How Do E-Government Services Go Wrong? An Analysis of Four Online Services Using a Typology of Service Provision and Use

Hun Myoung Park
International University of Japan

December 2021

How Do E-Government Services Go Wrong? An Analysis of Four Online Services Using a Typology of Service Provision and Use

Hun Myoung Park

December 2021

Associate Professor, Ph.D.
Public Management and Policy Analysis Program
Graduate School of International Relations
International University of Japan

Abstract: This study develops a typology of online service provision and use to examine why e-government services fail. Service provision measures the quality of an online service that encompasses task-technology fit and perceived usefulness, while service use denotes the extent that target clients use the online service. Quadrant I represents a set of satisfying online services whose service provision and use are high. Quadrant II-IV respectively represent irritating, useless, and lavish services, which are not successfully developed and/or used. An analysis of four online services illustrates how e-government services are not used properly and how their statuses change over time. The results highlight the importance of reflecting client demands and preferences in system analysis and design and continuously updating online services to respond to changing needs and technological advancements.

Keyword: E-government, IT failure, modes of IT use, technology acceptance model.

1. Introduction

Electronic government (e-government) stage models posit that e-government will move beyond the interaction and transaction phases and ultimately enter transformation and participation stages (Baum & Di Maio, 2000; Hiller & Bélanger, 2001). Weerakkody and Reddick (2013) argued that this paradigm shift in e-governments involves "fundamentally changing the relationship between how governments interact with citizens as well as other stakeholders… to collaborate, participate, share resources to undertake work… to engage citizens in policy modelling through e-participation…" (p. 2). However, few studies have reported transformational changes that resulted from e-government (Coursey & Norris, 2008). American local e-government systems have evolved incrementally without rapid or fundamental changes (Norris & Reddick, 2013a, 2013b).

E-government, akin to e-commerce, is expected to save time and cost. Park (2015) postulated three modes of information technology (IT) use and argued that clients primarily use e-government services in the utilitarian mode rather than in the solidary or participatory mode. E-government users primarily pursue efficiency and material benefits rather than government reform (transformation) and participatory democracy. However, not all e-government services are properly designed, developed, and used to produce significant efficiency gains in the public sector. Most online public services debut in the spotlight but unsuccessful online services tend to fade away surreptitiously. The failure of information systems is far more prevalent than their success (Heeks & Bhatnagar, 1999).

E-government services are not always evaluated properly, while unsuccessful results are seldom reported, announced, or utilized for feedback in public organizations.[1] Some e-government projects are completed as scheduled, yet others overrun their expected cost and

---

[1] Lyytinen and Robey (1999) stated, "Not only have many organizations failed to learn, but they have also learned to fail" (p. 85).

duration or are eventually canceled. Some e-government services are properly used by target clients, but others are not used and/or operate at a loss. Some online services are well-developed but not sufficiently demanded by clients, however others are poorly developed but forcefully used by many clients. Some online services were successfully used once but are badly maintained and thus become burdensome and useless.

Why do many e-government services go wrong? Why are well-developed online services not used by target clients? Why are poorly developed services continuously used without being revised or retired? To answer these questions, this study develops a typology of online service provision and use that categorizes e-government services into four quadrants. This analytic framework facilitates the understanding of success or failure of e-government services.

The following section reviews the e-government literature on task-technology fit, the technology acceptance model, and the information systems success model. Section 3 then proposes a typology of online service provision and use, and Section 4 articulates the research methods. Next, four online public services are compared and analyzed in Section 5. Finally, the findings and implications of this research are discussed.

2. Literature Review

This section reviews the literature on information system failure, the information systems success model, the technology acceptance model, and task-technology fit in information systems.

2.1 Information Systems Failure

Heeks and Bhatnagar (1999) stated that "failure is far more prevalent than success in information systems projects" (p. 49). They conceptualized failures as gaps between stakeholders' conceptions of information systems and organizational realities; the larger the degree of mismatch is, the greater the risk of failure (p. 59). However, it is difficult to reach a

consensus of how to define and measure success or failure of information systems due to their multidimensional and interdependent natures (Wilson & Howcroft, 2002, p. 237), as Cameron (1986) argued, "[A]greement about [organizational] effectiveness is mainly an agreement to disagree" (p. 544).

Heeks and Bhatnagar (1999) suggested the dimensions of information, technology, processes, objectives and values, staffing and skills, management and structures, and other resources (ITPOSMO) to encompass conception-reality gaps and examine failure in information age reforms (pp. 61-62). Wilson and Howcroft (2002) grouped information system failures into project, system, and user categories (Table 1). For example, an information system project fails when it overruns cost (budget) and time (deadline), operates at a loss, or is canceled before completion, while user failure occurs when end-users are dissatisfied with a system and thus resist using it. More recently, Anthopoulos, Reddick, Giannakidou, and Mavridis (2016) provided a failure taxonomy tool that summarizes the reasons for and factors of e-government project failure. Failure reasons include design-reality gaps, absence of focus and need, content, skill, execution, regulatory framework, external factors, and user satisfaction, while failure factors include organizational power, politics, education, project management, business needs and vision, security and privacy, operation and maintenance costs, information technology, and system development processes (p. 164).

Table 1. Variety of Information Systems Failures

	Description of Information Systems Failure
Project	The project fails to achieve established standards.
	The project is an operating failure.
	The system is not routinely assessed.
System	System does not work properly; it does not perform as expected, it is not operational at a specified time and it cannot be used in the intended manner.
Users	A system may be considered a failure if it is not used.

Source: Adapted from Wilson and Howcroft (2002, p. 237).

However, these factor-oriented approaches do not consistently or systemically explain how information systems fail (Goldfinch, 2007). For instance, an online service may

not be successfully used even if it is technologically sophisticated and well managed. Wilson and Howcroft (2002) argued that multifarious factors (descriptions and causes of information systems) could be equally applied to explain success or failure (pp. 243, 247).

An evaluation of information systems is not a technological but a social phenomenon; technology does not speak for itself (Wilson & Howcroft, 2002, p. 247). The ascription of failure or success to an information system depends on stakeholder viewpoints or perspectives whose legitimacy is determined by organizational power (contexts) at any given time (p. 246). Thus, Cameron (1986) argued, "Evaluators of effectiveness often select models and criteria arbitrarily in their assessments, relying primarily on convenience" (p. 543). Accordingly, a "measurement of success meant seeing 'the cup half-full', whereas failure meant seeing 'the cup half-empty'" (Wilson & Howcroft, 2002, p. 246). Information systems can therefore be "simultaneously constructed as a success or a failure to different groups at one time, … the same people reinterpret that system over time … depending on factors beyond the technology itself" (p. 247). Accordingly, Wilson and Howcroft (2002) concluded that a failure of information systems needs to be conceived "as a process rather than a single, discrete event" (p. 238).

2.2 Information Systems Success Model

DeLone and McLean (1992) created their information systems success model to measure the success or effectiveness of information systems. This framework is comprised of system quality, information quality, system use, user satisfaction, and individual/organizational impact. DeLone and McLean (2003) later added service quality and refined individual and organization impacts into net benefits (Figure 1). System quality measures the desired characteristics of information systems, such as adaptability, functionality, availability, reliability, response time, and usability (easy-of-use); information quality measures completeness, timeliness, ease of understanding, personalization, relevance,

and security of the contents that systems produce; and service quality entails the overall

support delivered by a service provider regarding assurance, empathy, and responsiveness;

system use measures, for instance, the nature of use, navigation patterns, number of site visits,

and number of transactions; the measures of user satisfaction include repeat purchases, repeat

visits, and user surveys; finally, net benefits are the impacts of information systems on an

individual, organization, sector/group, or society, such as cost/time savings, expended

markets, increased sales, and reduced search costs (DeLone & McLean, 2003, pp. 24-26).

This model focuses on information systems (quality dimensions) themselves and users rather

than on information systems projects.

Figure 1. Information Systems Success Model
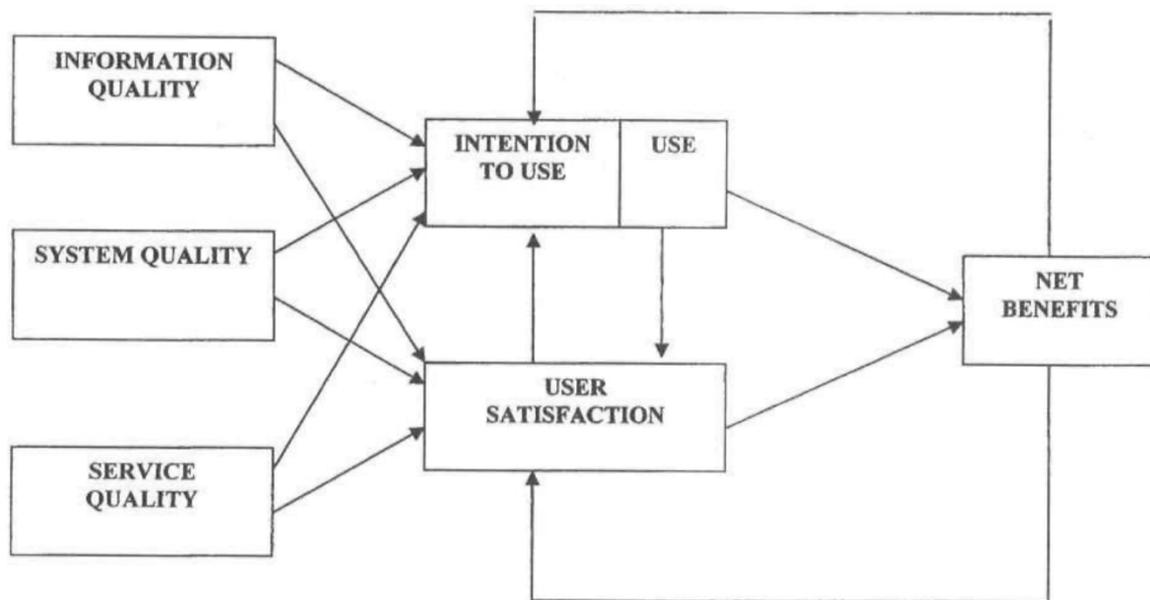
Source: DeLone and McLean (2003, p. 24).

System, information, and service quality variables are major dimensions that

influence the subsequent "intention to use" (attitude), system use (behavior), and "user

satisfaction," which interact with each other and jointly produce net benefits. The higher the

quality of the system, information, and service dimensions is, the higher the intention to use

(system use) and user satisfaction become, and the higher the net benefits are. A net benefit

affects subsequent system use and user satisfaction, forming reinforcing feedback loops: "more use of a poor quality system would be associated with more dissatisfaction and negative net benefits" (pp. 23-24). Users must be satisfied with and motivated by information systems so that they are willing to utilize the systems to produce successful benefits.

2.3 Technology Acceptance Model

Davis (1989) developed the technology acceptance model (TAM) to explain why and how users accept and use a technology. In the TAM, perceived usefulness and ease of use jointly influence attitude and intention to use, which eventually determine the actual use of an information system. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance," while perceived ease of use is "the degree to which a person believes that using a particular system would be free of effort" (p. 320). Perceived ease of use is an antecedent of perceived usefulness rather than a direct determinant of system use (p. 334). Roughly, perceived usefulness matches information quality in the information systems success model, and perceived ease of use is associated with system quality and service quality.

Venkatesh and Davis (2000) extended the TAM to encompass social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use), which jointly determine perceived usefulness and intention to use. Specifically, system experience and voluntariness mediate the influences of a subjective norm on perceived usefulness and intention to use. For example, a subjective norm has a positive direct effect on intention to use when system use is mandatory and not a significant effect on voluntary settings (p. 188). The positive direct effect of a subjective norm on perceived usefulness will attenuate with increased experience, but its impact on intention to use will attenuate with experience only in mandatory systems (p. 190).

Figure 2. Extended Technology Acceptance Model
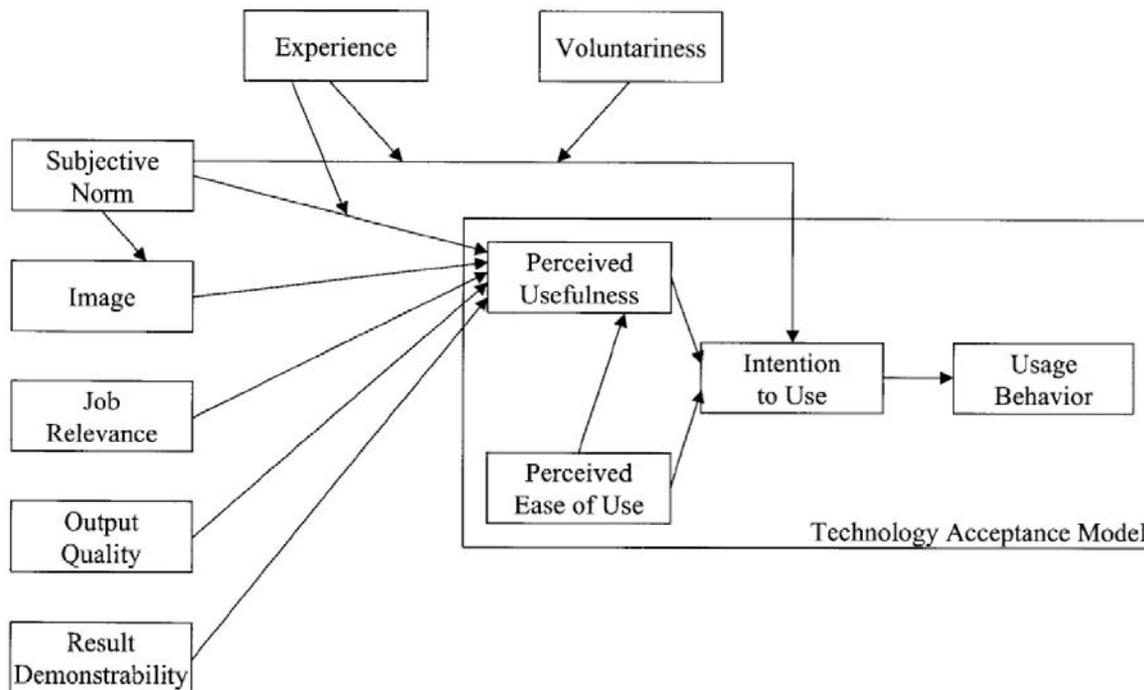
Source: Venkatesh and Davis (2000, p. 188).

2.4 Task-Technology Fit in Information Systems

Goodhue and Thompson (1995) defined task-technology fit as "the degree to which a technology assists an individual in performing his or her portfolio of tasks" (p. 216). A technology needs to provide features and support that fit the requirements of a task (p. 214). This taxonomic or contingent approach catalogs the characteristics of each task (e.g., routinized versus nonroutinized) and technology (e.g., stationary versus mobile) and then determines the ideal profiles of task contingencies and technologies or "viable alignments of task and technology" that will likely enhance performance (Zigurs & Buckland, 1998, pp. 314, 323). Here, technologies denote the computer systems and user support services that individuals use to perform a task (p. 216).

Goodhue and Thompson (1995) articulated the technology-to-performance chain, where task and technology characteristics determine the task-technology fit that influences a utilization of information systems. Task-technology fit and technology utilization also jointly

8

predict level of performance (Figure 3). That is, a piece of technology must be suited to a task and actually utilized to have a positive impact on task performance (Goodhue & Thompson, 1995). Task-technology fit therefore influences beliefs about the expected consequences of using information systems, facilitating utilization of a technology (p. 218). Task-technology fit is to information, system, and service qualities of the information systems success model as expected consequences of utilization is to perceived usefulness of the TAM.

Figure 3. Technology-to-Performance Chain
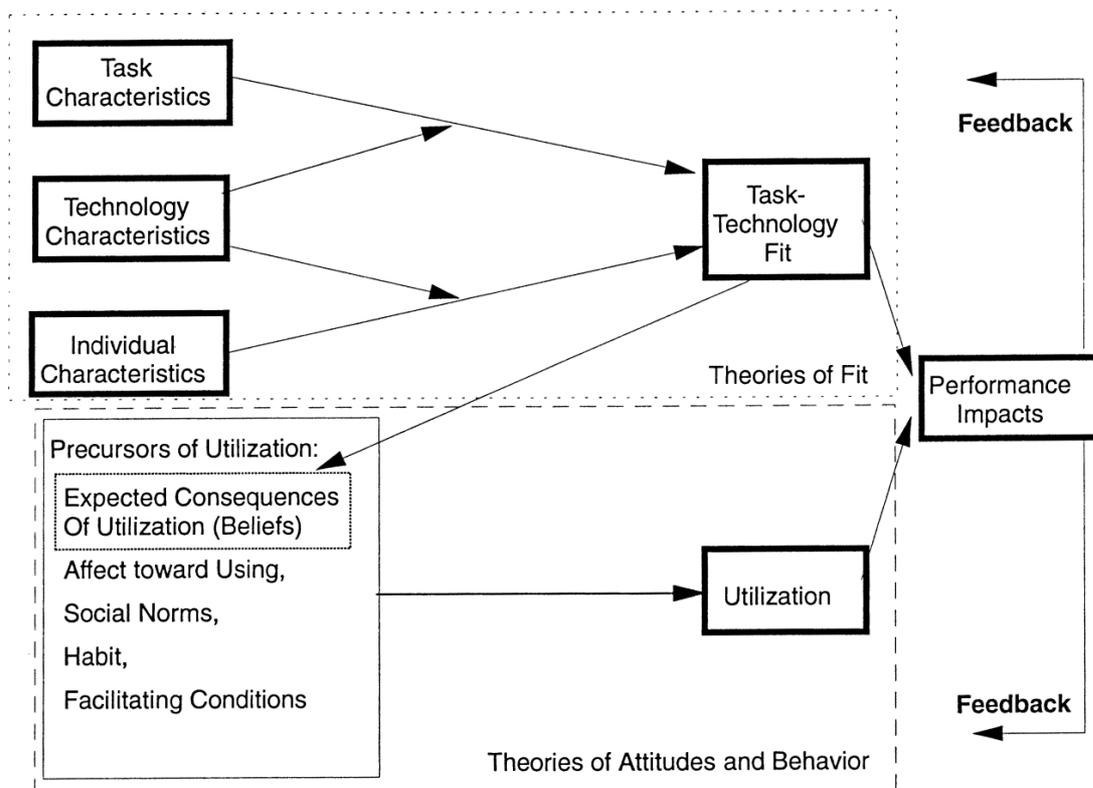
Source: Goodhue and Thompson (1995, p. 217).

3. Analytic Framework

Based on the literature review in the previous section, this paper establishes a typology of online service provision and use to examine why online services are not properly used and how their statuses change over time. Online services need to be developed and actually utilized to produce performance. Proper development and utilization are thus necessary conditions for successful online services. This typology incorporates Wilson and

Howcroft's (2002) system failure and user failure. A government project that is not completed or canceled does not deserve further discussion regarding its effectiveness. Accordingly, this analytic framework does not evaluate information system projects and the effectiveness of online services but rather investigates the status of e-government services. The net benefit of using an online service is not necessarily proportional to its usage, specifically, when there is a poor task-technology fit.

3.1 Online Service Provision and Use

This typology is comprised of two dimensions (Figure 4). Online service provision, on the supply side, measures the quality of an online service with respect to its time and cost savings. The primary goal of e-government services is to increase efficiency and material benefits in the utilitarian mode of IT use (Park, 2014). A high level of service provision means that an online service is suitably designed and developed to help clients achieve their expected goals without difficulty. A low level of service provision implies that an online service is not stable, functional, and/or easy to use; does not produce expected information; and/or provides insufficient technical and administrative support. The quality of service provision is associated with task-technology fit, information/system/service qualities, and usefulness. The perceived ease of use is an element of service provision but is not as critical to actual use as usefulness is. Online service use, on the demand side, denotes the level of online service use. This measure is not absolute but relative; each online service is targeted at clients who are expected to use it. A high level of service use means that an online service is used by the majority of its target clients, while a low level of use entails that no or very few target users utilize the service.

A social norm or mandatory usage setting mediates individual decisions to use online services. When the quality of service provision is high, clients are willing to use services

regardless of compulsory requirements.[2] Whether formal or informal, pressure exerted on employees constitutes a coercive social norm that is perceived as a legitimate rule to be followed (DiMaggio & Powell, 1983). Moreover, mandatory or voluntary use is related to whether alternative competing services exist in a market; a monopolistic service will automatically become compulsory. When mandatory use is simply declarative rhetoric that lacks both intention and a means of enforcement, however, such a mandate is often ignored by users. Hartwick and Barki (1994) argued that voluntary users are more likely to engage in participation and have positive attitudes toward information systems use.

User satisfaction was not considered in this typology because it is not linearly related to the quality of an online service and the actual use of the service. Although Iivari (2005) argues that user satisfaction is strongly related to actual use of information systems, relatively low user satisfaction does not always indicate the poor utility of an online service and low usage. For instance, IT experts with high expectations of an online service are rarely satisfied fully with it, even if the quality of service provision is objectively high, while IT novices are often under- or oversatisfied, regardless of the quality of a service provision (Park, 2017).

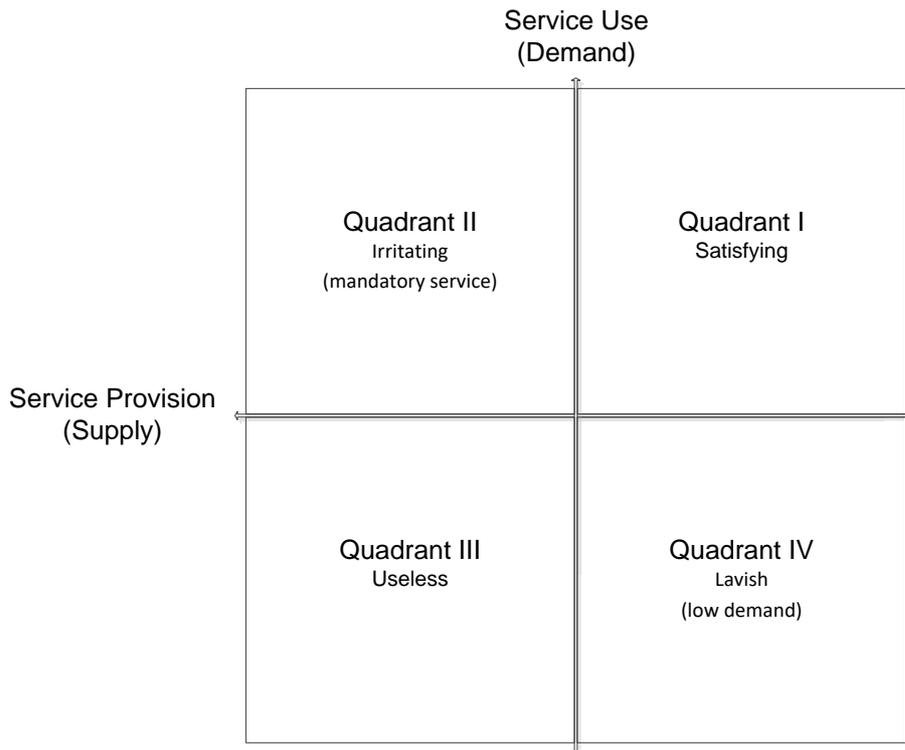**3.2 Four Quadrants of Online Services**

In Figure 4, the service provision and use dimensions divide the plane into four quadrants. The horizontal axis represents the continuum of service provision, and the vertical axis indicates the continuum of service use. The first quadrant denotes satisfying online services with high degrees of service provision and use. These online services have high system/information/service qualities and thus are useful and easy to use. Accordingly, the majority of target clients are willing to use these online services, which satisfy their expectations. As long as clients have a strong incentive to take advantage of usefulness, they

---

[2] Some governments prohibit civil servants from using commercial online services, such as Gmail and Facebook, to prevent distractions from their work. This requirement is meaningful when online services deserve utilization; otherwise, a few clients will want to use the services, regardless of such regulation.

would make up for, if any, inferior user interfaces and support. Satisfying online services

deserve further investigation to examine their effectiveness, for example, by calculating their

benefit-cost ratio (BCR) and return on investment (ROI). Quadrant I represents the ideal

result of an information system project.

Figure 4. Typology of Online Service Provision and Use

Service Use
(Demand)

Service Provision
(Supply)

Quadrant II
Irritating
(mandatory service)

Quadrant I
Satisfying

Quadrant III
Useless

Quadrant IV
Lavish
(low demand)

Quadrant III comprises useless and disappointing results that contrast with the

satisfying Quadrant I. In Quadrant III, the quality of service provision is low, and few clients

are willing to use online services or information systems. Many clients are unaware of online

services or are unsatisfied due to their deficient levels of usefulness (information quality) and

ease of use (system and service qualities). It is thus difficult for them to benefit from these

online services, which are neither useful nor user-friendly. Accordingly, the key issue is not

task-technology fit or user interface but rather client needs and expectations. Unsurprisingly,

these online services are rarely used and therefore do not merit an investigation of their

effectiveness. Rather, they should be thoroughly reviewed for a complete redesign or

termination. However, government bureaucracies are rarely self-correcting and are typically unwilling to admit and redress their mistakes appropriately.

Quadrant II is the category for irritating online services, the most problematic consequences. Here, the quality of online services is low, with marginal usefulness and ease of use. Nevertheless, the majority of target clients continue to utilize these online services. This result rarely occurs in a voluntary usage setting due to the poor incentives to attract clients; such online services would not endure in their market without coercive intervention. This type of result often occurs when institutional rules make the use of such services compulsory or there is no alternative in a market. That is, neither the discretion (freedom) to select online services or competition among services exist. Since these online services are inefficient and unsatisfying, their heavy use implies a vast incurred social cost. Indeed, it is annoying to use poor services compulsorily. However, government bureaucracies rarely internalize client costs and inconveniences, preferring to have clients pay for these burdens until their society can no longer bear their costs.

Finally, Quadrant IV encompasses lavish online services whose service provision is high but service use is low. These online services are well designed and are developed to have a high level of usefulness and ease of use. However, no or very few target clients are willing to use these services. This result typically occurs when most clients are not aware of or interested in these services or when client needs are not carefully examined and reflected during the system analysis and design phases. Such online services are not what clients want but rather what a service provider wants to display.[3] As a result, some of these online services are never used and are eventually eliminated because their governmental service providers receive almost nothing in return for such expenditures. Hence, these lavish services

---

[3] Goldfinch (2007) criticized pathological enthusiasms including public servants' technological infatuation (idolization), computer experts' technophilia, IT sales representatives' lomanism, and consultants' managerial faddism.

do not merit an investigation of their effectiveness, regardless of service quality and user satisfaction. If low awareness is the principal reason for low usage, online services need to be advertised sufficiently, and their user interfaces should be improved to increase their accessibility. That is, unless these services can address client needs, they should be redesigned or terminated.

3.3 Dynamics of Online Service Failure

An online service does not remain in a single quadrant. It is not a one-time event but an ongoing process to identify and correct errors in response to organizational and technological changes. No online service is perfect because all are human-made products. It is thus critical that organizations have a mechanism to continuously find and correct problems associated with online services. Online services and information systems should be upgraded in response to changing client demands and preferences and rapidly advancing IT. Through error correction, even lavish online services (Quadrant IV) and irritating services (Quadrant II) can be transformed into satisfying services (Quadrant I). An irritating online service would become useless (Quadrant III) if organizational pressure or strict enforcement no longer existed. Conversely, a satisfying online service could become useless and might eventually be terminated if it is not updated and upgraded properly.

4. Methods

This study analyzes three e-government applications according to the typology of online service provision and use. First, the electronic document management system in Kyrgyzstan is a government-to-government (G2G) service that facilitates document handling (e.g., receiving, storing, and distributing) and approval. The online import and export license service in Myanmar is a government-to-business (G2B) application for issuing export and import licenses to international traders. The national digital certificate framework in the Republic of Korea, a type of government-to-citizen (G2C) application, operates client

14

authentication for secure transactions. Overall, this qualitative study clarifies how these e-government services deviated from the satisfying quadrant (Quadrant I).

5. Case Analyses

This section examines the similarities and differences of three e-government applications with respect to Quadrant I.

5.1 Electronic Document Management System (Elvira, 2016)

In 2011, the Ministry of Economy of the Kyrgyz Republic introduced LanDocs, an electronic document management system (EDMS) that is used to receive, store, search, distribute, and approve various documents online (Elvira, 2016). LanDocs was developed by LANIT, a Russian vendor, as a proprietary license software package. The Ministry of Economy invested USD 72 thousand in this project and expected to annually save USD 22 thousand (p. 3). The minister, who launched this pilot project in 2011, supported LanDocs and strictly required that all employees use the system for document handing and approval (Internal regulation No. 165) (p. 19).

LanDocs was largely used for receiving documents from the secretary department and then distributing them to individual employees of the ministry (p. 3). All employees used LanDocs to receive and send documents, and all documents were distributed and received through LanDocs after its debut in 2011 (p. 30). LanDocs was useful for handling documents, although few employees recognized its detailed benefits, such as reduced paper use, time and cost savings, and document tracking features. The secretary department and its employees no longer needed to physically copy, print, store, edit, and distribute documents. Although LanDocs occasionally produced errors, it was relatively stable and functional, and thus, few employees complained about its quality (p. 33).

LanDocs appeared to save time and cost in the document approval process (p. 33), although a reliable and accurate effect was not measured. Before LanDocs was introduced, it

15

took at least 42 hours to obtain a document approval (p. 31). However, with LanDocs, a specialist who was responsible for the whole document approval process needed only five minutes to register a draft on the approval list, and he or she could track the progress of a document's approval to minimize delays (p. 32). Approximately 53 percent of employees utilized LanDocs for document approval as of November 2011, but the proportion decreased to 15 percent in 2012, 20 percent in 2013, and 21 percent in 2014 and 2015 (p. 29). In late 2011, 51 percent of documents (approximately 250-350 documents per day in the ministry) were approved through LanDocs, but this figure fell to 10-13 percent during 2012 and 6-7 percent during 2013-2015 (pp. 30-31). Many interviews demonstrated that some managers hesitated to approve documents online in favor of conventional face-to-face approvals (p. 35). Employees' workloads therefore doubled; they had to prepare both physical and electronic copies of a document needing approval. While the minister approved 40 percent of documents through LanDocs in 2011 before he left in January 2012, his successors did not use LanDocs to approve documents until 2015 (p. 31). Moreover, most employees and managers did not seem prepared to use or to have a strong need for an electronic document approval service. The problem in the online approval process did not result from technology but from tasks and people. That is, the task-technology fit of document handling in LanDocs was sufficient but was not suitable for document approval.

LanDocs was functional but was not as user-friendly as expected. It has never supported customizations such as adjusting menus and various options. For example, users are not allowed to stop the system from producing many unnecessary daily system reports and notifications (p. 33). Since LanDocs has a proprietary license, the ministry and Kyrgyz contractors may not modify or fix this software as needed. As a consequence, the ministry became unable to enforce the mandatory use of LanDocs. No newly appointed ministers were interested in LanDocs but they undermined the compulsory use of LanDocs without

abolishing regulation No. 165. Hence, the regulation was no longer functional, and most government employees consider the use of LanDocs more or less voluntary (pp. 20, 37). The result is a negligible usage of LanDocs for document approvals.

5.2 Import and Export License Service (Ko, 2018)

In Myanmar, all exporters and importers must obtain proper export and import licenses pursuant to the Export and Import Law (2012). International traders or their agents need to prepare documents (e.g., an application form, exporter and importer registration, sales contract, and invoice) and, on average, five certificates from the ministries in charge. Then, they need to submit application materials to the public access center of the trade department of the Ministry of Commerce, which is located in Nay Pyi Taw, the capital city. This department reviews and approves an application and then issues an export or import license in a single day.[4] Successful applicants need to visit the center again to pick up their license after paying a license fee of USD 50.

However, 90 percent of international traders established their headquarters in Yangon, 200 miles south of Nay Pyi Taw (an approximately five-hour drive), where most government departments and agencies are located. This geographical setting implies a vast travel cost and amount of time to obtain and submit the necessary application documents. Thus, 90 percent of license applications are submitted through service agents who are contracted to international traders. As the volume of imports and exports has increased, not only travel costs and durations but also service completion times have become critical opportunity costs for trading businesses.

Accordingly, the Ministry of Commerce launched a Web-based e-government service in June 2016, which was provided through the Myanmar Trade Net Web portal. This

---

[4] It took approximately three weeks to obtain a proper license before the Ministry of Commerce alone took full responsibility for the export and import license service in 2011 (Ko, 2018, p. 7).

17

online service was expected to issue export and import licenses online quickly, without the burden of visiting the center. Traders or their agents were enabled to submit application materials, make payments (i.e., application and license fees), and print approved licenses through the Web portal (pp. 7-9). However, the majority of applicants were unwilling to use the online license service, preferring the traditional offline license service. The average number of offline license applications submitted was 15 thousand per month during 2016-2017, but the corresponding number of online applications decreased from 2 thousand in June 2016 to 400 in August 2017; the proportion of online license applications was approximately 10 percent of the total (p. 21).

Table 2. Offline and Online Export and Import License Services

	Offline License Service	Online License Service
Registration for Membership		Public access center
		Two days
Annual Membership Fee		USD 100 (50 for renewal)
E-token application/pick-up		Public access center
Annual E-token Fee		USD 10 (5 for renewal)
Certificates	Visit related ministries once	Visit related ministries twice
	Wet ink signature/stamp	Barcode on certificates
Document/Certificate Preparation	One day	Two days
Submission of Applications	Public access center	Online
	Hardcopy	Electronic copies
Application Fee	USD 2	USD 2
License Pick-up or Printout	Public access center	Online
License Fee	USD 50	USD 50
Payment		Myanmar Citizen Bank account
Transportation/Accommodation	Roundtrip (USD 200)	Two roundtrips or accommodation
Rejection/Delay Rate	1 percent	Increased to 25 percent
Service Completion	One working day	Two working days
User Interface/Support	Face-to-face onsite support	Poor online instructions and support
		IT staff assistance needed

Source: Based on Ko (2018).

The export and import license service on the Web portal was neither useful nor easy to use. This service requires applicants to complete two additional steps. First, all applicants must visit the public access center and submit the required documents to obtain a username and password for membership registration because an online registration function is not available. This step takes approximately two days, and the annual membership fee is USD

100 with a renewal cost of USD 50 (p. 27). Next, applicants must download the e-token application form from the Web portal, submit the form to the public access center (no online submission is available), and then pick up the e-token from the center. The annual e-token fee is USD 10 with a renewal cost of USD 5. These additional requirements are rather costly and time-consuming (at least two days).

The online service also requires certificates with barcodes added for authentication. This format is different from conventional formats that rely on wet ink signatures and seal stamps (pp. 7-8). Ministries do not issue electronic certificates and need at least two days to issue a certificate with a barcode added. Thus, applicants must visit an average of five ministries at least twice to request and acquire all necessary certificates.[5] Applicants then need to log in to the portal with their username, password, and a six digit security code from their e-token. Next, they need to complete the online license application and invoice forms and then upload electronic versions of all other documents, which should be prepared in advance. Finally, applicants must pay an application fee (USD 2) using the e-payment application of Myanmar Citizen Bank. Once an application is reviewed and approved, the applicant is notified to pay a license fee (USD 50) online and is able to print out his or her license. On average, it takes two days to obtain an export or import license that has been issued online, but there is no way to track the status of an application.

The user interface of the online license service was not user-friendly. Thus, ordinary applicants have difficulty completing the service without IT staff assistance (p. 25). It is not easy to search for code lists and daily prices or to understand instructions and procedures. Whenever applicants encounter technical problems, they have to call IT staff, since no online assistance (e.g., email and video chat) has been provided. Nevertheless, most applicants are

---

[5] An interviewee suggested that it was very painful and burdensome to collect all documents and certificates for the online license service (Ko, 2018, p. 26).

agents of international traders who have the requisite professional knowledge and skills (e.g., scanning and searching) to take advantage of online services (p. 30). Since this online service is not mandatory, traders or their agents can select either the offline or online service depending on their cost–benefit calculations.

In sum, Myanmar's online export and import license service was not as useful and easy to use as its offline counterpart. Online applicants must still visit the center at least twice and pay USD 110 to obtain membership and the e-token needed to use the online license service. Thus, the online service requires at least four additional days (two days for membership and e-token, one for document preparation, and another for application process) compared to its offline counterpart. Since same-day service is not available in ministries, online applicants have to pay additional roundtrip or accommodation fees. The online service is therefore less efficient and convenient and more expensive and time-consuming than the offline service. The rate of delayed or rejected online applications gradually increased to 25 percent as of August 2017, much higher than the corresponding 1 percent for the offline service (p. 21). Low predictability and timeliness of the online service imply significant business risks and opportunity costs for international traders (pp. 28-29).[6] Hence, most traders prefer the offline license. Kyaw (2019) also reported a similar pattern in the online service to issue certificates of origin of goods, which was instituted on the Myanmar Trade Net Web portal in 2018.

5.3 National Digital Certificate Scheme (Park, 2012)

The Korean government, pursuant to its Digital Signature Act (1999), made it mandatory to use national digital certificates for all electronic financial and nonfinancial transactions. Since the Web browsers available in Korea, such as Netscape Navigator and

---

[6] An interviewee answered that timeliness is very important for his or her business and any delay in license issuance will incur loss of a huge amount of money (Ko, 2018, p. 29).

Internet Explorer (IE), did not support 128-bit encryption until the 1990s, Web browser plug-ins (extensions) were introduced as feasible solutions to ensure secure connections and safe transactions at that encryption level. These plug-ins were coincidentally exploited by Microsoft ActiveX controls, which were the *de facto* technology in Korea at that time. IE began to support secure sockets layer (SSL) encryption protocol in 1995 and 128-bit encryption worldwide in 2000 (version 5.5). However, Korean public Websites did not utilize the global security standards (i.e., SSL/TLS) available in Web browsers but continuously relied on ActiveX plug-ins to establish secure sessions independent of IE. Clients have no choice but to use the authentication plug-ins that the certificate authority (CA) in charge and public organizations provide.

Under the client authentication scheme, which lacks cross-platform and cross-browser compatibility, online service users must use Microsoft Windows and IE to fully utilize online public information and services. Almost all public Web sites in Korea require users to sign in, but a username and password alone is not sufficient for login. In addition, Internet users must carry national digital certificates with them and install all the ActiveX plug-ins that each Web site requires for authentication and secure connection. Otherwise, their access will be denied prior to logging in. Even after logging in, they must provide a certificate password, security code, or verification number when conducting financial transactions.[7] This national digital certificate scheme is neither efficient nor convenient; it is vulnerable, error-prone, and incompatible with other software packages. Public Web sites have discriminated against online clients who do not use Windows, IE, and ActiveX controls, excluding them out from online information and services. As a result, the desktop market shares of Microsoft Windows and IE in Korea stayed at almost 99 percent throughout the 2000s (Park, 2012).

---

[7] In general, clients need to provide their network ID and password for login although some Web sites also ask security questions or require a one-time password to validate identity. Clients do not need to obtain a digital certificate, security code card, verification number, or various ActiveX plug-ins.

Despite its apparent inconvenience, 62 percent of citizens in 2010 and 89 percent in 2020 used e-government services powered by the national digital certificate scheme, and 63 percent and 98 percent of them were satisfied, respectively (Ministry of Interior and Safety & NIA, 2012-2020). Many online users complained about complicated authentication procedures (30-50%) and burdensome procedures for identification and authentication (40-80%) in a survey. Civil society has questioned the use of client authentication implemented by ActiveX plug-ins, but any voices were rarely acknowledged by policy processes until 2014. The government officially abolished the mandatory use of national digital certificates for all electronic transactions in 2015, removed almost all ActiveX plug-ins from public Web sites until 2020, and ultimately abolished the national digital certificate framework and allowed diverse digital signature methods in 2020. However, due to the lock-in effect, many clients still use the antiquated client authentication scheme, entailing unnecessary burdens and security risks.

6. Discussion

In terms of task-technology fit, the LanDocs in Kyrgyzstan is suitable for document handling but not for document approval. Most managers were not familiar with electronic approval and, likely due to political culture, were not willing to use the approval functionality. The service provision level of this online service, despite its customization problems, was high in general. The system was efficient and effective enough to reduce the times and costs of document handling and approval. The export and import license service in Myanmar had a good task-technology fit but failed to reflect client needs and expectations in its system analysis and design stages. Accordingly, this service was neither useful nor easy to use. The national digital certificate scheme in Korea had a good fit until the early 2000s before 128-bit encrypted SSL/TLS in Web browsers became available globally. However, public organizations and CAs continuously insisted on using ActiveX plugins for client

authentication, leaving aside SSL/TLS on Web browsers until 2020. This deficient task-technology fit indicates a low level of service provision regarding both usefulness and ease of use.

Table 3. Comparison of Four Online Services

	Electronic Document Management Systems (G2G)		Export/Import License Service (G2B)	National Digital Certificate Scheme (G2C)
	Handling	Approval		
Task-Technology Fit	High	Low	High	High (2000s) $\rightarrow$ Low
Usefulness	High	High	Low (poorly designed)	High $\rightarrow$ Low
Ease of Use	Moderate		Low	Low
Social Norm	Mandatory $\rightarrow$ Connived		Voluntary	Mandatory $\rightarrow$ Voluntary
Alternative Service	Manual		Manual	None $\rightarrow$ Multiple
Service Use	100%	Low	Low	High $\rightarrow$?
Beneficiaries	Employees	Politicians	Politicians	Politicians, CAs
Losers		Employees	Traders	Citizens
Dynamics	Quadrant I	Quadrant IV$\rightarrow$III	Quadrant III	Quadrant I$\rightarrow$II$\rightarrow$III

In Kyrgyzstan, using the LanDocs was mandatory for two months before the minister, who introduced the system, left in January 2012. The new minister connived at the voluntary use, signaling that employees might return to manual document management. Accordingly, all employees voluntarily utilized LanDocs for document handling to take advantage of its time and cost savings, implying that efficiency gain is a strong incentive for employees and citizens to use e-government services. However, most employees, including the new ministers and senior managers, refrained from using online approval because public managers considered document approval a matter of their political power rather than a matter of efficiency. In Myanmar, the online export and import license service was purely voluntary; international traders were able to select either the conventional offline service or the online service.[8] Given its low levels of usefulness and ease of use, only a small portion of traders or agents chose the online option, which was costlier and more time-consuming. Finally, in

---

[8] Wilson and Howcroft (2000) stated, "… end-users must be persuaded to abandon previous systems of working, through the establishment of the IS as an obligatory point of passage" (p. 239) and "… if an alternative to the proposed technology remains in place, an obligatory point of passage cannot be successfully constructed" (pp. 247-248).

Korea, the use of national digital certificates in transactions was compulsory for almost two decades until this requirement was reduced in 2015 and then abolished in 2020. Indeed, no alternative solution for client authentication was available under the national digital certificate scheme until the early 2000s. However, public organizations and CAs, due to organizational inertia and political reasons, refused to permit server authentication or various alternative methods that were already employed globally. Since online users accustomed themselves to the national digital certificate scheme for a long time, most of them will not switch over to more efficient and safer solutions at least in the near future.

The major beneficiaries of online services tend to be politicians or executive managers who initiate the services for political gain. The debut of an online service is often ostentatious in the public sector, but its retirement is not. Thus, politicians and CAs in Korea took advantage of their monopolistic statuses, shifting their main responsibilities and burdens to online service users. Citizens had to install all required ActiveX plug-ins on their machines, update them whenever necessary, continue to upgrade Windows, and complete all annoying authentication procedures for online transactions. Most citizens unconsciously began to take a series of authentication procedures for granted and mistakenly considered client authentication an inevitable due process for secure transactions without questioning its quality or safety. Moreover, most employees in the Ministry of Economy of Kyrgyzstan could benefit from using LanDocs for document handling rather than for document approval. LanDocs was inherently useful for document approval, but most public managers were not willing to use this functionality, and their subordinates did not want to double their workloads. Finally, international traders and their agencies in Myanmar could not benefit from the online export and import license service, which turned out to be costlier and more time-consuming than its offline counterpart.

Kyrgyzstan's LanDocs for document handling stayed in the satisfying quadrant (I) and Myanmar's export and import license service remained in the useless quadrant (III), but two of the online services did not remain in a single quadrant. LanDocs provided high-quality services that reduced the times and costs for handling documents, while Myanmar's export and import license service was costlier and more time-consuming than its manual license service and thus failed to attract many traders or their agents. The electronic document approval service shifted from the lavish quadrant (IV) to the useless quadrant (III) as its use became virtually voluntary. Most public managers appeared to be more concerned about the impact of online approval on their political power rather than on efficiency (Kraemer & King, 2006). The national digital certificate scheme in Korea was satisfying before the early 2000s (Quadrant I), but it became irritating (Quadrant II) due to poor service provision and high service use until the end of 2020s. Online users were forced to use the scheme and Microsoft products (i.e., Windows and IE), regardless of their preferences; the government and CAs hesitated to provide clients with authentication solutions that supported other operating systems and Web browsers than Microsoft Windows and IE. Ultimately, the scheme lost its monopolistic status in 2020 and had to compete with global authentication standards and alternative solutions. This odd client authentication system will continue in the near future, mainly due to the lock-in effect, but it will eventually be phased out (Quadrant III). Overall, these cases suggest that e-government services need to evolve over time to meet client demands and integrate technological progress.

7. Conclusion

This study proposes a taxonomy for online service provision and use as an analytic framework to examine failures of online public services. A satisfying result in Quadrant I means that high-quality online services are provided and that the majority of target clients use them. Quadrant III is a set of useless online services whose levels of service provision and

use are low. Online services in Quadrant II are irritating because despite their low level of service provision, many target clients are forced to use them, regardless of their needs and preferences. Quadrant IV represents high-quality online services that are not demanded and used as expected. The analysis of four online services provides lessons for understanding unsuccessful online services in the public sector. Online services need to be continually monitored and renovated so that their demand and supply meet each other in Quadrant I.

References

Anthopoulos, L., Reddick, C. G., Giannakidou, I., & Mavridis, N. (2016). Why e-government projects fail? An analysis of the healthcare.gov website. *Government Information Quarterly*, 33(1), 161-173. doi: 10.1016/j.giq.2015.07.003.

Baum, C., & Di Maio, A. (2000). Gartner's four phases of e-government model. Gartner Group, Research Note. 2000. https://www.gartner.com/doc/317292.

Cameron, K. S. (1986). Effectiveness as paradox: Consensus and conflict in conceptions of organizational effectiveness. *Management Science*, 32(5), 539-553. doi: 10.1287/mnsc.32.5.539.

Coursey, D., & Norris, D. F. (2008). Models of e-government: Are they correct? An empirical assessment. *Public Administration Review*, 68(3), 523-536. doi: 10.1111/j.1540-6210.2008.00888.x.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340. doi: https://doi.org/10.2307/249008.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research*, 3(1), 60-95. doi: 10.1287/isre.3.1.60.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems*, 19(4), 9-30. doi: 10.1080/07421222.2003.11045748.

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(2), 147-160. doi: 10.2307/2095101.

Elvira, I. (2016). Why didn't government employees use electronic document management system for approval: A study on LanDocs in the Ministry of Economy of the Kyrgyz Republic (Unpublished master's thesis). Graduate School of International Relations, International University of Japan, Niigata, Japan.

Goldfinch, S. (2007). Pessimism, computer failure, and information systems development in the public sector. *Public Administration Review*, 67(5), 917-929. doi: 10.1111/j.1540-6210.2007.00778.x.

Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly*, 19(2), 213-236. doi: 10.2307/249689.

Hartwick, J., & Barki, H. (1994). Explaining the role of user participation in information system use. *Management Science*, 40 (4), 440-465. doi: 10.1287/mnsc.40.4.440.

Heeks, R. (1999). *Reinventing government in the information age: International practice in IT-enabled public sector reform.* New York: Routledge.

Hiller, J. S., & Bélanger, F. (2001). Privacy strategies for electronic government. In Mark A. Abramson and Grady E. Means (Eds.), *E-Government 2001* (pp. 162-198). Lanham, Maryland: Rowman & Littlefield Publishers.

Iivari, J. (2005). An empirical test of the DeLone-McLean model of information system success. *Data Base for Advances in Information Systems*, 36 (2), 8-27. doi: 10.1145/1066149.1066152.

Ko, M. H. (2018). Why don't people use online public service frequently? A case study on the online export and import license service in Myanmar (Unpublished master's thesis). Graduate School of International Relations, International University of Japan, Niigata, Japan.

Kraemer, K. L., & King, J. L. (2006). Information technology and administrative reform:
Will e-government be different? *International Journal of Electronic Government
Research*, 2(1), 1-20. doi: 10.4018/jegr.2006010101.

Kyaw, C. N. (2019). An analysis on end user acceptance of the certificate of origin online
application system using the technology acceptance model (Unpublished master's
thesis). Graduate School of International Management, International University of
Japan, Niigata, Japan.

Lyytinen, K., & Robey, D. (1999). Learning failure in information systems
development. *Information Systems Journal*, 9(2), 85-101. doi: 10.1046/j.1365-
2575.1999.00051.x.

Ministry of Interior and Safety, National Information Society Agency. (2012-2020). Annual
survey of e-government service use [in Korean]. Seoul, Korea.

Norris, D. F., & Reddick, C. G. (2013a). E-democracy at the American grassroots: Not now
… not likely? *Information Polity*, 18(3), 201-216. doi: 10.3233/IP-130312.

Norris, D. F., & Reddick, C. G. (2013b). Local e-government in the United States:
Transformation or incremental change? *Public Administration Review*, 73(1), 165-
175. doi: 10.1111/j.1540-6210.2012.02647.x.

Park, H. M. (2012). The Web accessibility crisis of Korea's electronic government.
*Proceedings of the 45th Hawaii International Conference on System Sciences
(HICSS-45)*, Maui, HI, January 4-7, 2012, pp. 2319-2328. doi:
10.1109/HICSS.2012.591.

Park, H. M. (2015). Should e-government be transformational and participatory? In
Proceedings of the 48th Hawaii International Conference on System Sciences, Kauai,
HI, pp. 2476-2485 (2015). https://doi.org/10.1109/HICSS.2015.296.

Park, H. M. (2017). Has information technology competence ever increased? Evidences from the Annual User Satisfaction Survey of Information Technology Services. The 78th Annual Conference of the American Society for Public Administration. Atlanta, Georgia, March 17-21, 2017.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186-204. doi: https://doi.org/10.1287/mnsc.46.2.186.11926.

Weerakkody, V., & Reddick, C. G., eds. (2013). *Public sector transformation through e-government: Experiences from Europe and North America*. New York: Routledge.

Wilson, M., & Howcroft, D. (2002). Re-conceptualising failure: Social shaping meets IS research. *European Journal of Information Systems*, 11(4), 236-250. doi: 10.1057/palgrave.ejis.3000437.

Zigurs, I., & Buckland, B. K. (1998). A theory of task/technology fit and group support systems effectiveness. *MIS Quarterly*, 22(3), 313-334. doi: 10.2307/249668.