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Structuration of e-Government Systems Assimilation: A Comprehensive Framework Development and Case

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The multifarious array of benefits to the e-Government systems research, from evaluative frameworks and conceptual models to guidelines for initiatives, adoption, and assimilation, evidences the requirement, both from the researcher's and the practitioner's standpoint, of sound theoretical foundations that can be applied directly in practice. Grounded upon structuration theory, this paper proposes a framework for e-Government systems assimilation through the structuration of its organizational factors. Upon this proposition, we map the factors of e-Government systems assimilation with the organizational meta-structures of signification, domination and legitimization. The framework is then tested for the case of one particular e-Government systems of Korean government. The juxtaposition of the theoretical position and the practical findings leads us to isolate the organizational, technological, and inter-organizational factors that shape the meta-structures for the assimilation of e-Government systems. This framework offers interesting possibilities to researchers in exploring the relationships and insights into the complex interactions that shape the relationships among government, people and technology. Thus, the paper's contribution lies on three axes: first, the furthering of a theoretical perspective of e-Government systems assimilation; second, a detailed exposition of the structuration theory and an illustration of its application to the issues of e-Government systems assimilation in the organizational context; and finally, developed framework through the isolation of a usable set of theoretically grounded factors affecting e-Government systems assimilation that can be applied in future research and practice.

Keywords : Structuration Theory, Organizational Meta-structures, Signification, Domination, Legitimization, e-Government Systems, Assimilation

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Ⅰ. Introduction

With the phenomenal growth of the Internet and e-commerce [Edmiston, 2003], e-Government systems are regarded as an important outcome in the efforts of government to leverage its potential in fulfilling their digital mission. In fact, governments across the world have felt pressure to join the digital revolution [Strejcek and Theil, 2002] through realizing the importance of using ICT to improve operational efficiency, attain operational transparency and enhance organizational performance, to make efficient and transparent government [Prattipati, 2003]. Since the late 1990s, most governments at all levels have launched e-Government systems with the promise of providing quality electronic information and services to the citizens and business [Torres *et al*., 2005]. The involvement of such an array of contributors has shaped e-Gover nment as a discipline that cuts across and draws on many other disciplines [Meneklis and Douligeris, 2010]. This multifarious nature of e-Government has produced two major strands of consideration; not only has it created high and diverse expectations by practitioners of the field, but it has also resulted in a lack of a universally agreed upon definition of e-Government [Yildiz, 2007]. However, just within a decade, the research on actual practices and functionalities development become concern of e-Government researchers [Gil-García *et al*., 2005] and making it a burgeoning field for research on the multifarious nature of relationships among government, citizens and technology [Heinze and Hu, 2005].

However, the more concern is the fact that there has been no unifying theoretical framework for understanding the phenomenon [Gronlund, 2005]. In most cases, e-Government research draws mainly from a weak or confused positivism and is dominated by over optimistic. A theoretical work that has done little to accumulate either knowledge or practical guidance for e-Government and there is a lack of clarity and lack of rigor about research methods alongside poor treatment of generalization [Heeks and Bailur, 2007]. Previous researchers frequently pay little attention to underlying theory about organizations and these perspectives may paint an incomplete picture of the effect e-Government will have on governments and their relationships with citizens and technology, as they both fail to take into account the fact that social and organizational structures undergo constant change, with information technology itself an integral element of those structures [Heinze and Hu, 2005]. Hence, a nuanced understanding on e-government systems is necessary from the theoretical perspective.

In particular, management of e-Government systems are becoming an essential element of modern government administration [Torres *et al*., 2005] in supporting the transition from administration-oriented towards service-oriented Organizations [Guo *et al*., 2009]. Therefore, it is important to assess the effectiveness of e-Government, and to take necessary action based on these assessments [Gupta and Jana, 2003]. However, the key objective during the post-implementation stage is to assimilate the outcomes of information systems into the business routines so that the expected benefits can be actually realized [Liang *et al*., 2007]. Assimilation is an important construct in the causal chain of influence from the organizational adoption of an in-

formation technology to the evidence of its impacts on business performance [DeLone and McLean, 2003]. However, past studies have overlooked the fact that technology assimilation is an ongoing process by focusing on one stage of the assimilation life cycle, such as the decision to adopt a specific IS innovations [Rai *et al*., 2009]; further, the majority of past studies on IS innovation have been anecdotal [Rai *et al*., 2009]. A nuanced understanding on e-Government systems assimilation is necessary from the theoretical perspective because research on post adoption use of IT is generally lacking in the literature [Ahuja and Thatcher, 2005]. In fact, initial efforts from academics have been devoted to studying assimilation mostly in e- business area [e.g., Zhu *et al*., 2003, 2006]. Hence, little is known about the factors that determine e-Government systems assimilation within organization. Therefore, this study tries to expand knowledge frontier to e-Government systems assimilation. The prime motivators for the research we present in this study are these gaps.

In this light, to improve the explanatory value of the organizational e-Government systems assimilation which creates government business value, this paper proposes a comprehensive framework for e-Government systems assimilation through the structuration of its organizational factors. Upon this proposition, we impinge the factors of e-Government systems assimilation identifying through a literature review on organizational IS assimilation with the organizational meta-structures of signification, domination and legitimization. The framework is tested for the case of one particular e-Government systems of Korean government, namely AgriX (Agriculture Integrated Information eXcellent System). The juxtaposition of the theoretical position and the practical findings leads us to isolate the organizational, technological, and inter-organizational factors that shape the meta-structures for the assimilation of e-Government systems. This conceptualization of e-Government systems assimilation through the lens of structuration theory offers researchers interesting possibilities in exploring the relationships and insights into the complex interactions that shape the relationships among government, citizens and technology.

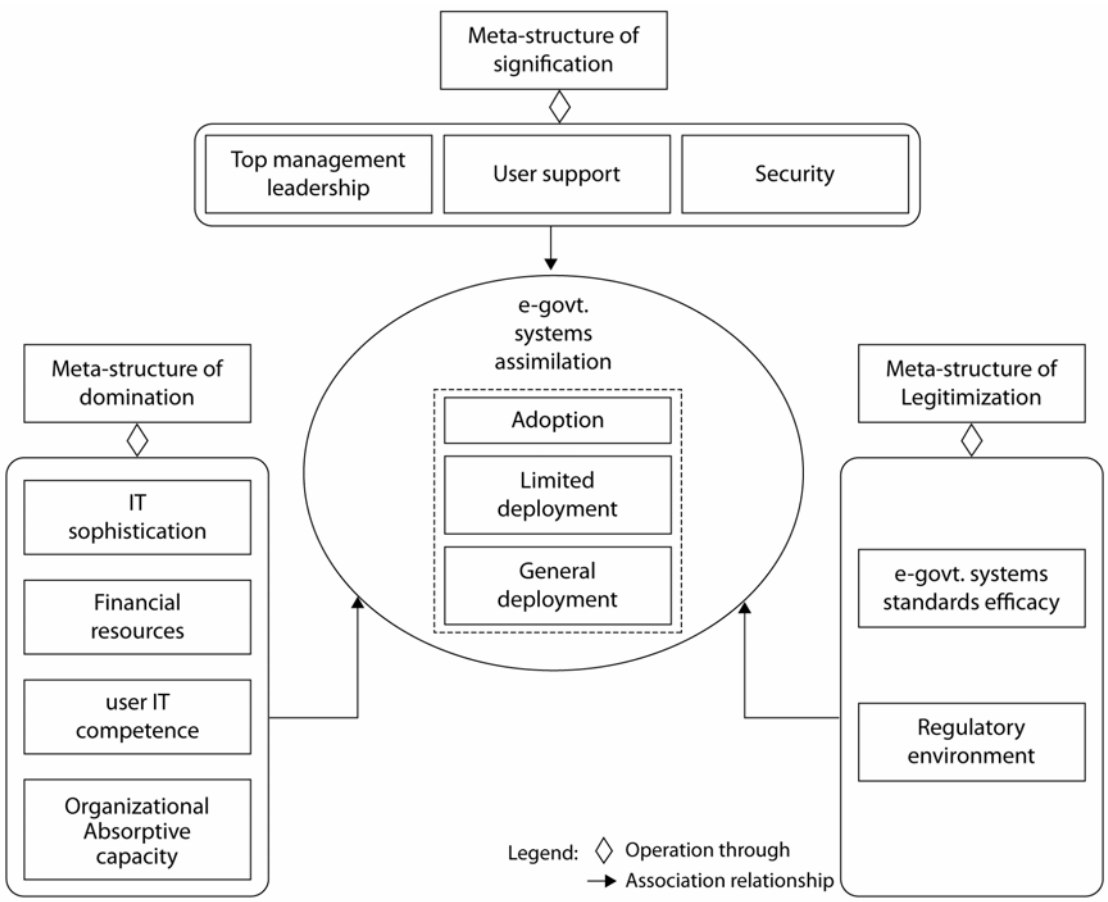
Thus, the paper's contribution lies on three axes: first, the furthering of a theoretical perspective of e-Government systems assimilation; second, a detailed exposition of the structuration theory and an illustration of its application to the issues of e-Government systems assimilation in the organizational context; and finally, the isolation of a usable set of theoretically grounded factors affecting e-Government systems assimilation that can be applied in future research and practice.

The rest of the paper is organized as follows. First, proposed framework is described through the premises of structuration theory. Next, to test the framework, a case study for AgriX is presented. Finally, we conclude this work by laying out its implications and future research direction.

Ⅱ. A Framework for e-Government Systems Assimilation

This section describes the developed e-Government systems assimilation framework (EGAF) and it is illustrated in <Figure 1>. It contains three organizational meta-structures along with

the factors through which they operate to inform e-Government systems assimilation behavior. The theoretical basis for the three organizational meta-structures of EGAF is structuration theory along with a struturation theory of technology assimilation. A set of factors of information systems assimilation are identified through literature review of inter-organizational IS assimilation. Finally, the factors, which determine organizational e-Government systems assimilation behavior, are we structurized with the organizational meta-structures of signification, domination and legitimization through the lens of structuration theory. Meta-structures of signification operating through top management leadership, user support, security, meta-structures of domination operating through top management leadership, IT sophistication, financial resources, user IT competence, organizational absorptive capacity, and meta-structures of legitimization operating through top management leadership, e-Government systems standards efficacy, regulatory environment determine organizational e-Government systems assimilation behavior. These steps are described in the following sections.



<Figure 1> Organizational e-Government Systems Assimilation Framework (EGAF)

2.1 Perspectives on e-Government Systems Assimilation

Assimilation is defined as the extent to which the use of technology diffuses across organizational work processes and becomes routinized in the activities associated with those processes [Purvis *et al*., 2001]. Therefore, e-Government systems assimilation can be defined as the extent of organizational use of e-Government systems in facilitating business strategies and activities. This definition focuses on the relative success of organizations in incorporating the e-Government systems into its business strategies and activities and it is consistent with earlier treatments of IT assimilation at the organizational level [Armstrong and Sambamurthy, 1999]. Here the e-Government can be broadly defined as a government's use of ICT to enhance the access to and delivery of government information and services to citizens, businesses partners, employees, and other agencies and entities to improve efficiency, effectiveness, transparency, accountability, responsibility and service delivery of public governments [Kraemer, and King, 2003; Wang and Liao, 2008]. As governments are eagerly looking toward a digital future with the implementation of e-Government systems, they need to overcome the obstacle and the challenges in assimilating e-Government systems. Therefore, our phenomenon of interest is the extent to which IS of e-Government are incorporated into organizational business strategies and activities aimed at operational efficiency, transparency, and public services.

Manifold organizational-level IT/IS adoption models are identified from the literature. Several researchers tapped Innovation Diffusion Theory [Rogers, 1983] to investigate antecedents of IT Adoption [Lewis *et al*., 2004]. Taking this approach to assimilation, Cooper and Zmud [1990] related IT implementation with task and technology characteristics in the perspective of manufacturing firms [Cooper and Zmud, 1990]. By extending this theory, researchers have also proposed that task, organizational, and environmental characteristics play important roles in technology adoption [Damapour, 1991]. Furthermore, Tornatzky and Fleischer [1990] stated through the technology-organization-environment framework that the decision to adopt a technological innovation by a firm is based not only on the technology, but also on the related organizational and environmental contexts. The technology adoption model using social psychological theory [Davis, 1989], the IT innovation adoption research model [Agarwal and Prasad, 1998], and innovation adoption and implementation model [Gallivan, 2001] have also been widely used.

According to technology assimilation theories, most information technologies exhibit an ''assimilation gap:'' their rates of organizational assimilation and use lag behind their rates of organizational adoption [Chatterjee *et al*., 2002]. As a result, lessons learned about the assimilation of prior information technologies could be extended to understand how organizations promote the assimilation of e-Government systems. Nevertheless, e-Government systems assimilation is more challenging than other information systems assimilation in private organizations because of the different natures and dynamics of these entities.

Consistent with Swanson's [1994] taxonomy of information system innovation, e-Government

systems assimilation is a Type Ⅲ innovation, where the focus is upon the integration of IT in customer-facing strategies and activities at the organizational level [Chatterjee *et al*., 2002]. The development of e-Government requires the radical transformation of government, including profound changes in the structure, process, culture, and behavior of individuals in the public sector [Irani *et al*., 2005]. In e-Government initiatives and e-Government assimilation, these transformational efforts usually encompass all the major organizational dimensions such as strategies, structure, people, technology, and processes as well as the principal external forces of citizens, suppliers, partners, and regulators [Tung and Rieck, 2005]. According to Kamal [2006], e-Government environment simply acquires or adopts a technology is not sufficient to realize the anticipated benefits; it must be deployed and used sophisticatedly by the organization and its intended users [Kamal, 2006]. Government organizations face challenges such as overcoming resistance to change, security, and possibly a lack of top management supports in assimilating this technology [West, 2004]. Therefore, for government organizations to be successful in assimilating this innovations, they need to have a thorough understanding of the relative advantages of the innovations, organizational operations and it's absorptive capacity, managerial capabilities, and business standards of information systems relative to the requirements of the work processes [Kamal, 2006].

Researchers have commented that e-Government activities are a follow on from e-business [Carter and Belanger, 2005]. Therefore, the success of e-business can motivate implementation of e-Government, which in turn may facilitate implementation of more e-business [Srivastava and Teo, 2010]. In spite of this synergistic relationship, the current literature typically views e-business and e-Government activities as inherently different [Srivastava and Teo, 2010]. In fact, they have different business goals [Chircu and Lee, December 2003] that leading to a gap between IT adoption in private and government sector organizations with regard to provisions made for its assimilation [Kamal, 2006].

We postulate two distinct reasons why e-Government systems assimilation deserves investigation using an e-Government specific assimilation framework. First, the dynamics of e-Government systems assimilation within organization are distinct, as it is a Type Ⅲ innovation that occurs at the organizational level of analysis and organization wide actions are required to integrate information system into strategies, activities, and processes. In contrast, Types I and Ⅱ information system innovations operate at different levels of analysis. In fact, limited attention has been devoted to the assimilation of Type Ⅲ information system innovations as compared to Types I and Ⅱ [Chatterjee *et al*., 2002]. e-Government systems assimilation require the mobilization of attention and coordination of actions across a wider group of stakeholders and inter-organizational factors such as top management, IS executives, members of the IS function, and members of a work group than is the case for the assimilation of individual information systems. The intensity of the interactions and collaborations required among these members is much more pronounced for the e-Government systems assimilation than for the assimilation of other information systems. The

fundamental perspectives on e-Government systems assimilation have two implications for our research. First, consistent with the entire portfolio of information systems, we conceptualize e-Government systems assimilation along two dimensions: organizational strategies and online business activities such as government to government (G2G), government to citizen (G2C), and government to business (G2B) activities [Wang, 2008]. Higher levels of e-Government systems assimilation within organization will be achieved when a larger proportion of the individual assimilation initiatives are targeted at the enterprise business strategies and value chain activities. Therefore, government organizations can foster higher levels of technology assimilation by shaping, influencing, and motivating individual and managerial attention, cognition, and behaviors toward more assimilation initiatives across the enterprise [Chatterjee *et al.*, 2002]. While assimilation itself is the cumulative result of actions by individuals and units within the organization, these actions are stimulated by an organizational milieu of norms, values, and rules [Chatterjee *et al.*, 2002].

Second, the unique aspects of e-Government system assimilation and the weak theoretical perspectives indicate that a different investigative approach is required. According to Heeks and Bailur [2007], e-Government research draws mainly from a weak or confused positivism and is dominated by over-optimism, thus there is a paucity of knowledge and practical guidelines for e-Government and a lack of clarity and rigor about research methods alongside poor generalizations. Furthermore, the evidence reported in the literature suggests that some of the assimilation factors might need to be redefined because public and private organizations differ in several important aspects and it is necessary to make meaningful adjustments to address the specific needs of public organizations [Moon, 1999].

We therefore identified a set of factors that have been found to influence assimilation at the organizational level. We then mapped these factors through the lens of structuration theory to develop a framework that can be used as a tool to measure the e-Government system assimilation within organization.

2.2 Structuration Theory

Structuration theory, proposed by Giddens' [Giddens, 1984, 1979] is an attempt to reconcile theoretical dichotomies of social systems such as agency/structure, subjective/objective and micro/macro perspectives. This theory recognizes that human actions are enabled and constrained by structures, yet that these structures are the result of previous actions. Hence, structuration is conceived as a social process which involves the reciprocal interaction of human actors and structural features of organizations [Orlikowski, 1992]. This duality of structure refers to the notion that the structure or institutional properties of social systems are created by human action, and then serve to shape future human action. So human action can be seen on the one hand to constitute the institutional properties of social systems, yet on the other hand it can be seen to be constituted by institutional properties. These structural properties consist of the rules and resources that hu-

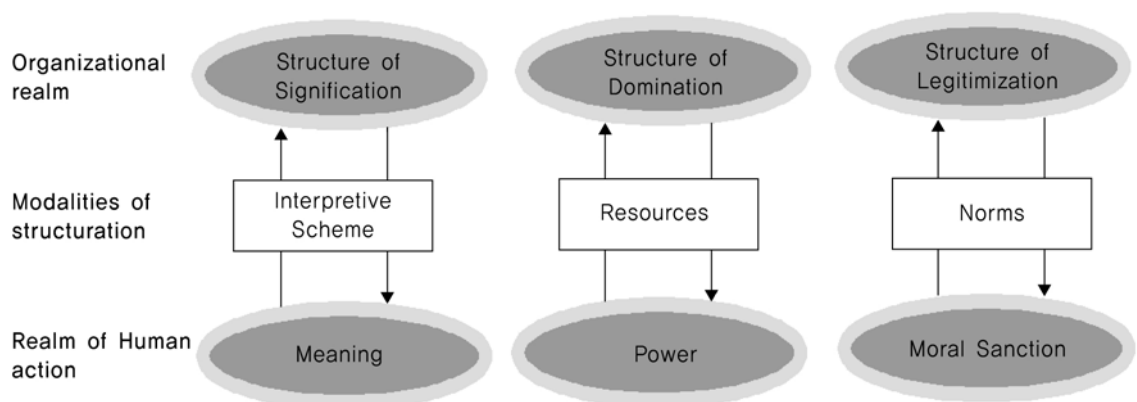
man agents use in their everyday interaction and these rules and resources mediate human action, while at the same time they are reaffirmed through being used by human actors [Orlikowski, 1992].

Giddens specifies that all human interaction is inextricably composed of structures of meaning, power, and moral frameworks, and that any interaction can be analyzed in terms of them as the realms of social action and social structure coexist. He specifies three "modalities" as shown in <Figure 2> that link the realm of action and the realm of social structure: interpretive schemes, resources, and norms.

These three modalities determine how the institutional properties of social systems mediate deliberate human action and how human action constitutes social structure. The linkage between the realms of social structure and human action is referred to as the "process of structuration" [Giddens, 1979]. Giddens [1984] describes how these modalities operate within each of the institutional and action realms of organizations, hence achieving an interaction of subjective and objective elements.

The modalities of structures and their interdependencies helped us to construe the factors of the assimilation of e-Government systems and present them in this paper in a coherent manner. Particularly in the e-Government realm and in several cases of information systems development, deployment and assimilation, certain aspects of the knowledge ability of the agents are partly manifest in their descriptions of the role that the e-Government system has as part of its environment and the development, deployment, and assimilation decisions that are based on such descriptions.

Several studies has been employed structuration theory, such as, to study technology induced organizational change [Barley, 1986; Conrad, 2005], organizational knowledge management [Hargadon and Fanelli, 2002], labor transformation processes [Manning and Sydow, 2007], and health care research [Beringer *et al.*, 2006; Hardcastle *et al.*, 2005].



<Figure 2> Interaction of Human Action and Organizational Properties as Mediated by the Three Modalities of Structuration [Adapted from Giddens, 1984]

2.3 Structuration Theory in Information System Research

Structuration theory has inspired a structurational perspective on technology and the technology's implications for organizations. The perspective initially aimed at the interaction of technology in general and at organizational structures [Orlikowski, 1992].

A shift in focus from technologies in general to information technologies in particular was realized through the use of structuration theory of technology assimilation [Wanda Orlikowski, and Robey, 1991; Orlikowski, 1992], Orliwoski's [1992] the duality of technology, the use of group decision support systems [Poole and DeSanctis, 1990; Poole, Scott and DeSanctis, 1989] and computer conferencing systems [Robey *et al*., 1989] and Adaptive Structuration Theory [DeSanctis and Poole, 1994; Poole and DeSanctis, 1990]. Previous works employ a structurational perspective of technology to study technological and organizational change in times of crisis [Harrison *et al*., 2007], structuring processes during information systems development [Meneklis and Douligeris, 2008], software process improvement [Allison and Merali, 2007], decision support systems [Limayem *et al*., 2006], and computer-mediated communication in organizations [Peters, 2006].

Recently, Guo and his collegues [2009] [Guo *et al*., 2009] classified the literatures based on Structuration Theory in the IS field into four directions: (1) Reconstructing the theoretical system in accordance with the characteristics of IT, (2) Using Structuration Theory as an analytical tool; (3) Using Structuration Theory as the meta-theory of other theories; and (4) Defining objects in IS researches with concepts in Structuration Theory. Reimers and Johnston [2008] integrated the Structuration Model with the Practice Theory to analyze the adoption of inter-organizational information systems in particular industry sectors. Their model divides the structures in IS application practice into ideational structure, normative structure, and material structure, and defines different behavior "patterns," so as to reinforce and extend the concept of duality [Reimers and Johnston, 2008].

Among these studies, Orliwoski's [1992] the duality of technology, and Poole and DeSanctis's [Poole and DeSanctis, 2004] description of structuration theory are the most influential theoretical paradigms influencing IS research in the last decade or more and researching the relationship between information systems and organization.

Orliwoski's [1992] the duality of technology study signifies that IT impinges on each of the Giddens' modalities of structuration and explains the links between the subjective and objective dimensions of social reality that constitutes a central part in the structuration process [Orlikowski, 1992]. Orlikowski also established that the modalities of structuration are embedded within historical and organizational contexts and these contexts influence how IT is developed, used, and institutionalized, and need to be understood within the structuration framework [Orlikowski, 1992]. The root of the structuration theory of technology assimilation [Orlikowski, 1992] lies in the basic institutional theory that describes how firms act as institutions in shaping the behaviors and cognitions of individuals within. Institutional theory [Orlikowski, 1992; Scott, 1995] identifies three ways in which the

organizations influence individual cognition and behaviors: (1) Structures of signification, (2) Structures of legitimization, and (3) Structures of domination.

Orlikowski *et al*. [1995] argue that individuals utilize these institutional structures of signification, legitimization, and domination to make sense of the technology, garner the resources needed to infuse it into work processes, business activities, and strategies, and undertake the improvisational actions needed to assimilate the technology [Orlikowski *et al*., 1995]. These assimilation actions are referred to as structuring actions. She also argue that top management or organizational human resources can manipulate the institutional structures of signification, legitimization, and domination and, thereby, influence, guide, motivate, or alter individual structuring actions. These organizational actions are called meta-structuring actions because they either reinforce the existing institutional structures or alter those structures to create conditions more conducive to technology assimilation.

Another influential theoretical paradigms influencing IS research is the Adaptive Structuration Theory (AST) [DeSanctis and Poole, 1994; Poole and DeSanctis, 1990] and Poole and DeSanctis's description of structuration theory [Poole and DeSanctis, 2004]. Their AST also consistent with the Orlikowski's work since it suggests that "the social structures provided by an advanced information technology can be described in two ways: structural features of the technology and the spirit of this feature set" [DeSanctis and Poole, 1994; Poole and DeSanctis, 1990].

Jones and Karsten [2008] concluded on a recent review of 331 IS articles which have drawn on Gidden's work that there are significant opportunities for IS researchers to pursue structurational research that "engages sympathetically, yet critically with Gidden's work" [Jones and Karsten, 2008]. However, they identify three broad strands of use; application of structurational concepts, development and application of IS-specific versions of Structuration Theory and thirdly, critical engagement with Structuration Theory. These suggestions signify the proper use of structuration theory in information systems research.

2.4 Structuration Theory in Conceptualizing e-Government Systems

In the context of e-Government, structuration can be seen within government organization as there is an interaction between organization, technology, and employee. These three are interrelated in that the relationship between organization and its employee is increasingly shaped and mediated by technology, in effect altering the "structural properties" of the relationship. Government organization will continue to feel pressure to restructure itself in order to maintain the viability of its relationship with citizens [Layne and Lee, 2001].

In response to this pressure government restructuration will necessarily include the introduction and implementation of new technologies within government, and may themselves create further change in the structural properties of the government/employee relationship [Heinze and Hu, 2005]. Consecutively, this change will be enabled through the use of technology that has been developed and implemented both to enact, and as a result of, the

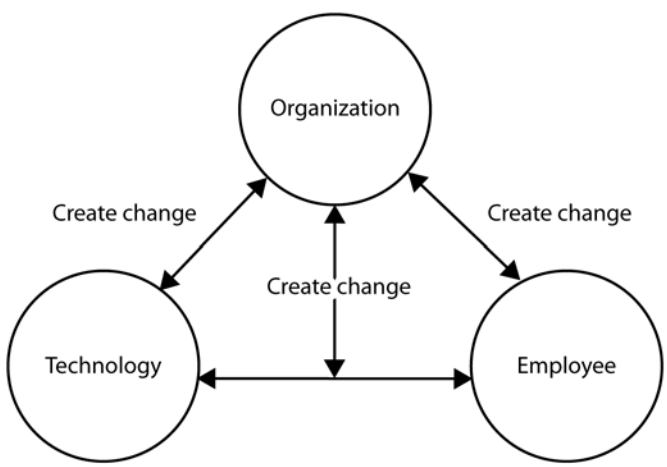
structural changes within government organization (see <Figure 3>).

Structuration theory has also been applied to e-Government research, such as examining the organizational learning process during the project implementation [Phang *et al*., 2008], analyzing the dynamic of system procurement and development [Devadoss *et al*., 2002], analyzing the adoption and application practice of e-Government systems from organizational level perspective [Guo *et al*., 2009], analyzing management accounting practices [Coad and Herbert, 2009], Structural analysis of e-Government initiatives [Devadoss *et al*., 2002], analyzing e-Government research [Heeks and Bailur, 2007], e-technology and the emergent e-environment analysis [Tassabehji *et al*., 2007]. The recent study of Meneklis provides the furthering of the theoretical perspective of e-Government through a structurational lens which focuses not only on the evaluation of the results of past implementations but on the explanation of the process that enabled these implementations [Meneklis and Douligeris, 2010].

Ⅲ. A Structuration Perspective for e-Government Systems Assimilation

Finally, this study applies Gidden's duality of structure along with the duality of technology concept [Orlikowski, 1992] and strutura-tion theory of technology assimilation [Orlikowski, 1992; Scott, 1995] to provide structuration of e-Government systems assimilation. Struturation theory of technology assimilation focuses on the relationship between social structure and human actions and suggests that assimilation of e-Government systems innovations is a cumulative consequence of individual actions, which are shaped by organizational meta-structures [Giddens, 1984]. Finally, these meta-structures reinforce established structures and patterns of action that reproduce established behavior or enable the emergence of new structures and actions that generate innovation behavior.

Struturation theory of technology assimilation base has been used to inform studies related to organizational assimilation of informa-



<Figure 3> Relationship among Government Organization, Technology, and Employee

tion technology innovations for business processes such as the assimilation of computer- aided software engineering technology [Purvis *et al*., 2001], Web services [Chatterjee *et al*., 2002], and assimilation patterns in the use of electronic procurement innovations [Rai *et al*., 2006]. Recently, Rai *et al*. [2009] used to investigate the assimilation of electronic procurement innovations and its impact on procurement productivity in buyer organizations and found a substantial impact of the assimilation of these innovations on procurement productivity [Rai *et al*., 2009].

In our context, e-Government systems assimilation that emerges from the structuring actions of individuals, whose cognitions and behaviors are influenced by institutional meta-structures. Exclusively, meta-structures for signification, domination and legitimization, the three key meta-structures that have been identified through the structuration theory and literature review [Orlikowski, 1992; Scott, 1995], influence the cognitions and behaviors of individuals. Signification is established by meta-structures that provide meaning and promote understanding that serve as cognitive guides for individual action and behavior. Legitimization is established by those meta-structures that validate behaviors as desirable and congruent with the goals and values of the organization. Finally, domination is provided by the meta-structures that enforce established institutional rules to regulate actions and behaviors of individuals.

In the next section, we elaborate on our rationale for mapping causal factors to particular meta-structures for e-Government systems assimilation <Table 1>.

<Table 1> Structuration Perspective for e-Government Systems Assimilation: Mapping to Factors [Hossain *et al*., 2011]

	Definition	Factors	Mapping
Structures of signification	Meta-structures related to the strategic, relational, signification and technological context yield meaning and understanding, serving as cognitive guides to understand appropriate behavior/actions with respect to e-Government systems assimilation.	Top management leadership	The extent to which top management articulates the strategic context for e-Government systems deployment, which informs cognition on the business need of e-Government systems.
		User support	Perceptions about the technical support from service providers for e-Government systems. e-Government systems is dependable (reliability); Service providers give prompt service to users (responsiveness); e-Government systems has users' best interests at heart (empathy)
		Security	Security defines as the degree to which e-Government systems provide safeguards and protections for users to process business. therefore, it reflects the perceptions about the security and protection of e-Government systems which defines the methods of protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction in order to provide integrity, confidentiality and availability.

Structures of domination	Meta-structures related to political, financial, and technological resources validate behaviors associated with e-Government systems assimilation as being appropriate and consistent with the goals and values of the organization.	Top management leadership	Top management signals political support for the initiative and legitimizes actions and behaviors related to e-Government systems assimilation, by their active involvement in the deployment of e-Government systems.
		IT sophistication	The sophistication of IT resources and capabilities in the organization is an aggregate signal of the desirability and importance of IT-related innovations for core organizational processes, in this case, e-Government systems assimilation for fulfilling business mission.
		Financial resources	The general base of financial resources available to be invested in organizational improvement and innovation, such as e-Government systems assimilation.
		User IT competence	The belief that one is capable of performing in a certain manner to attain certain goals, such as, the confidence to use e-Government systems.
		Organizational absorptive capacity	Organizational absorptive capacity is defined as its capability to "absorb," through its prior related infrastructures to assimilate and use new IT [Cohen and Levinthal, 1990; Tippins and Sohi, 2003]. Here, the related infrastructure refers to organizational prior internal IT knowledge structures, organizational techonogical opertunism to attain e-Government systems assimilation.
Structures of legitimization	Meta-structures related to goals and organizational standards regulate actions and behaviors for e-Government systems assimilation.	Top management leadership	Top management regulates actions and behaviors for IS assimilation, by establishing goals for initiatives and standards to monitor them.
		e-Government systems standards efficacy	Perceptions about e-Government systems business standards relative to the requirements of the work processes of the organization. e-Government systems standards efficacy reflects the perceptual measures of the comprehensiveness, flexibility, and enforcement. Comprehensiveness standards provide positive feedback for broader deployment of e-Government systems, by accommodating for the scope of business activities. Flexibility standards provide positive feedback for broader deployment of e-Government systems by accommodating for required deviations, and finally, the level of enforcement of formalized tasks and work processes provide a stronger prediction of attitudes toward formalization compared with the extent of formalization itself.
		Regulatory environment	Regulatory environment refers to governments' role to encourage e-Government systems usage by establishing e-Government laws and providing incentives. In fact, the open-standard nature of the e-Government systems due to internet involvement brings unique issues regarding business law, security, credit card use, and online transactions with parties that have no prior relationship, which in turn poses unique demands on sound regulatory environment. Government can encourage e-Government systems usage by establishing supportive business laws to protect e-transactions, regulating the e-Government systems, Internet to make it a trustworthy business platform within G2G, G2C and G2B.

3.1 Meta-structures of Signification: Top Management Leadership, User Support, and Security

Meta-structure of signification is the interpretive schemes of standardized, shared stocks of knowledge that humans draw on to interpret behavior and events, thus achieving meaningful interaction [Wanda Orlikowski and Robey, 1991]. Hence, meta-structures for signification are provided by the strategic, relational, and technological context in which e-Government systems must be interpreted and used. We identify accordingly, top management leadership [Chatterjee *et al*., 2002; Rai *et al*., 2006; Liang *et al*., 2007], for e-Government systems as organizational factor, user support [DeLone and McLean, 2003; Grover *et al*., 1996; Parasuraman *et al*., 1988] from providers as inter-organizational factor, and security [Rai *et al*., 2006] for e-Government systems as technological factor as meta-structures of signification.

Information systems innovations are resource-intensive and require substantial material and managerial resources [Chatterjee *et al*., 2002]. In our context, e-Government systems assimilation involves managerial factors [Rai *et al*., 2006] and in general it is an important factor [Chatterjee *et al*., 2002]. Top management leadership informs cognition on the business need of e-Government systems through articulating the strategic context for e-Government systems deployment. The role of user support has become critical to the success of organizations [Landrum *et al*., 2007]. Users' support from providers, in the form of extended technical assistance, emergency maintenance, updates, and special user training, is an important factor with ERP during the post-implementation stages [Somers and Nelson, 2004]. Security refers to the degree to which e-Government systems provide safeguards and protections for users to process government business [Rai *et al*., 2006]. As such, secured e-Government systems of organizations ensure reducing the risks and deploy countermeasures lead higher use of the e-Government systems. It is commonly believed that good security improves trust, and that the perceptions of good security will ultimately increase the use of electronic commerce [Kim *et al*., 2010]. A lack of security awareness can make an organization vulnerable to the internal and external threats [Chen *et al*., 2006].

Top management leadership provides the strategic rationale for an organization's e-Government systems deployment, User support signifies the perceptions about the technical support from service providers for e-Government systems use, and Security signifies on the match between requirement for safeguards and protection and perceptions of those provided by e-Government systems.

3.2 Meta-structures of Domination: Top Management Leadership, IT Sophistication, Financial Resources, Organizational Absorptive Capacity, and User IT competence

Meta-structures for domination are provided by the political support, human resources and financial commitment for e-Government systems assimilation and the extent to which IS innovativeness, in general, is desirable and pursued in an organization. We identify accordingly, top management leadership as an organ-

izational factor and IT sophistication [Armstrong and Sambamurthy, 1999; Chwelos *et al*., 2001] (Technological), financial resources [Zhu *et al*., 2004], user IT competence [Tippins and Sohi, 2003] technological, and organizational absorptive capacity [Cohen and Levinthal, 1990; Tippins and Sohi, 2003] as the causal factors through which the meta-structures of domination operate to validate actions and behaviors for e-Government systems assimilation.

IT sophistication is a salient in the context of IT based innovation behaviors and it is concerned with the existing level of IS usage in the core part of an organization. Organizations with high IT sophistication possess superior corporate data resources, information management practices and resources for the organizational integration of IT innovations [Chwelos *et al*., 2001; Thong, 2001]. As a result, organizations with high IT sophistication should have capacity to transform business processes using e-Government systems innovations. User IT competence represents as human resources, specially the end users that can be used for e-Government system legitimizes and supports actions related proper utilization, integration with processes [Chwelos *et al*., 2001], enhancements during usage [Saunders and Clark, 1992]. Organizations with high competent human resources possess employees with high levels of IS knowledge that can provide best information management practices in the organizations. Prior research has shown that financial resources are an important factor for technology implementation [Zhu *et al*., 2004]. Sufficient financial resources help organizations to obtain necessary IT resources and develop them into superior e-business functionalities, so as to realize the potential e-business value [Chircu and Kauflman, 2000].

Organizational absorptive capacity is defined as its capability to "absorb," through its prior related infrastructures to assimilate and use new IT [Cohen and Levinthal, 1990; Tippins and Sohi, 2003]. The ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends is critical to its innovative capabilities and Cohen labels this capability a firm's absorptive capacity and suggest that it is largely a function of the organization's level of prior related knowledge [Cohen and Levinthal, 1990]. Organizational absorptive capacity is widely understood to enhance an organization's innovative capabilities [Liang *et al*., 2007]. The insight of absorptive capacity has been applied to explain IT usage in large organizations and shown how absorptive capacity can influence the intention to adopt an EDI system [Teo *et al*., 2003]. Again, assimilation can be greatly improved if organizations have prior knowledge that facilitates assimilation of external information and its application to commercial ends [Cohen and Levinthal, 1990].

Top management signals political support for the initiative and legitimizes actions and behaviors related to e-Government systems assimilation, by their active involvement in the deployment of e-Government systems. In other words, top management leadership directs political support for e-Government systems actions.

IT sophistication, financial resources, user IT competence, and organizational absorptive capacity all together reflect like organizational readiness to provide technological capabilities, financial and human resources, especially end

users respectively that should promote e-Government systems assimilation behaviors. Therefore, IT sophistication, financial resources, user IT competence, and organizational absorptive capacity plays key causal factors of the meta-structure of domination as it represents the organization's resources to act on intentions, pursue goals, and exert power related to e-Government systems assimilation.

3.3 Meta-structures for Legitimization: Top Management Leadership, e-Government Systems Standards Efficacy and Regulatory Environment

Meta-structures for legitimization are established by top management imperatives for e-Government systems and behavioral regulations associated with e-Government systems usage. This study identifies top management leadership (organizational factor), e-Government systems standards efficacy [Rai *et al*., 2006] (technological factor), and regulatory environment [Zhu *et al*., 2004] (organizational factor) respectively as the causal factors through which the meta-structures of legitimization operates to regulate e-Government systems assimilation behaviors.

Top management regulates actions and behaviors for IS assimilation, by establishing goals for initiatives and standards to monitor them. e-Government systems standards efficacy collectively composed of three components: (1) comprehensiveness, which is concerned with the scope of user requirements for the business process that can be governed by process standards, (2) flexibility, which is concerned with the range of user behavior in the business process that can be governed by process standards as well [Rai *et al*., 2006], and (3) enforcement, which is concerned with the actions taken by actors of formalized procedures to insure compliance and it could affect attitudes toward formalization [Kayworth and Sambamurthy, 2000]. By adopting certain e-Government systems standards to govern the e-Government business process, the organization indicates that these systems standards represent how to execute tasks and that compliance to these system standard is the approved mode of action [Rai *et al*., 2006].

Organization's comprehensiveness, flexibility and level of enforcement through which responsiveness to localized exploitation and enterprise-wide integration achieved, captured as e-Government systems standards efficacy, represents a meta-structure of legitimization factor. This should regulate actions and behaviors related to e-Government systems assimilation. Hence, the routines works embodied within the system standard thus incorporate norms about the criteria and the priorities to conduct tasks, as well as the logic by which tasks are related, which collectively represent meta-structures of legitimization [Rai *et al*., 2006].

Regulatory environment refers to governments' role to encourage e-Government systems usage by establishing e-Government laws and providing incentives. e-Government systems development and its life cycle requires the formulation of a new policy and regulatory framework. Regulatory environment identified as coercive pressure on assimilation e-Government systems that can arise from government as regulator or policies from professional and legislative influences and it has been recognized as a critical environmental factor affecting innovation diffusion within the Technology Organi-

zation and Environment (TOE) framework [Zhu *et al*., 2004]. Previous empirical studies also indicate that regulatory environment is a critical environmental factor that affects e-business use [Zhu *et al*., 2003], e-business diffusion [Kraemer *et al*., 2002], and companies operating in an environment where government policies are restrictive have low IT adoption [Dasgupta *et al*., 1999]. Regulatory environment represents a meta-structure of legitimization factor because it deals with the organizational standards regulating actions and behaviors for e-Government systems assimilation.

Ⅳ. Validation of the Framework

The purpose of this section is to demonstrate the applicability of the developed e-Government systems assimilation framework (EGAF) for explaining the observed patterns of assimilation within organizational context. Therefore, we analyzed one particular case of e-Government systems of Korean government, namely AgriX (Agriculture Integrated Information eXcellent System) to verify the developed framework.

4.1 Methodology

An in-depth, interpretive case study [Yin, 2003] was chosen for this verification because it is well situated to examine the interaction among different structural variables. 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]. Therefore, verification through case analysis is highly appropriate in this context, since a case can serve the purpose of exemplifying theory application and also can demonstrate why the theory is useful by making causal relationships transparent.

Data collection and analysis was exploratory and iterative as the authors spent a considerable amount of time reviewing background documentation and observing users' interactions with the systems providing public service in the relevant organizations. We conducted face to face interviews with 32 AgriX users and 8 top level public manager's interviews from the relevant organizations, and some telephone interviews for follow-up on important issues. We maintained a consistent discipline of sharing the data collected from document reviews and interviews, holding 1h meetings during the data collection process and in between communicating new developments by e-mail. Therefore, we rely on such qualitative data collection methods as observations, interviews and focus groups in order to investigate the natural setting where AgriX users operate the systems for delivering public service.

4.2 Case

AgriX is an integrated information system for efficient management of agricultural investments and was financed (invest about 1.19 B$ till 2013) by the Ministry for Food, Agriculture, Forestry and Fisheries (MIFAFF), Government of Korea. At the moment, 2 projects are dealt and 130 units of entire agriculture and forestry projects will be available online through total of 4 stages to set its ground as the representative system of Ministry of Agriculture and

Forestry (MIFAFF). The government organizations deployed AgriX are located at the municipal, county and district offices in all over the Korea. The projects dealt with municipal, county and district offices (government agency) of small or medium size (including some hundred thousands of citizens and employing small or a medium number of employees). These organizations were characterized by certain common attributes, such as central financial resources, and frequent transactions with the farmers. The key objectives of AgriX are to make business operations more innovative to increase the satisfaction levels of people working in agriculture, public service employees of municipal and district offices, and employees of MAF and to reduce the workload of public service employees. It has transformed multi-layered complex offline management of agriculture and forestry projects into an online web format, allowing farmers to submit applications for agriculture-related business without paper work (G2C) and helping government official deal with a myriad of work, such as reviewing and choosing applications, financing, and reporting through an online system (G2B). Government employees connect to the system through an electronic authentication process (public key infrastructure) and manage all the related tasks online and also monitor progress in real time. Therefore, AgriX also acts as an internal system to fulfill the objective of reducing the number of tasks government officials have to perform.

4.3 Factors of Meta-structures of Signification

AgriX developed was involved a combination of in-house development (the government were actively involved in the requirements analysis, the design, and the development) and outsourcing. First, the application form was standardized and the task redesigning that simplified unreasonable and unnecessary processes (Business Process Reengineering) and information strategy plan (ISP) were preceded by the government. There were constant complaints raised from the agricultural people, public service officers and officers of ministry that the existing offline business operation method that required a lot of time and effort in understanding various agricultural projects, application of project, receiving capitals and verification of eligibility was very complex and inconvenient. Hence, through AgriX deployment a multi layered complex offline method transformation into online method was suggested. This organizational environment creates a dare to change old rules which makes top management leadership, user support from AgriX provider and its security crucial factor for its usage.

Top management involvement was a crucial issue in the deployment of AgriX. They modify prevailing structures, introduce complementary structures to facilitate technology use, and reinforce norms that value the use of the AgriX thereby changing the organizational environment. Further, top management plays a role in regulating the pace of AgriX by establishing goals and targets for its assimilation. Hence, they actively participate in formulating a strategy for the deployment and organizational use of the AgriX as well as establish goals, and standards to monitor AgriX.

Throughout the assimilation life cycle of AgriX, without strong ongoing leadership back-

ing from top management, it becomes difficult, if not impossible, for organizational members to see how AgriX are related to the organization's mission and strategic goals, to allocate valuable resources to support e-Government systems initiatives, and to overcome inertial routines and establish new ones to actually use AgriX in daily work.

While top management articulates the strategic vision for AgriX deployment, User support from providers and Security provides the relational and technological context for employees to interpret behaviors and events related to AgriX. Service providers of AgriX provide prompt service to users and they keep their promises to do something by a certain time. Therefore, User support from provider plays a key meta-structuring role of signification by shaping the cognitions, actions, and behaviors of users with respect to their day to day activities usage application with AgriX, and then with respect to their limited and broader deployment of the AgriX applications. Again, security in AgriX provides a set of interpretive schemes for users to structure and understand how sensitive information can be protected by the systems itself as well as for online communications and transactions. Hence, the users' feel comfortable with the security that AgriX provide to conduct transactions.

Top management leadership plays a key role in each of the three meta-structuring actions naming as signification, domination, and legitimization. By articulating a vision and establishing a strategic plan, top management establishes a context within which AgriX actions and behaviors assume meaning. Further, top management legitimizes AgriX assimilation by demonstrating their commitment and political support through participation in deployment initiatives.

4.4 Factors of Meta-structures of Domination

Sophisticated use of AgriX with high competent human resources possess employees with high levels of IT knowledge which provided best information management practices in the organizations in assimilating AgriX. Further, in the AgriX realm certain aspects of the knowledge ability of the agents are partly manifest in their descriptions of the role that the system has as part of its environment and the development decisions that are based on such descriptions [Meneklis and Douligeris, 2010]. Citizens does not require to visit government office because of AgriX and it has also reduced operational costs and improve quality of decision making through which productivity improvements achieved, thereby it represents the sophisticated use of IT. AgriX users' were knowledgeable about new computer based innovations and in terms of organizational absorptive capacity IS management team were well informed about business operations of each unit and technical support staff is knowledgeable when it came to AgriX. These organizations high in absorptive capacity have the ability, skills, and accumulated knowledge to acquire information about technological opportunities, to invest resources to exploit them, and to act proactively to innovate on a consistent basis [Srinivasan *et al.*, 2002]. Therefore, IT sophistication, user IT competence, organizational absorptive capacity, and financial resources all together reflect like

as organizational readiness for AgriX and inform the key causal factors of the meta-structure of domination to AgriX assimilation suggesting that these resources are critical to infuse business process at the work routines of public professionals.

4.5 Factors of Meta-structures of Legitimization

AgriX was explicitly defined and conceptualized as platforms for service delivery. Since transactions in the AgriX often involve very sensitive information, an adequate regulatory environment in which its activities can be conducted smoothly and securely was deemed vital. Therefore, the role of e-Government systems standards efficacy and regulatory support became essential for its assimilation. As standards embody rules on how AgriX should be used and establish the institutional structures to regulate individual actions and behaviors related to the business process.

On the direction of influence from the systems standards efficacy and regulatory environment to the AgriX focused not only on organizational aspects but also on legal regulations surrounding the systems' operation. The power of these regulations extended well beyond the municipalities' bounds to a national level. The legal environment of the systems was in AgriX particularly diverse because of its link with the various institutions in complex layers such as central administration institutions, local communities and related institutions and the agricultural people who are the beneficiary are scattered all over the country. The association included organization from various ministries and the legal framework of each of them was different from the rest. The environment not only affected the way that the AgriX was designed and eventually implemented, but environment could also be potentially altered by the realization of such a system. This phenomenon evidences that events of legal and organizational nature instead of being addressed as independent and exogenous to each other can be considered as mutually implicated.

In summary, this case concludes that the meta-structures of signification, legitimization, and domination operate through organizational, inter-organizational, and technological factors to impact the assimilation of the AgriX. All three meta-structures operate through Top management leadership to impact the AgriX assimilation. The meta-structure of signification operates through user support, Security to promote the general deployment of e-Government systems assimilation. The meta-structure of domination, operating through financial resources, IT sophistication, user IT competence and organizational absorptive capacity all together reflecting like organizational readiness, gains importance in AgriX assimilation. The meta-structure of legitimization, operating through e-Government systems standards efficacy and regulatory environment appear to be more influential in facilitating the deployment and adoption of AgriX. These results consistent with other studies that report, the meta-structures of signification, legitimization, and domination play an important role across all IT innovations and gains importance throughout of assimilation of a buyers' firm [Rai *et al*., 2009], therefore we extended these findings to the e-Government systems assimilation context.

Ⅴ. Conclusion

This study developed an organizational e-government systems assimilation framework through the structurization of the factors of organizational IS assimilation grounded upon the structuration theory, and on the extant literature of inter-organizational IS assimilation. Our theoretical framework reconciles the independent contributions of three streams in the literature: first, the furthering of the theoretical perspective of e-Government systems assimilation through a structurational lens which focuses on the evaluation of assimilation; second, a detailed exposition of the structuration theory and an illustration of its application to the issues of e-Government systems assimilation in the organizational context; and third, the isolation of a usable set of theoretically grounded factors affecting e-Government systems assimilation that can be applied in future research and practice.

5.1 Theoretical Contributions

Given the strategic potential of e-Government systems for government business innovation, we developed a comprehensive framework for e-Government systems assimilation. Our study makes the following theoretical contributions.

First, furthering of a theoretical perspective of e-Government systems assimilation enriching the extant literature of organizational IS assimilation. This framework can be an initial step for extending and enriching the extant literature on IS assimilation adding the context of e-Government systems assimilation. Therefore, this study provides important new insights into the e-Government systems assimilation and report that each of the three meta-structures, and the identified eight factors through which they operate, may play a significant role across e-government systems assimilation which can be applied in future research and practice. This paper maps the meta-structures of signification, legitimization, and domination to a set of organizational, inter-organizational, and technical factors and then structurized these factors to the e-Government systems assimilation context. Although a limited number of prior structuration based studies had applied the theory to the best of our knowledge, this is one of few studies to apply this theory to the e-Government systems assimilation.

5.2 Managerial Implications

This research has significant implications for public managers, especially within the context of managing IT deployment and its assimilation within public organizations. Through a sound regulatory environment, governments can encourage e-Government systems usage by establishing supportive business laws to protect e-transactions, regulating the internet to make it a trustworthy business platform within G2G, G2C and G2B. They can accelerate e-Government systems assimilation by establishing required e-Government systems standards act and laws to make IS business platform. As we argue that if e-Government systems assure system standards with its attributes as comprehensiveness, flexibility and level of enforcement, and sound regulatory environment, the cognitions, actions, and behaviors are positively reinforced, thereby promoting e-Government systems assimilation.

Public managers can benefit from knowing what are the structures and factors through which they operate, play key role across e-Government systems assimilation processes to improve organizational capabilities and under what circumstances these processes are likely to succeed or fail. Hence, this research offers a useful framework for public managers to assess the organizational, technological, and inter-organizational factors that shape the meta-structures for the assimilation of e-Government systems for better pursuance. They should formulate their organization's e-Government systems strategy through process changes, technology integrates, and personnel trains. Public managers can support e-Government systems assimilation by signifying why the change is being undertaken and how it maps to the overall government business strategy, by legitimizing the use of e-government systems in place of traditional approaches, and by exerting dominance to overcome inertial forces. They can legitimize assimilation by enforcing a complete set of flexible standards for improving organizational efficiency, operational transparency and public satisfaction to impact business process and create business value of e-Government systems.

Finally, this study also has implications for government policymakers. The all three meta-structures operate through top management leadership reports as a driving force in obtaining e-Government system assimilation. This structuration of the dynamic nature of leadership allows decision-makers in government organizations to correct their current operations and develop strategies to address problems and focus on the creation of leadership in the organization in order to accelerate e-Government systems assimilation.

5.3 Limitations and Future Research Directions

It is important to examine some of the limitation of this study and raise some future research directions. Our study utilized an interpretive case study to test the framework. While this design is suitable to address the questions that we are interested in, a cross-sectional survey design or a longitudinal research study on e-Government systems assimilation can generate insights on how the different structuration factors change and interact over time to affect e-Government systems assimilation. Future research adopting a different sampling strategy will be useful to validate our proposed framework and findings. Furthermore, recently, Hossain *et al*. [2011] investigated the impact of organizational assimilation of e-Government systems on business value creation and found a substantial impact of it on value creation [Hossain *et al*., 2011 , doi: 10. 1016/j.elerap. 2010. 12. 2003]. Furthermore, Rai *et al*. [2009] also investigated the assimilation of electronic procurement innovations and its impact on procurement productivity in buyer organizations and found a substantial impact of the assimilation of these innovations on procurement productivity [Rai *et al*., 2009]. This signifies that e-Government systems or other information systems assimilation within organization creates business value. Hence, future research should extend this framework to investigate the effects of e-Government systems assimilation on value creation in the organizational contexts.

Finally, we hope that our theoretical per-

spective and managerial findings will stimulate researchers to investigate e-Government systems assimilation in a wide variety of settings using multiple streams of literature to build a cumulative body of evidence that can advance knowledge about its organizational assimilation and have significant practical implications for how government organizations should manage e-Government systems assimilation to streamline their digital mission.

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