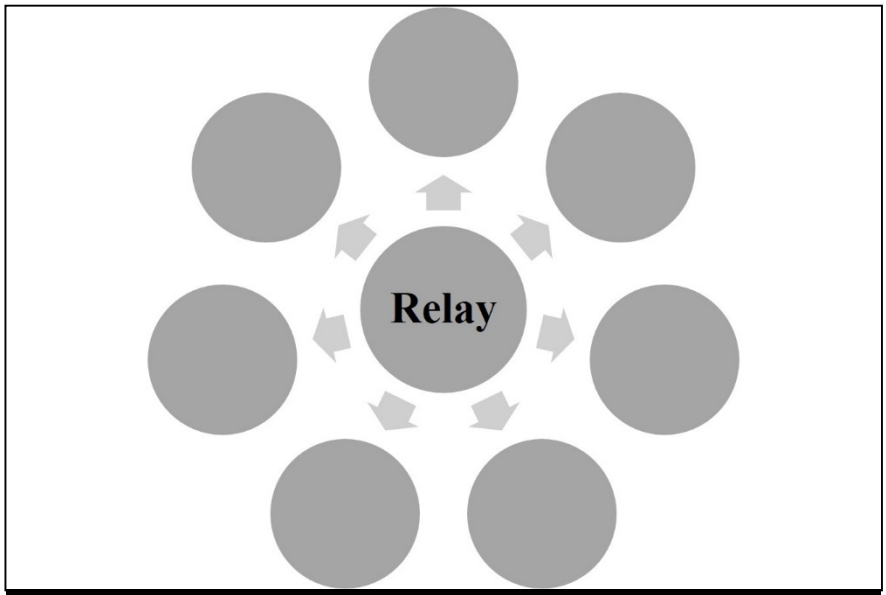
Through the initial stages, the actors “become a part of or ‘translate’ into a single network”, so they start to realize what the common goal is in the enrollment stage (Song et al., 2014). Consequently, the interactions increase, and the role of focal actor is naturally decreased at the same time (Song et al., 2014).

In this study, as the focal actor had led the nation-wide e-Government projects with the two administrations, MOGAHA and MIC, and the committee, the presidential advisory body, over the previous stages, the infrastructure of e-Government was settle down by constituting three major parts: the laws, the standards, and the relay systems. As a result, in the enrollment stage, the government-wide plans in e-Government could be more actively performed as well as the conflicts between the actors increased. This is because each administration tried to hold its own view while the specific role was assigned to them. Thus, in order to resolve the conflicts between the actors, the role of standards were changed as well as the ways to create the standards. After all, the roles of focal actor was naturally decreased. Especially, in March 2004, the Government Organization Law was enacted to give a jurisdiction of e-Government responsibility to MOGAHA, and this made the well-organized structure to advance the e-Government services.

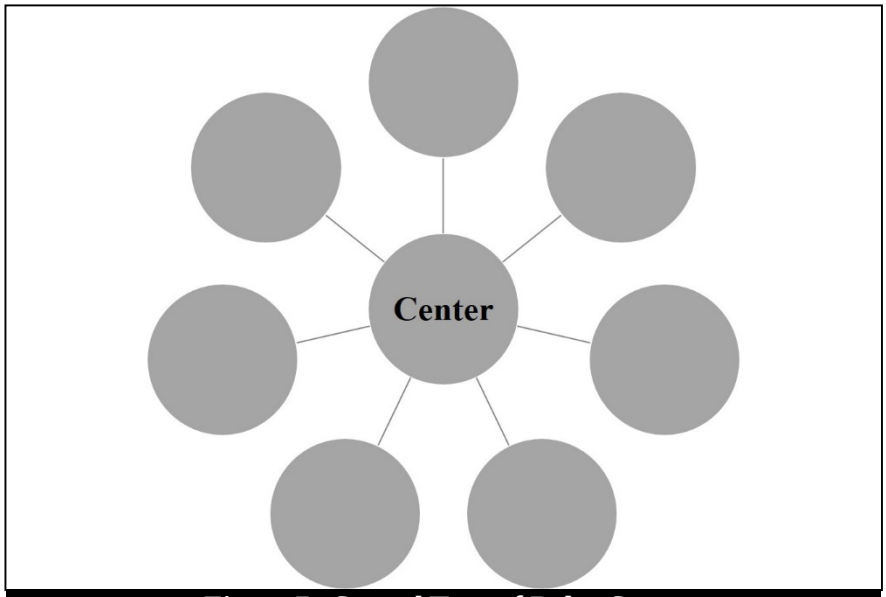
“Government for Citizens (G4C) System” began in May 2000 as the first government-wide project. This activity required the linkage between the actors to provide a single window portal for civil petitions by sharing the dispersed information. In the process of sharing the information, the conflicts between the actors in the network began to rise because the administrations were sensitive to

share their own information (Executive Director of National Information society Agency, personal communication, October 31, 2014). The focal actor and the e-Government Special Committee tried to mediate the different points of view from the actors rather than enforced them. In fact, before carrying out the G4C project, “citizens had to visit public offices several times and bring required documents to get their civil petitions done,” and “public servants had to request needed information from other agencies by sending official documents or visiting these agencies” as well (National Informatization White Paper, 2011).

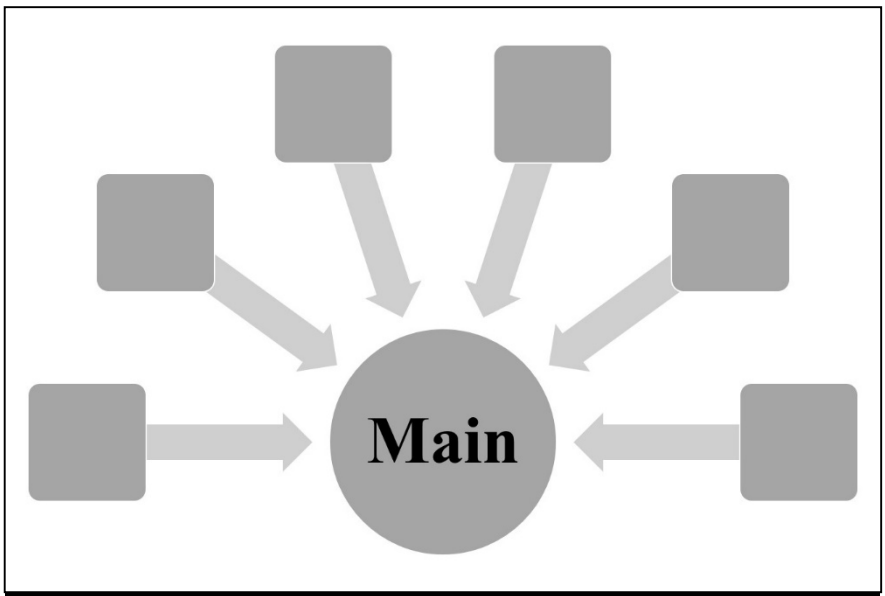
Consequently, MOGAHA held the working-level conference with the other actors. Then, they decided the private agency, LG CNS, to construct the information sharing system. The executive director of NIA stated that there are three main types of shared system (2014). First, the system focuses on the function to relay and convert the different systems from the administrations, and this type has utilized until a recent date as the role of portal as shown in <**Figure 6** >. Second, the system connects the existing systems from the administrations, and it used especially during the period from 1997 to 2002 in <**Figure 7**>. Finally, they system takes a role of main system, and each organization is not required to have its own system at all in <**Figure 8**>.



<Figure 6> First Type of Relay System



<Figure 7> Second Type of Relay System



<Figure 8> Third Type of Relay System

In G4C, the director of LG CNS represented that they invented the first type of relay system as connecting the five national main databases: resident, real estate, automobile, business, and tax database (2014). Therefore, through this activity, it raised the possibility that could provide the more convenient services to citizens by decreasing the number of required paper documents for civil petitions.

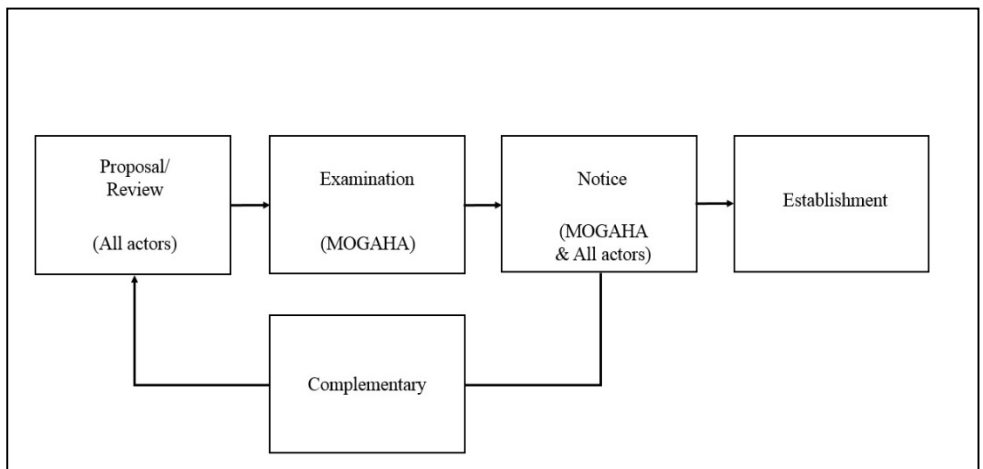
On the basis of G4C, the several numbers of the pan-government projects emerged: Minwon 24 and Administrative Information Sharing. In November 2002, the government portal service called Minwon 24 began, and it was evolved its brand identity (BI) from G4C (Director of LG CNS, personal communication, October 27, 2014). The major services in Minwon 24 were divided into the three parts such as guidance, request, and issuance. When the government portal service started, the only limited number of services provided (4,400 services for guidance, 393 services for request, and 8 services for issuance). However, as it developed, the number of

services extended (5,300 services for guidance, 650 services for request, and 33 services for issuance). As a result, the government portal service succeeded by treating almost 100 million of civil petitions per year, and the number of citizens who utilized Minwon24 had increased 5 times from 2003 to 2004. In addition, the "Administrative Information Sharing" project began to share the information with not only all central administrations but also 16 banks in Korea in 2005. Consequently, in the enrollment stage, the development of relay system increased the interaction between the actors as well as secured the compatibility in order to give better civil petition service. Sharing the actors' own information occurred the conflicts, but implementing shared systems gradually resolved the conflicts between the actors by improving the quality of services in public sector at the same time.

As a number of the government-wide projects were progressed, the existing standards were not enough to support the relay systems. As a result, the number of standards was increased and the types of standards were complicated: procedure standard and technology standard.

In the initial stages, the only two types of the standards for administrative were existed: function (B) and data standard (D). In the enrollment stage, all four types of standards for administrative work were created because the interactions between the actors were increased. Additionally, the ways to settle the standards were enforced by the focal actor, MOGAHA, and MIC in the problematization and domination, but the process to set up the standards changed to accept all actors' opinions in the enrollment stage. In <**Figure 9**>, the life cycle of standards for administrative work was stated. First, the actor who needs a certain standard in

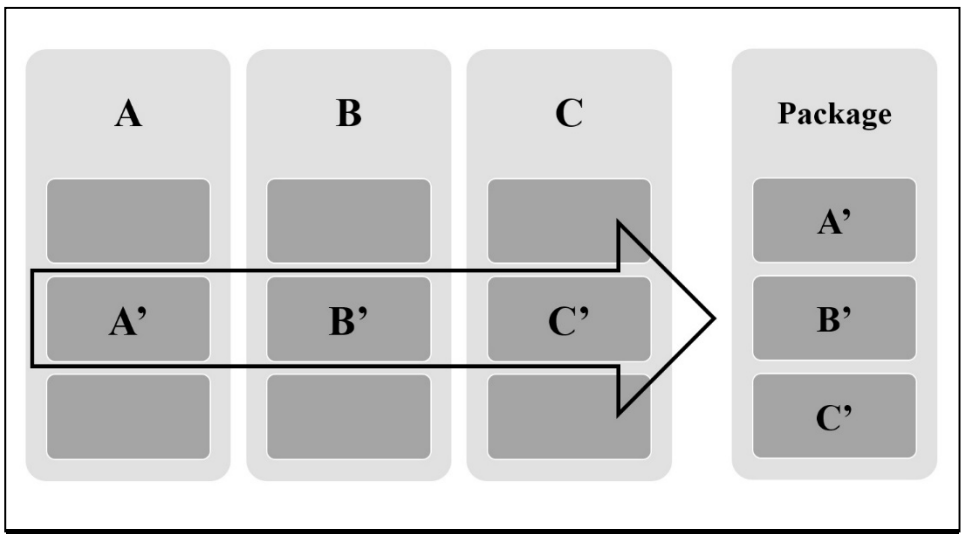
proceeding a project could turns out the proposal of new standard. Then, MOGAHA, has a jurisdiction of e-Government projects, examines the proposal. Finally, it will be made as the official standard for administrative work if the proposal passed.



<Figure 9> The Life Cycle of Procedure Standard in Korea

Moreover, the director of MOGAHA stated that numerous technology standards emerged as the technologies related to e-Government were developed. Technology standards in Korea have adopted the international standards mostly (Executive Director of National Information society Agency, personal communication, October 31, 2014). Since the relay system had been actively invented, a number of technology standards were produced to secure the compatibility between the actors and to support the shared system stably. The problem of this activity was that some technology standards are overlapped each other. In other words, since each administration was able to make a proposal for a new standard, the standards which had same functions had been created sometimes. As a result, a package of standards was created to prevent this problem. Thus, it

allowed selecting multiple existing standards to use as a package, and it is called Technical Reference Model (TRM), as shown in **<Figure 10>**.



<Figure 10> The Principle of Technical Reference Model (TRM)

Technical Reference Model (TRM) is the tool to support the establishment of technical architecture in Enterprise Architecture (EA), and it classifies and defines technology standards into the five parts by realizing functions in administrative works: service access and delivery, platform and infrastructure, elemental technology, integration and interface, and security (Deputy Director of Ministry of Security and Public Administration, personal communication, November 20, 2014). Specifically, TRM enhanced the re-use of the technology and application service, and supported the environment for the secure exchange of administrative works and the compatibility between organizations while it managed technology standards and technology trends (Deputy Director of Ministry of Security and Public Administration, personal communication, November 20, 2014).

As a result, technology standards in Korean e-Government were started to be managed by TRM systematically in the enrollment stage.

This activity was realized through the project of establishing “Enterprise Architecture (EA)” in 2007 (Deputy Director of Ministry of Security and Public Administration, personal communication, November 20, 2014). The goal of implementing EA was to manage complicated and massive information resources effectively and efficiently by preventing an overlap of resources. EA is the combination of idea, technique, and related technology, and it helped to proceed the informatization systematically depending on the plan and the goal.

In summary, in the enrollment stage, the e-Government system had the organized structure by enhancing the law, the standard, and the relay system. The laws of e-Government had given the legal basis to promote a great number of e-Government projects through the amendments since the problematization stage. In addition, the standards are divided into two types: the standards for administrative work and the technology standards. The process of making the standards was modified, i.e., all actors could suggest a new standard depending on their needs. That is, it is closed to the definition of standard what ISO stated: standard is a document based on consensus. Finally, the shared system was invented to fulfill the shortage of standards, linkage. If the standards are just the substances, the relay systems will realize these substances by connecting the actors (Director of Ministry of Security and Public Administration, personal communication, October 22, 2014). Therefore, these three significant factors, law, standard, and shared system, contribute to the success of Korean e-Government as non-human actors with the human actors, all central administrations.

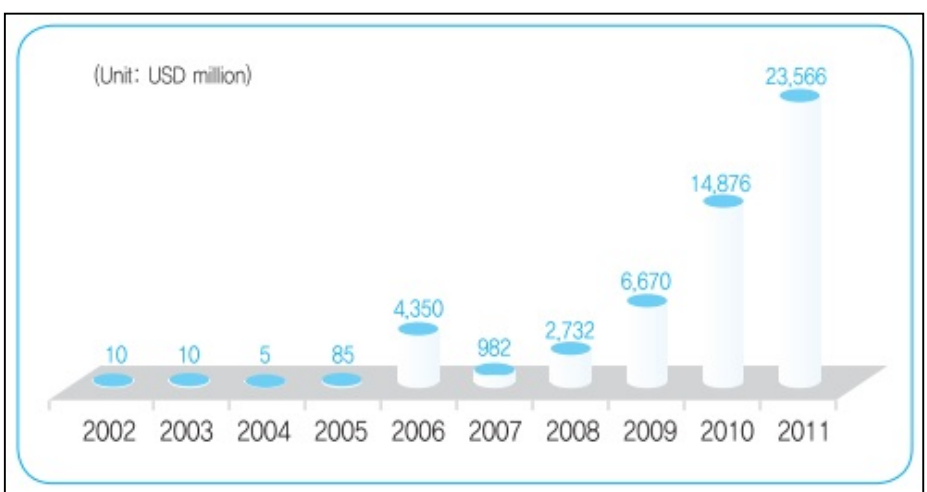
4.4 Moblization (Advanced Stage: 2010 ~ 2014)

The last stage, mobilization, is to complete building the network so that the network begins to produce the tangible outcomes as a result. According to Callon(1986), mobilization “where the network formed through the previous three stages become powerful and the existing network actors make good on promises with the focal actor, luring more actors into the network.” Thus, the network comes to be strengthened as human actors and non-human actors maintain the strong relationship in the mobilization stage.

In this study, through the previous stages such as problematization, domination and enrollment, the human actors (i.e. the focal actor and the actors) have developed the non-human actors (i.e. laws, standards, and relay systems) stage by stage. Many e-Government projects have been practiced as stated in the study, and each non-human actor has advanced by stages as well. As a result, Korean e-Government has taken the first prize in 2010, 2012, and 2014 from UN e-Government Survey.

United Nation e-Government Survey evaluates the e-Government development status of the 193 UN member states. Since 2002, the Department of Economic and Social Affairs in UN had produced the UN e-Government survey per year until 2005. Since 2008, the UN e-Government survey has been done in every two years. “It serves as a tool for decision-makers to identify their areas of strength and challenges in e-Government and to guide e-Government policies and strategies.” (UN e-Government Survey, 2014) The assessment is separated into two parts: e-Government Development Index and e-Participation Index. First, the e-

Government development index “measures capacity and will in using e-Government for ICT-based national development” (National Informatization White Paper 2013) Korean e-Government has taken the first prize in the e-Government development index for three times, 2010, 2012, and 2014. In other words, Korean e-Government has established the completed network with the central administrations, the local government, and the private agencies to provide the online e-Government services. Second, the e-Participation index “measures level of online participation of citizens in decision-making for public policies” (National Informatization White Paper 2013). As Korean e-Government network established the solid foundation of e-Government service in online, citizens are assured of the opportunity to utilize online e-Government services. Therefore, the network, including the human actors and the non-human actors, has produced the tangible outcomes as taking the first prize of the UN e-Government survey in 2010, 2012 and 2014.



<Figure 11> The Value of e-Government Exports
(Source by The Introduction of e-Government in Korea, 2012)

The potential market scale of e-Government in all over the world is almost 650 million U.S. dollars, compared to the domestic market, about 67 million U.S. dollars. In other words, exporting Korean e-Government is a must because the world e-Government market is the one of important markets in terms of the scale. Since Korean e-Government had taken the first prize for UN e-Government Survey in 2010 and 2012, 400 people from 65 countries came to MOGAHA in Korea for benchmarking the Korean e-Government system in 2012. Thanks to these performance, Korea has exported e-Government.

As shown in the <**Figure 11**>, the amounts of exportation was 27.3 million dollars in 2008, 66.7 million dollars in 2009, 148 million dollars in 2010, 235 million dollars in 2011, and 342 million dollars in 2012. That is, the actual exports in 2012 achieved 11 times more than the record of exports in 2008. At the first time, the exportation of Korean e-Government was started only for the parts which are able to be standardized, such as patent, custom, and procurement, but it has extended its parts widely in these days.

In summary, “the focal actor mobilized the actors for the end goal and induced a new actor to the network, making the tangible achievement” in the mobilization stage. The focal actor induced the external actor, the new actor, to the network for making the tangible achievement of Korean e-Government. For example, the focal actor organized the group of e-Government export market development with the actors to share the best practices and key success factors of Korean e-Government in Indonesia, Peru, and Chile in 2013 and 2014. Therefore, the focal actor mobilized the actors for the success of Korean e-Government by producing the tangible outcomes of receiving the prize for UN e-Government

Survey in 2010, 2012, and 2014, and exporting Korean e-Government to all over the world.

CHAPTER 5 CONCLUSION

5.1 Findings

According to Robert Schware, the failure of adopting e-Government in developing countries are about 80%, and it is divided either totally failed (35%) or partially failed (50%) (Schware, 2004). In other words, most of developing countries fail to implement the e-Government system. South Korea also was one of the developing countries by facing with the economic crisis in the late 1990s after IMF. The Korean government had the burden of changing the social structure based on knowledge and information technology for the national development. As a result, the informatization was started to transit into an information-oriented society in order to secure the national competiveness. It was the initial step of Korean e-Government business. Through the evolution of Korean e-Government, Korea won the first prize for UN e-Government Survey in 2010, 2012, and 2014, and even the Korean e-Government system have been exported to all over the world. Therefore, the motivation of this study is what the success factors are in Korean e-Government.

This study applied the approach of interpretive case study (Yin, 2003) to analyze the evolution of Korean e-Government services. This study involved six in-depth interviews with key actors in the case of Korean e-Government. According to the interviewees, there are the three major success factors in implementing Korean e-Government: law, standard, and relay system. Furthermore, the high-level of governmental support also led Korean e-Government to be succeeded (De', 2005).

Consequently, this study decided to describe the case of Korean e-Government in the perspective of Actor-Network Theory.

Actor network theory (ANT) was originated in science and technology research field, and it treats not only social aspects, but also technical aspects (Tatnall & Gilding, 1999). ANT considers that human and non-human actors are same and equal factors in its analytical view (Lee & Oh, 2006). ANT focuses on the mutual effects on social and technical actors, and it helps to understand how actors unify as one, how actors engage in each other, and how human actors use non-human actors to make their union be stronger with keeping their interest (Lee & Oh, 2006). In terms of ANT, the focal actor (i.e. the president) led to construct new network by enticing the human actors (i.e. the central administrations), and they use the non-human actors (i.e. law, standard, and relay system) to establish their network stably in the 'translation' process. Translation of ANT means that the process of negotiation between human and non-human actors, and it shows how the systems find out their stability by making the networks by themselves.

However, in the evolution of Korean e-Government services, the inequalities between the human actors occurred because most Korean e-Government projects were the government lead projects especially from the late 1990s to the early 2000s. There is also the actor who has managed the e-Government business mainly, and it raised the conflicts and inequalities between the human actors. As a result, ANT is not enough to explain the case of public sector. According to Naidoo (2009), "Walsham (2001) made a valuable contribution by combining ANT and ST theories in the same cases, using ST to guide broader social analysis, and ANT to describe the detailed socio-technical processes that took place." Therefore, in order to

overcome the limitation of ANT, this study adopted the Structuration Theory (ST) in the macro-context.

Structuration Theory intended that “human actions are enabled and constrained by structures, yet that these structures are the result of previous actions” (Hossain et al., 2011). Especially, the structure of domination is appropriate to explain the strategy of ‘top-down’ in Korean e-Government with using resources (facilities) and power. Therefore, this study changed the interessment stage in the ‘translation’ process of ANT to domination of ST.

In summary, in terms of theory building, Actor-Network theory needs to complement its limitation to describe the cases of public sector. According to Elsenhardt (1989), “case studies can be used to generate theory (e.g., Gersick, 1988; Harris & Sutton, 1986).” Consequently, through the case of Korean e-Government, this study found out the shortages in Actor-Network Theory, and it adopted Structuration Theory to explain both the ‘top-down’ strategy and the inequalities in Korean e-Government.

5.2 Implications and Limitations

First, in terms of e-Government law, there are not much countries legislate specific e-Government law. Specifically, most developed countries, such as Canada, Singapore, Australia, and England, do not have e-Government Act (Ryu, 2000). Nevertheless, in Korea, Korean e-Government Act was enacted in 2001, and it has been the strong legal basis for developing the Korean e-Government system efficiently and effectively. Thus, it emphasizes the necessity of e-Government Act

that is able to proceed projects of e-Government with the centralized governmental structure.

In addition, at the first time, this study was started to focus on the conflicts between the branches of the government, and the ways to resolve them. However, some interviewees stated that there was not much of conflicts between the central administrations because of 'top-down' strategy. Even if the conflicts were occurred, they were resolved by the laws and the standards. Nevertheless, there are still some studies concentrate on the conflicts between administrations to progress the Korean e-Government projects (De', 2005; Kim, 2010; Yoo & Yoon, 2006). As a result, it is necessary to research the conflicts in Korean e-Government in depth.

On the other hand, this study has some limitations. This study did not deal with all the projects of Korean e-Government. In other words, other success factors might be found in the future studies. Moreover, the evolution of Korean e-Government is still in the progress. In the future research, Structuration Theory should be treated in broaden way with Actor Network Theory for the case of Korean e-Government. This study only adopted the structure of Domination by replacing the stage of Interessment in translation of ANT. As a result, researchers are able to find out the other ways to support macro contexts to overcome the limitations of ANT in describing the cases of public sector with Structuration Theory.

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Appendix: Procedure Standard in Korean e-Government

<Appendix> Procedure Standards in Korean e-Government (Source: National Informatization White Paper, 2011)				
Stage	Type	Name	Description	Date of Enactment & Amendment
Establishment Stage (1987~1996) (Problematization)	Functional Standard (B)	Administration of Multifunctional Office Equipment Standard	The standard for multifunctional office equipment such as PC, monitor printer, scanner, and lesser jet is necessary to process administrative works by securing required performance, safety, reliability and interconnectedness.	(January 1992/June 2013)
		Information Network System Standard (LAN & WAN)	The standard supports the device-to-device interconnectivity to compose the efficient and target-oriented communication network.	(March 1994/May 2000)
	Data Standard (D)	Administration Standard Code	The standard supports that all administrations share the standardized codes for administrative works.	(October 1990/June 2013)
		Administration Domain Name & structure of IP	In order to construct the efficient information sharing and transferring system among the administrations, the standard stated.	(October 1995/June 2013)
Promotion Stage (1997~2002) (Domination)	Functional Standard (B)	Administration Electronic document	The standard is supported when electronic	(November 1996/September 2010)

		System Standard	documents develops and the administrations adopt them.	
		Administration Information Processing Standard for KIOSK	The standard is for issuing civil affair documents without verifying an identification number.	(May 2000/July 2010)
		Administration IC card Standard	The standard provides the requirements such as measuring size, hardware, and software when administrations need to adopt and use the IC card.	(December 2001/June 2013)
	Interface Standard (C)	Government Electronic Document Distribution Standard	The standard exists for transferring electronic documents efficiently.	(October 1999/September 2010)
		Administration Interworking Standard for GPKI	The standard exists for securing and keeping documents safely with passwords.	(April 2001/ -)
Advanced Stage (2003~2011) (Enrollment)	Procedure Standard (A)	Administration Standardization Code Standard	The administrations share the standardization code for administrative works through the standard.	(June 2004/June 2013)
		E-Government Compatibility Standard	In order to secure compatibility of e-Government, the standard states the requirements of hardware and software.	(August 2009/June 2013)
		IT Project Standard Process	The standard is to support the information-oriented businesses by setting up organized	(October 2009/ -)

			processes.	
	Functional Standard (B)	Administration Record Center Automation System Standard	The standard exists for establishing record center automation system and improving efficiency and convenience of managing documents.	(July 2003/ -)
		Administration Electronic Civil Form Standard	The standard is to transfer the civil affair documents efficiently.	(October 2005/ -)
		Electronic Identification for KIOSK Standard	The standard is for implementing the KIOSK system by securing required performance, safety, reliability and interconnectedness.	(July 2001/January 2009)
		Administration Work Management System Standard	The standard needs to improve the efficiency and continuity of conducting administrative works.	(January 2008/September 2010)
		Integrated Complaints Dispenser Standard	In order to issue civil affair documents stably, the standard secures the efficiency and connectivity among the administrations.	(May 2009/June 2013)
		Integrated Authentication Gateway Standard	The standard supports that an employee is able to access to various kinds of information by logging in the system at one time.	(December 2010/ -)
	Interface Standard (C)	Interface Standard between	The standard is necessary to support interworking	(January 2008/ -)

		Work Management System and Electronic Document System	process, which share the information among the administrations.	
		Interface Standard between Work management system and Knowledge Management System	The standard is necessary to support interworking process, which share the information among the administrations.	(January 2008/ -)
		Electronic Document Verification Service Standard	The standard needs when the administrations try to use the system detecting the tamper problems.	(November 2011/ -)
	Data Standard (D)	Administration Information Database System Standard	When the administration information database system establishes, the standard needs to manage the system and to share the information actively.	(November 2008/ -)
		A RFID Coding Standard to Identify Administrative and Public Agencies	The RFID tag which the administrations try to use should have a certain code, KKR, to classify each department.	(January 2009/June 2013)
	Format Standard (E)	Administration Electronic Civil Form Standard	The standard is to transfer the civil affair documents efficiently.	(January 2005/ -)