Chapter XI
Diffusion of Innovation and Capability Theory in the Context of E–Government

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ABSTRACT

E-government (EG) enables governments to provide citizens easier and electronic access to information and modernized services through personal computers, kiosks, telephones, and other resources. Information and communication technology (ICT) is the prime driving force of EG. Therefore, before implementing an EG project, it is vital to investigate the capability of developing countries to adopt ICT and research the impact of adopting ICT in that society. The authors argue that the purposes of implementing EG can only be accomplished and the full benefits of EG realized if a majority of the population of developing countries has the ability to adopt ICT, the main driver of EG. Therefore, it is essential for policy makers of developing countries to study the adoption capability of ICT of citizens prior to launching EG. Otherwise, there is the strong possibility that EG projects could not accomplish the purpose of its implementation and could fail to reduce the digital divide, establish equal rights for all citizens, and promote good governance.

INTRODUCTION

Over recent years, information technology (IT) has experienced an unprecedented degree of change, enabling the transformation of the basic mechanisms of public administration and business. This transformation is accelerated and supported by computer-based applications to the management processes (Miers, 1996). The emergence of the Internet as a general communication channel has also opened the opportunity for E-government (EG) and E-commerce (EC) to be globalized. The adoption and extension of IT is now a major concern in many countries. According to Lanvin (1995), the development of global technology infrastructure is imperative to help both developed and developing countries improve the image of business organizations and exploit the global market substantially (Wilson, 2001). It plays a significant role in the present information- and knowledge-based market by planning, generating, managing, and transmitting information in the most effective way. Modern IT provides easy access and availability across the countries and invites potential customers by providing the necessary information through the Internet. Therefore, the global proliferation of technology is the backbone of global EG and EC. However, the sphere of the scope of EG is much wider than EC. Alternatively, EC is only a fragmented part of EG. EG is about complete relationships with both the public and private institutions and the foundation of our next-generation states and communities. Understanding what citizens and businesses want and how government, the private sector, and other institutions will be integrated is the vital function of EG. Transformation and reengineering of public institutions require new discourses about policy issues and political realities and their impact on the satisfaction of different stakeholders (Sakowicz, 2007). The EG model should also encompass the evolution of ICT, the reformation of public administration, and the integration of stakeholders. Therefore, EG has a

much wider, more extensive, and more exhaustive application of ICT than does EC.

EG refers to government's use of IT to provide and exchange information and services with citizens, businesses, and other stakeholders of government. It is a tool to transform and reengineer public sector work through the use of ICT (Schware and Deane, 2003). It enables government to provide citizens with easier and electronic access to information and modernized services from anywhere in the world through personal computers, kiosks, telephones, and other resources (Banerjee and Chau, 2004). This suggests that citizens, for example, no longer need to claim services in person over the counter. EG involves using ICT to deliver public services through digital channels. Throughout the world, governments are realizing the potential of placing traditional government services online. However, varying degrees of complexity, failure, and success in the process have been observed from different parts of the world. Different EG implementation results (Heeks, 2002; Ho, 2002; Moon, 2002) show that strategic development of EG initiatives can be very complex, which demonstrates the difficulties of transition to EG.

Previous experiences also demonstrate that the proper implementation of EG is very complex and depends on many different factors. Moreover, since its main mission is citizen driven, its implementation, development, and performance should be such that it meets the criteria and facilitating factors that enable citizens to adopt this modern technology-driven government system—EG. In this connection, the diffusion of innovation (DOI) theory can be a powerful instrument to investigate the facilitating factors for adoption of ICT-based EG by citizens (Carter and Bélanger, 2005; Moore and Benbasat, 1991; Rogers, 1995; Tornatzky and Klein, 1982). EG should also overcome the initial resistance of citizens, be culturally sensitive, and change the way different stakeholders of EG relate to each other. One potential concern in this aspect is the digital divide. Does a majority

of the population in developing countries, which are less advanced in technology diffusion (exceptions are developing countries like India, China, Malaysia, South Korea, Thailand, and Brazil), have the capability to adopt ICT? The capability theory introduced by Nussbaum and Sen (1993) can provide significant insight in conceptualizing the capability to adopt ICT grounded on DOI.

User ability and acceptance of a new technology can be defined as the skill, integrity, and competence of users to learn, use, and adopt a new technology and also capture the functional benefits of that technology, either completely or partially, and demonstrable willingness to employ that technology for the tasks it is designed to support. Thus, acceptance theorists are less concerned with unintended and unplanned uses and more interested in understanding the factors influencing the ability to use and accept technologies as planned by users who have specific intentions to use it. DOI is an IS theory that models how users come to accept and use a technology, and thus technology is diffused throughout the population. The model suggests that when users are presented with a new technology, a number of societal, behavioral, and individual ability factors influence their decision about how and when they will use it. Researchers have investigated a wide range of issues relating to technology diffusion and transfer. These factors include the attitude of a government, the technology absorption capability of citizens, appropriateness of technology, and the management of ICT. Also important are the development and maintenance of technology, cooperation or conflict between government and citizens, and the social and economic benefits of EG through adopting the new IT (Brudney and Sally, 1995; Bugler and Stuart, 1993; Cusumano and Elenkov, 1994; Norris and Moon, 2005).

The strategy and objectives of EG development has technological, social, economic, organizational, marketing, and political aspects. From the technological point of view, different countries strategically implement EG to institutionalize modern ICT in the government, make citizens familiar with ICT, and capitalize on the benefits of this technology. From the social point of view, the implementation strategy of EG focuses on changing social relations between government and citizens, creating more opportunity for citizens to participate in government decision making, and improving living standards. The economic aspects of developing EG lies in boosting national development, keeping a leading position in the global economy, integrating the domestic market, and promoting international investment, which will improve the economic capability at the micro level. From the organizational perspective, EG has as an objective to reform and re-engineer public administration which can be very bureaucratic, corrupt, and stagnant. The marketing aspect of EG is mostly driven by improving the service quality, which ensures its competence with the private sector. This agenda includes efficient, cost effective, dynamic, extensive, easy, and higher quality services of government to citizens and businesses. The political aspect of EG has as its objectives to enhance public participation and access to government information and decision making, promote a cohesive government with all the stakeholders of government, improve transparency and accountability, and, thus, to improve governance.

However, in order to develop a citizen-focused, EG system that provides participants with accessible, relevant information, and quality services that are more expedient than traditional "brick and mortar" transactions, government agencies must first understand the factors that influence citizens' adoption of this innovation. Developing countries are especially vulnerable to adoption of EG, since ICT is the primary driving force of EG. Due to a significant digital divide in developing countries between the urban and rural populations, accomplishing the primary objectives of EG as a nation fundamentally depends on the adoption capability of ICT among the less advanced population. If it is discovered that the impact of implementing ICT at the national level

reflects more discrimination and a deeper digital divide in respect to the social, technological, and financial aspects, it is rarely possible to succeed in implementing EG. Numerous studies (Basu, 2004; Dada, 2006; Ndou, 2004) have shown that it is not only the application of EG, but also ICT in general, that have abruptly failed in developing countries. Success stories can be cited in literature, but failures are more frequent (Krishna *et al.*, 2005). Heeks (2003) studied the application of EG theme in developing countries and found that 35 percent were classified as total failures at the outset of the application or immediately afterwards, and 50 percent were termed as partial failures, i.e., the major goals were not attained or there were unexpected and freaky outcomes. Why did this happen or why is it still happening? Several scholarly articles (Bhatnagar, 2002; Dada, 2006; Heeks, 2002; Madu, 1989) noted that IT is still not diffused in developing countries as a means of appropriate communication, and they also observed that it was a subtle mistake to implement the models of ICT in developing countries by copying directly from developed countries. The technology absorption capacity of developing countries and its impact are quite different from developed countries. Before funding and implementing EG in developing countries, it is a challenging issue to identify the generic and distinctive characteristics of developing countries in terms of the overall technology absorption capabilities of citizens and its impact on the digital divide, since ICT is the driving force of EG. Existing literature hardly addresses this aspect comprehensively, because research into issues related to the implementation of EG are at an early stage (Heeks and Bailur, 2007; Titah and Barki, 2005). However, understanding and conceptualizing this issue is very important for researchers, practitioners, and United Nations organizations (Madon, 2004; Madu, 1989). Therefore, the objective of this research is twofold:

1. To identify the prime purposes of EG development as a major sector of ICT and to identify the issues related to accomplishing those purposes.
2. To explore the use of DOI theory to learn the adoption capability of ICT and shed light on the capability theory.

To accomplish the abovementioned objectives, this study is focused on developing countries. Because developed countries like, USA, Canada, UK, Denmark, Finland, Sweden, Japan, Australia, France, Germany, Italy etc. have already shown enormous success in achieving nationwide implementation of EG. However, due to severe digital divide, non-availability of resources in rural areas, scarcity in capital, higher illiteracy rate, less diffusion of ICT (exceptions are developing countries like India, China, Malaysia, South Korea, Thailand, and Brazil); most of the developing countries are substantially struggling to achieve the strategic mission and objective of EG (Shareef *et al.,* 2007). Therefore, revealing EG adoption capability of overall citizens of developing countries is a potential question to be investigated. The next section deals with the strategic objectives of EG and the issues related to accomplishing those purposes. In this connection, special attention is given to a major controversy of ICT adoption, viz., the digital divide along with shedding light on capability theory. The following section addresses and describes the elaborately conceptual paradigms of the DOI theory with brief conceptualization of exogenous and endogenous variables. Then ICT adoption capability is theorized, based on operationalization of DOI constructs. Finally, we reach a conclusion and offer future research direction.

EG: STRATEGIC OBJECTIVE OF IMPLEMENTATION

EG is a new and fast growing area that is being increasingly studied by researchers from many disciplines, who bring with them their various accumulations of concepts. Being new, there has

been limited time to develop conceptual paradigms and theories. Governments, especially of developed countries, are increasingly using ICT in their daily operations and businesses and in presenting government system and services. As a consequence, the study of EG has increased in recent years and researchers attempt to develop theoretical and conceptual paradigms to understand and analyze different aspects of EG (Cresswell and Pardo, 2001; Dawes *et al.,* 2004; Fountain, 2001; Gil-García and Pardo, 2005; Gil-Garcia and Martinez-Moyano, 2007; Gupta and Jana, 2003; Moon, 2002). There are several aspects to EG, such as social, technical, economic, political, and public administrative. As a result, different authors define the fundamental concepts and paradigms of EG from different perspectives. However, most dominating concepts of EG arise from the technical perspective. The use of the Internet and ICT has become an essential part of many government organizations to move forward (Steyaert, 2000). This movement of government organizations towards more IT-based service is simply called EG. EG has potential in that it facilitates the delivery of government services in the electronic form, which is fast, dynamic, efficient, and transparent, and this can, in turn, lead to a considerable reduction of service cost and an increase in the satisfaction of its stakeholders (Al-Mashari, 2007). Gil-Garcia and Martinez-Moyano (2007) delineated the concept of EG as the use of ICT in government settings. Evans and Yen (2006) defined EG as the communication between the government and its stakeholders via computers and the Internet. Hernon *et al.* (2002) defined the meaning of EG as using "technology, particularly the Internet, to enhance the access to and delivery of government information and services to citizens, businesses, government employees, and other agencies." From a technical standpoint, EG initiatives usually involve several types of electronic and information systems, including a database, front office and back office storage, computers and networking, multimedia,

automation, security systems, and personal identification technologies (Snellen, 2002).

Accomplishment of ICT Adoption Through EG

After the advent of the Internet, IT and electronic communication played a very important role in fulfilling the vision of reforming government in an entirely different way. Innovations in ICT have dramatically transformed organization-customer, government-citizen, and inter-state communications. The Internet gradually has matured into a universally accepted and user-friendly platform for government organizations to communicate directly with citizens and deliver information at any time of day. Therefore, ICT is believed to be conducive to the movement of government reinvention. It has transformed the way government operates. EG is the pragmatic use of ICT to improve the way that government performs its business. It can be seen as a modern government organizational structure operated through ICT to transform and rationalize public sector work so that citizens have easier and electronic access to information and modernized services through personal computers, kiosks, telephones, and other resources (Banerjee and Chau, 2004; Schware and Deane, 2003).

By using the EG structure, both citizens and government can get a competitive advantage. Citizens can receive effective, efficient, and better quality service whereas governments can reduce operation and management costs, increase transparency, and fulfill political commitment to establish good governance. In the USA, the Internal Revenue Service (IRS) saves significant amount of government costs on printing, sorting, and mailing tax materials by offering web access to citizens and business organizations to tax return forms and publications (Warkentin *et al.,* 2002). EG services are cheaper, faster and more readily available from anywhere and at any time. EG also reduces travel and waiting time, introduces

more efficient and effective payment methods, improves transparency and accountability of government operations and eventually leads to transformation of good governance (Abanumy *et al.,* 2003; Prattipati, 2003).

However, all the previously mentioned purposes of EG can only be fully realized if its prime stakeholders, viz., citizens, can adopt this system (Carter, & Bélanger, 2004; Kumar *et al.,* 2007; Shareef *et al.,* in press; Warkentin *et al.,* 2002). But, among many other factors, citizens must have the capability to use ICT to adopt the EG system, Therefore, to accomplish these purposes of launching EG, its main driver should be available and accepted among all the citizens. If adoption and use of ICT in EG create a digital divide and discriminate against a majority of the population, its citizens-centric focus service will totally collapse (Evans and Yen, 2006). Certainly, in that case, EG will fail to create equal rights for all of the population, which is the fundamental premise for any good governance (Okot-Uma and Caffrey, 2000). However, since a majority of the population in developing countries lives in rural areas, the main obstacle for EG to accomplish its prime purposes is its low adoption rate among the rural population due to the severe lack of acceptance of ICT by rural people. Several researchers pointed out that the main cause of failure of ICT in developing countries is the digital divide (Bhatnagar, 2002; Dada, 2006; Heeks, 2003). The term digital divide refers to the gap between those people who have available resources to use and get the benefits of information technology and who do not have the right, freedom, ability, or resources available to use information technology. It includes the disparities to adopt and effectively use EG system. Especially in developing countries, a majority of the population has neither access to ICT or the skills needed to use ICT (Wilhelm, 2004). The present adoption rate of EG initiatives by stakeholders in developing countries, especially citizens who are the prime stakeholder of government, is very low. According to a study

conducted by Taylor Nelson Sofres (2002), the average adoption rate globally for EG is still only 30 percent. For developing countries, this adoption rate is lower and among rural people, it is extremely low (Taylor Nelson Sofres, 2002). The prime reasons for this low adoption rate of ICT and, thus, EG, are mostly due to less awareness, the unavailability of resources, and overall lower capability to use it.

Therefore, to realize the full benefits offered or proclaimed by EG, the capability of adoption of ICT by citizens must be enhanced. When more citizens can use ICT, more people will adopt EG, and this will reduce the operation and management costs of EG (Carter and Belenger, 2005). For this reason, we can see from our extensive literature review that the implementation, adoption, and diffusion of an ICT-based public administration system, viz., EG, can be conceptualized and give significant insight into different technology diffusion, acceptance, and transfer theories (Belenger and Carter, 2005; Bretschneider and Wittmer, 1993; Carter and Belenger, 2005; Caudle *et al.*, 1991; Chircu and Lee, 2003; Danziger, 2004; Gefen *et al.*, 2002; Gilbert *et al.*, 2004; Norris and Moon, 2005; Phang *et al.*, 2005; Ventura, 1995; Warkentin *et al.,* 2002). These authors and many others address implementation, adoption, and diffusion of ICT in public and private organizations and show that an incapability to adopt ICT might create severe discrimination among citizens of a country. This is especially true in developing countries where a majority of the citizens do not have the resources and knowledge to be able to adopt ICT (Basu, 2004; Dada, 2006; Heeks, 2003; Ndou, 2004). Consequently, these citizens who are not capable of adopting ICT fail to use EG and, thus, the implementation of EG produces a severe digital divide in society. Therefore, from our thorough literature review, addressing issues such as the implementation, development, and adoption of EG (Carter and Belenger, 2005; Evans and Yen, 2006; Gil-Garcia and Martinez-Moyano, 2007; Heeks, 2003; Heeks and Bailur,

2007; Irkhin, 2007; Jaeger and Thompson, 2003; Kumar *et al.,* 2007; Moon, 2002; Reddick, 2006; Titah and Barki, 2005; Warkentin *et al.,* 2002), we can remark:

1. EG is significantly dominated by ICT.
2. EG operates through ICT and offers benefits and competitive advantage both for governments and citizens.
3. However, the full benefits of EG are still far from expectation.
4. Adoption rates of EG, operated through ICT, for a majority of citizens of developing countries are low due to lack of awareness, inability to use ICT, and unavailability of resources.
5. The prime reason of failure to use EG is the inability to adopt ICT.
6. The inability to adopt ICT and, thus, the failure to use EG will consistently defeat the strategic purpose of implementing EG.
7. Digital divide is a potential issue for extensive implementation of EG.
8. Diffusion of Innovation theory (DOI) can provide deep insight into strategic development of EG in developing countries.

Digital Divide: Capability Theory

EG will not be successful if the users do not have the ability to use the technology to access useful information and services. Linked to this is the lack of skills and training that are required to effectively use an EG system that is mostly available to privileged citizens in developing countries. This problem has been referred to by numerous academics (Ebrahim and Irani, 2005; Ho, 2002; Moon, 2002). Disparity in access to EG and discrimination in facilitating the same scope of opportunity for all stakeholders of EG are potential managerial issues (Bertot, 2003). Gaps in access to and use of EG can be related to a number of aspects, including gender, race, color, political involvement, income level, educational level, language, and disability. The issues of the

digital divide seem to be present across cultures and nations. (Bertot *et al.*, 1999). All communities need the same services available for them. As a government structure, EG should create a level playing field for all of the population; otherwise, EG in the modern world cannot proliferate.

In this context, if we shed light on the capability theory, we can observe that without equal capability, defined by awareness and availability of resources and skill, the scope of the same opportunity cannot either be created or justified. Following Nussbaum and Sen (1993), the capability approach is defined here as the development objective of a government that seeks to enhance the ability of its stakeholders by expanding and procuring modern ICT and to provide good governance by enhancing the freedoms and capabilities of individuals and groups to voluntarily engage in sustainable state development. Depending on this phenomenal concept of welfare economics, we can develop our paradigm that without creating the same capability for all of the population to use ICT, the adoption of EG and the purpose of implementing EG, cannot be accomplished or justified (Gigler, 2004; Harris, 2005). Rather, implementation of EG in developing countries might have the effect of increasing inequality, the digital divide, and discrimination. Therefore, the single most important issue for the policy makers of developing countries is to study the adoption capability of ICT, especially among the rural population, before launching EG where ICT is the main driver (Bhatnagar, 2000; Krishna and Madon, 2003; Madon, 2000). In this regards, DOI is regarded as a powerful tool to investigate the issue of adoption capability of ICT.

CONCEPTUAL PARADIGMS OF DIFFUSION OF INNOVATION THEORY

DOI (Rogers, 1995) is a popular model used in IS research to explain user adoption of new technologies. Although its acronym is DOI, it is alter-

natively known as Innovation Diffusion Theory (IDT). This theory is extensively used in information systems (IS) literature for finding epistemological and ontological paradigms of endogenous constructs like diffusion of technology, quality of technology, adoption of technology, strategy of implementing ICT in different projects, and the adoption and diffusion of EG and EC. Based on the paradigms of this theory, a researcher generally must conceptualize the exogenous variables, viz., latent constructs, compatibility of technology, complexity of technology, and relative advantage relating to the aforementioned concepts postulated here as endogenous constructs.

The study of DOI is the study of how, why, and at what rate new ideas, concepts, products, and technology spread across communities. Accordingly, "the innovation-decision process is the process through which an individual or other decision-making unit passes, 1) from first knowledge of an innovation, 2) to forming an attitude toward the innovation, 3) to a decision to adopt or reject, 4) to implementation of the new idea, and 5) to confirmation of this decision" (Rogers, 2003, p. 161). The diffusion of innovation and adoption can be defined as the "process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003). Rogers (2003) further points out that this innovation decision process "can lead to either adoption, a decision to make full use of an innovation as the best course of action available, or rejection, a decision not to adopt an innovation." Innovation, in turn, is relative to the adopter, being any "idea, practice, or object that is perceived as new by an individual or other unit of adoption". Rogers (1962) theorized that innovations would spread through members of a community in an S curve, as the early adopters accept the technology first, followed by the majority, until a technology or innovation is common. "The speed of technology adoption is determined by two characteristics: p, which is the speed at which adoption takes off, and q, the speed at which later growth occurs" (Rogers, 1962).

However, the full adoption process depends on several factors called variables. Gallivan (1996) suggests that the appropriate adoption process depends on:

1. Individuals' innovativeness
2. Innovation type
3. Innovation attributes
4. Implementation complexity

According to the operationalization of this theory, the rate of diffusion is affected by an innovation's relative advantage, complexity, compatibility, trialability, and observability Rogers (1995). Rogers (1995) addresses relative advantage as "the degree to which an innovation is seen as being superior to its predecessor." For EG, it is the relative advantage (as perceived by the citizens) of presentation of government information, service, and interaction through websites with the use of ICT as compared with the traditional presentation of government physical office functions. Complexity comparable to competence in use is "the degree to which an innovation is seen by the potential adopter as being relatively difficult to use and understand." Compatibility refers to "the degree to which an innovation is seen to be compatible with existing values, beliefs, experiences and needs of adopters." For EG systems, we assume compatibility as the preference of citizens using EG websites that match with the behavioral attitudes of the citizens. Trialability is the "degree to which an idea can be experimented with on a limited basis." And observability is the "degree to which the results of an innovation are visible." Several literature reviews suggest that relative advantage, compatibility, and complexity are the most relevant constructs to determine the adoption characteristics of ICT by citizens (Carter and Bélanger, 2005; Moore and Benbasat, 1991; Rogers, 1995; Tornatzky and Klein, 1982). In addition, Moore and Benbasat (1991) propose that a new construct, Image, should be added to DOI; this construct influences the acceptance and

use of an innovation. Image refers to citizens' perceptions of innovation as a status symbol. Interaction with EG systems based on ICT, instead of using a traditional government office, reflects a perception of the superior status of citizens. Several researchers have encountered this theory while identifying the constructs of ICT-based EG adoption (Bretschneider and Wittmer, 1993; Carter and Bélanger, 2005; Gilbert *et al.* 2004; Shareef *et al.,* 2007, Shareef *et al.,* forthcoming; Ventura, 1995).

IMPLEMENTATION OF EG: ICT ADOPTION CAPABILITY

As IS researchers, policy makers, and United Nations organizations have been addressing the challenge of the digital divide and technology failure in developing countries, the strategic implementation of EG-based ICT research has become a prominent issue (Adam and Wood, 1999; Madon, 1991). While researchers and United Nations organizations report on the strategy of implementation of EG, the adoption of ICT to increase the overall capability of a majority of the populations of developing countries is very limited (Meso *et al.*, 2006). In recent years, United Nations, non-government organizations (NGO), and some researchers (Heeks, 2002; Madon, 1997; Sahay and Avgerou, 2002; Sein and Ahmad, 2001; Walsham and Sahay, 2006) have been addressing this issue in scattered ways.

Madon (2003) developed an exploratory framework for assessing the impact of EG projects through empirical study in a developing country, however, it did not account for the pre-implementation perspective, viz, ICT adoption as a general criterion. Many aspects of the initial situation prior to the implementation of EG must be known so that the diffusion of ICT among the population can be evaluated as the condition of the pre-implementation phase of EG (Menou and Potvin, 2007). Therefore, an assessment of

the adoption capability of ICT-based EG is a long-term, continuous process that is contingent upon a variety of factors related to the capability of technology adoption.

Therefore, based on literature review and the discourses drawn from the above discussion, this research argues that strategic implementation of EG should be evaluated based on the capability of adoption of ICT by citizens. Otherwise, the fundamental objective of EG might not be achieved and a government could be accused of creating discrimination among citizens by introducing EG. In this regard, the DOI theory can be used to shed light on the capability theory. Before implementing EG extensively in different public organizations at the local, provincial, and federal levels, an ad-hoc study is essential to investigate and determine whether people are ready and capable to adopt ICT. Getting insight from the capability theory, the capability of adoption is defined by this research as the ability of citizens becoming familiar with modern technology, getting availability of resources required to sufficient access and use, achieving skill to use, and perceiving functional benefits of ICT.

From the implied essence of theory of planned behavior and DOI theory, a user will not have an intention to use the ICT system to get a competitive advantage unless the user has the skill, integrity, and competence to learn, adopt, and use it, and perceives the functional benefits of modern ICT. This is especially true for several developing countries that are less advanced in terms of ICT diffusion and usage. A majority of the citizens of these countries are less educated, do not have enough skill, and are unaware of characteristics and functional benefits of ICT. If that majority of the population does not get sufficient skill and knowledge to use it and realize the absolute and relative functional benefits, they will not invest time and money in learning and using ICT (Dixit, 2006; Mansell, 2002; Mansell and When, 1998).

This research argues that since a majority of the citizens of most of the developing countries (some exceptions are developing countries that are very advanced in usage and adoption of ICT such as China, India, Malaysia, Brazil, Mexico, Thailand, Taiwan, Hong King, and South Korea) are less educated and unfamiliar with modern technology, the purpose of implementing EG should be evaluated based on the capability of a majority of the citizens to adopt ICT (Dixit, 2006; Mansell, 2002; Mansell and When, 1998). At the beginning, to create the belief in and intention to use ICT, people must be aware of the characteristics of ICT and its functional benefits. Overall readiness by awareness, ability, intention, and preparation are contributing factors for the capability to absorb ICT and implement EG. EG fails if the users do not have the ability to use the technology to enable access of useful information and services and do not perceive EG as useful.

Due to revolutionary re-engineering of the traditional government system, the perception of the online organizational structure, which is apparently new, is an important aspect to the perceived ability of using the system. Knowledge of technology is important in the ability to use EG. We argue that perceived complexity of DOI theory can successfully capture the ability of citizens of developing countries to adopt ICT-based EG. This construct can be operationalized through the use of perceived ease of use (PEOU) of the technology adoption model (TAM). TAM is a widely referenced theoretical model for predicting the intention to use and the acceptance of IS by individuals. It proposes that PEOU and perceived usefulness (PU) determine the attitude toward adoption of ICT. This attitude, in turn, leads to the intention to use ICT-based projects and the eventual acceptance and adoption of the IT (Bhattacherjee, 2001; Davis, *et al.*, 1989; Lucas and Spitler, 1999; Moon, 2002; Venkatesh, 2000). Davis (1989) defined PEOU as "the degree to which a person believes that using a particular system would be free of effort." PEOU is assumed

to influence the perception of relative advantage, because the easier a system is to use, the more useful it can be. Relative advantage captures the gain and comparative benefits from adopting a new system in comparison with the existing system (Rogers, 1995). At the personal or organizational level, several aspects of benefits can determine its adoption decision, ranging from effectiveness, efficiency, availability, accessibility from anywhere, comfort in use, time savings, cost savings, and convenience. Relative advantage is a matter of perception of relative benefits, which also capture the TAM's emphasis on perception of usefulness. If citizens perceive functional benefits by adopting an EG system, they might be interested in developing the fundamental capability to adopt ICT. Therefore, we argue that the relative advantage construct of DOI and PU of TAM can be used to model the implementation strategy of EG and adoption of ICT. These constructs can be operationalized to capture the relative benefits and usefulness of adopting EG system by the citizens of developing countries in terms of time, money, availability, travel, bureaucracy, corruption, participation, etc, and termed here as the Perceived Functional Benefits (PFB) of EG. This construct has economical, organizational, marketing, behavioral, and social perspectives. Therefore, for adoption of ICT-based EG, PFB is an exogenous variable.

According to information management principles for ICT adoption, creating awareness among the stakeholders, i.e., the end users, about implementation of innovation with regards to factors and issues, basic paradigms of the new system, a comprehensive view of advantages and disadvantages, and the overall security of the system are prime factors for adoption. Awareness is defined by (Okot-Uma and Caffrey, 2000) as "Providing information about the political process, about services and about choices available, the time horizons for the decision-making process and about the exponents of the decision-making process." A majority of the population in most of

the developing countries is very unfamiliar with ICT due to unavailability of information, illiteracy, economic scarcity, and insufficient knowledge about the evolution of modern technology; they are also not very aware of this new innovation of the government system. As we learned from the theories of planned behavior and of reasoned action, beliefs about a system turn to attitudes about the system. However, awareness of the system is important at the beginning to develop beliefs. Before developing an attitude to adopt ICT, stakeholders need to be aware of complete characteristics, including functional behavior, strategic benefits, security and privacy, and the legal environment. Spence (1994) advocates awareness as the predominant explanatory factor for adoption of ICT. Several researchers asserted awareness as the significant independent variable to create the attitude to use ICT system (Nedovic-Budic and God-schalk, 1996; Okot-Uma and Caffrey, 2000; Parent *et al.,* 2005; Watson *et al.* 2000). This research conceptualizes awareness as the gaining knowledge, education, and consciousness as much as a user perceived to be sufficient to learn and use ICT and realize its overall characteristics, strategic functionality, and competitive advantage. Depending on the above arguments, we propose that for developing countries, a slight modification of the compatibility construct of DOI represented by the awareness attribute can be a strong predictor of evaluating adoption capability of ICT and developing an implementation strategy of EG. Several researchers use the compatibility construct as the significant predictor of EG adoption in developed countries where a majority of citizens are completely aware of and habituated to use ICT (Carter and Bélanger, 2004; Chen and Thurmaier, 2005; Shareef *et al.*, 2007). However, since, as we stated before, a majority of the population of most of the developing countries are not aware of ICT and EG, the construct compatibility of DOI can be operationalized for predicting ICT adoption capability and EG implementation strategy by the construct Awareness.

Unavailability of resources—including computers, Internet connection, electricity, and telecommunications—is one of the main barriers for a majority of the population of developing countries to learn, adopt, and use ICT (Dada, 2006). Several researchers asserted that the adoption of new technology is closely related to the availability of resources (Kumar *et al.,* 2007; Parent *et al.,* 2005; Titah and Barki, 2005). From the technological, behavioral, economic, and organizational perspectives, it is anticipated that failing to get enough resources using ICT will not create a behavioral attitude among users to adopt the system. Several researchers pointed out that due to scarcity of computers; the Internet with competent features like access, speed, and cost; and government supports like call-center, resource-center, and cyber-café, ICT implementation in public projects in several countries—especially developing countries—could not attain the desired success (Bhatnagar, 2002; Dada, 2006; Heeks, 2002; Madu, 1989). If we look at the capability theory, it stresses that citizens can not achieve capability in using a system unless they can, without any barrier, use that system. Generally, where computers, Internet, and modern ICT are not available, citizens are economically poor, less educated, socially and culturally unaware of modern technology, and not technologically skilled. As a result, they also do not have a belief that they will acquire benefits by using an ICT system. Therefore, there is an obvious relation between availability of resources (AOR) and adoption capability of ICT. We define AOR as the availability and freedom of using computers, the Internet, and ICT with competitive features like access, speed, and cost. We argue that AOR creates a belief in using ICT, which, in turn, creates an attitude to use ICT. Heeks (2003) and Dada (2006) claim that a low adoption rate and, eventually, failure of EG in developing countries are mostly due to a scarcity of resources and, consequently, lack of skill and knowledge of using ICT. Drawing conclusions from these arguments, we propose

that in encapsulating capability of adopting ICT and developing strategy for implementation of EG to accomplish fundamental missions of EG, another construct should be included in DOI. This is AOR.

This is a theoretical framework to study the adoption capability of ICT and implementation strategy of EG in developing countries. This will explain the fundamental purposes of EG implementation by operationalizing DOI and shedding light on the capability theory. From the operationalization of the four independent constructs and one dependent construct, we can measure the ICT adoption capability of the population of developing countries. We argue that those four parameters —PEOU, perceived functional benefits, awareness, and availability of resources—can comprehensively measure the ICT adoption capability of developing countries for the strategic implementation of EG as shown in Figure 1.

Therefore, the relation between the two objectives of this study is obvious. As the first objective, we described the purposes of implementing EG and related issues to accomplish those purposes. Different governments set so many citizen-centric purposes for implementing EG. Those purposes can be achieved if its prime stakeholder, viz., the citizen, has the capability to adopt the EG system. However, since ICT is the main driver of EG,

competence in ICT is a vital issue for adopting EG. So, based on DOI and shedding light on the capability theory, we propose here a theoretical framework (as shown in Figure 1) to investigate the adoption capability of ICT of a country's citizens to accomplish the strategic objective of implementing EG and also minimizing the digital divide.

CONCLUSION AND FUTURE DIRECTION

The purpose of this research, as mentioned earlier, is twofold. In the first section, we have attempted to conceptualize the purpose of EG. We also argued that those purposes of EG can only be accomplished and the full benefits of EG realized if most of the citizens have the ability to adopt ICT, the main driver of EG. Then we have developed a theoretical framework to investigate the adoption capability of ICT of most citizens, especially of developing countries, grounded on DOI and shedding light on the capability theory.

Although the purposes of implementing EG may be multi-dimensional, some regard EG as a powerful tool for improving the internal efficiency of government services and the quality of service delivery as well as enhancing public participation, government accountability, and system transpar-

Figure 1. Adoption capability of citizens' of developing countries
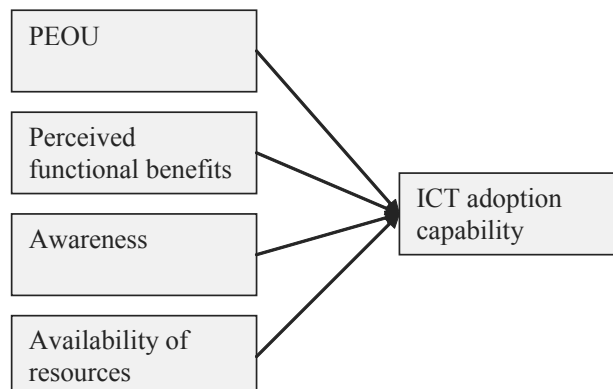
ency (Fountain, 2001). EG is primarily devoted to offering equal and cost-effective service to all of its citizens, including more participation, democracy, transparency, accountability, and good governance through the extensive use of ICT. To capitalize on the full benefits of EG and fulfill the purposes of EG as revealed in this research, different countries, especially developing countries where ICT diffusion and adoption has not achieved significant and extensive progress and where the digital divide is prominent in terms of access and availability of ICT, should conduct empirical studies in the pre-implementation phase of EG to understand the capability of adoption of ICT of a majority of the population. It is the prime motive of policy makers of developing countries to study the adoption capability of ICT of the majority of the citizens prior to launching an EG project. Otherwise, there is a great possibility that EG projects could not accomplish the purpose of their implementation and could abruptly fail to reduce the digital divide, establish equal rights for all citizens, and promote good governance.

In this regard, we have studied DOI theory with a special emphasis on the capability theory. The capability theory provided us a strong paradigm that without getting the capability to adopt modern technology-based public administration, diffusion of technology cannot be possible and EG implementation cannot accomplish its full potential and purpose. Therefore, before implementation of an EG, policy makers of a country should investigate the capability of a majority of the population to determine whether they have the ability to adopt ICT. In this regard, DOI theory might be a powerful tool to explore the adoption capability of majority of the population, especially of developing countries, which is essential for accomplishing EG implementation purposes. Consequently, the constructs of the DOI theory could be recognized and postulated considering the social, cultural, technological, and economic perspectives of a majority of the citizens of developing countries. We identified

four constructs from DOI to investigate this theoretical paradigm.

These four constructs are PEOU, perceived awareness, perceived functional benefits, and availability of resources. PEOU is adopted from TAM to visualize the complexity of technology in connection with usage, especially for people who are not very skilled in or familiar with modern ICT. The perceived functional benefit construct targets conceptualizing and revealing absolute and relative benefits that citizens can realize from adopting ICT-based EG system in terms of time, money, availability, travel, bureaucracy, corruption, and participation. This comprises the essence of relative advantage of DOI and includes PU, a construct of TAM. Compatibility is a powerful construct of DOI to evaluate the citizens' social, behavioral, attitudinal, cultural, and technological beliefs to be matched and consistent with technology adoption and usage. However, a majority of the population of developing countries (excluding some developing countries that are very advanced in adopting ICT in private and public organizations) are not familiar with the characteristics, usage, and benefits of ICT. Because of this, a refined form of compatibility, which is denoted by awareness, is introduced here to measure adoption capability of ICT. Finally, since most of the developing countries in Africa and Asia have a shortage of resources in terms of capital, technology infrastructure, computers, Internet, and skilled personnel, a new construct is added in DOI; this is termed as availability of resources to conceptualize the adoption capability of ICT.

This theoretical evaluation has some potential managerial implications for policy makers, academicians, and researchers. For our first objective, as revealed from our literature review, the prime purpose of EG implementation is to provide effective and efficient services to all citizens with equal opportunity and transparency. We can expect that this revolutionary reformation of the traditional government system is implemented to achieve a lower digital divide. However, if the

majority of the population of developing countries fails to develop the capability of adopting and using ICT, which is the main driver of EG, the implementation of EG hardly can accomplish its goal. Rather, it will enhance the extreme digital divide. So, at the outset of implementing EG, it is important for developing countries to conduct countrywide empirical studies to address whether the majority of the population has the ability to adopt and use ICT-based public service. In this connection, as our second objective, we have conceptualized DOI shedding light on the capability theory to develop the theoretical paradigm of investigating the capability of adopting ICT, especially in developing countries. Operationalizing the identified four constructs in the light of DOI, developing countries can define and develop their strategy for implementation of EG.

This is a theoretical paradigm for exploring adoption capability for diffusion of ICT and, thus, implementation of EG. However, definite empirical studies are essential for this finding. In different developing countries that are less advanced in usage of ICT, extensive empirical studies could be conducted in identifying the digital divide, the readiness to adopt ICT, the literacy rate in terms of technology, and the resource availability. Also, studies are needed to reveal the mission, objective, and implementation strategy of EG by different countries to conceptualize characteristics of an ICT-based EG system.

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KEY TERMS AND DEFINITIONS

Adoption of EG: It is the acceptance and use of EG by its stakeholders with satisfaction.

Availability of Resources (AOR) for ICT: It is the availability and freedom of using computers, the Internet, and ICT with competitive features like access, speed, and cost.

Awareness of ICT: It is the gaining knowledge, education, and consciousness as much as a user perceived to be sufficient to learn and use ICT and realize its overall characteristics, strategic functionality, and competitive advantage.

Capability to Adopt ICT: The ability of citizens becoming familiar with modern technology, getting availability of resources required to sufficient access and use, achieving skill to use, and perceiving functional benefits of ICT.

Capability Theory for EG: It can be defined as the development objective of a government that seeks to enhance the ability of its stakeholders by expanding and procuring modern ICT and to provide good governance by enhancing the freedoms and capabilities of individuals and groups to voluntarily engage in sustainable state development.

Developing Countries: A developing country is a country which is not industrially developed and has less economic capacity, per capita income, and lower and inconsistent human development index (HDI).

Diffusion of Innovation (DOI): It can be conceptualized as a systematic process by which an innovation can spread over the members of a society through certain distributing channels. According to the operationalization of this theory, diffusion is measured by an innovation's relative advantage, complexity, compatibility, trialability, and observability.

Digital Divide: The term digital divide refers to the gap between those people who have available resources to use and get the benefits of information technology and who do not have the right, freedom, or resources available to use information technology.

E-Government (EG): EG refers to government's use of IT to exchange information and services with citizens, businesses, and other arms of government. It is the government organizational structure for presentation and delivery of information, service, and function to its users and stakeholders through personal computers, kiosks, telephones, and other network resources.