

IT-MEDIATED CUSTOMER SERVICE CONTENT AND DELIVERY IN ELECTRONIC GOVERNMENTS: AN EMPIRICAL INVESTIGATION OF THE ANTECEDENTS OF SERVICE QUALITY¹

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Despite extensive deliberations in contemporary literature, the design of citizen-centric e-government websites remains an unresolved theoretical and pragmatic conundrum. Operationalizing e-government service quality to investigate and improve the design of e-government websites has been a much sought-after objective. Yet, there is a lack of actionable guidance on how to develop e-government websites that exhibit high levels of service quality. Drawing from marketing literature, we undertake a goal approach to this problem by delineating e-government service quality into aspects of IT-mediated service content and service delivery. Whereas service content describes the functions available on an e-government website that assist citizens in completing their transactional goals, service delivery defines the manner by which these functions are made accessible via the web interface as a delivery channel. We construct and empirically test a research model that depicts a comprehensive collection of web-enabled service content functions and delivery dimensions desirable by citizens. Empirical findings from an online survey of 647 respondents attest to the value of distinguishing between service content functions and delivery dimensions in designing e-government websites. Both service content and delivery are found to be significant contributors to achieving e-government service quality. These IT-mediated service content functions and delivery dimensions represent core areas of e-government website design where the application of technology makes a difference, especially when considered in tandem with the type of transactional activity. A split sample analysis of the data further demonstrates our model's robustness when applied to e-government transactions of varying frequency.

Keywords: Electronic government service quality, IT-mediated service content functions, IT-mediated service delivery dimensions, service content quality, service delivery quality

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Introduction

E-government is the diffusion of technology within public administration to give rise to an emerging genre of web-enabled public services that are sensitized to citizens' transactional requirements (Chan and Pan 2008). For this reason, the design of *e-government websites* has been a subject of constant deliberation for both academics and practitioners (e.g., Barnes and Vidgen 2006; Carter and Bélanger 2005; Coursey and Norris 2008; Grimsley and Meehan 2007; Huang 2007; Zhang et al. 2001). Out of 189 countries surveyed in a 2008 United Nations e-government study, only 20 percent (39 countries) possess any form of online submission for governmental transactions; even fewer offer payment (15 percent) and tracking (6 percent) services, thus limiting citizens' ability to transact via e-government websites (United Nations 2008). Accenture's (2007) latest report on e-government maturity reached a similar conclusion: despite significant strides being taken by most countries in the provision of public e-services, even the most mature e-government websites are handicapped by a shortage of citizen-centric, quality-driven services (see also Beynon-Davies and Williams 2003; West 2004, 2008).

E-government service quality plays an instrumental role in determining citizens' acceptance of public e-services (Ancarani 2005; Buckley 2003; Hazlett and Hill 2003; Teicher et al. 2002; Teo et al. 2008). Yet, an overemphasis on the overarching concept of service quality alone tends to neglect the underlying design principles for creating citizen-centric, quality-driven e-government websites. E-government service quality has been conceptualized as an amalgamation of IT-mediated service content and delivery components (Ancarani 2005). Whereas *service content quality* depicts the range and sophistication of functions available from an e-government website to assist citizens in completing their transactions (Cenfetelli et al. 2008), *service delivery quality* characterizes the manner by which these functions are made accessible via web interfaces as delivery channels. Likewise, Ancarani (2005) maintained that citizens' assessment of e-government service quality is shaped by *what* and *how well* public e-services are delivered: "The quality of the medium is often confused with the quality of the content [when in reality] both should be considered in defining e-service quality" (p. 8).

Grounded in a goal perspective, this paper explores and articulates the spectrum of *IT-mediated customer service content functions* (Cenfetelli et al. 2008) being offered through e-government websites, as well as dimensions of *IT-Mediated Customer Service Delivery* (Cenfetelli et al. 2008) governing how these functions are delivered via web channels (henceforth referred to as *service content functions* and *service deli-*

very dimensions for simplicity). Together, these taxonomies of service content and delivery form the cornerstone of our proposed theoretical model of e-government service quality.

Our *goal approach* is novel in that it bridges extant literature on consumer goals and service quality. To date, prior research has largely emphasized the identification of consumer goals without paying specific attention to how these goals can be realized (e.g., Lee and Ariely 2006). Conversely, contemporary studies of service quality have accentuated *how* quality criteria can be attained without offering strong theoretical justification for *why* these criteria were hailed as "gold standards" in the first place. By theorizing e-government service quality as a blend of content and delivery elements—which are linked to the fulfillment of consumption and process goals respectively—this paper not only offers prescriptions for how quality standards can be enacted for public e-services, it also provides goal-based explanations for our recommendation of such standards. In this sense, the goal approach clarifies the service mission behind each prescribed quality criterion such that web interfaces for e-government websites can be designed in an informative and purposeful fashion.

Embracing a goal perspective of e-government service quality, this paper accomplishes two primary research objectives. First, building on Tan and Benbasat's (2009) claim of the importance of distinguishing between service content and delivery in designing e-government websites, it is necessary to establish that such a distinction is not only discernible by citizens in reality, but it also influences their receptivity to public e-services. Second, even if the distinction were of pragmatic significance, it is necessary to consolidate and compile a set of actionable IT levers, which may be deployed for design purposes, given the diversity of service content functions and delivery dimensions that exist across e-government websites (Benbasat and Zmud 2003). Specifically, we endeavor to answer the following research question: *How can IT-mediated service content and service delivery be leveraged to improve the service quality of e-government websites?*

The paper is organized as follows: the next section synthesizes the extant literature in developing a theoretical model of e-government service quality together with testable propositions. Specifically, our model draws a distinction between service content and service delivery quality as focal antecedents of e-government service quality. Then, we derive separate taxonomies of service content and delivery for public e-services. Subsequently, in the methodology section, we outline an empirical study to validate the constructs and their relationships postulated in our e-government service quality

model. Based on the empirical evidence, we summarize the key findings from our investigation in the analysis section. We conclude the paper with a discussion section that highlights the insights to be gleaned from this investigation in informing the design of e-government websites as well as potential limitations and probable avenues for future research.

Literature Review: Toward an Integrated Theoretical Model of E-Government Service Quality

To derive a theoretical model of e-government service quality, we draw on the well-established notion of service quality within the disciplines of marketing and management information systems (e.g., Cenfetelli et al. 2008; Gefen 2002; Parasuraman et al. 1985, 1988; Reichheld and Scheffer 2000). Then, espousing a goal perspective, we elaborate on our rationale for differentiating between service content and delivery in conceptualizing e-government service quality.

Figure 1 illustrates our proposed theoretical model of e-government service quality.

E-Government Service Quality: A Conceptual Overview

A primary reason behind citizens' low acceptance of public e-services is the inability of e-government websites to move beyond information dissemination to encompass fully executable transactional capabilities (Coursey and Norris 2008; Norris and Moon 2005). Content analysis of 1,744 e-government websites across counties in the United States revealed that executable functions are limited: with 32 percent supporting electronic tax filing, 15 percent dealing with personal records (i.e., birth, marriage, and death), and 10 percent involving online utility payments (Huang 2007). Surveys conducted by the International City/County Management Association (ICMA) in 2004 and the United Nations in 2008 reported equally low usage patterns across e-government websites due to a lack of public e-services that can be executed virtually. The 2004 ICMA survey noted that this deficiency in executable transactional functionalities can be attributed to the absence of service quality standards (see also Hamner and Al-Qahtani 2009). The same opinion was expressed by West (2008) who, in analyzing 1,667 e-government websites across 198 countries, concluded that a mere 50 percent of these websites offer executable public e-services and, even then, severe deficiencies exist in the quality of such services (see also Norris and Moon 2005). Indeed, Tan et al. (2007) con-

ceded that our understanding of actionable design principles, which may be harnessed by practitioners in designing quality-driven public e-services, is still somewhat limited (Benbasat and Zmud 2003; Orlikowski and Iacono 2001). The absence of such principles may be a reason why citizens' acceptance of public e-services for modern e-government websites continues to be dismal (Coursey and Norris 2008; Norris and Moon 2005; United Nations, 2008). This study thus strives to close this knowledge gap by offering guidance on how e-government websites can be better designed to embody public e-services that meet citizens' expectations of service quality.

Drawing on e-service literature in the retail sector, Cenfetelli et al. (2008) posited that perceived service quality is an appropriate yardstick for evaluating customer-oriented web services as it reflects customers' response to actions undertaken by e-businesses to improve service encounters (Parasuraman et al. 1985, 1988, 1994). Particularly, customers' perceptions of service quality have been influential in eliciting a host of positive attitudinal reactions, such as loyalty (Gefen 2002), trust (Reichheld and Scheffer 2000), and satisfaction (Cenfetelli et al. 2008). These same attitudes, as corroborated by empirical evidence from past e-government studies, are predictive of citizens' acceptance of public e-services (Bélanger and Carter 2008; Grimsley and Meehan 2007; Teo et al. 2008; Treiblmaier et al. 2004; Welch and Hinnant 2003). Conceivably, what is missing is a design blueprint for e-government websites that embraces a *customer-centric focus* in the provision of public e-services (Barnes and Vidgen 2001; Beynon-Davies and Williams 2003; Buckley 2003; Hazlett and Hill 2003).

Hamner and Al-Qahtani (2009) admitted that while substantial advances have been achieved on the supply side of e-government (i.e., system infrastructures and service policies), there is comparatively less progress being made on the demand side for public e-services (i.e., desirability of services from citizens' viewpoint). Yet, despite general consensus on the urgency of improving the quality of public e-services for citizens' consumption (Ancarani 2005; Gupta et al. 2008; Hazlett and Hill 2003; Kahraman et al. 2007; Teicher et al. 2002; West 2004), the operationalization of service quality in the design of e-government websites remains an elusive challenge (Buckley 2003).

A Goal Perspective of E-Government Service Quality

Definitions of quality are found in diverse areas such as economics, engineering, marketing, operations, strategy, soci-

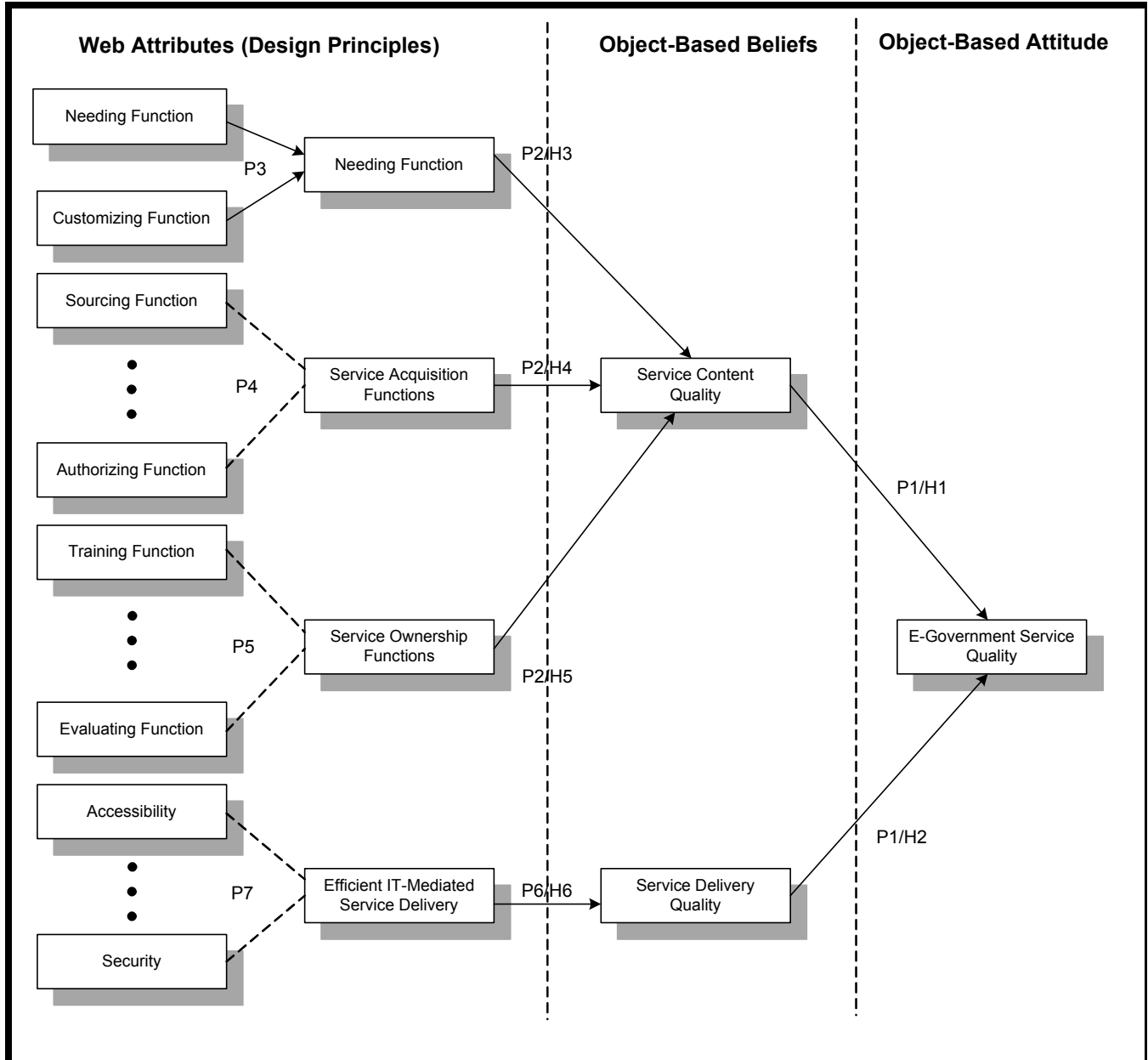


Figure 1. Theoretical Model of E-Government Service Quality

ology, and philosophy. Although there is widespread disagreement among scholars on what quality truly means, Garvin (1984) advanced a conceptual framework for synthesizing and categorizing divergent approaches to defining quality across multiple disciplines. Garvin's framework was subsequently refined by Forker (1991), who defined quality from five main perspectives: (1) transcendent, (2) product-oriented, (3) user-oriented, (4) manufacturing-oriented, and (5) value-oriented. A sixth perspective of defining quality

from the perspective of societal losses was further added by Taguchi (1987). Table 1 summarizes the resultant six perspectives of quality.

Of the six perspectives illustrated in Table 1, we subscribe to a *user-oriented* conception of e-government service quality. Conceptualizing e-government service quality from a user-oriented standpoint resonates with our intent of bridging knowledge gaps in the customer-centric design of public

Table 1. Summary of Quality Perspectives

Perspective	Definition	Discipline(s)	Contributing Author(s)
Transcendent	Quality is an abstract moral, religious or philosophical concept	• Philosophy	Forker (1991); Garvin (1984)
Product-Oriented	Quality is a function of the discrepancy between actual and ideal attributes of a product/service that determines its desirability	• Economics • Marketing	Forker (1991); Garvin (1984); Teas (1993)
User-Oriented	Quality is the ability of a product/service to satisfy human needs and is equivalent to customer's contentment with product/service attributes	• Economics • Marketing • Operations	Forker (1991); Garvin (1984); Hauser and Clausing (1988)
Manufacturing-Oriented	Quality is the extent to which a product/service conforms to its design and engineering specifications	• Engineering	Forker (1991); Garvin (1984)
Value-Oriented	Quality is the difference between product/service benefits and costs	• Marketing • Operations	Forker (1991); Garvin (1984); Hirschman and Holbrook (1982)
Societal Loss	Quality is a society's loss from the variability of production or harmful side effects	• Sociology	Taguchi (1987)

e-services. From this premise, we reviewed extant literature on e-service quality to derive a working definition of e-government service quality. Appendix A summarizes past conceptualizations of the e-service quality construct along with its constituent dimensions, scope of application, and theoretical frame of reference, where available.

Our review has uncovered two predominant trends pertaining to past theorizations of e-service quality. First, with the exception of a few notable studies (i.e., Fassnacht and Koese 2006; Gummerus et al. 2004; Kim et al. 2006; Parasuraman et al. 2005; Santos 2003; Zeithaml et al. 2000), the majority fail to provide an explicit definition of e-service quality despite having acknowledged it as a multi-dimensional construct. Second, even for studies with concrete definitions of e-service quality, scholars appear to be divided over whether it emerges as a belief (i.e., Fassnacht and Koese 2006; Gummerus et al. 2004; Kim et al. 2006; Parasuraman et al. 2005; Zeithaml et al. 2000), as an attitude (i.e., Santos 2003), or—as noted in Table 1—as an objective yet abstract concept.

According to Ajzen and Fishbein's (1980) expectancy-value theory (EVT), external stimuli influence an individual's beliefs regarding the outcomes associated with their performance of a targeted behavior. These beliefs, in turn, shape attitudes toward actually performing the behavior. Whereas a person's belief about a targeted behavior refers to "the individual's subjective probability that performing the target behavior will result in [certain] consequence," his attitude toward the behavior is determined by "his or her salient

beliefs about consequences of performing the behavior [and] the evaluation of those consequences" (Davis et al. 1989, p. 984; see also Davis 1989).

Extending the EVT to the domain of information systems, Davis (1993) maintained that system design features act as external stimuli affecting users' beliefs about the consequences of utilizing a technological innovation, and that such beliefs in turn, impact their attitudes toward the actual usage of the technology. In a detailed analysis of the system success and technology acceptance research streams, Wixom and Todd (2005) called for a separation between *object-based* and *behavioral-based* beliefs and attitudes in assessing the quality of technological innovations and predicting their acceptance by intended users. Whereas object-based beliefs and attitudes are concerned with the design attributes of a technological innovation, behavioral-based beliefs and attitudes pertain to the action of utilizing that technology and the consequences arising from its usage.

Object-based beliefs and attitudes are hence pertinent to this study because *object-based beliefs* reflect users' evaluation of the design attributes (or features) embodied within a technological innovation whereas *object-based attitudes* mirror the value they attached to the technology given such properties (Wixom and Todd 2005). Arguably, since e-government service quality denotes citizens' valuation of transactional features accessible from e-government websites (Ancarani 2005; Buckley 2003; Hazlett and Hill 2003; Teicher et al. 2002), it is synonymous with what Wixom and Todd con-

strued as an object-based attitude. That e-government service quality can be conceived as an object-based attitude is also borne out in our literature review: most studies have implicitly portrayed e-service quality as an object-based attitude by treating it as an aggregation of constituent object-based beliefs (e.g., Barnes and Vidgen 2001; Douglas et al. 2003; Kim et al. 2004; Palmer 2002; Rosen and Purinton 2004; Santos 2003; Shchiglik and Barnes 2004).

E-government service quality, as an object-based attitude, aligns with the concept of consumer goals in marketing. Scholars have increasingly recognized that a *goal perspective of consumption choice* advances knowledge of customer satisfaction (Garbarino and Johnson 2001; van Osselaer et al. 2005) by illuminating the motivational forces driving consumers' behavioral actions (Gollwitzer 1990; Lee and Arieli 2006). Within the e-government domain, consumer goals represent transactional objectives that citizens wish to attain through consuming public e-services (Garbarino and Johnson 2001; Peterman 1997). For instance, convenience is an intrinsic motivation for taxpayers to file their tax returns electronically and, as a consequence, the availability of easy-to-use online submission features becomes an important determinant of taxpayers' receptivity of electronic tax filing systems (Tan and Pan 2003). Therefore, insofar as an e-government website offers public e-services that fulfill citizens' transactional goals, it should be regarded by its target audience to be of high quality.

Whenever we reference e-government service quality, we are referring to citizens' general assessment of how well content functions of an e-government website are integrated with the delivery properties of the web medium to create a set of core services,² which facilitate citizens in achieving their transactional goals. We hence define ***e-government service quality*** as *citizens' perceptions of the general performance of public e-services offered via an e-government website in fulfilling their transactional goals*. Consistent with predominant trends within the technology acceptance research stream (Davis 1989, 1993), we concede that users' beliefs about and attitudes toward technological systems tend to be individualized and should be construed as perceptual variables (see also Seddon 1997). That is, whenever the word *quality*

²By theorizing services as functional processes leading to predetermined outcomes, the distinction between services and transactions becomes clear. Services refer to functional processes put in place to assist customers in achieving promised outcomes, whereas transactions are occurrences in time when these processes are activated by consumers to arrive at promised outcomes. For example, an electronic tax filing system entails a collection of e-government services (e.g., estimation of tax returns, payment of taxes due). In contrast, the electronic filing of a tax return by a citizen should be viewed as an independent, time-specific e-government transaction.

is mentioned in this paper, it refers to a perception and not an objective measure.

Distinguishing E-Government Service Content from Service Delivery

Many researchers have asserted that the conceptualization of service quality must include considerations for both service content and delivery (Baker and Lamb 1993; Grönroos 1982, 1990; Grönroos et al. 2000; Mangold and Babakus 1991; Rust and Oliver 1994; Teo et al. 2008). There is ample conceptual and empirical justification for such a distinction within online transactional environments. In the absence of direct interaction with human service providers, Grönroos et al. (2000) argued that the website must be "functionally advanced enough [i.e., effective service content] and technically easy to operate [i.e., efficient service delivery] by the customer so that he or she can get access to the service package" (p. 248). Moreover, service content deficiencies culminate in negative consequences that are independent of those resulting from service delivery inadequacies. Whereas the absence of service content quality reduces the likelihood of obtaining desirable outcomes from transactional activities, the lack of service delivery quality amplifies the difficulty of performing such activities (Ancarani 2005; Gil-Garcia 2006; Grimsley and Meehan 2007). Empirically, previous studies have reinforced the delineation between service content and delivery as distinct antecedents of e-service quality (Cenfetelli et al. 2008; van Riel et al. 2001). Findings prove that regardless of how accessible service content functions may be, they serve little purpose if they do not match customers' requirements (Cenfetelli et al. 2008; van Riel et al. 2001). Conversely, the availability of superior service content will be rendered meaningless if it is not made accessible to customers through efficient delivery (Carter and Bélanger 2005; Cenfetelli et al. 2008; van Riel et al. 2001).

From a goal perspective, van Osselaer et al. (2005) also differentiated consumption goals from process goals in explaining consumer choices. Whereas *consumption goals* capture the functional benefits favored by customers in consuming a product or service, *process goals* relate to the experiential aspects of the transactional process (van Osselaer et al. 2005). Consumption goals, in the context of e-government, are thus synonymous with the transactional outcomes preferred by citizens in utilizing public e-services. For example, the electronic tax filing website of the Singaporean government [www.iras.gov.sg] offers service content functions that enable the simulation of multiple tax scenarios for taxpayers. Such content benefits its target audience in that it offers personalized advice to the individual

taxpayer on ways to optimize their income situation for tax filing purposes. Process goals, on the other hand, are tied to the transactional experience of citizens when interacting with e-government websites. For instance, the “one-stop” e-government service portal of Montgomery County in the state of Maryland [<http://www.montgomerycountymd.gov>] embeds text-to-audio features to accommodate citizens with vision impairment. Such features allow the portal to deliver content in a manner that guarantees universal access and a consistent transactional process for every citizen who transacts with the portal.

We therefore postulate that it is important to differentiate service content from service delivery as distinct but complementary factors contributing to the overall quality of an e-government website. We henceforth refer to **service content quality** as the *effectiveness of service content functions provided via an e-government website in fulfilling citizens’ consumption goals* and to **service delivery quality** as the *efficiency of accessing service content via the e-government website as a delivery channel in fulfilling citizens’ process goals*. Further, consistent with Wixom and Todd’s recommendation, we construe both content and delivery quality as *object-based beliefs*. While the former deals with *what* services a citizen is receiving from an e-government website for attaining their consumption goals, the latter pertains to *how well* these services are made accessible to the citizen in achieving their process goals. We hence propose that:

Proposition 1: E-government service quality is influenced by service content quality and service delivery quality.

Conceptualizing E-Government Service Content Quality

Service content quality reflects the assortment of web-enabled functions made available via e-government websites. Homburg et al. (2002) observed that service content quality is instrumental in shaping positive customer reactions by ensuring constant support throughout the entire transactional process. The provision of timely assistance to customers from pre- to post-transactional stages can only be realized through the appropriation of technology, especially with regard to the nurturing of a personalized service experience (Cenfetelli et al. 2008). The same can be said for e-governments. Through leveraging information technologies, governments can overcome physical barriers and resource constraints in personalizing public services, while simultaneously increasing the number of contact points between governmental institutions and citizens (Pan et al. 2005). In this sense, e-government

websites present opportunities for governmental institutions to capitalize on web technologies in offering customizable service content that caters to citizens’ requirements at every stage of the transactional process (Ho 2002; Tan and Pan 2003).

Van Lamsweerde (2001) argued that the concept of goals, when applied to system developmental projects, should be formulated at varying levels of abstraction, which range from high-level strategic considerations to low-level technical concerns (see also Austin and Vancouver 1996; Ligas 2000). We therefore base our theory on the dual identification of higher-order design principles and lower-order technological prescriptions in designing e-government websites. While the higher-order design principles reflect strategic service visions for e-government websites, the lower-order technological prescriptions represent service content functions supportive of these visions.

Customer Service Life Cycle (CSLC)

To derive these design principles and technological prescriptions for e-government websites, we rely on Ives and Learmonth’s (1984) customer service life cycle (CSLC). The CSLC model depicts the spectrum of interactions experienced by a customer in a typical transaction and consists of four strategic design principles, beginning with *requirements*, followed by *acquisition*, *ownership*, and finally *retirement*. Each of these four principles is, in turn, augmented by a series of customer-centric service content functions, technologies that can generate added value for consumers (Ives and Learmonth 1984; Ives and Mason 1990). Table 2 summarizes the 15 service content functions of the CSLC model.

As remarked by Piccoli et al. (2001, p. 45), the CSLC model is invaluable in exposing core service areas where technology can truly make a difference:

The Customer-Service Life Cycle [CSLC] is intended to help you to think creatively about how technology can be integrated into your products and into your customer’s experience [because] the most innovative ideas are often not the most costly or resource-intensive, but simply those based on an understanding of how customer needs can effectively be satisfied.

Previous applications of the CSLC model to e-commerce domains attest to its robustness in identifying design principles and technological prescriptions catering to consumers’ transactional expectations. While Cenfetelli et al. (2008) ap-

Table 2. The Customer Service Life Cycle (CSLC) (Ives and Learmonth 1984; Ives and Mason 1990)

Requirements	
<i>Needing</i>	Assists the customer to better understand his/her transaction needs
<i>Specifying</i>	Allows the customer to modify transactional attributes
Acquisition	
<i>Sourcing</i>	Facilitates the customer to locate a viable source from where the product may be obtained
<i>Ordering</i>	Enables the customer to purchase the product from its provider
<i>Paying</i>	Provides the customer a means of submitting payment for the purchase of a product
<i>Obtaining</i>	Offers the customer an avenue by which to take possession of a purchased product
<i>Accepting</i>	Ensures that the purchased product matches the specifications of the customer
Ownership	
<i>Training</i>	Helps the customer to exploit the purchased product to its full potential
<i>Monitoring</i>	Aids the customer to control access and utilization of a purchased product
<i>Maintaining</i>	Repairs a purchased product whenever necessary
<i>Upgrading</i>	Permits the customer to upgrade a product whenever conditions change
Retirement	
<i>Accounting</i>	Monitors where a product is purchased as well as how much has been spent
<i>Reselling/Returning</i>	Authorizes the customer to move, return, or dispose of a purchased product as and when necessary
<i>Replacing</i>	Presents the customer with another product for one that has been consumed or is beyond repair
<i>Evaluating</i>	Supplies the customer with a feedback channel for commenting on his/her transactional experience

plied the CSLC model in deriving a checklist of service content functions pertinent to e-commerce websites, Lightner (2004) drew on the model to map existing functional features of Amazon.com and Chumbo.com in order to detect content discrepancies between the two websites. In the e-government context, Tan and Benbasat (2009) also adapted the CSLC model for comparing the electronic tax filing websites of Singapore and the United States and determining whether variation in service content quality exists between them.

Because the CSLC model is initially theorized for general product offerings to customers, it cannot be applied indiscriminately to citizen-centric e-government services. Our goal is to appropriately apply the CSLC to the domain of e-government and so determine those content functions that can cater to citizens' expectations in executing e-government transactions. We refine the CSLC model both deductively and inductively in order to glean creative insights from observations (Patton 1990) without dismantling proven ideas (Fox-Wolfgramm et al. 1998). Of the four design principles highlighted in the CSLC model, we isolate *requirements*, *acquisition*, and *ownership* as those most germane to

e-governments (see Table 3). The remaining principle of *retirement* is not included in our model because it deals primarily with the return or abandonment of physical products and, thus, is not applicable in the case of e-services. Unlike physical products, the intangibility of services permits continuous evolution in response to changing customer preferences (Parasuraman et al. 1985, 1988, 1994). This continuity in service progression is an important distinguishing characteristic between products and services to the extent to which it is often the case that there is no visible period of obsolescence for the latter (Grönroos 1990; Grönroos et al. 2000). This lack of obsolescence also holds true for public services in that they seldom become obsolete outright, but rather evolve over time in response to legislative or regulatory changes to governmental transactions (Tan and Pan 2003).

The feasibility of precluding retirement while retaining the other three design principles (i.e., requirements, acquisition, and ownership) in the design of e-government websites is further verified in conjunction with our derivation of the supporting technological prescriptions as described below.

Table 3. IT-Mediated Service Content Functions for E-Government Websites

Service Content Function	Definition (Website provides functions allowing citizens to...)	Consumption Goal-Directed Rationale
Requirements	In the absence of face-to-face communication and clarification, it is imperative for e-government websites to provide IT-mediated service content functions that assist citizens in determining public e-services most suited to their purpose.	
<i>Needing</i>	Anticipate and/or establish the type of public e-service needed	To provide information about prerequisite actions needed as citizens are often unclear about the administrative steps mandated for governmental transactions
<i>Customizing</i>	Customize service content and procedures according to individual requirements	To offer public e-services that conform to citizens' transactional requirements as governmental transactions are often laden with numerous administrative procedures
Acquisition	To induce adoption of public e-services, e-government websites should provide IT-mediated service content functions that assist citizens in obtaining desired transactional outcomes.	
<i>Sourcing</i>	Identify specific governmental institutions responsible for various public e-services	To communicate directly with specific governmental institutions responsible for various public e-services in order to resolve any transactional problems that may arise
<i>Trying</i>	Gain familiarity with servicing processes by permitting trial runs of e-government transactional procedures	To allow citizens to experiment with public e-services being offered in order to achieve familiarization with the informational and procedural requirements needed in performing a given e-government transaction
<i>Ordering</i>	Perform e-government transactions online	To enable citizens to complete the entire e-government transaction online in order to provide the most obvious form of convenience promised by the advent of the internet such as time and location independent services
<i>Paying</i>	Pay for e-government transactional charges and service fees online	To permit citizens to utilize the most convenient online method to transfer funds for governmental transactions such that the entire transactional process appears seamless
<i>Tracking</i>	Estimate the processing time for different kinds of e-government transactions; Track the progress of uncompleted transactions, and; Review archival records of completed transactional history	To increase the accountability and transparency of e-governmental transactions to citizens
<i>Accepting</i>	Forecast possible results of an e-government transaction in order to identify additional components that may be helpful in improving its eventual outcome	To let citizens evaluate if the service to be acquired satisfies their e-government transactional specifications and if not, to pinpoint missing or complementary elements, which may be included to
<i>Authorizing</i>	Grant or reject access privileges to confidential information disclosed within an e-government transaction	To grant citizens the right of authorizing access to their personal and/or confidential content disclosed during an e-government transaction to allay widespread privacy concern among citizens

Table 3. IT-Mediated Service Content Functions for E-Government Websites (Continued)		
Service Content Function	Definition (Website provides functions allowing citizens to...)	Consumption Goal-Directed Rationale
Ownership	To promote the participative involvement of citizens in developing public e-services, e-government websites should provide IT-mediated service content functions that confer ownership of these services from public agencies to citizens.	
<i>Training</i>	Transfer accumulated transactional experience across various public e-services	To aid citizens in transplanting experience accumulated from performing a specific e-government transaction onto other public e-services with similar functional features in order to expose citizens to expanded service experience via e-government websites
<i>Monitoring</i>	Be made aware of novel public e-services and/or amendments to existing transactional procedures that are relevant	To direct citizens' attention to transactional deadlines and procedural amendments so as to stay updated with e-government transactional procedures that should then become more routine to citizens, thus removing their need to proactively filter huge amounts of governmental information to stay abreast
<i>Upgrading</i>	Respond to amendments in transactional procedures without re-performing the entire e-government transaction	To make incremental improvements to public e-services whenever requirements change, without the need to revisit the entire acquisition process to assist citizens caught in between transitional periods
<i>Scheduling</i>	Keep track of the dates of recurring e-government transactions	To supply a comprehensive schedule of deadlines for governmental transactions in hope of acclimatizing citizens to e-government transactions that may have to be completed in phases
<i>Delegating</i>	Authorize and delegate automatic execution of recurring e-government transactions	To assist citizens in authorizing and assigning automatic execution of recurring e-government transactions in order to relieve citizens of the inconvenience of having to personally perform repetitive mundane transactions
<i>Negotiating</i>	Dispute results or revisit a decisional process leading to the outcome of a completed e-government transaction	To authorize citizens to challenge perceived inequitable transactional outcomes and seek restitution from governmental institutions
<i>Evaluating</i>	Communicate with different governmental institutions to provide feedback on offered public e-services	To present citizens with communication avenues to provide feedback to different governmental institutions so as to participate actively in the future improvements of public e-services

Defining IT-Mediated Service Content Functions

To identify the series of service content functions that are supportive of higher-order design principles, we adapted the 15 functions of the CSLC model to the domain of e-government. For each service content function advocated in the CSLC model, we identified its accompanying consumption goal. Three independent coders were then recruited to peruse e-government websites belonging to

governmental institutions in Canada, Singapore, and the United States,³ one coder for each country. The coders were briefed on the purpose of the CSLC model, its advocated service content functions, and the consumption goal to be

³The choice of the three countries for soliciting examples of best practices in e-government web interface design is in response to the latest Accenture (2007) report on e-government leadership for which Canada, Singapore, and the United States were ranked as the top three nations in terms of e-government maturity.

fulfilled by each function. Each coder was then instructed to determine whether service content functions from the CSLC model are representative of genuine functions that exist on the e-government websites they were reviewing. The coders were also told to elicit service content functions on e-government websites that could not be properly classified in accordance with the CSLC model. Whenever one of the coders was unsure of the placement of an elicited service content function, he/she was to consult with the others on how best to categorize the function. Upon the completion of the elicitation exercise, the coders were interviewed to learn about the consumption goal to be fulfilled by each service content function and to understand their rationale for its placement.

Based on the content analysis of preexisting e-government websites, 5 of the 15 service content functions found in the CSLC model were dropped due to the absence of corresponding functionality in practice (i.e., obtaining, maintaining, accounting, reselling/returning, and replacing). Additionally, six extra service content functions were introduced by the coders to categorize elicited functionalities that do not conform to the CSLC model, namely *authorizing*, *delegating*, *negotiating*, *scheduling*, *tracking*, and *trying* (see Appendix B). Together with the 10 functions retained from the CSLC model (i.e., *accepting*, *customizing*, *evaluating*, *monitoring*, *needing*, *ordering*, *paying*, *sourcing*, *training*, and *upgrading*), we arrive at a taxonomy of 16 service content functions that epitomize generic web features, which can be found across reputable e-government websites. Table 3 depicts the resultant 16 service content functions that correspond to the fulfillment of various consumption goals for citizens in transacting via e-government websites.

Next, two new coders were brought in and asked to place the best practices (in Appendix B) into the 16 service content functions identified. In reversing the initial coding process, we were able to triangulate our development of the 16 service content functions by subjecting these functions to a second round of verification. A hit ratio of 90 percent⁴ and an inter-coder Kappa value of 0.86⁵ imply a high degree of agreement between the two coders as to their placement of the best prac-

⁴The hit ratio is a measure of how well measurement items tap on their respective targeted constructs by calculating the ratio of "correct" item placements to total placements across all dimensions (Moore and Benbasat 1991). Although there are no strict guidelines for evaluating the hit ratio, 80 percent is generally deemed to be acceptable.

⁵Kappa assesses agreement *between judges* by taking into account probabilities of chance agreement. The commonly acceptable threshold for Kappa is 0.70 (Boudreau et al. 2001).

tices into one of the 16 service content functions. This inter-rater agreement in turn affirms the validity of the 16 service content functions. The two coders were also instructed to categorize the 16 service content functions into the 4 service principles advocated in the original CSLC model (i.e., requirements, acquisition, ownership, and retirement). In line with our earlier postulation, none of the 16 service content functions were classified under retirement. This reinforces our decision to drop retirement from our theoretical model. We hence propose that

Proposition 2: Service content quality, in the context of e-government websites, is influenced by service content functions catering to requirements, acquisition, and ownership.

Table 3 classifies each of the 16 service content functions under the 3 design principles of *requirements*, *acquisition*, and *ownership*. It should be emphasized that these 16 service content functions exist on a higher level of abstraction; that is, at any time, there may be more than one method of implementation for these recommended functions. Such an approach guarantees that regardless of how each service content function is implemented for a particular e-government website, it is theoretically rooted in the attainment of a salient consumption goal. Consequently, while the underlying technology may differ over time, the basic transactional goal to be fulfilled by each service content function remains constant. Subsequent sections will account for how these 16 service content functions contribute to the enactment of the 3 design principles for e-government websites: requirements, acquisition, and ownership.

Service Requirements

Without the benefits of face-to-face communication and clarification for online transactions, it is necessary for websites to offer service content functions that assist customers in making sense of their transactional *requirements* (Cenfetelli et al. 2008; Ives and Learmonth 1984; Ives and Mason 1990; Lightner 2004). The demand for such functions may be even more pronounced for e-governments because, unlike commercial dealings in which consumers usually have a well-formed idea of what they want before accessing the website, governmental transactions are typically mandated by legislation (Tan and Pan, 2003; Tan et al. 2005). Therefore, citizens may not always be conscious of the administrative requirements being stipulated. In order for e-government websites to replace conventional media for governmental transactions, their ability to advise citizens on how to proceed with unfamiliar administrative tasks is of utmost importance (Grimsley and Meehan 2007).

By relying solely on web-enabled interfaces as the focal point of contact for governmental transactions, e-government websites must provide service content functions that not only assist citizens to make sense of their transactional requirements (i.e., needing), but also enable them to tailor content to match their individual needs (i.e., customizing) (Fagan and Fagan 2001). E-government websites exhibiting high levels of content quality should help citizens to identify essential public e-services and to customize these services to suit their immediate transactional purposes (Beynon-Davies and Williams 2003). We hence propose that

Proposition 3: Service content functions catering to service requirements, in the context of e-government websites, comprise needing, and customizing functions.

Service Acquisition

Acquisition pertains to the process of completing online transactions (Ives and Learmonth 1984; Ives and Mason 1990). Acquisition is a valid concern, as recent empirical studies point to a deficiency of virtually executable functions (Huang 2007; United Nations, 2008; West 2008) as the major cause behind citizens' unwillingness to go beyond mere information-gathering activities for e-government transactions (Coursey and Norris 2008; Norris and Moon 2005; Reddick 2004, 2005).

Service content functions catering to the service acquisition process must, therefore, at the very least automate and mimic conventional practices associated with "face-to-face" governmental transactions (Kahraman et al. 2007; Poon 2002). Furthermore, the impersonal nature of public e-services and the uncertainty inherent within an open transactional architecture imply that e-government websites must not only offer service content fulfilling basic transactional activities (i.e., sourcing, ordering, paying, tracking and accepting) (Pirog and Johnson 2008), but they should also be equipped with functions that facilitate trial runs of typically unfamiliar procedures (i.e., trying) (Moore and Benbasat 1996), as well as safeguard against privacy infringement of confidential personal information disclosed during online transactions (i.e., authorizing) (Jaeger et al. 2003; Midha and Nemati 2004; Otjacques et al. 2007; Seifert and Relyea 2004; Wang 2002). We hence propose that

Proposition 4: Service content functions catering to service acquisition in the context of e-government websites comprise sourcing, trying, ordering, paying, tracking, accepting, and authorizing functions.

Service Ownership

Ownership is the third strategic service principle embodied in the CSLC model and is geared toward the enhancement of the ownership experience for customers after product acquisition (Cenfetelli et al. 2008; Ives and Learmonth 1984). Unlike e-commerce where ownership services are targeted at purchased products, ownership in the domain of e-government seeks to promote participative and continuous involvement on the part of the citizens (Chan and Pan 2008; Tan et al. 2005)—what Lawson (1998) envisioned as the provision of services in a manner where power is transferred to the people. O'Neill (2001) also noted that e-government will grant citizens "access to the levers of power in government. As more information reaches the citizens, the greater the potential for them to influence and make informed choices regarding how government touches their lives" (p. 6; see also Olphert and Damodaran 2007).

Through empowering citizens to take "command" of recurring administrative duties (e.g., monthly payment for city services, tax filing), ownership resembles service acclimatization whereby the burden of conducting e-government transactions is significantly reduced such that these transactions are ultimately accepted as part of citizens' standard routines (Beynon-Davies and Williams 2003). Service content functions catering to service ownership should, therefore, alleviate citizens' transactional load by proactively keeping them abreast of deadlines and emerging developments in e-government services (i.e., training and monitoring) (Lawson 1998). Further, given that certain governmental transactions recur only periodically, the presence of service content functions to aid citizens in scheduling transactional activities and in effortlessly adapting to regulatory amendments should be of a high standard for e-government websites keen on promoting service ownership (i.e., upgrading, scheduling, and delegating) (Irani et al. 2007; Tan and Pan 2003). Kahraman et al. (2007) also favored the automation of standardized tasks as a means of error reduction to improve the consistency of transactional outcomes. Finally, to legitimize citizens' position as "owners" of selected governmental transactions, it is obligatory for e-government websites to offer service content functions that allow them to resolve disagreements (i.e., negotiating) and/or voice their opinions (i.e., evaluating) (Grimsley and Meehan 2007). We hence propose that

Proposition 5: Service content functions catering to service ownership, in the context of e-government websites, comprise training, monitoring, upgrading, scheduling, delegating, negotiating, and evaluating functions.

Conceptualizing E-Government Service Delivery Quality

The accessibility of service content is predictive of e-government service quality. Therefore, it is imperative to design e-government websites that not only provide effective service content functions but also deliver those functions in an efficient manner (Beynon-Davies and Williams 2003; Kahraman et al. 2007).

Design principles of the e-government website as a medium for service delivery have been empirically demonstrated to be distinguishable from the service content functions being offered (e.g., Cenfetelli et al. 2008; Collier and Bienstock 2003, 2006; Fassnacht and Koese 2006). For instance, while an e-government website may offer various service content functions that assist a citizen in estimating tax dues and in filing and paying those taxes electronically, the quality of these functions are distinct from the web medium itself. This is a crucial distinction, yet one that has been infrequently made when listing criteria for e-service quality. The research conducted in the retail context sets a parallel situation to ours of viewing the web medium as a separate and distinguishable element from its service content. Although dealing with traditional rather than with online retail channels, Brady and Cronin (2001) claimed that the physical environment—comprising ambient conditions and social factors—is a critical contributor to service quality. These factors describe the “service encounter” where the customer is in the presence of the service provider and observes factors such as cleanliness, noise, or lighting. These physical cues may serve as tangible indicators of service provider performance in the face of the more intangible nature of the services themselves (Bitner 1990).

Undoubtedly, online interactions are different from conventional face-to-face interactions. However, environmental cues present during physical interactions can also exist in the form of web attributes. Such commonalities have been borne out in investigations of website quality, such as Wolfenbarger and Gilly (2003), who acknowledged the pivotal role of web channel design in contributing toward website quality. More recently, Bauer et al. (2006) alluded to the role of design features, such as navigability, accessibility, and clarity, as being deterministic of end-user quality evaluations for retail websites.

Within the context of e-government, Yao and Huston (2002) found that accessibility is positively correlated with citizens’ usage of electronic voting systems (see also Chan et al. 2008a, 2008b; Irani et al. 2008). Triebelmaier et al. (2004) observed that the security of virtual payment functions reduces citizens’

resistance to online payment methods for e-government transactions (see also Bélanger and Carter 2008; Janssen et al. 2008; Kahraman et al. 2007). Other factors that have received similar empirical support include navigability, interactivity, and interoperability (e.g., Bélanger and Carter 2008; Ebbers et al. 2008; Gil-Garcia et al. 2007; Heeks and Stanforth 2007; Luna-Reyes et al. 2007; Pieterse et al. 2007; Poon 2002; Welch and Hinnant 2003).

This study, therefore, postulates that inefficient service delivery can compromise e-government transactional activities in spite of superior service content functions by rendering them inaccessible to citizens (Cenfetelli et al. 2008; van Riel et al. 2001). Inefficiencies in the delivery of service content for any e-government website may lead citizens to sense minimal differences between the web medium and its physical counterpart, thereby inhibiting switching behavior among potential adopters (Carter and Bélanger 2005). Efficient IT-mediated service delivery, therefore, warrants a separate research stream to uncover interface design principles that exploit the properties of the web medium to deliver content in a readily accessible manner. In line with Ancarani (2005), we hence define IT-mediated service delivery as the *manner by which service content are made accessible to citizens via the e-government website as a delivery channel* and propose that

Proposition 6: Service delivery quality, in the context of e-government websites, is influenced by service delivery dimensions associated with efficient IT-mediated delivery of content.

Defining IT-Mediated Service Delivery Dimensions

Service delivery is a multidimensional concept. To arrive at a descriptive set of constituent dimensions comprising efficient IT-mediated service delivery, we reviewed conference proceedings from major MIS conferences and articles from refereed journals, namely *European Journal of Information Systems (EJIS)*, *Government Information Quarterly (GIQ)*, *Information Systems Journal (ISJ)*, *Information Systems Research (ISR)*, *Journal of the Association for Information Systems (JAIS)*, *Journal of Information Technology (JIT)*, *Journal of Strategic Information Systems (JSIS)*, *MIS Quarterly (MISQ)*, *Public Administration Review (PAR)*, the Americas Conference on Information Systems (AMCIS), the European Conference on Information Systems (ECIS), the Hawaii International Conference on System Sciences (HICSS), and the International Conference on Information Systems (ICIS). Utilizing digital libraries belonging to the

authors' universities and the Association for Information Systems (AIS), we searched for papers dated from 2000 to 2008 on the topic of e-government published in the conference proceedings and journals listed above. To be comprehensive, our search included related topic areas such as "digital government" and "IT in public sector." We located a total of 377 articles.⁶

Due to the vast pool of published articles to be reviewed, an initial screening process was carried out by the authors to shortlist papers that might potentially yield dimensions of service delivery and thus warrant in-depth scrutiny. In the screening process, the authors combed through the theory and findings (if any) segments of each article to eliminate papers that either deal with the supply-side of e-governments or concentrate primarily on the content aspects of public e-services. This process yielded 186 out of 377 (or 49 percent) papers for interpretive coding.

For coding purposes, two independent coders were recruited and briefed on what constitutes a *process goal*. The coders were told that process goals are tantamount to interactive outcomes desired by citizens in transacting via e-government websites (e.g., convenience, ease-of-access, responsiveness, and user friendliness). Examples of process goals were also given to ensure that these two coders were familiar with the authors' interpretation of process goals. Next, the coders were instructed to review the retrieved articles and uncover constructs that they believed were connected with the achievement of process goals. For each paper, the coders were told to extract probable service delivery dimensions together with their definitions as specified in the article. When extracting the service delivery dimensions, coders were also requested to elaborate on the process goal to be fulfilled via each dimension. Elicited service delivery dimensions were then subjected to a round of unlabeled sorting by two other coders in which they were asked to organize the dimensions into broader categories according to their theoretical proximity (i.e., how these dimensions have been defined). Feedback from the coders indicates that the goal perspective was invaluable in the classification exercise by enabling them to quickly resolve and group seemingly disparate constructs based on the homogeneity of their targeted process goals. Unlabeled sorting eventually led to the consolidation of six service delivery dimensions (see Table 4) with an inter-coder Kappa value of 0.81.

While the derivation of service delivery dimensions is an interpretive process, it is a novel contribution to theory in that

⁶The complete list of citations is available upon request.

it acts as a preliminary taxonomy of web channel properties that potentially affect the delivery quality of e-government websites. The resulting six service delivery dimensions of *accessibility*, *navigability*, *interactivity*, *interoperability*, *adaptability*, and *security* pertain directly to the intrinsic attributes of the web medium, which augment the delivery of service content for e-government websites. Although we were unable to conduct an exhaustive search for all e-government related articles due to manageability issues as well as time and effort constraints, it is our conviction that the aforementioned six service delivery dimensions, as solicited from an extensive review of 186 published articles, are representative constituents of efficient IT-mediated service delivery for e-government websites.

Because the six service delivery dimensions have received broad support for their viability in extant e-government literature (see Table 5), we propose that

Proposition 7: Service delivery dimensions catering to efficient IT-mediated service delivery of content, in the context of e-government websites, comprise accessibility, navigability, interactivity, interoperability, adaptability and security.

Classificatory Versus Explanatory and Predictive Propositions

In a methodical classification of theories in information systems, Gregor (2006) distinguished analytical theories from those of an explanatory and predictive nature. According to Gregor, *analytical* theories analyze, describe, and recapitulate salient attributes of phenomena of interest and the relationships among them. These specified relationships can be associative, classificatory or compositional, but not causal. Conversely, *explanatory and predictive* theories embody both testable propositions and causal explanations to offer predictions about phenomena of interest. Our proposed theoretical model of e-government service quality hence embodies characteristics intrinsic to analytical as well as explanatory and predictive theories. Not only do we advance classificatory and compositional propositions (i.e., propositions 3, 4, 5, and 7) that elucidate the constituents of service content and delivery for e-government websites, but we also proffer explanatory and predictive statements about the causal relationships between e-government service quality and its immediate antecedents (i.e., propositions 1, 2, and 6). Of the seven propositions, only those of an explanatory and predictive nature can and will be subjected to empirical validation to establish the chain of causality from web design attributes to e-government service quality (Gregor 2006).

Table 4. IT-Mediated Service Delivery Dimensions for E-Government Websites

Service Delivery Dimension	Definition	Process Goal-Directed Rationale
Accessibility	Extent to which service content of an e-government website appears compatible with citizens utilizing diverse technological platforms (e.g., accessing the content in the same manner and presentation format even when utilizing different Internet browsers)	To provide assurance of universal accessibility of public e-services in the face of diverse needs/ physical disabilities and technical capabilities present within the entire population so as to prevent segments from being precluded from the benefits of such e-services
Navigability	Extent to which the navigational structure of an e-government website can be easily traversed and its service content accessed in a user-friendly manner (e.g., minimizing the number of clicks required to retrieve any specific piece of information)	To categorize and present public e-services in a clear and uncluttered format to ensure the maximum level of ease and comfort for citizens when they are transacting with the e-government website
Interactivity	Extent to which an e-government website proactively engages the citizen during transactions (e.g., allowing citizens to directly input personal information for the application of governmental documents online without relying on conventional postal services)	To reward citizens with an engaging experience with the governmental institutions during an e-government transactions so as to offer unique value beyond that encountered when using conventional offline services
Interoperability	Extent to which affiliated service content is delivered via the same web-interface window of an e-government website (e.g., allowing citizens to complete an e-government transaction using a single online user-platform even though certain components of the transaction may lie within the purview of other governmental institutions)	To provide citizens with a single and seamless experience, regardless of associated governmental departments.
Adaptability	Extent to which an e-government website reflects revised service content and accommodates fluctuations in citizens' usage patterns (e.g., having a dynamic content section within an e-government website that updates citizens on new services without causing disruptions to the rest of the pages)	To accommodate evolving service content and unpredictable usage demand patterns due to the diversity in the lifestyles and needs within a population
Security	Extent to which service content of an e-government website is safeguarded against unsanctioned intrusions by unauthorized individuals (e.g., using third-party validation and clear statements about the types of security measures in place to keep the e-government transactional environment safe)	To make an optimal tradeoff between the presence of highly cautious and restrictive measures to prevent digital information leakage, versus that of easy-to-use features and overall benefits made available through the online transfer and storage of sensitive citizens' data: satisfying the dual need for security and convenience

Methodology

To validate the causal relationships in the model, we converted propositions 1, 2, and 6 into testable hypotheses (see Table 6). Furthermore, since the primary objective of this study is to verify the applicability of our theoretical model in predicting citizens' evaluation of service quality for contemporary e-government websites given the presence of various service content functions and delivery dimensions, constructs in the model were framed as perceptions for measurement purposes.

We employed a field survey to gather data on a variety of e-government websites. Survey respondents were instructed to provide assessments for each of the service content functions and service delivery dimensions as well as for the

remaining quality constructs. Data was analyzed via structural equation modeling (SEM) techniques.

Development of Survey Measures

Three to four measurement items were generated for each of the 22 service content functions and delivery dimensions (i.e., 16 service content functions and 6 service delivery dimensions).⁷ Prior empirical work on e-government and the CSLC

⁷Our measures of IT-mediated service content and delivery were designed to capture the *performance* of an e-government website in delivering content functions rather than to merely establish the presence of those constructs of interest (refer to Appendix A).

Table 5. Breakdown of Conference and Journal Papers Based on IT-Mediated Service Delivery Dimensions [% Divided over total papers]

Conference/Journal Title	Total Papers	Relevant Papers [%]	IT-Mediated Service Delivery Dimensions					
			ACC [%]	NAV [%]	INT [%]	IOP [%]	ADT [%]	SEC [%]
Americas Conference on Information Systems (AMCIS)	91	48 [53]	23 [25]	11 [12]	16 [18]	25 [27]	6 [7]	22 [24]
European Conference on Information Systems (ECIS)	44	24 [55]	14 [32]	7 [16]	13 [30]	12 [27]	6 [14]	11 [25]
European Journal of Information Systems (EJIS)	8	5 [63]	4 [50]	0 [0]	1 [13]	3 [38]	2 [25]	3 [38]
Government Information Quarterly (GIQ)	50	34 [68]	17 [34]	4 [8]	12 [24]	14 [28]	2 [4]	12 [24]
Hawaii International Conference on System Sciences (HICSS)	131	54 [41]	13 [10]	9 [7]	8 [6]	28 [21]	1 [0.8]	30 [23]
Information Systems Journal (ISJ)	5	1 [20]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	1 [20]
Information Systems Research (ISR)	0	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
International Conference on Information Systems (ICIS)	14	7 [50]	6 [42]	2 [14]	5 [36]	3 [21]	2 [14]	4 [29]
Journal of the Association for Information Systems (JAIS)	0	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
Journal of Information Technology (JIT)	6	4 [67]	1 [17]	0 [0]	2 [33]	4 [67]	1 [17]	1 [17]
Journal of Management Information Systems (JMIS)	2	2 [100]	0 [0]	0 [0]	0 [0]	1 [50]	0 [0]	2 [100]
Journal of Strategic Information Systems (JSIS)	6	1 [17]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	1 [17]
MIS Quarterly (MISQ)	0	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
Public Administration Review (PAR)	17	6 [35]	4 [24]	2 [12]	5 [29]	4 [24]	0 [0]	5 [29]
Total Number of e-Government Papers Reviewed	377	186 [49]	82 [22]	35 [9]	62 [16]	94 [25]	20 [5]	92 [24]

ACC – Accessibility; NAV – Navigability; INT – Interactivity; IOP – Interoperability; ADT – Adaptability; SEC – Security

Table 6. Testable Hypotheses as Generated from Theoretical Model of E-Government Service Quality

H1	A citizen's perception of service content quality will positively influence his/her overall perceived service quality of an e-government website.
H2	A citizen's perception of service delivery quality will positively influence his/her overall perceived service quality of an e-government website.
H3	A citizen's perception of service content functions catering to service requirements will positively influence his/her perceived service content quality of an e-government website.
H4	A citizen's perception of service content functions catering to service acquisition will positively influence his/her perceived service content quality of an e-government website.
H5	A citizen's perception of service content functions catering to service ownership will positively influence his/her perceived service content quality of an e-government website.
H6	A citizen's perception of service delivery dimensions catering to the IT-mediated service delivery of content will positively influence his/her perceived service delivery quality of an e-government website.

model supplied the foundation for wording the items (see Cenfetelli et al. 2008; Wang 2002). Items for measuring overall e-government service quality as well as service content and delivery quality were adapted from marketing studies that measure service quality as a singular construct (e.g., Dobholkar et al. 1996; Spreng and Mackoy 1996).

To verify construct validity and assess the extent to which newly created measures adequately tap on various service content functions and delivery dimensions, three rounds of labeled sorting exercises with selected judges were performed (Moore and Benbasat 1991). Appendix C outlines the procedures and outcomes of the sorting exercises. From Appendix C, it can be deduced that measurement items for the various constructs display sufficient convergent and discriminant validity. The complete list of measurement items for constructs in our theoretical model is detailed in Appendix D. The resulting measures were then subjected to the test of nomological validity as described in Appendix E.

Pretest

Given the predominantly Internet-savvy target audience of e-government service participants, we opted to administer an online survey (Boyer et al. 2002; Stanton and Rogelberg 2001). A questionnaire was developed in which measurement items were phrased as seven-point Likert scale statements and their order randomized. The questionnaire was then circulated among graduate students and faculty members to solicit feedback on its presentation format. Specifically, we verified the clarity of the survey instructions, as there would not be any face-to-face contact between investigators and the survey respondents (Stanton and Rogelberg 2001). We also assessed the proper functioning of the questionnaire across multiple browser platforms, display resolutions, and hardware systems. The questionnaire was pretested on a sample of 25 e-government service users selected with the help of a marketing research firm (52 percent females). On average, each respondent has to access at least four differing types of e-government services. Other than minor formatting modifications, no major problems surfaced during the pretest.

Field Survey

We e-mailed invitations to 4,000 members of a nationwide (United States) panel of e-business consumers from a marketing research firm to participate in the field survey. In exchange for their participation, the marketing research firm awarded the panel members points that could be accumulated

in exchange for prizes. Due to the possibility of disabled e-mail accounts, spam filtering, or other forms of account blockages (Cenfetelli et al. 2008), no mechanism was readily available to gauge the diffusion rate of the invitation to all panelists. Alternatively, we reviewed the computer logs of the web server on which the electronic survey was hosted. The server logs recorded 2,203 visits to the online questionnaire, some of which may not be unique. We used a filtering question at the beginning of the survey to identify respondents who matched our targeted profile of citizens with prior e-government transactional experience. Of the 2,203 visitors to the survey, 689 satisfied our sampling criteria. Therefore, a conservative estimate of the response rate is 31 percent of invited participants. Forty-two responses were deleted due to incompleteness or data runs, thereby yielding a sample of 647 respondents for analysis.

In administering our survey questionnaire, we instructed each respondent to specify:

- Which of the following e-government services do you perform most frequently? (Please pick one)
- Online application for government benefits
 - Online filing of taxes
 - Online application/renewal of licenses (professional, driver, auto registration, hunting/recreational)
 - Online payment of fines
 - Online application for government jobs
 - Other, Please Specify

Then, in reference to the particular e-government service specified as being most frequently used, we asked each respondent to further indicate:

- How frequently do you carry out the e-government transaction you have specified above? (Please pick one)
- At least once daily
 - At least once per week
 - At least once per fortnight
 - At least once per month
 - At least once per 3 months
 - At least once per 6 months
 - At least once per year
 - Less than once per year

The participants were then requested to respond to the online questionnaire based on their assessment of the e-government website that provides their most frequently used service (i.e., "With regard to your experience with the e-government website that provides the service you have specified, please indi-

Table 7. Type and Frequency of E-Government Transactions Targeted by Survey Respondents

Frequency of Conducting e-Government Transaction						Total Number of Respondents	%
	At Least Once per Month	At Least Once per 3 Months	At Least Once per 6 Months	At Least Once per Year	Less than Once per Year		
Type of e-Government Service [†]							
Online filing of taxes [‡]	15	17	13	246	10	301	46.52%
Online application/renewal of licenses (e.g., professional, driver, auto registration, hunting, recreational)	7	18	46	94	29	194	29.98%
Others	16	7	8	15	7	53	8.19%
Online application/renewal of government benefits	15	6	2	10	16	49	7.57%
Online application for government jobs	14	9	2	4	3	32	4.95%
Online payment of fines	4	0	5	3	6	18	2.78%
Total Number of Respondents	71	57	76	372	71	647	100.00%

[†]The range of options for the types of e-government services is in accordance with surveys conducted by the Pew Internet & American Life Project (2004) that disclosed these public e-services as the ones most frequently conducted by citizens.

[‡]Online filing of taxes in the United States involves the electronic filing and payment of taxes [<http://www.irs.gov/>].

cate your level of agreement with the statements”). Table 7 depicts the type of e-government transactions to which respondents’ answers were targeted, together with the frequency with which each transactional activity was conducted.⁸

Table 8 summarizes the descriptive statistics for the sample. Paired *t*-tests between our sample demographics and those reported in the Pew Internet & American Life Project’s (2004) survey of 2,106 U.S. e-government service participants reveal no significant differences in distribution (i.e., $t_{(15)} = -0.084, p = .934$).

⁸Although the frequency distributions for some of the e-government transactions presented in Table 7 might appear puzzling at first glance (e.g., some respondents stated filing taxes and paying fines at least once a month), it is not so. For instance, while individual income taxes are filed on an annual basis, monthly tax filings are mandated for certain tax types. Besides, individuals who file taxes on a monthly basis belong to a very small minority in that they constitute a mere 4.9 percent (15/301) of the total number of respondents who indicated *tax filing* as their most frequently performed e-government transaction. Because the survey questionnaire does not require respondents to report on the reason why a particular e-government transaction is performed with certain frequency, we cannot speculate as to the motivation for their responses. It can, however, be observed that frequencies for each e-government transaction adhere to an intuitive and naturally occurring distribution (e.g., *median* and *mode* frequency for tax filing is “at least once per year”). The same can be said for the other e-government services.

Data Analysis

Because survey methodologies may be plagued by common method bias, we performed exploratory factor analysis (EFA) of the 77 variables and applied Harman’s (1967) one-factor extraction test. The EFA resulted in a factorial structure of 11 components with eigenvalues greater than 1.00. No single factor accounted for more than 50 percent of total variance explained (Schriesheim 1979), thus implying that common method bias was not a threat in this study.

Modeling IT-Mediated Service Content and Delivery

The spectrum of service content functions, as classified under the three strategic service principles of *requirements*, *acquisition*, and *ownership*, relates to higher-order design principles that extend beyond lower-order technological prescriptions. That is, while our recommendation of the 16 service content functions might be meaningful for web interface developers, the 3 design principles are informative of comprehensive developmental directions for e-governments. Therefore, to glean additional insights for managerial practice over and above technical instructions, we modeled *requirements*, *acquisition*, and *ownership* as second-order aggregate constructs, each comprising a weighted sum of its respective ser-

Table 8. Descriptive Statistics for Online Survey [Sample N = 647]

Demographic Characteristic	Number of Respondents [%]	Comparison	Frequency	Type of e-Government Transaction					
				a	b	c	d	e	f
Gender									
Male	310 (47.91%)	50%	At least once per 6 months	25	135	95	8	18	29
Female	334 (51.62%)	50%	At least once per 6 months	24	166	96	10	14	24
Unwilling to disclose	3 (0.46%)	0%	At least once per year	0	0	3	0	0	0
Age									
Age 19-29	91 (14.06%)	21%	At least once per 6 months	5	51	17	8	7	3
Age 30-49	315 (48.69%)	44%	At least once per 6 months	20	152	97	8	13	25
Age 50-64	202 (31.22%)	24%	At least once per 6 months	19	86	64	1	12	20
Age 65+	37 (5.72%)	10%	At least once per 6 months	5	12	14	1	0	5
Unwilling to disclose	2 (0.31%)	3%	At least once per year	0	0	2	0	0	0
Educational Level									
Less than college education	263 (40.65%)	35%	At least once per year	21	138	68	7	7	22
College education or higher	379 (58.58%)	65%	At least once per 6 months	28	162	123	10	25	31
Unwilling to disclose	5 (0.77%)	0%	At least once per year	0	1	3	1	0	0
Income									
\$0-\$30,000	126 (19.47%)	24%	At least once per year	14	61	31	2	5	13
\$30,000-\$50,000	227 (35.09%)	22%	At least once per 6 months	15	122	52	8	12	18
\$50,000-\$75,000	196 (30.29%)	17%	At least once per 6 months	7	83	71	4	11	20
\$75,000+	27 (4.17%)	23%	At least once per 6 months	3	10	12	2	0	0
Unwilling to disclose	71 (10.97%)	14%	At least once per 6 months	10	25	28	2	4	2

Pew Internet & American Life Project (2002)

^aOnline application/renewal of government benefits

^bOnline filing of taxes

^cOnline application/renewal of licenses (e.g., professional, driver, auto registration, hunting, recreational)

^dOnline payment of fines

^eOnline application for government jobs

^fOthers

vice content functions.⁹ These second-order aggregate constructs were then tested against the reflectively measured service content quality construct to determine their predictive power. Insofar as causal indicators *cause* variance to occur in their associated higher-order constructs, aggregate constructs resemble formative ones (Chin and Gopal 1995; Diamantopoulos and Siguaw 2002; Diamantopoulos and Winklhofer 2001; Edwards and Bagozzi 2000; Edwards 2001; Jarvis et al. 2003) with the exception of one distinguishable trait: formative constructs are modeled with observable variables,

⁹A formative construct may suffer from issues of confounds in interpretation. Therefore, formative constructs developed in this study should be verified in future studies with the MIMIC model recommended by Jarvis et al. (2003) and Kim et al. (2010).

whereas the measures of aggregate constructs are themselves constructs (Cenfetelli et al. 2008).

A secondary consideration in modeling second-order aggregate constructs is that service content functions can manifest on e-government websites independently of one another. As can be deduced from Appendix B, technology can be leveraged to derive a host of mutually exclusive service content functions such that developers are free to choose any combination of these applications as they see fit. Thus, the manifestation of any one specific service content function is not indicative of the presence of another. Unlike superordinate or reflective constructs where higher-order constructs are accountable for variance in their affiliated indicators (Cenfetelli et al. 2008), there is no underlying factor that

generates common variance across all 16 service content functions.

We modeled efficient IT-mediated service delivery as a second-order superordinate construct (Chin 1998; Edwards 2001). We measured each of its six constituent dimensions (i.e., accessibility, navigability, interactivity, interoperability, adaptability, and security) reflectively, and these dimensions, in turn, reflected an overall second-order efficient IT-mediated service delivery construct, the reason being that it is unlikely for a specific service delivery dimension to exist independently of another. For example, citizens' assessment of the accessibility of service content from an e-government website will most probably be impacted, to a certain degree, by their evaluation of other delivery attributes such as navigability and/or interactivity. By modeling efficient IT-mediated service delivery as a second-order superordinate construct comprising the six constituent dimensions, we recognize the existence of a universal service delivery factor that permeates every aspect of content delivery for e-government websites.

Model Testing

We utilized the latest version of SmartPLS 2.0¹⁰ to validate both the measurement and structural properties of our research model (Chin 1998). Partial least squares (PLS) analysis is preferred over other analytical techniques because (1) it facilitates the modeling of formative (and therefore aggregate) constructs (Chin 1995, 1998), and (2) it tests the psychometric properties of the measurement items (i.e., the measurement model) while simultaneously analyzing the direction and strength of each hypothesized relationship (i.e., the structural model) (Wixom and Watson 2001). As recommended by Chin et al. (2003), the second-order aggregate constructs of requirements, acquisition, and ownership as well as the second-order superordinate construct of efficient IT-mediated service delivery were modeled as hierarchical elements using repeated indicators from their respective constituent dimensions.

Test of the Measurement Model

The test of the measurement model involves the estimation of internal consistency as well as the convergent and discriminant validity of the measurement items included in our survey instrument. Formative and reflective items, however,

should be treated differently (Wixom and Watson 2001). We assessed the measurement properties of the reflective items in the model using Cronbach's alpha (Nunnally and Bernstein 1994), composite reliability, and the average variance extracted (AVE) (Fornell and Larcker 1981). As illustrated in Table 9, all latent constructs for both recurring and nonrecurring datasets far exceed recommended thresholds, thus supporting convergent validity.

To determine discriminant validity, we calculated the square root of the AVE for each construct and compared this against its correlations with other constructs (Fornell and Larcker 1981). For discriminant validity to hold, the square root of the AVE for each construct should be greater than its correlations with any other construct. As can be inferred from the inter-construct correlation matrix in Appendix F, all constructs display sufficient discriminant validity. Furthermore, of the 300 unique bivariate correlations¹¹ among the 25 latent constructs embodied in our measurement model, only 19 pairs of inter-construct correlations (6.3 percent) surpass the 0.70 mark for the dataset, and even then, their values are still much lower than the square root of intra-construct AVE for each. Finally, it must be emphasized that out of 96 bivariate correlations among service content functions and delivery dimensions (i.e., 16 service content functions \times 6 service delivery dimensions), none exceeded 0.70, a clear sign of discriminant validity (Fornell and Larcker 1981). This implies that survey respondents, in general, were able to differentiate between service content functions and delivery dimensions for e-government websites.

Convergent and discriminant validity are also confirmed when measures load highly (greater than 0.50) on their associated latent constructs (Wixom and Watson 2001). Based on the factor loading matrix¹² accessible through PLS analysis (Chin 2001), we observed that all items loaded above 0.70 on their targeted constructs (refer to Appendix D), and these loadings were much higher than any cross-loadings on any other untargeted constructs as generated via SmartPLS 2.0, thus supporting convergent and discriminant validity (Gefen and Straub 2005).

Formative measures are items that *cause* variance in the construct under scrutiny (Bollen 1984); they neither correlate with one another nor exhibit internal consistency (Chin 1998).

¹⁰Downloadable from the website: <http://www.smartpls.de/forum/>.

¹¹The number of unique bivariate correlations can be calculated with the formula $\frac{\chi}{2}(\chi - 1)$, where χ is the given number of constructs.

¹²The entire factor loading matrix is too large to be included in this paper and can be made available upon request.

Table 9. Internal Consistency[†] of Latent Constructs [Sample N = 647]

Construct	Average Variance Extracted (AVE) [> 0.50]	Composite Reliability (Fornell) [> 0.70]	Cronbach Alpha [> 0.70]
Accepting (ACC)	0.73	0.89	0.82
Accessibility (ASS)	0.84	0.94	0.90
Adaptability (ADT)	0.78	0.91	0.86
Authorizing (AUT)	0.79	0.92	0.86
Customizing (CUS)	0.75	0.90	0.84
Delegating (DEL)	0.79	0.92	0.87
Evaluating (EVA)	0.82	0.93	0.89
Interactivity (INT)	0.72	0.89	0.81
Interoperability (IOP)	0.77	0.91	0.85
Monitoring (MON)	0.71	0.88	0.80
Navigability (NAV)	0.73	0.89	0.82
Needing (NED)	0.73	0.89	0.81
Negotiating (NEG)	0.81	0.93	0.88
Ordering (ORD)	0.79	0.92	0.87
Paying (PAY)	0.87	0.95	0.92
Scheduling (SCH)	0.75	0.90	0.83
Security (SEC)	0.81	0.93	0.88
Service Content Quality (SCQ)	0.91	0.97	0.95
Service Delivery Quality (SDQ)	0.90	0.96	0.94
e-Government Service Quality (ESQ)	0.86	0.96	0.94
Sourcing (SOU)	0.70	0.87	0.78
Tracking (TRK)	0.67	0.89	0.83
Training (TRA)	0.69	0.87	0.77
Trying (TRY)	0.80	0.92	0.88
Upgrading (UPG)	0.70	0.87	0.78

[†]Recommended threshold values for Cronbach's alpha, composite reliability (Fornell), and the average variance extracted (AVE) are 0.70 (Nunnally and Bernstein 1994), 0.70, and 0.50 (Fornell and Larcker 1981), respectively.

Statistics for assessing internal consistency (i.e., Cronbach's alpha, composite reliability, and AVE) are therefore inappropriate (Wixom and Watson 2001). The same reasoning applies to aggregate constructs. Multicollinearity is the major concern for formative/aggregate constructs because multiple indicators are jointly predicting a latent construct in an analogous fashion to variables in multiple regression (Diamantopoulos and Winklhofer 2001). Multicollinearity was not a threat in our study because (1) none of the bivariate correlations were above .90 (refer to Appendix F) (Tabachnick and Fidell 2001); (2) tolerance values averaged more than .30; and (3) the maximum variance inflation factor (VIF) was 3.86 and well below the prescriptive diagnostic of 5.0 or 10.0 (Hair et al. 1998; Mathieson et al. 2001).

Test of the Structural Model

Results from PLS analysis of the structural model, including path coefficients and their statistical significance,¹³ are illustrated in Figure 2.

As anticipated, the taxonomic properties for the second-order constructs of requirements, acquisition, ownership, and efficient IT-mediated service delivery are upheld by the empirical evidence. Each of the 16 service content functions is a highly

¹³Standard errors were computed via a bootstrapping procedure with 500 resamples.

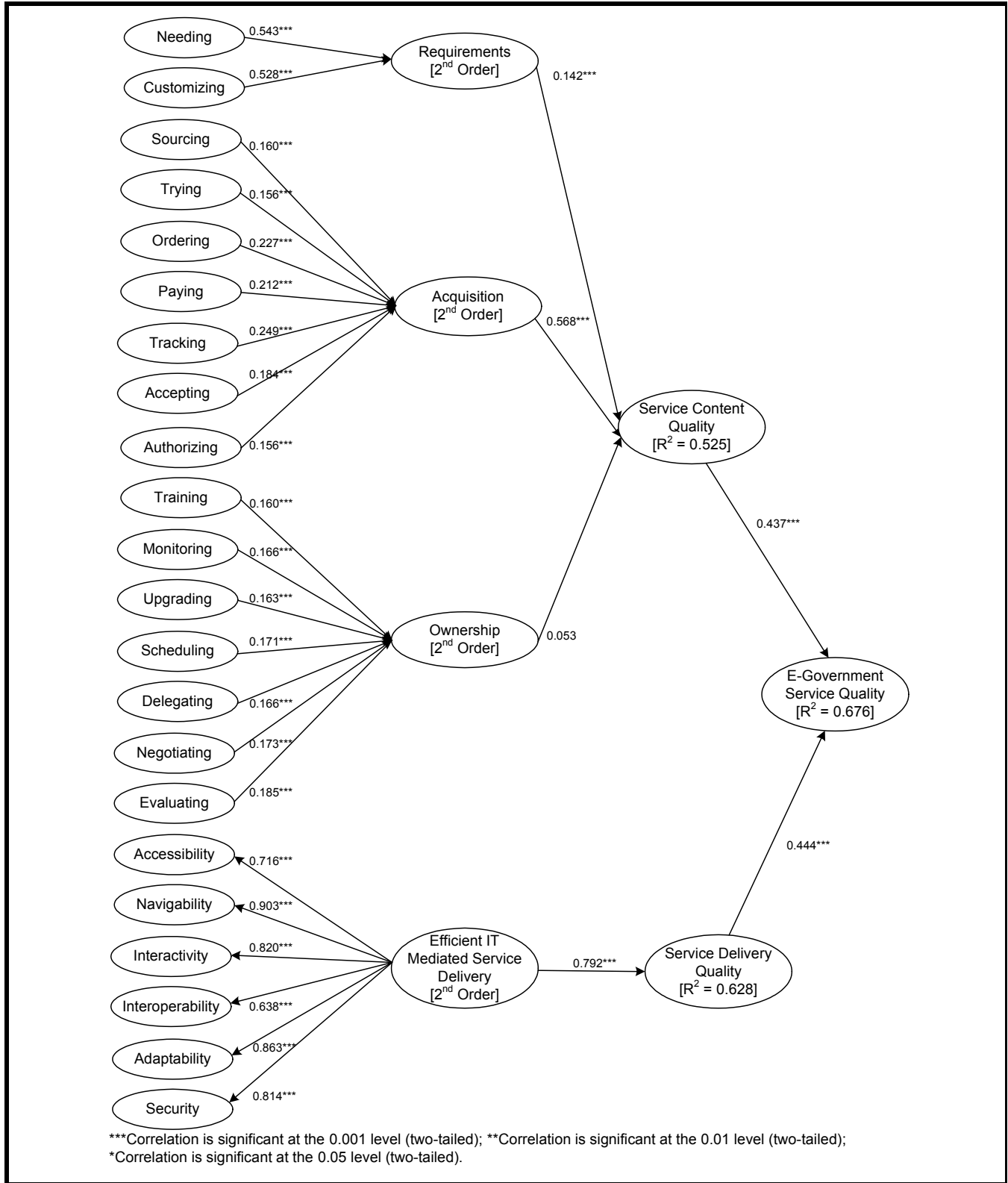


Figure 2. Results of Structural Model Analysis [Sample N = 647]

significant contributor¹⁴ ($p < 0.001$) to its associated second-order aggregate (i.e., *requirements*, *acquisition*, and *ownership*). The reflective paths for the six service delivery dimensions were also found to be statically significant: *accessibility* ($\beta = 0.72, p < 0.001$), *navigability* ($\beta = 0.90, p < 0.001$), *interactivity* ($\beta = 0.82, p < 0.001$), *interoperability* ($\beta = 0.64, p < 0.001$), *adaptability* ($\beta = 0.86, p < 0.001$), and *security* ($\beta = 0.81, p < 0.001$). In turn, the validity of these second-order constructs lays the foundation for further interpretation of empirical findings from hypotheses testing.

With the exception of hypothesis 5, all hypotheses are supported. *Service content quality* ($\beta = 0.44, p < 0.001$) and *service delivery quality* ($\beta = 0.44, p < 0.001$) exert positive and significant effects on *e-government service quality*. Together, both paths explain 68 percent of the variance for e-government service quality. This substantiates hypotheses 1 and 2. *Requirements* ($\beta = 0.14, p < 0.01$) and *acquisition* ($\beta = 0.57, p < 0.001$) exert positive and significant effects on *service content quality* whereas *ownership* ($\beta = 0.05, p > 0.05$) has no effect on *service content quality*. The three second-order aggregates, in turn, account for 53 percent of the variance in *service content quality*, thus corroborating hypotheses 3 and 4, but not 5. The second-order superordinate construct of *efficient IT-mediated customer service delivery* exerts positive and significant effects ($\beta = 0.79, p < 0.001$) on *service delivery quality*, explaining 63 percent of the variance in the latter and corroborating hypothesis 6.

Comparison of Alternate Models

Following procedures described in Gefen et al. (2000) and Mathieson et al. (2001), we employed the *pseudo-F*¹⁵ test to assess the impacts of dropping either service content or delivery quality from the model and its resulting impact on e-government service quality. As indicated by the medium effect sizes, eliminating either service content or delivery quality contributes to a significant decrease in variance for e-government service quality (see Table 10).

¹⁴Because the path coefficients from individual service functionality dimensions to their associated second-order aggregates represent weights and not reflective loadings, they should be evaluated for statistical significance similar to that of beta weights in multiple regression functions.

¹⁵The effect size of f^2 was estimated as $(R^2_{\text{full}} - R^2_{\text{excluded}}) / (1 - R^2_{\text{full}})$, and the *pseudo-F* statistic was computed by multiplying f^2 by $(n - k - 1)$ where n is the sample size and k is the number of independent constructs.

Post Hoc Analysis

Ownership-oriented service content functions appear not to have any effects on service content quality despite their prevalence across matured e-government websites. While the ownership category of service content functions is designed to encourage proactive participation on the part of the citizens, the nature of certain e-government transactions may not necessitate prolonged involvement, thereby resulting in the insignificant relationship between ownership-oriented functionalities and service content quality. For instance, transactional activities such as online payment of traffic fines are often irregular and non-repetitive in comparison to monthly payment for city services. Consequently, ownership-oriented service content functions such as automated payment deductions may not be deemed essential for rarely performed governmental transactions (e.g., online payment of traffic fines) in contrast to regularly conducted ones (e.g., monthly payment for city services). Rather, it should be the case that the more frequently citizens perform an e-government transaction, the greater will be their appreciation of ownership-oriented service content functions. We therefore postulate that the *frequency* with which a governmental transaction is conducted may impose an *attenuating* effect on the relationship between service content quality and ownership. To test our proposition, a *post hoc* analysis was performed by analyzing five separate structural models founded on datasets, which are derived from progressively including responses from each of the five frequency categories (i.e., at least once per month, at least once per three months, at least once per six months, at least once per year, and less than once per year), respectively (see Tables 7 and 8). Figure 3 depicts a graphical plot of the path coefficient between service content quality and ownership for each of the five structural models against its corresponding cumulative frequency. As can be inferred from Figure 3, the graph reflects a downward trend that demonstrates a steady decline in the path weight between service content quality and ownership as responses targeting less frequent e-government transactions are added to each consecutive structural model. This lends credibility to our postulation of frequency as an attenuating moderator.

While the graph in Figure 3 appears to substantiate our proposition, it does not necessarily indicate that the moderating effect of frequency is statistically salient. Therefore, to assess the statistical significance of this moderation, we analyze the multivariate regression equation between service content quality and its predictors (i.e., requirements, acquisition, and ownership) via SPSS and then incorporate *frequency* as a *moderator* of the relationship between *service content quality* and *ownership*; that is,

Table 10. Pseudo-F Test of the Impact of Dropping Service Content and Delivery Quality on E-Government Service Quality

Comparison	R ² _{excluded}	R ² _{full}	f ² value	pseudo-F Statistic	df
Content Quality Excluded	0.592	0.676	0.259	167.06***	(1, 645)
Delivery Quality Excluded	0.588	0.676	0.272	175.44***	(1, 645)

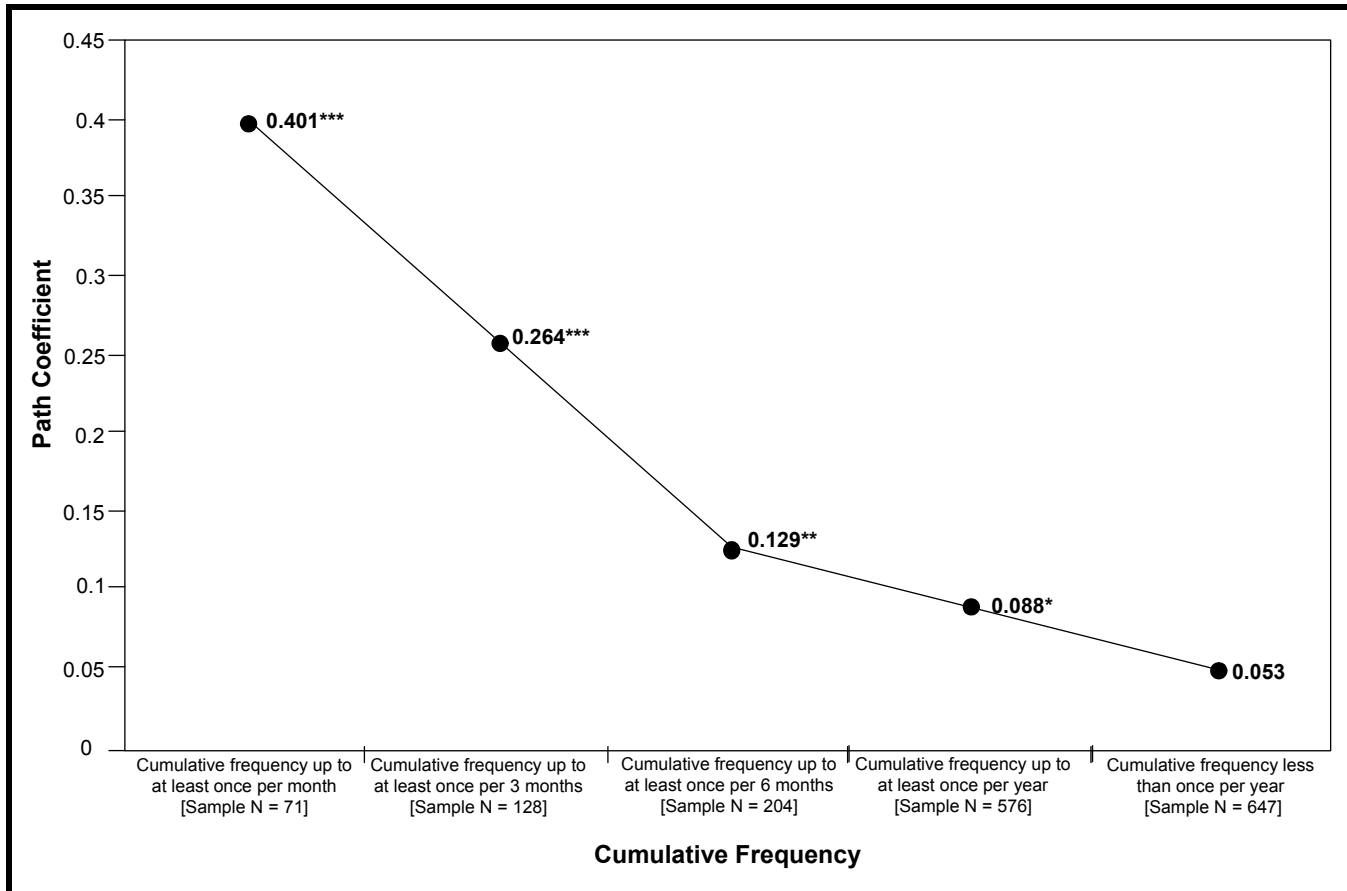


Figure 3. Path Coefficient between Ownership and Service Content Functionality at Different Levels of Cumulative Frequency of Use [Declining Trend]

$$\text{Service Content Quality} = \beta_0 + \beta_1 * \text{Requirements} + \beta_2 * \text{Acquisition} + \beta_3 * \text{Ownership} + \beta_4 * \text{Frequency} + \beta_5 * \text{Frequency} * \text{Ownership} + \epsilon \tag{1}$$

Significance levels for the hypothesized relationships between *service content quality* and its predictors of *requirements* ($\beta = 0.13, p < 0.01$), *acquisition* ($\beta = 0.58, p < 0.001$), and *ownership* ($\beta = 0.04, p > 0.05$) remain unaltered. Although

frequency does not exert a direct impact on *service content quality* ($\beta = -0.01, p > 0.05$) as expected, its interaction term with *ownership* exerts a statistically significant negative effect on *service content quality* ($\beta = -0.09, p < 0.01$), thereby attesting to frequency as an attenuating moderator for the relationship between *service content quality* and *ownership*. Moreover, the inclusion of the interaction term resulted in a more predictive regression model as evidenced from its

statistically significant F -change¹⁶ statistic ($\Delta F_{(1, 641)} = 10.08$, $p < 0.01$). This, in turn, implies that the inclusion of frequency as a moderating term improves the variance explained for service content quality.

Discussion

This paper advances a theory of e-government service quality that sheds light on how public e-services may be designed from a citizen-centric, quality-driven perspective. We then empirically examine a theoretical model that encompasses a comprehensive yet select suite of service content functions and delivery dimensions, which has been derived via a combination of deductive and inductive techniques.

Key Findings and Insights

Findings from our empirical investigation raise several points of interest. First, our proposed theoretical model appears to be relatively robust in predicting citizens' assessment of service quality for e-government websites as the majority of hypothesized relationships are corroborated by our empirical evidence.

Second, service content and delivery quality can be regarded as being equally predictive of e-government service quality, as evidenced by their almost equivalent path coefficients¹⁷ (refer to Figure 2). Coupled with strong discriminant validity among service content functions and delivery dimensions, we can conclude that our taxonomies of IT-mediated service content and delivery not only comprise distinguishable elements of public e-services, they are also equally informative in explaining citizens' perceptions of e-government service quality. Moreover, results from the pseudo- F tests attest to the saliency of both IT-mediated service content and delivery in predicting e-government service quality (see Table 10).

¹⁶The F -change statistic is computed via SPSS to detect statistical significance in R -square change due to the addition or removal of independent variables and, in the context of this study, is obtained from the formula $\Delta F = \Delta R^2 (N - p^*) / q(1 - R^2_{\text{current}})$ where N is the sample size, p^* is the number of variables in the regression equation (inclusive of the constant), and q is the number of independent variables being added or removed.

¹⁷A path coefficient is a standardized regression coefficient (beta) illustrating the direct effect of an independent variable on a dependent variable in a path model. Thus, when two or more causal variables are involved, path coefficients are partial regression coefficients, which measure the extent of one variable's effect on another in the path model while controlling for other variables (Bryman and Cramer 1990).

Finally, ownership-oriented service content functions exert positive and significant effects on service content quality when aligned with frequently conducted governmental transactions. Such an observation lends credibility to our dual-layered abstraction approach for modeling IT-mediated service content and delivery: only by relating content functions and delivery dimensions to their respective higher-order design principles can we be sensitized to the service objectives behind lower-order technological specifications of e-government websites.

Theoretical Contributions

From a theoretical viewpoint, this study contributes to the operationalization of e-government service quality, the lack of which has stymied the design of public e-services to-date (Ancarani 2005; Buckley 2003; Hazlett and Hill 2003; Teicher et al. 2002). Subscribing to a goal perspective, we synthesized extant literature on e-service quality to arrive at a theory of e-government service quality that lays out a clear agenda and precise directions to guide the design of high quality public e-services. A prevailing proposition in marketing that has gone unchallenged in the realm of e-services is the delineation between service content and delivery in theorizing service quality (Grönroos 1990, 1998; Grönroos et al. 2000). The conventional intertwining of service content and delivery for offline services has led to the misconception that they are relatively inseparable from each other in practice (Parasuraman et al. 1988; Zeithaml and Bitner 1996). The advent of e-services, however, has made such a distinction prominent (e.g., Ancarani 2005; Cenfetelli et al. 2008). Although scholars have alleged that advances in e-government development have been hampered by the unavailability of and inaccessibility to quality-driven public e-services (Gil-Garcia 2006; Grimsley and Meehan 2007; Kahraman et al. 2007), there is a paucity of studies that delve into how these obstacles may be circumvented. Consequently, we distinguished between service content and service delivery as distinct but complementary design-oriented antecedents to achieve the eventual target of e-government service quality. Further, we identified separate taxonomies of lower-order service content functions and delivery dimensions that, when combined, constitute a prescriptive model detailing IT-inspired developmental actions for e-government websites. Essentially, the model stresses on core service areas of e-government websites where technology can be harnessed to satisfy salient consumer goals. By subjecting the model to subsequent empirical testing, we not only verify the practicality of our IT-mediated service content and delivery taxonomies, but also ascertain the causal chain linking these taxonomies to citizens' evaluation of e-government service quality.

Our study expands on extant literature in several ways. First, although there has been much debate over the importance of designing high quality e-government websites (e.g., Ancarani 2005; Buckley 2003; Gupta et al. 2008; Hazlett and Hill 2003; Teicher et al. 2002; West 2004), this study is the first of its kind to theoretically differentiate and empirically establish IT-mediated service content and delivery as distinct contributors to e-government service quality. Our findings constitute a significant theoretical development because past studies tend to be divided over critical success factors for e-government. Whereas some scholars have advocated the provision of effective service content functions to assist citizens in obtaining desirable transactional outcomes from e-governmental transactions (e.g., Grimsley and Meehan 2007; Kahraman et al. 2007; Otjacques et al. 2007; Pirog and Johnson 2008), others have recommended the assurance of efficient access to these functions as a means of streamlining the transactional process for citizens (e.g., Ebberts et al. 2008; Gil-Garcia et al. 2007; Heeks and Stanforth 2007; Luna-Reyes et al. 2007; Pieterse et al. 2007). Our study, therefore, paves the way for an integration of the aforementioned research streams to advance e-government development in a cohesive manner.

Second, the delineation of IT-mediated service content and delivery into finely grained technological prescriptions, through a blend of deductive and inductive techniques, opens up the black box of design specifications for e-government websites. Specifically, subscribing to the goal perspective and Ives and Learmonth's (1984) CSLC model, we identify 16 content functions for e-government websites that, when considered in tandem, satisfy 3 strategic service missions: (1) to advise citizens on unfamiliar administrative requirements, (2) to assist citizens in completing their transactions, and (3) to co-opt citizens into being proactive transactional partners. While several of these 16 service content functions have received empirical support in the e-commerce context (see Cenfetelli et al. 2008), there are additional functions that are uniquely elicited from our content analysis of e-government websites (i.e., authorizing, customizing, delegating, negotiating, scheduling, and trying). Furthermore, we put forward six dimensions of service delivery that capitalize on the capabilities of the web medium to grant citizens efficient access to content functions on e-government websites. The empirical validation of these service content functions and delivery dimensions substantiates the prominence of each of these web attributes in affecting citizens' perceptions of e-government service quality. This verifies the relevance of our theoretical model in contributing to the design of citizen-centric, quality-driven e-government websites.

Third, our study brings to light the importance of aligning the design of an e-government website with the type of govern-

mental transaction it serves. As deducible from our empirical investigation, the saliency of ownership-oriented service content function becomes evident only when citizens' transactional frequency is taken into account. While the moderating effect of usage frequency has received ample attention across a multitude of systems-related phenomena (see Dennis et al. 1999), its treatment in e-government research has been left wanting. This study is thus pioneering in that it exposes transactional frequency as a significant attenuator of the impact of ownership-oriented service content functions on citizens' perceptions of e-government service quality.

On a more general note, empirical findings from this study, although constrained to the context of e-government, hint at the possibility of differentiating between IT-mediated service content and delivery in the design of websites for a wider spectrum of e-services. There are two justifications for our position. First, as uncovered through our investigation, the granularity of technological artifacts renders it much easier for customers to distinguish aspects of IT-mediated service content from those of delivery for online transactions. Moreover, as implied by the empirical evidence, each of the 16 service content functions and 6 service delivery dimensions caters to a specific consumer goal in the design blueprint for an e-service website and, as such, should be accorded due attention.

Pragmatic Implications

In an environment without clear guiding standards for website design, our model of e-government service quality, which prescribes design principles targeting general e-government transactions, is an invaluable tool for practitioners.

Developers are challenged by the lack of actionable quality standards for designing citizen-centric e-government websites (Hamner and Al-Qahtani 2009; Norris and Moon 2005). To combat this, our proposed e-government service quality model performs two vital functions: (1) it derives taxonomies of generic service content functions and delivery dimensions across mature e-government websites, and (2) it validates the practical value of these content functions and delivery dimensions. In this sense, our study drew upon lessons learned from mature e-governments on the development of quality-driven public e-services to derive a parsimonious collection of actionable IT levers that can be leveraged by practitioners to enhance the quality of their e-government websites.

Our investigation further indicates that the design of an e-government website cannot be divorced from the type of e-government transaction it supposedly targets. Empirical

findings reveal that ownership-oriented service content functions may be favored for frequent transactional activities but not for their infrequent counterparts. Therefore, whenever e-government websites are designed in isolation, governmental institutions are essentially wasting valuable organizational resources that can be better channeled to improve service content that matches the nature of the governmental transaction for which it is intended. Along this line of reasoning, we have broken down the type of e-government services most commonly utilized and the frequency of that usage according to varying demographic groupings (see Table 8). This reveals interesting patterns of e-government service utilization in accordance with demographic distribution and opens up possibilities for practitioners to employ demographic profiling as a means of configuring public e-services in terms of content and delivery.

Our model can, therefore, act as an analytical toolkit for practitioners to (1) pinpoint missing content functions and delivery dimensions for existing e-government websites, and (2) decide whether the inclusion of these omitted components can overcome service inadequacies given the nature of the governmental transactions. As an illustration, in applying our theoretical model to analyze the electronic tax filing (e-Filing) websites of Singapore and the United States, we discovered functional discrepancies between the two. Due to steps taken by the Singapore government in providing taxpayers with their own personalized domain within the e-Filing website, it can better accommodate specialized transactional preferences (i.e., customizing). Such personalizable domains are crucial to governmental transactions that are conducted on a recurring basis because they not only facilitate governmental institutions in paying individualized attention to citizens, but also reduce errors associated with repeated entries of static personal information (e.g., name and social insurance number) (Kahraman et al. 2007). The personalizability of the Singapore e-Filing website allows the tax agency to seek out and interact with taxpayers on an individual level, and vice versa, should any problems arise during the annual tax filing cycle. The Singapore government has also made remarkable progress in archiving all transactional proceedings between taxpayers and the tax agency (accessible to both parties) within the personalized domain such that disputes can be resolved amicably (i.e., tracking). Comparatively, the absence of such service content functions has restricted the personalizability of the United States e-Filing website and tarnishes the citizen-centric purpose of the e-government movement. In turn, this discrepancy in service provision translates to opportunities for the United States government to contemplate whether the addition of customizing and tracking functions would benefit taxpayers given the recurring nature of the tax filing process.

Limitations

This section highlights four limitations to our study that should be taken into account in the interpretation of empirical findings. First, while the theoretical model denotes 16 service content functions that impact citizens' perceptions of service content quality, it should be noted that these functions represent an abstraction of existing technological features being offered on e-government websites and not a recipe for implementation (i.e., the definition and description for each of the 16 functions serve as diagnostic or prescriptive guidelines in aiding web interface design). Nevertheless, the model does not stipulate exact technological feature(s) that would be compatible with each of the 16 service content functions. It is up to the developers of e-government websites to exercise creativity in coming out with innovative features, which conform to our functional recommendations.

Second, due to our choice of perceptual measures as the means for validating our theoretical model, empirical findings from this study may be subjected to response bias in that social desirability may have an effect on respondents' evaluation of service content functions and delivery dimensions for e-government websites. That is, respondents may respond to the survey questionnaire according to what they believe to be the "right" answers. While we have controlled for response bias by assessing the amount of common method variance across measurement items, future research should still explore ways of validating the theoretical model objectively. For instance, collaborative arrangements may be reached with governmental institutions to obtain web analytics data on the extent to which service content functions are utilized on e-government websites.

Third, "ceiling effects" may exist due to the self-selective nature of the sample population. Because respondents were recruited from current users of public e-services, it is likely that they already possess favorable impressions of the e-government websites being evaluated: we are likely to witness relatively higher means for the constructs being investigated. Nonetheless, as the main objective of this paper is to validate the pragmatic significance of quality-driven web attributes for e-government websites, it is meaningless to survey respondents without exposure to public e-services.

Finally, as can be seen from Table 7, the majority (or 46.52 percent) of e-government websites being evaluated by survey respondents relate to online filing of taxes. Although this result is not unexpected given that the Pew Internet & American Life Project's (2004) report on e-government websites has similarity alluded to online tax filing as a pervasive

public e-service application, we acknowledge the limited generalizability of our empirical findings to governmental transactions which share characteristics with those evaluated in our study (see Table 7). Further investigations should expand the scope of inquiry by validating our theoretical model across other forms of governmental transaction such as those not involving payments.

Suggestions for Future Research

Relevant avenues for future research are available in terms of different modes of e-government transactions and other ways of segregating public e-services. Gupta et al. (2008) and Reddick (2004) observed that governmental transactions occur on one of three levels: government to citizen (G2C), government to business (G2B), and government to government (G2G). Our theoretical model is attuned to the domain of G2C transactions. Although we cannot conclusively state the extent to which this theoretical model will be valid across other transactional contexts, its strong diagnostic and prescriptive properties, as proven via our empirical inquiry, may render it applicable to future studies of alternative e-government websites with minor adaptations. We speculate that our model is applicable to other modes of e-government transactions so long as these domains display parallelism with G2C transactions. For example, as tax filing is an administrative duty performed by citizens and businesses alike, our model may be equally predictive in both scenarios.

While our study postulates transactional frequency as a moderating influence on citizens' assessment of service content functions and delivery dimensions being offered via e-government websites, this is but one way of segregating public e-services into their multifaceted nature. For instance, e-government transactions can also be divided according to whether they relate to mandatory (e.g., online renewal of driver's license) or voluntary (e.g., online booking of communal facilities) tasks. As noted by several researchers (e.g., Moore and Benbasat 1991; Venkatesh et al. 2003), users' attitudes toward technology differ between mandatory versus voluntary task settings. Under compulsory usage conditions, a dampening effect can be observed for initial acceptance. This effect is then attenuated over time as users become more knowledgeable about the application, such that the accumulated experience provides a "more instrumental basis for individual intention to use the system" (Venkatesh et al. 2003, p. 453). In the same vein, mandated e-government transactions may cause certain IT-mediated service content functions and delivery dimensions to be more salient, and vice versa for those which are voluntary in nature.

Conclusion

While academics and practitioners have recognized the urgency of prescribing design specifications for the development of citizen-centric, quality-driven e-government websites, past studies have failed to achieve consensus on such developmental principles due to skewed emphasis on either content or delivery aspects of public e-services. This study is hence novel in that it bridges the gap between the two research streams by advancing a theory of e-government service quality that gives equal prominence to both content functions and delivery dimensions. Further, we derive separate taxonomies depicting the range of service content functions and delivery dimensions that would contribute to citizens' perceptions of service quality for e-government websites. These service content functions and delivery dimensions translate to actionable design principles that could be leveraged by practitioners to develop e-government websites which cater to citizens' transactional goals. Further, this study is the first of its kind to discover the transactional frequency as a moderator influencing the effectiveness of service content functions on citizens' perceptions of e-government service quality. Together with concerted investigative efforts in the future, our theory would advance knowledge on how to better structure e-government websites for the governmental transactions they serve.

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IT-MEDIATED CUSTOMER SERVICE CONTENT AND DELIVERY IN ELECTRONIC GOVERNMENTS: AN EMPIRICAL INVESTIGATION OF THE ANTECEDENTS OF SERVICE QUALITY

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Appendix A

Summary of Extant Literature on Electronic Service (e-Service) Quality

Author(s)	Domain	Dimensions + [Sub-Dimensions]	Scope of Application	Theoretical Frame of Reference	Conceptual vs. Empirical
Agarwal and Venkatesh (2002)	Website Quality	<ul style="list-style-type: none"> • Content [Relevance, Media Use, Depth/Breath and Current Information] • Ease of Use [Goals, Structure and Feedback] • Promotion • Made-for-the-Medium [Community, Personalization and Refinement] • Emotion [Challenge, Plot, Character Strength and Pace] 	Online Shopping and Content based Website	Microsoft Usability Guidelines [MUG] (Keeker 1997)	Empirical
Barnes and Vidgen (2001)	Website Quality	<ul style="list-style-type: none"> • Tangibles [Aesthetics and Navigation] • Reliability [Reliability and Competence] • Responsiveness [Responsiveness and Access] • Assurance [Credibility and Security] • Empathy [Communication and Understanding the Individual] 	Online Shopping	Parasuraman et al.'s (1988) SERVQUAL	Empirical
Cai and Jun (2003)	Service Quality	<ul style="list-style-type: none"> • Website Design/Content • Trustworthiness • Prompt/Reliable Service • Communication 	Online Shopping	SERVQUAL and eTailQ	Empirical

Author(s)	Domain	Dimensions + [Sub-Dimensions]	Scope of Application	Theoretical Frame of Reference	Conceptual vs. Empirical
Childers et al. (2001)	Website Quality	<ul style="list-style-type: none"> • Navigation [Influence Ease of Use and Enjoyment] • Convenience [Influence Usefulness, Ease of Use and Enjoyment] • Substitutability Experience [Usefulness and Enjoyment] 	Online Shopping	None	Empirical
Collier and Bienstock (2003, 2006)	Service Quality	<ul style="list-style-type: none"> • Process Quality [Privacy, Design, Information Accuracy, Ease of Use, Functionality] • Outcome Quality [Order Timeliness, Order Accuracy, Order Condition] • Recovery Quality [Interactive Fairness, Procedural Fairness, Outcome Fairness] 	Online Shopping	Model of Logistics Service Quality (Mentzer et al. 2001)	Conceptual
Devaraj et al. (2002)	Website Quality	<ul style="list-style-type: none"> • Ease of Use • Usefulness • Asset Specificity • Uncertainty • Empathy • Reliability • Responsiveness • Assurance 	Online Shopping	Technology Acceptance Model [TAM], Transaction Cost Analysis [TCA] and SERVQUAL	Empirical
Douglas et al. (2003)	Website Quality	<ul style="list-style-type: none"> • Presentation • Content • Accessibility • Reliability • Customer Support • Security 	Websites of Legal Practices	Surjadjaja et al.'s (2003) 20 Determinants of E-Service Operations	Empirical
Evanschitzky et al. (2004)	E-Satisfaction	<ul style="list-style-type: none"> • Convenience • Product Offerings • Product Information • Site Design • Financial Security 	Online Shopping	Szymanski and Hise (2000) E-Satisfaction	Empirical
Fassnacht and Koese (2006)	Quality of Electronic Service [QES] - Degree to which an electronic service is able to efficiently and effectively fulfill relevant customer needs	<ul style="list-style-type: none"> • Environment Quality [Graphic Quality, Clarity of Layout] • Delivery Quality [Attractiveness of Selection, Information Quality, Ease of Use, Technical Quality] • Outcome Quality [Reliability, Functional Benefit, Emotional Benefit] 	All forms of Electronic Services	Rust and Oliver's (1994) Service Quality Framework [i.e., Service Environment, Service Delivery, Service Product]	Empirical
Gefen (2002)	Service Quality	<ul style="list-style-type: none"> • Tangibles • Reliability, Responsiveness, Assurance • Empathy 	Online Shopping	SERVQUAL	Empirical
Gounaris and Dimitriadis (2003)	Service Quality	<ul style="list-style-type: none"> • Customer Care and Risk Reduction Benefit • Information Benefit • Interaction Facilitation Benefit 	Portal Sites	SERVQUAL	Empirical
Gummerus et al. (2004)	Service Quality – "Extent to which a Web site facilitates efficient and effective shopping, purchasing, and delivery" (Zeithaml et al. 2000, p. 11)	<ul style="list-style-type: none"> • User Interface • Responsiveness • Need Fulfillment • Security 	Content-based Websites	None	Empirical

Author(s)	Domain	Dimensions + [Sub-Dimensions]	Scope of Application	Theoretical Frame of Reference	Conceptual vs. Empirical
Janda et al. (2002)	Internet Retail Service Quality (IRSQ)	<ul style="list-style-type: none"> • Performance • Access • Security • Sensation • Information 	Online Shopping	None	Empirical
Jiang et al. (2002)	Information Systems Quality	<ul style="list-style-type: none"> • Reliability • Responsiveness • Assurance • Empathy 	Information Systems	SERVQUAL	Empirical
Kim et al. (2004)	Service and Website Quality	<ul style="list-style-type: none"> • Service Quality [Reliability, Responsiveness, Assurance and Empathy] • Website Quality [Information Quality and System Quality] 	Online Shopping	Information Quality [IQ] and System Quality [SQ] (Delone and McLean 1992; McKinney et al. 2002) and SERVQUAL	Empirical
Kim and Lim (2001)	Website Quality	<ul style="list-style-type: none"> • Entertainment • Speed • Information Quality • Reliability 	Online Shopping	Kolter et al.'s (1996) 14 Service Elements	Empirical
Kim and Stoel (2004)	Website Quality	<ul style="list-style-type: none"> • Web Appearance • Entertainment • Information Fit-to-Task • Transaction Capability • Response Time • Trust 	Online Shopping for Apparel	Loiacono's (2000) Original 12 Dimensions of WebQual	Empirical
Kim et al. (2006)	Service Quality - "Extent to which a Web site facilitates efficient and effective shopping, purchasing, and delivery" (Zeithaml et al. 2000, p. 11)	<ul style="list-style-type: none"> • Efficiency • Fulfillment • System Availability • Privacy • Responsiveness • Contact • Personalization • Information • Graphic Styles 	Online Shopping for Apparel	Parasuraman et al.'s (2005) E-S-QUAL	Conceptual
Loiacono et al. (2002)	Website Quality [WebQual]	<ul style="list-style-type: none"> • Usefulness [Informational fit-to-task, Interactivity, Trust, Response Time] • Ease of Use [Ease of Understanding, Intuitive Operations] • Entertainment [Visual Appeal, Innovativeness, Flow] • Complementary Relationship [Consistent Image, Online Completeness, Better than Alternative Channels] 	All manners of Websites but with no explicit reference to service delivery	Technology Acceptance Model [TAM]	Empirical
McKinney et al. (2002)	Website Quality	<ul style="list-style-type: none"> • IQ Expectations [Relevance, Understandability, Reliability, Adequacy, Scope, Usefulness] • SQ Expectations [Access, Usability, Entertainment, Hyperlinks, Navigation, Interactivity] 	Online Shopping	Information Quality [IQ] and System Quality [SQ] (Delone and McLean 1992)	Empirical
Meliàn-Alzola and Padron-Robaina (2006)	Website Quality	<ul style="list-style-type: none"> • Tangibility [Navigation, Signposting, Tools and Explanation] 	Online Shopping	Eiglier and Langedard's (1989) Two Components of a Service	Empirical

Author(s)	Domain	Dimensions + [Sub-Dimensions]	Scope of Application	Theoretical Frame of Reference	Conceptual vs. Empirical
O'Neill et al. (2001)	Service Quality	<ul style="list-style-type: none"> • Contact [Assurance, Empathy + (Reliability)] • Responsiveness • Reliability • Tangibles 	Online Service Websites	SERVQUAL	Empirical
Palmer (2002)	Website Quality	<ul style="list-style-type: none"> • Download Delay [Initial Access Speed, Speed of Display Between Pages] • Navigation/Organization [Arrangement, Sequence, Links, Layout] • Interactivity [Customization, Interactivity] • Responsiveness [Feedback, FAQ] • Information/Content [Amount of Information, Variety of Information, Word Count, Content Quality] 	Online Shopping	None	Empirical
Parasuraman et al. (2005)	Service Quality [E-S-QUAL] – Extent to which a Web site facilitates efficient and effective shopping, purchasing, and delivery	<ul style="list-style-type: none"> • Efficiency • System Availability • Fulfillment • Privacy 	Online Shopping	Means-End Framework	Empirical
Ribbink et al. (2004)	Service Quality	<ul style="list-style-type: none"> • Ease of Use • Website Design • Customization • Responsiveness • Assurance 	Online Shopping	SERVQUAL and eTailQ	Empirical
Rosen and Purinton (2004)	Website Quality - [Website Preference Scale (WSPS)]	<ul style="list-style-type: none"> • Coherence • Complexity • Legibility • Mystery 	Online Shopping	Kaplan et al.'s (1998) Environment Preference Framework	Empirical
Santos (2003)	Service Quality – Consumer's overall evaluation and judgment of the excellence and quality of e-services offerings in a virtual marketplace	<ul style="list-style-type: none"> • Incubative Dimension [Likely to increase website's daily hit rates] – Ease of Use, Appearance, Linkage, Structure and Layout, and Content • Active Dimension [Likely to increase customer retention and positive word of mouth referral] – Reliability, Efficiency, Support, Communications, Security, and Incentives 	Online Shopping	None	Empirical
Schubert (2002)	Website Quality [Extended Web Assessment Method (EWAN)]	<ul style="list-style-type: none"> • Ease of Use Criteria • Usefulness Criteria • Trust Criteria 	Online Shopping	Technology Acceptance Model [TAM]	Empirical
Semeijn et al. (2005)	Service Quality	<ul style="list-style-type: none"> • Assurance • Navigation • E-Scape • Accuracy • Responsiveness • Customization 	Online Shopping	SERVQUAL and eTailQ	Empirical
Shchiglik and Barnes (2004)	Website Quality [Perceived Airline Website Quality Instrument (PAWQI)]	<ul style="list-style-type: none"> • Domain Specific Dimension • Web Information Quality • Web Interaction Quality • Web Design Quality 	Online Shopping	Barnes and Vidgen's (2001) WebQual	Empirical

Author(s)	Domain	Dimensions + [Sub-Dimensions]	Scope of Application	Theoretical Frame of Reference	Conceptual vs. Empirical
Shim et al. (2002)	Website Quality	<ul style="list-style-type: none"> • Ease of Contact • Customer Service Information • Ease of Access of Product Information 	Online Shopping	None	Empirical
Singh (2002)	E-Services	<ul style="list-style-type: none"> • E-Search • E-Response-Transaction and E-Payment • E-Assurance and Trust • E-Help and E-Technologies 	Online Service Websites	None	Empirical
Srinivasan et al. (2002)	E-Service Loyalty	<ul style="list-style-type: none"> • Customization • Contact Interactivity • Care • Community • Convenience • Cultivation • Choice • Character of E-Retailer 	Online Shopping	None	Empirical
Surjadjaja et al. (2003)	Service Quality	<ul style="list-style-type: none"> • Service Marketing [Trusted Services, Internal Communication, External Communication, Price and Return Process] • Service Delivery [Real time Assistance by CSR, Fulfillment and Availability] • Service Design [Responsiveness, Site Effectiveness & Functionality, Up to Date Information, Supply Chain Information, System Integration, Personalization, Customization, Navigability, Security, Interactivity, Service Recovery] 	Online Service Websites	None	Conceptual
Wolfenbarger and Gilly (2003)	Service Quality [eTailQ]	<ul style="list-style-type: none"> • Website Design • Fulfillment/Reliability • Security/Privacy • Customer Service 	Online Shopping	None	Empirical
Zeithaml (2002), Zeithaml et al. (2002)	Service Quality [e-SQ] - Extent to which a Website facilitates efficient and effective shopping, purchasing, and delivery of products and services	<ul style="list-style-type: none"> • Information Availability and Content • Ease of Use or Usability • Privacy/Security • Graphic Style • Fulfillment 	Online Shopping	Zeithaml et al.'s (2000) e-Service Quality	Conceptual
Zhang and von Dran (2001)	Website Quality	<ul style="list-style-type: none"> • Basic [Features the support expected needs of users] • Performance [Features that enable the website to stay current to users' expectations] • Exciting [Features that are not expected but have the ability to excite and delight users] 	News Content-based Website	Kano et al.'s (1984) Model of Quality	Empirical

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Appendix B

A Comparison of E-Government Best Practices across Canada, Singapore, and the United States

Service Content Function	Canada	Singapore	United States
Requirements			
Needing	The net-filing website of the Canada Revenue Agency [www.netfile.gc.ca] of the Canadian government provides taxpayers with a detailed checklist to ensure the fulfillment of prerequisites before they can file their taxes online	The website of the Housing Development Board [www.hdb.gov.sg] of the Singapore government details step-by-step instructions on how to proceed with complicated procedures such as the buying of properties	The website of the Social Security Administration [www.ssa.gov] of the American government provides users with step-by-step information on how to replace a lost social security card
Customizing	The website of the Government of Canada [www.canada.gc.ca] allows users to open a "My Government Account" from which users can choose to load different administrative links and tools to manage their e-service within a single domain	The website of Singapore Army's National Service [www.ns.sg] allows users to choose the different types of services to be loaded on the their own login page	The website of government benefits [www.govbenefits.gov] of the American government allows users to choose different page presentation according to how the information is categorized

Service Content Function	Canada	Singapore	United States
Acquisition			
Sourcing	The website of Contracts Canada [contractsCanada.gc.ca] of the Canadian government provides services such as the Government Electronic Tendering Service to match federal government purchasing orders with commercial suppliers	The website of the Government e-Business [www.gebiz.gov.sg] of the Singapore government provides online tracing functions to match government purchasing orders with commercial suppliers	The website of the Federal Business Opportunities [fedbizopps.gov] of the American government provides matching functionalities to match federal government purchasing orders with commercial suppliers
Trying	The website of the Canada Revenue Agency [www.netfile.gc.ca] of the Canadian government has certified several commercial software applications that will assist taxpayers in tax returns preparation before the actual net-filing process	The website of the Inland Revenue Authority [mytax.iras.gov.sg] of the Singapore government allows demo slides that take users through a simulated tax filing process before the actual transaction	The website of the Internal Revenue Services [www.irs.gov] of the American government provides a service know as Free File: An online tax preparation and electronic filing service through a partnership agreement between the IRS and the Free File Alliance for American Taxpayers
Ordering	The website of the Human Resources and Skills Development Canada [www100.hrdc-drhc.gc.ca] of the Canadian government allows users to apply for Employment Insurance (EI) benefits online	The website of the Inland Revenue Authority [mytax.iras.gov.sg] of the Singapore government allows users to file their taxes online	The website of the Social Security Administration [www.ssa.gov] of the American government allows users to apply for social security benefits online
Paying	The website of the Canada Savings Bonds [www.csb.gc.ca] of the Canadian government provides users with a variety of online options to pay for the purchase of saving bonds	The website of One Motoring [www.onemotoring.com.sg] that is affiliated to the Land Transport Authority of the Singapore government provides users with the ability to pay for the renewal of road tax online	The website of the Department of Motor Vehicles [www.dmv.ca.gov] of the Californian state government provides users with the ability to pay for the renewal of driver license online
Tracking	The website of Citizenship and Immigration Canada [www.cic.gc.ca] of the Canadian government allows users to view securely, the status of his/her immigration application(s) online, 24 hours a day, 7 days a week; anytime, anywhere	The website of the Central Provident Fund (CPF) Board [www.cpf.gov.sg] of the Singapore government provides real-time status of all online transactions with the government agency and informs users whether transactional applications are received, rejected, being processed or approved	The website of the Social Security Administration [www.ssa.gov] of the American government allows American Citizens to: (1) check on the status of their online application for Social Security Retirement, Spouse's, or Disability benefits; (2) continue an unfinished Online Appeal Disability Report, and; (3) review benefits and personal information that have been supplied
Accepting	The website of the Canada Revenue Agency [www.netfile.gc.ca] of the Canadian government allows automatic computation of tax returns and users to estimate online the expected amount of refunds	The website of the Inland Revenue Authority [mytax.iras.gov.sg] of the Singapore government allows users to re-file their taxes within the same tax portal if amendments are required before the filing is finalized	The website of the Social Security Administration [www.ssa.gov] of the American government allows users to request confirmation of their Social Security benefit information
Authorizing	The website of the Canada Revenue Agency [www.netfile.gc.ca] of the Canadian government provides clear statements about how the tax information received will be used and about the security features used to protect the taxpayers' privacy	The website of the Inland Revenue Authority [mytax.iras.gov.sg] of the Singapore government allows users to authorize third parties and to verify their identity in order to carry out the tax filing process on the users' behalf	The website of the Social Security Administration [www.ssa.gov] of the American government offers clear privacy statement about the usage of the residential information provided by users

Service Content Function	Canada	Singapore	United States
Ownership			
Training	The website of the Government of Canada [www.canada.gc.ca] allows users to open a "My Government Account" that allows users to make use of existing personal information and transaction records to facilitate future administrations in a more simplified manner	The website of Singapore Army's National Service [www.ns.sg] has integrated the servicemen's reservist records with other related services such as reimbursement claims from the government and annual fitness test requirements under a single database to allow a serviceman to initiate multiple-service applications whenever he receives a military call-back	The website of the State Government of California [www.ca.gov] allows users to open a "My California" account that allows users to make use of existing personal information and transaction records to facilitate future administrations in a more simplified manner
Monitoring	The website of the Government of Canada [www.canada.gc.ca] allows users to choose among the different news feeds from which they can stay updated on news from different levels of government	The website of One Motoring [www.onemotoring.com.sg] that is affiliated to the Land Transport Authority of the Singapore government offers news flash to inform users of new administrative procedures and new transport regulations	The website of the U.S. Government [www.firstgov.gov] offers well-categorized summaries of news and features that are related to the government
Upgrading	The website of the Canada Revenue Agency [www.netfile.gc.ca] of the Canadian government allows taxpayers the option to log into their account should they wish make changes to their tax returns after net-filing	The website of the Inland Revenue Authority [mytax.iras.gov.sg] automatically recalculates tax returns of employees in respond to changes in tax regulations without requiring taxpayers to go through the entire e-filing process again	The website of Employee Express [www.employeeexpress.gov] of the American government allows federal employees the ability to update and make changes to specific payroll information without having to submit a new application to create an entirely new personal profile
Scheduling	The website of the Canada Revenue Agency [www.cra-arc.gc.ca] of the Canadian government provides clear information to remind taxpayers of important dates of recurring administrative events such that the annual tax filing process can be completed with complications	The website of eCitizen [www.eCitizen.gov.sg] of the Singapore government provides automatic Short Message Services and email alerts for recurring administrative steps such as road tax renewal and passport renewal notifications, library book reminders, season parking reminders	The website of the Internal Revenue Services [www.irs.gov] of the American government provides clear information to remind taxpayers of important dates of recurring administrative events such that the annual tax filing process can be completed with complications
Delegating	The website of Jobs Etc. [www.jobsetc.ca] of the Canadian government allows users to create and store their resumes online so that potential employers may contact and notify these users should an appropriate position becomes available	The website of the Housing Development Board [www.hdb.gov.sg] of the Singapore government allows automatic deduction of seasonal parking ticket payments through General Interbank Recurring Order (GIRO)	The website of the Electronic Federal Tax Payment System [www.eftps.gov] of the American government allows taxpayers to schedule dates of installment payments of their tax returns up to one year in advance
Negotiating	The website of the Canada Revenue Agency [www.cra-arc.gc.ca] of the Canadian government allows users to log into their personal account to dispute their assessments and determinations in tax matters	The website of the Inland Revenue Authority [mytax.iras.gov.sg] of the Singapore government automatically logs all taxpayers' complaints and concerns in the e-filing system for easy retrieval and re-evaluation of processed tax transactions	The website of the Internal Revenue Services [www.irs.gov] of the American government provides comprehensive information about the different ways by which taxpayers can go about solving tax controversies through appealing
Evaluating	The website of the Government of Canada [www.canada.gc.ca] offers a comprehensive list of governmental websites addresses for easy access, by users with feedback, to the relevant authorities	The website of the Feedback Unit [app.feedback.gov.sg] of the Singapore government allows layers of bureaucracy to be flattened by providing a one-stop portal for channeling any feedback on e-service offerings	The website of the U.S. Government [www.firstgov.gov] offers a one-stop email address for enquiries about the FirstGov.gov website or about anything in government, if the users are not sure who to ask

Appendix C

Sorting Procedure and Outcomes for Measurement Items

The sorting exercise for measurement items began with the recruitment of five judges for the first round of sorting. Consisting of postgraduate students and faculty members, the judges either were familiar with the topic of e-government or had conducted research in the area of virtual transactions. To reduce fatigue among judges, measurement items for service content functions were separated from those for service delivery dimensions during sorting. Each judge was initially presented with definitions for each of the 16 service content functions and a randomly sorted list of 49 reflective items. The judges were then told to assign each item to one of the functions or to an “ambiguous” category if they were unsure of its placement. Upon completion, an identical procedure was followed to sort another 18 reflective items corresponding to the 6 service delivery dimensions. Average “hit ratios” of 85 percent and 83 percent were attained for the service content functions and delivery dimensions, respectively. Computed Kappas also averaged above 0.80 for both service content functions and delivery dimensions (Cohen 1988).

Following this initial round of sorting, the judges were interviewed and minor amendments were made to the phrasing of the measurement items. The second round of sorting was conducted with the sole purpose of discerning the performance of the measurement items in a general population. For this reason, six judges were selected from a convenient pool of postgraduate students with e-government transactional experience but not affiliated with the information systems discipline. Again, the judges sorted the items for service content functions separately from those for service delivery. Hit ratios of 80 percent and 83 percent were registered for the service content functions and delivery dimensions, respectively, whereas calculated Kappas yielded values of above 0.78 for both.

A third and final round of sorting was conducted with three other judges (who, again, were unfamiliar with the research topic) whereby measurement items from both service content functions and delivery dimensions were sorted simultaneously. An average hit ratio of 82 percent and a Kappa value of 0.79 were observed, thereby eliminating the probability of cross-loadings among measurement items between service content functions and delivery dimensions.

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Appendix D

List of Measurement Items

Construct	Reflective Measures [All items were measured using a 7-point Likert scale ranging from “Strongly Agree” to “Strongly Disagree”]	Mean (S.D.)	Standardized Factor Loading
Constructs of IT-Mediated Customer Service Functions			
Requirements			
Needing	Using the website lets me identify the e-government transactions I need to perform.	2.48 (1.23)	0.87
	Using the website lets me better understand the e-government transactions I have to perform.	2.94 (1.32)	0.82
	Using the website lets me determine the e-government transactions I have to perform.	2.55 (1.18)	0.87
Customizing	Using the website lets me configure the steps for completing e-government transactions according to my specific needs.	2.82 (1.38)	0.87
	Using the website lets me customize e-government transactions according to my requirements.	3.15 (1.43)	0.90
	Using the website lets me customize its content to serve my needs better.	3.61 (1.53)	0.83

Construct	Reflective Measures [All items were measured using a 7-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree"]	Mean (S.D.)	Standardized Factor Loading
Acquisition			
Sourcing	Using the website lets me communicate with relevant public agencies when performing my e-government transactions.	3.04 (1.36)	0.75
	Using the website helps me determine specific governmental branches that can assist me when performing e-government transactions.	3.00 (1.37)	0.88
	Using the website lets me locate the governmental branch responsible for a specific e-government transaction.	2.83 (1.30)	0.87
Trying	Using the website lets me try out the necessary steps before attempting to perform actual e-government transactions.	3.22 (1.48)	0.91
	Using the website lets me simulate the steps needed to perform actual e-government transactions.	3.28 (1.51)	0.90
	Using the website lets me perform trial-runs of e-government transactions.	3.69 (1.53)	0.87
Ordering	The website facilitates the processing of my e-government transactions.	2.36 (1.22)	0.88
	Using the website lets me effectively perform my e-government transactions online.	2.35 (1.26)	0.93
	All functions needed to perform/complete my e-government transactions are available from the website.	2.73 (1.44)	0.86
Paying	The website allows me to pay for my e-government transactions online.	2.42 (1.42)	0.92
	Using the website, I am able to pay for my e-government transactions.	2.52 (1.47)	0.95
	All functions needed to process payments for my e-government transactions are available from the website.	2.72 (1.41)	0.92
Tracking	Using the website lets me review my history of completed e-government transactions.	3.36 (1.55)	0.68
	Using the website lets me track the progress of my e-government transactions.	3.01 (1.45)	0.88
	Using the website lets me determine when my e-government transactions will be processed.	2.81 (1.38)	0.85
	Using the website informs me about the current status of my pending e-government transactions.	3.19 (1.45)	0.85
Accepting	Using the website enables me to see the potential outcomes of different e-government transactions and helps me choose the best option.	3.53 (1.49)	0.85
	Using the website gives me suggestions to improve the outcome of my e-government transactions.	3.49 (1.50)	0.85
	Using the website lets me predict the outcomes derived from performing my e-government transactions.	3.23 (1.41)	0.86
Authorizing	Using the website lets me decide on who is allowed to see my confidential personal information such as credit card numbers.	3.87 (1.61)	0.88
	Using the website lets me determine who can access my personal information disclosed while performing my e-government transactions.	3.93 (1.63)	0.89
	Using the website lets me have full authority and control over access to my personal information when performing e-government transactions.	3.65 (1.53)	0.88
Ownership			
Training	Using the website lets me be innovative in how I can go about performing an e-government transaction.	3.65 (1.48)	0.84
	Using the website empowers me to perform any e-government transaction.	3.43 (1.50)	0.81
	Using the website lets me discover other ways of performing the same e-government transaction over time.	3.50 (1.42)	0.84
Monitoring	Using the website lets me know about new service features that may aid me in performing my e-government transactions.	2.81 (1.34)	0.82
	Using the website keeps me updated on amended administrative procedures for e-government transactions.	3.38 (1.40)	0.84
	The website always advises me on newly added e-government service features.	3.34 (1.40)	0.88

Construct	Reflective Measures [All items were measured using a 7-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree"]	Mean (S.D.)	Standardized Factor Loading
Upgrading	The website informs me of any additional steps to be taken if administrative procedures change while my e-government transactions are being processed.	3.29 (1.42)	0.84
	Using the website lets me modify details of my uncompleted e-government transactions whenever administrative procedures change.	3.44 (1.41)	0.85
	Using the website lets me modify uncompleted e-government transactions without having to re-enter the exact same information.	3.46 (1.47)	0.82
Scheduling	Using the website lets me make note of the dates for recurring e-government transactions.	3.52 (1.43)	0.83
	Using the website lets me keep track of the deadlines of e-government transactions that I need to perform.	3.30 (1.47)	0.88
	Using the website lets me remember dates of e-government transactions to be completed in the future.	3.72 (1.51)	0.88
Delegating	Using the website lets me authorize future recurring administrative procedures such as payment for seasonal government services.	3.90 (1.42)	0.89
	Using the website lets me schedule execution of recurring e-government transactions automatically.	4.00 (1.42)	0.89
	Using the website frees me from performing recurring e-government transactions.	3.86 (1.54)	0.89
Negotiating	Using the website lets me dispute the outcome of an e-government transaction which I believe is unjustified.	3.93 (1.44)	0.88
	Using the website lets me query the relevant authorities if I disagree with the outcome of my e-government transactions.	3.92 (1.47)	0.91
	Using the website lets me challenge the outcomes of my e-government transactions if I perceive them to be unfair.	4.16 (1.49)	0.91
Evaluating	Using the website lets me provide feedback to the governmental branch responsible for a specific e-government service.	3.59 (1.52)	0.91
	Using the website lets me send my evaluation of the quality of an e-government service to the governmental branch responsible for it.	3.81 (1.50)	0.91
	Using the website lets me communicate my experience of a specific e-government service to its relevant governmental branch.	3.74 (1.46)	0.90
Constructs of IT-Mediated Customer Service Delivery Dimensions			
Accessibility	I do not need to perform complicated technical configurations on my computer in order to access the website to perform e-government transactions.	2.47 (1.33)	0.86
	I do not face any difficulty in accessing the website using my favorite Internet browser to perform e-government transactions.	2.43 (1.27)	0.94
	I do not encounter any problem in accessing the website using my computer to perform e-government transactions.	2.38 (1.21)	0.94
Navigability	I do not find the presentation of instructions and procedures to be ambiguous and confusing when performing e-government transactions using the website.	2.98 (1.38)	0.85
	Using the website lets me surf effortlessly through relevant webpages while performing my e-government transactions.	3.26 (1.35)	0.81
	Using the website lets me easily understand the instructions and procedures for performing e-government transactions.	2.80 (1.26)	0.90
Interactivity	I find using the website to be engaging when I am performing e-government transactions.	3.58 (1.35)	0.89
	I find using the website a stimulating experience.	3.75 (1.40)	0.83
	The website is responsive and sensitive to my online habits.	3.60 (1.30)	0.83
Interoperability	I am able to complete different e-government transactions using the same website.	3.58 (1.54)	0.83
	Using this website, I can access services provided by different governmental branches.	3.50 (1.51)	0.90
	Various e-government services under the responsibility of different governmental branches are available via the same website.	3.70 (1.48)	0.89

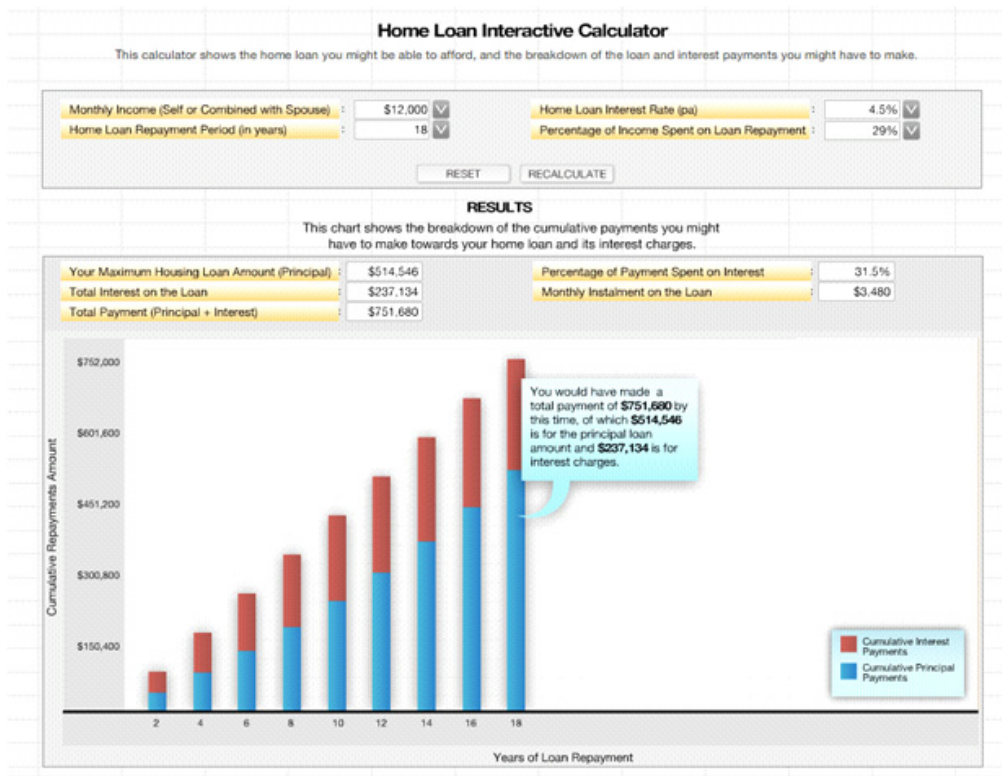
Construct	Reflective Measures [All items were measured using a 7-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree"]	Mean (S.D.)	Standardized Factor Loading
Adaptability	Using the website, I do not experience lag-time in loading of webpages when performing my e-government transactions.	3.11 (1.36)	0.88
	The website does not slow down at certain periods of time when performing my e-government transactions.	3.23 (1.42)	0.89
	The website does not become cluttered or confusing over time due to changes in service content.	3.08 (1.31)	0.88
Security	I know that my personal information disclosed during the performance of an e-government transaction is transferred in a secure manner.	3.06 (1.38)	0.90
	I trust that hackers will not be able to access the personal information I provide when performing my e-government transactions.	3.39 (1.50)	0.87
	The website provides mechanisms that protect my disclosed personal information from being stolen when I perform my e-government transactions.	3.16 (1.34)	0.92
Quality Constructs			
Perceived Service Content Quality	Generally, the service content offered on the website to support me in performing my e-government transactions is satisfactory.	2.78 (1.26)	0.94
	On the whole, the service content offered on e-government websites is highly effective in supporting me to perform my e-government transactions.	2.89 (1.29)	0.96
	Generally, I am pleased with the service content offered on e-government websites to support me in performing e-government transactions.	2.82 (1.30)	0.96
Perceived Service Delivery Quality	The general technological mechanisms underlying various service functionalities of the website are satisfactory.	2.88 (1.21)	0.93
	Generally, the e-government website service functionalities are delivered in a professional manner.	2.58 (1.16)	0.95
	Overall, the service functionalities are delivered efficiently via e-government websites.	2.67 (1.17)	0.96
Overall E-Government Service Quality	The website offers excellent overall service.	2.73 (1.20)	0.93
	The website offers service of a very high quality.	2.75 (1.21)	0.93
	The website offers a high standard of service.	2.91 (1.22)	0.95
	The website offers superior service in every way.	3.26 (1.29)	0.90

Appendix E

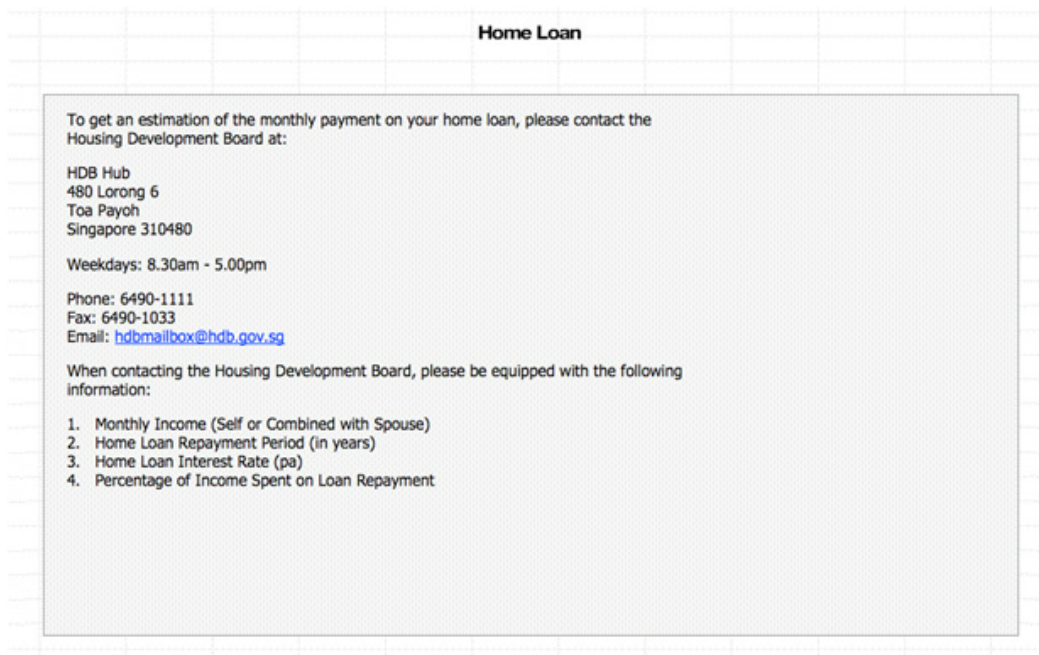
Test of Nomological Validity

Unlike the six service delivery dimensions that were derived from the systematic categorization of theoretically grounded constructs identified through an extensive literature review, the 16 service content functions were adapted from the CSLC model. Consequently, it is necessary to determine the nomological validity of the service content functions. Nomological validity, as explained by Lewis et al. (2005), is the capability of a construct to predict relationships between itself and its hypothesized antecedents and consequents (Smith et al. 1996). Adapting the methodological procedures outlined in Lin et al. (2008), an online experiment was conducted to verify whether e-government websites containing features corresponding to the 16 service content functions would translate to perceptual differences among citizens when contrasted against websites lacking such features.

To begin, we obtained screenshots from actual e-government websites that exemplify the web-enabled features corresponding to each of the 16 service content functions. We then extracted these specific content functions, while retaining the remaining design of the screenshots, to create artificial sites that reflect the absence of the service content functions. Sixteen pairs of screenshots demonstrating a dichotomy of high versus low service content were thus created. Figures E1 and E2 depict examples of screenshot pairs corresponding to the content functions of accepting and ordering respectively. By creating the comparison sites from existing e-government websites (see Figures E1 and E2), we purged potential confounds that may emanate from other aspects of web interface designs and informational content that could jeopardize the internal validity of our experiment.



Screenshot Demonstrating Presence of Accepting Service Functionality



Screenshot Demonstrating Absence of Accepting Service Functionality

Figure E1. Pair of Screenshots Demonstrating Presence Versus Absence of Accepting Service Functionality



Screenshot Demonstrating Presence of Ordering Service Functionality



Screenshot Demonstrating Absence of Ordering Service Functionality

Figure E2. Pair of Screenshots Demonstrating Presence Versus Absence of Ordering Service Functionality

To reduce fatigue for experimental participants, the 16 pairs of screenshots were divided into two groups of 10 service content functions each, such that 4 of the functions (i.e., authorizing, ordering, paying, and training) overlapped. To account for sequencing effects, each pair of screenshots was randomly ordered in the experiment; that is, participants might first be presented with screenshots corresponding to the presence of a service content function before being shown screenshots representing its absence, or vice versa. Upon viewing each pair of screenshots, participants were presented with a series of statements measured using nine-point comparative scales¹ (i.e., measurement items for the service content function corresponding to the screenshots) and asked to indicate the extent to which they agree or disagree with these statements. Because these statements were devised to capture citizens' perceptions of the presence of particular service content functions for e-government websites, perceptual differences should arise from participants' evaluation of each pair of contrasting screenshots.

Separate pretests were conducted for the two experimental groups. Pretests on samples of 28 (25 percent females and, on average, each respondent having conducted e-government transactions at least once every six months) and 25 (48 percent females and, on average, each respondent having conducted e-government transactions at least once every six months) e-government service users, recruited from a commercialized marketing research panel, did not indicate problems with the treatments (i.e., screenshots) for each experimental group.

For the actual experiment, we elicited the assistance of a commercialized marketing firm to recruit 75 and 76 participants for experimental groups 1 and 2, respectively. The participants were randomly assigned to one of the two groups. Table E1 tabulates the distribution of demographic characteristics across both groups. Paired *t*-tests performed on both samples revealed no significant differences in demographic distribution (i.e., $t_{(14)} = -0.001, p = .99$).

Table E1. Descriptive Statistics for Online Experiment Testing Nomological Validity

Demographic Characteristic	Group 1 [Sample N = 75]		Group 2 [Sample N = 76]	
	No. of Respondents	%	No. of Respondents	%
Gender				
Male	39	52.00%	38	50.00%
Female	36	48.00%	38	50.00%
Unwilling to disclose	0	0.00%	0	0.00%
Age				
Age 19-29	16	21.33%	17	22.37%
Age 30-49	35	46.67%	36	47.37%
Age 50-64	16	21.33%	21	27.63%
Age 65+	8	10.67%	2	2.63%
Unwilling to disclose	0	0.00%	0	0.00%
Educational Level				
Less than college education	15	20.00%	20	26.32%
College education or higher	60	80.00%	55	72.37%
Unwilling to disclose	0	0.00%	1	1.32%
Income				
\$0-\$30,000	19	25.33%	19	25.00%
\$30,000-\$50,000	16	21.33%	22	28.95%
\$50,000-\$75,000	12	16.00%	13	17.11%
\$75,000+	22	29.33%	16	21.05%
Unwilling to disclose	6	8.00%	6	7.89%

¹We opted for a nine-point comparative scale (1 being “Website A is much better” to 9 being “Website B is much better”) to ensure that the scale contains the minimum of five options for each side of the spectrum with the middle option acting as the neutral (or pivot) point.

Two-tailed t -tests² were conducted on each screenshot pair to determine whether perceptual differences arose from viewing pairs of contrasting screenshots corresponding to the 16 service content functions; results are summarized in Table E2. As can be inferred from Table E2, the first group of experimental participants was presented with screenshot pairs that correspond to 10 service content functions (i.e., accepting, authorizing, customizing, evaluating, needing, ordering, paying, scheduling, tracking, and training) and they were able to distinguish the screenshot featuring the service content function of interest from that without the corresponding service content function. The same can be said for the second group of participants who were exposed to the screenshots featuring both the presence and absence of each of the ten service content functions (i.e., authorizing, delegating, monitoring, negotiating, ordering, paying, sourcing, training, trying, and upgrading) (see Table E2). Furthermore, intergroup comparisons reveal no statistically significant differences in how participants reacted to the same pair of contrasting screenshots for the service content functions of authorizing, ordering, paying and training, regardless of whether they were in group 1 or 2 (see Table E2). This validates the nomological validity of our measurement items for the 16 service content functions.

Table E2. Summary of Empirical Results for Online Experiment Testing Nomological Validity

Content Functionality	Group 1 [Sample N = 75]		Group 2 [Sample N = 76]		Intergroup Comparison
	Mean (Std. Dev)	$t_{(74)}$	Mean (Std. Dev)	$t_{(75)}$	$t_{(149)}$
Accepting	3.11 (2.15)	-7.588***	–	–	–
Authorizing	3.52 (1.68)	-7.591***	3.65 (1.85)	-6.357***	-0.446 (n.s.)
Customizing	3.37 (1.44)	-9.786***	–	–	–
Delegating	–	–	2.81 (1.83)	-10.431***	–
Evaluating	3.87 (2.22)	-4.406***	–	–	–
Monitoring	–	–	4.08 (1.87)	-4.284***	–
Needing	4.12 (1.82)	-4.196***	–	–	–
Negotiating	–	–	3.20 (1.71)	-9.187***	–
Ordering	3.64 (1.82)	-6.505***	3.89 (2.21)	-4.357***	-0.782 (n.s.)
Paying	3.16 (1.68)	-9.508***	3.51 (1.85)	-7.043***	-1.221 (n.s.)
Scheduling	3.99 (1.91)	-4.586***	–	–	–
Sourcing	–	–	4.39 (1.73)	-3.097**	–
Tracking	3.17 (1.77)	-8.957***	–	–	–
Training	3.26 (2.15)	-7.008***	3.56 (2.27)	-5.533***	-0.838 (n.s.)
Trying	–	–	3.71 (1.98)	-5.677***	–
Upgrading	–	–	3.19 (1.77)	-8.930***	–

*** t -statistic is significant at the 0.001 level (two-tailed); ** t -statistic is significant at the 0.01 level (two-tailed); n.s. t -statistic is not significant at the 0.05 level (two-tailed).

References

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²Because the items are measured via nine-point comparative scales, the t -tests being performed are to establish whether there is a statistically significant deviation from the midpoint value of 5; that is, to refute the null hypothesis that no perceptual differences would arise from viewing each pair of contrasting screenshots. Also, because the dataset has been coded in a manner whereby responses leaning toward zero are indicative of experimental participants reacting positively to screenshots of websites offering each of the 16 service content functions, negative t -values are desirable (as shown in Table E2).

Appendix F

Inter-Construct Correlation Matrix

	ACC	ASS	ADT	AUT	CUS	DEL	EVA	INT	IOP	MON	NAV	NED	NEG	ORD	PAY	SCH	SEC	SCQ	SDQ	ESQ	SOU	TRK	TRA	TRY	UPG		
ACC	0.86																										
ASS	0.32	0.91																									
ADT	0.45	0.59	0.88																								
AUT	0.57	0.21	0.40	0.89																							
CUS	0.63	0.31	0.37	0.44	0.87																						
DEL	0.58	0.13	0.31	0.57	0.45	0.89																					
EVA	0.60	0.23	0.42	0.55	0.44	0.65	0.91																				
INT	0.59	0.39	0.62	0.53	0.54	0.52	0.56	0.85																			
IOP	0.48	0.24	0.44	0.44	0.44	0.55	0.58	0.60	0.88																		
MON	0.69	0.39	0.48	0.56	0.64	0.61	0.61	0.55	0.52	0.85																	
NAV	0.53	0.64	0.78	0.40	0.48	0.33	0.46	0.69	0.50	0.55	0.86																
NED	0.57	0.53	0.46	0.33	0.74	0.36	0.40	0.49	0.38	0.69	0.58	0.85															
NEG	0.61	0.13	0.35	0.58	0.41	0.70	0.75	0.54	0.53	0.62	0.37	0.34	0.90														
ORD	0.44	0.61	0.53	0.26	0.47	0.21	0.30	0.40	0.28	0.48	0.61	0.63	0.19	0.89													
PAY	0.35	0.51	0.40	0.21	0.31	0.20	0.23	0.32	0.23	0.39	0.48	0.49	0.18	0.82	0.93												
SCH	0.64	0.27	0.39	0.55	0.49	0.75	0.63	0.55	0.54	0.68	0.43	0.49	0.67	0.37	0.30	0.87											
SEC	0.43	0.50	0.62	0.55	0.36	0.32	0.42	0.64	0.42	0.42	0.65	0.41	0.35	0.48	0.36	0.41	0.90										
SCQ	0.51	0.59	0.63	0.40	0.52	0.36	0.48	0.61	0.41	0.55	0.74	0.62	0.37	0.71	0.58	0.49	0.58	0.95									
SDQ	0.45	0.71	0.67	0.37	0.45	0.30	0.41	0.57	0.42	0.54	0.73	0.60	0.29	0.68	0.54	0.44	0.64	0.74	0.95								
ESQ	0.52	0.61	0.68	0.44	0.52	0.37	0.45	0.70	0.45	0.55	0.76	0.58	0.36	0.63	0.53	0.47	0.63	0.77	0.77	0.93							
SOU	0.53	0.39	0.38	0.39	0.71	0.43	0.45	0.46	0.43	0.65	0.47	0.77	0.38	0.48	0.34	0.46	0.38	0.48	0.49	0.51	0.83						
TRK	0.66	0.41	0.44	0.54	0.52	0.53	0.47	0.50	0.43	0.62	0.50	0.55	0.45	0.60	0.53	0.63	0.45	0.59	0.49	0.55	0.43	0.82					
TRA	0.67	0.31	0.48	0.63	0.58	0.65	0.67	0.63	0.59	0.72	0.52	0.52	0.69	0.40	0.34	0.63	0.46	0.53	0.48	0.55	0.51	0.51	0.83				
TRY	0.64	0.26	0.29	0.44	0.67	0.48	0.39	0.43	0.33	0.60	0.34	0.59	0.43	0.28	0.16	0.50	0.29	0.34	0.31	0.37	0.58	0.49	0.51	0.90			
UPG	0.71	0.33	0.50	0.65	0.55	0.62	0.62	0.59	0.49	0.70	0.53	0.52	0.61	0.45	0.35	0.70	0.50	0.57	0.49	0.52	0.44	0.66	0.68	0.50	0.83		

*Square-root of Average Variance Extracted shown on Diagonals.

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