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Understanding the Antecedents and Consequences of E-Government Service Quality: An Empirical Investigation

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Abstract

Difficulties in defining and understanding the antecedents and consequences of e-government service quality have stymied the design of efficacious e-government websites. This study thus presents a working definition of e-government service quality that bridges the gap between MIS and marketing literatures. We then explore the delineation between service content and delivery quality as potential antecedents of e-government service quality. Together with cognitive and system-salient consequences derived from prior research, we construct and empirically test an e-government service quality model on a sample of 647 existing e-government service participants. 15 out of 17 hypotheses were supported, thereby attesting to the saliency of the constructs and relationships embodied in our model. Further, the structural properties of our model were validated using both LISREL and PLS analytical techniques. This lends credibility to our explanations and predictions by affirming the stability of our theoretical base upon which the hypothesized relationships were generated.

Keywords: e-Government Websites, e-Government Service Quality, Service Content Quality, Service Delivery Quality
Introduction

E-government is the application of IT to enable interactive exchanges between public institutions and their external stakeholders in order to “provide citizens and organizations with more convenient access to government information and public services” (Turban et al., 2002, p. 451; see also Marchionini et al., 2003; Milford, 2000; Sharma and Gupta, 2003). For this reason, the design of e-government websites has been a source of growing concern for both academics and practitioners alike (e.g., Barnes and Vidgen 2001; Fulla and Welch, 2002; Gant and Gant, 2001, 2002; Ho, 2002; Holden et al., 2003; Huang 2003; Kaylor et al., 2001; Scavo, 2003; United Nations, 2004; Zhang et al., 2001) as the mass migration of public services onto virtual communication media has positioned IT-enabled web interfaces as the focal point of contact between citizens and public institutions (Benbasat and DeSanctis, 2001; Cohen and Eimicke, 2003). A recent report released by Accenture (2006) on e-government maturity across a sample of 22 countries indicated that many of these countries (i.e., > 90%) have digitized at least 80% of their national services. Yet, documented statistics on citizen adoption continues to be dismal (ICMA, 2004; Pew Internet and American Life Project, 2002). A significant barrier to citizens’ acceptance of e-governments, as observed by West (2004a), is that while most governments boast of a strong web presence, a majority of these websites suffer from inadequacies in service quality, which impede citizens’ usage of public e-service offerings.

Though prior research has testified to e-government service quality as being a salient driver of citizens’ receptivity towards public e-services (Hazlett and Hill, 2003; Teicher et al., 2002), Buckley (2003) admitted that given the multiplicity of motivations and service targets underlying public institutions, researchers already face an uphill task in defining and measuring service quality for e-governments, much less understand the antecedents leading to and consequences arising from the provision of high quality public e-services. Consequently, this study intends to accomplish several objectives. First, we offer a working definition of e-government service quality that bridges the gap between service quality and e-government literature. Next, we explore whether the marketing proposition of delineating service content from service delivery in predicting service quality is feasible within an e-government context. We then examine how e-government service quality can enhance citizens’ loyalty towards public e-services by deriving and testing an integrated model of its antecedents and consequences. We believe that these aforementioned steps are pre-requisites to further research into actionable IT levers, which can be employed in the design of high quality e-government websites (Benbasat and Zmud, 2003; Orlikowski and Iacono, 2001).

Defining e-Government Service Quality

The concept of service quality, which has been extensively investigated in the domain of e-commerce (e.g., Cenfetelli et al., 2005; Gefen, 2002), measures customers’ perceptions of actions undertaken by businesses to improve service encounters (Parasuraman et al., 1985, 1988; Pitt et al., 1995). Previous research has established that service quality elicits a host of positive attitudinal responses from customers, such as loyalty (Gefen 2002), trust (Reichheld and Schefer, 2000) and satisfaction (Cenfetelli and Benbasat 2002); attitudes already established in prior studies as salient drivers of citizens’ adoption intentions towards public e-services (see Bélanger and Carter, 2005; Gefen et al., 2002; Treiblmaier et al., 2004;Welch and Hinmant, 2003). Because online consumers can readily exit a transactional relationship and switch to an alternative service provider due to low personal commitment1, the quality of e-services is paramount in attracting and retaining customers (Holloway and Beatty, 2003); more so for predominantly service-oriented domains such as e-governments (Ancarani, 2005; Hazlett and Hill, 2003).

Since services are produced in a fashion whereby customers interact with the business processes of the service firm, Grönroos (1998) suggested that consumption of a service must goes beyond outcome consumption to include process consumption because the functional processes leading to service fulfillment are no longer obscure to the consumer (Grönroos et al, 2000). Therefore, insofar as the customer interacts with the technological artifacts offered via the web interface to accomplish an intended activity (e.g., purchasing a product or making detailed inquiries), any Internet offering can be deemed to be a service (Grönroos et al, 2000). Drawing parallelism with e-commerce (see Cenfetelli et al, 2005), whenever we reference e-government service quality, we are actually referring to citizens’ general assessment of how well technological artifacts on an e-government website fuse together with the delivery properties of the Internet medium to create a collection of core services2 (e.g., interactive ordering and

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1 Not unlike e-commerce, e-governments also encounter competition despite their monopolistic agenda (Tan et al, 2005) with the key distinction being that e-commerce is confronted with competing rival services whereas e-governments face off their traditional physical counterparts.

2 By theorizing services as business processes leading to predetermined consequences, the distinction between services and transactions also becomes clearer. Services refer to business processes put in place to assist customers in deriving promised outcomes whereas transactions are
payment functions), which support governmental transactions. We hence define e-government service quality as the extent to which services offered via an e-government website assist citizens in completing their governmental transactions (see also Parasuraman, 2002). Figure 1 illustrates our proposed e-government service quality model.

Antecedents of e-Government Service Quality

As stated earlier, service quality has been conceived as a combination of functional and technical components (Grönroos 1982, 1990). Whereas functional or content quality describes the degree of outcome satisfaction to be derived from utilizing a service, technical or delivery quality refers to the process by which the service is being accessed (Grönroos, 1990; Grönroos et al., 2000). Numerous researchers have claimed that the conceptualization of service quality should include considerations of both service content and delivery (Baker and Lamb, 1993; Grönroos, 1982, 1990; Grönroos et al., 2000; Mangold and Babakus, 1991; Rust and Oliver, 1994) with direct empirical support for such a distinction being reported for various offline service environments (e.g., Brady and Cronin, 2001; Kang, 2006). Extrapolating to the domain of public e-services, service content quality is thus synonymous with citizens’ degree of outcome satisfaction when transacting via e-government websites. This satisfaction in turn is rooted in the depth or sophistication of IT-mediated service functionalities available from e-government websites to facilitate the achievement of desirable transactional outcomes. Conversely, service delivery quality depicts the manner by which these functionalities are made accessible via the Internet channel. We therefore define service content quality as the extent to which IT-mediated service functionalities provided via an e-government website assists citizens in accomplishing their governmental transactions (Cenfetelli et al., 2005) and service delivery quality as the manner in which these functionalities are made accessible to citizens via the e-government website as a delivery channel. Likewise, Ancarani (2005) maintained that citizens’ evaluation of e-government service quality is largely influenced by perceptions of 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). Gil-Garcia (2006) also argued for separating enacted technology (i.e., functional interface) from expected outcomes (i.e., efficacious content) in structuring e-government services.

Empirical evidence reinforces the delineation between service content and delivery. Findings suggest that IT-mediated service content is rendered meaningless if it cannot satisfy customers’ transactional requirements particular occurrences in time whereby these processes are activated by consumers to arrive at the 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), whereas the electronic filing of a tax return by a citizen should be viewed as an independent, time-specific e-government transaction.
(Cenfetelli and Benbasat, 2002; Cenfetelli et al., 2005; van Riel et al., 2001). Homburg et al. (2002) observed that the breadth and depth of service offerings are vital in shaping customers’ attitudes throughout the entire transactional process. But without leveraging the capacity of IT to circumvent physical limitations, critics countered that the provision of omnipresent assistance from pre- to post-transactional stages may be impractical in offline situations, especially with regards to the nurturing of personalized service experiences (Cenfetelli et al., 2005). In this respect, IT can not only counteract conventional resource constraints by tailoring content to accommodate customers’ expectations, but it also made available content which is otherwise infeasible through physical media (Gant and Gant, 2001, 2002).

**Hypothesis 1**: A citizen’s perceived service content quality of an e-government website will positively influence his/her overall perceived e-government service quality.

Prior e-government research has bear witness to alternate IT-inspired quality factors that drive citizens’ acceptance of public e-services and yet cannot be readily subsumed under the category of content-based functionalities. For example, Yao and Huston (2002) proved that accessibility is positively correlated with citizens’ usage of electronic voting systems whereas Triebelmaier et al. (2004) observed that the security of virtual payment functions mitigates citizens’ resistance in employing online payment methods for e-government transactions. Other factors, which have received similar empirical support, include navigability, interactivity and interoperability (Bélanger and Carter 2005; Beynon-Davies 2004; Poon 2002; Welch and Hinnant 2003). We therefore introduce the overarching concept of service delivery quality to describe scenarios where accessibility to service content can compromise e-government transactional activities even when superior functionalities have been developed according to citizens’ specifications (Cenfetelli et al., 2005; van Riel et al., 2001). Indeed, Richard and Allaway (1993) maintained that employing only functional quality to predict consumer behavior is a misspecification of service quality and will result in low predictive validity.

**Hypothesis 2**: A citizen’s perceived service delivery quality of an e-government website will positively influence his/her overall perceived e-government service quality.

**Consequences of e-Government Service Quality**

No matter the quality of an e-government website, it is meaningless if its web interface design is unable to foster the ‘right’ attitudes among its targeted audience. To this end, we seek to articulate the immediate Nomological network of cognitive and system-salient consequences that arises from e-government service quality. Though a review of extant literature yields an extensive list of potential consequences to be considered in tandem with service quality, we isolate the constructs of perceived usefulness, perceived ease of use, trust and risk as the most prominent concepts cited by both marketing and MIS scholars when theorizing about e-service quality (e.g., Agarwal and Venkatesh, 2002; Devaraj et al., 2002; Kim and Stoel, 2004; Ribbink et al., 2004; Schubert, 2002; Zeithaml, 2002; Zeithaml et al., 2002). The seminal work of Gefen et al. (2003) has also lent credibility to the relevance of applying an integrated Trust-TAM model to the investigation of online environments (see also Wang and Benbasat, 2005). By focusing our research efforts on pertinent constructs of interest within the integrated Trust-TAM model, we expand on Gefen et al.’s (2003) foundation by advising practitioners on how e-government websites can be designed to engender perceptions of trust, usefulness and ease of use among citizens. Furthermore, in place of adoption intentions, we opt for the construct of customer loyalty as the final dependent variable of interest. As maintained by Gefen (2002), loyal customers not only translate to repeated transactions, they are also more inclined to recommend the website to other consumers, thereby effectively increasing the customer base at no additional expense to the service provider. If customer loyalty can be properly induced, e-government websites will not only gain in terms of repeated citizen usage, they also stand to benefit from a peer-based referral system.

**Trust**

The absence of face-to-face assurance has exacerbated the risk of online transactions (Jarvenpaa and Tractinsky, 1999; Lee, 1998; Neumann, 1997). This risk may be even more pronounced for e-governments as critics questioned whether their monopolistic nature and political affiliation have undermined the morality and neutrality of public e-services (Robertson and Seneviratne, 1995; Tan and Pan, 2003; Tan et al., 2005). Characteristically, trust—“the subjective assessment of one party [trustor] that another party [trustee] will perform a particular transaction according to his or her confident expectations, in an environment characterized by uncertainty” (Ba and Pavlou, 2002, p. 245)—is vital to customers’ adoption of e-services by alleviating fears of being compromised by the service
provider (Gefen et al., 2003; Jarvenpaa and Tractinsky, 1999; Reichheld and Schechter, 2000; Pavlou, 2001). Empirical evidence has also established trust as a salient driver of e-government service adoption (Gefen et al., 2002; Lee et al., 2004, 2005; Warkentin et al., 2002).

The concept of trust hinges on a precondition of vulnerability, which dictates that one party (the trustee) must willingly assume a defenseless posture in anticipation that the other party (the truster) will behave in a socially responsible manner to fulfill the former’s expectations (Gefen, 2000; Mayer et al., 1995; Rousseau et al., 1998). Transactional relationships rest on the fundamental assumption that the interests of one party cannot be achieved without reliance on another (Sheppard and Sherman, 1998) and “if one were omniscient, actions could be undertaken with complete certainty, leaving no need or even possibility, for trust to develop” (Lewis and Weigert, 1985, p. 970; see also Karahannas and Jones, 1999). Since our conceptualization of e-government service quality pertains to an evaluation of how well delivered services conform to customer expectations on a consistent basis, it should arguably increase citizens’ trust towards the website, as parallel studies of e-commerce websites indicate (Gefen, 2002; Reichheld and Schechter, 2000).

**Hypothesis 3**: A citizen’s perceived service quality of an e-government website will positively influence his/her trust towards the website.

By the same rationale, the availability of matching service functionalities on an e-government website to assist citizens in completing their governmental transactions (i.e., service content quality) is a signal that transactional requirements are being met by the offered public e-services (Gant and Gant, 2001; Lee and Rao, 2003). Citizens are therefore likely to display greater confidence towards the competence of the e-government website to fulfill its transactional obligations.

**Hypothesis 4**: A citizen’s perceived service content quality of an e-government website will positively influence his/her trust towards the website.

The preponderance of e-government services serves to resolve the procedural obscurities surrounding governmental bureaucracies (Tan and Pan, 2003). This in turn reduces the level of uncertainty for governmental transaction. Deficiencies in service delivery however, will induce citizens to perceive little differences between the Internet medium and its physical counterpart in performing governmental transactions (Gant and Gant, 2001, 2002). For example, without exploiting the interactive capability of the Internet medium in delivering e-government services, citizens will still be unable to communicate with relevant public agencies when they encounter difficulties in performing governmental transactions. We can thus extrapolate that service delivery quality is crucial to building citizens’ trust towards e-government websites.

**Hypothesis 5**: A citizen’s perceived service delivery quality of an e-government website will positively influence his/her trust towards the website.

**Perceived Usefulness and Perceived Ease of Use**

Perceived usefulness and perceived ease of use are well-established constructs from the Technology Acceptance Model (TAM) such that the hypothesized relationship between perceived usefulness and perceived ease of use have been repeatedly elaborated and proven in MIS literature (e.g., Davis, 1989; Davis et al., 1989; Gefen and Straub, 2000; Gefen et al., 2000, 2003; Venkatesh and Davis, 2000; Venkatesh et al., 2003). Therefore, we will not reiterate what has been widely acknowledged and instead, focus our discussion on the relationships among perceived usefulness, perceived ease of use, trust and the three quality constructs.

**Hypothesis 6**: A citizen’s perceived ease of use towards an e-government website will positively influence his/her perceived usefulness of the website.

The service quality of an e-government website, as theorized in this study, is a culmination of citizens’ aggregated assessment of both service content and delivery components. Whereas service content and delivery quality draw consumers’ attention to specific functional properties of a website and aspects of accessibility for its e-service offerings respectively, service quality is a holistic evaluation of whether the blend of these IT-mediated functionalities and delivery mechanisms is optimal from a customer’s perspective. Indeed, service quality and the TAM share commonalities in their orientation towards user-centric benefits as catalysts of behavioral actions (Cenfetelli et al., 2005). Since perceived usefulness examines the benefit of using technology for a given task (Davis, 1989), it mirrors the encompassing idea of value as acknowledged in studies of service quality—the utility accorded to customers due to perceived differences between what is expected and what is actually provided (Cronin
et al., 2000; Parasuraman and Grewal, 2000). Nevertheless, perceived usefulness only amounts to a partial explanation of the value construct. The cognitive effort that must be expended by individuals in acquiring the service constitutes the other half of service value such that services with better quality should implicitly promote higher levels of perceived ease of use on the part of the users. Inasmuch as service quality is recognized as a potential driver of value in service environments (Cronin et al., 2000), it should also act as an antecedent to citizens’ perceived usefulness and perceived ease of use towards e-government websites (e.g., Cenfetelli et al., 2005).

**Hypothesis 7**: A citizen’s perceived service quality of an e-government website will positively influence his/her perceived usefulness towards the website.

**Hypothesis 8**: A citizen’s perceived service quality of an e-government website will positively influence his/her perceived ease of use towards the website.

Service content quality also has a bearing on citizens’ perceived usefulness of e-government websites. As conceived in this study, the service content quality of an e-government website is determined by the breadth and depth of IT-mediated functionalities available to aid in transactional activities, i.e. a higher level of perceived service content quality is associated with greater sophistication of tools accessible from the website (Anzarani, 2005). Cenfetelli et al. (2005) further argued that “as more service content is offered through a website, the more utility there is to be gained by customers using the site” (p. 11), which in turn fosters a greater likelihood of system usage by the consumers. We thus rationalize that citizens’ perceived service content quality of e-government websites will lead to corresponding perceptions of usefulness towards the offered public e-services.

**Hypothesis 9**: A citizen’s perceived service content quality of an e-government website will positively influence his/her perceived usefulness towards the website.

Our conception of the service delivery quality construct encompasses the defining characteristics of a web-based communication medium in delivering e-government services by measuring how well content is being delivered (Anzarani, 2005; Grönroos, 1990; Grönroos et al., 2000). Since perceived ease of use denotes the effort needed to exploit the full potential of a specific system (Davis, 1989), it can be deduced that the more efficient the mode of delivery, the easier it is for users to access public e-services offered on an e-government website. Also, while it is perhaps a truism that service delivery quality will influence perceived usefulness as well, but in accordance with the TAM, perceived ease of use is already taken into account as an antecedent of perceived usefulness and as such, it is our belief that the bulk of the effects of service delivery quality on perceived usefulness will most probably be mediated through perceived ease of use.

**Hypothesis 10**: A citizen’s perceived service delivery quality of an e-government website will positively influence his/her perceived ease of use towards the website.

Trust is a prime determinant of what to anticipate in uncertain situations and determines the utility extracted (Fukuyama, 1995), especially when the circumstances involve “current costs invested in exchange for future unguaranteed rewards” (Gefen et al., 2003, p. 61) such as online transactions. If users are reluctant to try new technologies, it is a foregone conclusion that these innovations will never be useful regardless of their design (Rogers, 1995). In such scenarios, trust is a valuable commodity by engendering the much-needed faith in the capacity of the system to deliver on its promised functional capabilities.

**Hypothesis 11**: A citizen’s trust towards an e-government website will positively influence his/her perceived usefulness of the website.

A key to building trust in business interactions is to treat the vulnerable party fairly by not taking advantage of its resource dependency or knowledge inadequacy (Hart and Saunders, 1997; Kumar, 1996). Providing due process and ample explanations with respect to procedures and policies cultivate trust in business transactions (Kumar, 1996) by reducing misunderstandings that undermine it (Blau, 1964). Since the web interface is the primary intersection point between consumers and vendors, easy access to transactional content and procedural information translates to perceptions of process transparency culminating in the creation of trust (Gefen et al., 2003). The same argument can be extrapolated to e-government websites in that:

**Hypothesis 12**: A citizen’s perceived ease of use towards an e-government website will positively influence his/her trust of the website.
Risk

Risk is a customer’s subjective expectation of a prospective loss from his/her consumption behavior (Stone and Gronhaug, 1993; Sweeney et al., 1999). Consumers’ appraisal of risk is derived from corresponding assessments of uncertainty and adverse consequences in consuming a product or service (Dowling and Staelin, 1994). When a truster decides to trust a trustee, it means that the former inherently assumes that the latter will not engage in unwarranted conduct that threatens the former’s interests (Gefen, 2000; Mayer et al., 1995; Rousseau et al., 1998). Correspondingly, trust neutralizes customers’ perception of risk in transacting with a given business partner by alleviating fears of being exploited by the vendor (Mayer et al., 1995; Williamson, 1985). E-commerce research has reinforced this proposition in that reduced risk perceptions were detected for online consumers who trust their vendors (Gefen, 2002; Jarvenpaa and Tractinsky, 1999; Reichheld and Schefer, 2000; Pavlou, 2001). The same logic also applies to e-government services to the extent to which the negative relationship between trust and risk was in fact, substantiated by Gefen et al. (2002).

Hypothesis 13: A citizen’s trust of an e-government website will negatively influence his/her perceived risk towards the website.

Loyalty

Trust has a straightforward relationship with loyalty. Loyalty, as defined in contemporary marketing literature, refers to a preferential attitudinal response expressed by a consumer towards a product or service over an extended time period (Assael, 1992; Engel and Blackwell, 1982; Srinivasan et al., 2002). Trust governs the belief that the trustee will be dependable (Kumar et al., 1995) and will behave in a socially acceptable fashion (Hosmer, 1995; Zucker, 1986) to fulfill promised commitments to the truster (Gefen, 2002; Rousseau et al., 1998). Consequently, trust sustains customers’ willingness to transact with a given service provider by amplifying perceptual assurances that the vendor will continue to act in good faith for subsequent transactions (Gefen, 1997, 2000, 2002; Jarvenpaa and Tractinsky 1999; Reichheld and Schefer 2000). As a matter of fact, trust has been well-acknowledged as an important antecedent of long-term business interactions (e.g., Ganesan, 1994; Gulati, 1995; Kumar et al., 1995).

Hypothesis 14: A citizen’s trust of an e-government website will positively influence his/her loyalty towards the website.

As mentioned, while perceived usefulness measures an individual’s subjective assessment of the utility to be gained from the utilization of a technology, perceived ease of use is indicative of the cognitive effort to be expended in learning and utilizing the technology (Gefen et al., 2003). Since the TAM is founded on the premise of individuals acting as rational beings who reason and react in a logical manner (Davis, 1989; Davis et al., 1989), it is clear that the more useful and easy to use is an e-government website in empowering citizens to accomplish their governmental transactions, the more loyal they will be towards the website.

Hypothesis 15: A citizen’s perceived usefulness of an e-government website will positively influence his/her loyalty towards the website.

Hypothesis 16: A citizen’s perceived ease of use of an e-government website will positively influence his/her loyalty towards the website.

Since risk translates to the probable existence of uncertainty and undesirable outcomes in transactional activities (Dowling and Staelin, 1994), heightened perceptions of risk is detrimental to loyalty by inducing perceptual beliefs about the unlikelihood of the vendor to be able to fulfil pledged obligations to customers. Without an acceptable guarantee that the service provider will not violate the interests of customers subsequently, it is impossible to prolong consumption beyond the current service encounter (Assael, 1992; Engel and Blackwell, 1982; Jacoby, 1971; Keller, 1993; Srinivasan et al., 2002).

Hypothesis 17: A citizen’s perceived risk of an e-government website will negatively influence his/her loyalty towards the website.

While e-government service quality may arguably exert a direct effect on customer loyalty, but in accordance with the correspondence principle advocated by Fishbein and Ajzen (1975) as well as Wixom and Todd (2005), e-government service quality, as conceived in this study, can be construed as an object-based attitude in that it measures citizens’ overall assessment of a website object whereas customer loyalty resembles a behavioral attitude by being intimately linked to both adoption intentions and eventual usage behavior. Consequently, the impact of an
An object-based attitude on a behavioral attitude should be fully mediated through behavioral beliefs (e.g., perceived usefulness, perceived ease of use and trust) as empirically proven by Wixom and Todd (2005).

Data Collection and Analysis

To validate our proposed e-government service quality model, data was gathered via an online survey questionnaire on a panel of current e-government service participants. Survey respondents were requested to recall a transaction-oriented e-government website which they frequented and to provide evaluations based on their cumulated transactional experience with this recollected website. The collected data was then analyzed using Structural Equation Modeling (SEM) techniques (Gefen et al., 2000).

Abiding by standard psychometric procedures (Nunnally and Bernstein, 1994), three measurement items were generated for each of the two constructs of service content quality and service delivery quality. Whereas the measurement items for service content quality elicit citizens’ perceptions regarding the availability and effectiveness of website functionalities in assisting them to perform their governmental transactions, those for service delivery quality target citizens’ assessment of whether these functionalities are delivered in an efficient and professional manner. The remaining constructs have been extensively investigated in past research and measures can be obtained from pertinent literature with minor modifications whenever necessary. Four items for measuring overall e-government service quality3 were derived from marketing studies that evaluated service quality as a single overarching construct (e.g., Dabholkar et al., 1996; Spreng and Mackoy 1996). Customer trust, loyalty and risk were measured with semantic scales adapted from Gefen (2002), who employed the exact same constructs in an inquiry of e-commerce service quality. Measures for perceived usefulness and perceived ease of use were adapted from existing empirical studies (Venkatesh et al., 2003). Table 2 details the list of measurement items.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Reflective Measures (All items measured using a 7-point Likert agreement scale)</th>
<th>Mean (S.D.)</th>
<th>Item Loading [before]</th>
<th>Item Loading [after]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Content Quality (CQ)</td>
<td>Generally, the service content offered on the website to support me in performing my e-government transactions is satisfactory.</td>
<td>2.78 (1.259)</td>
<td>0.89</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>On the whole, the service content offered on e-government websites is highly effective in supporting me to perform my e-government transactions.</td>
<td>2.89 (1.294)</td>
<td>0.95</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>Generally, I am pleased with the service content offered on e-government websites to support me in performing e-government transactions.</td>
<td>2.82 (1.299)</td>
<td>0.95</td>
<td>0.95</td>
</tr>
<tr>
<td>Service Delivery Quality (DQ)</td>
<td>The general technological mechanisms underlying various service functionalities of the website are satisfactory.</td>
<td>2.88 (1.213)</td>
<td>0.88</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>Generally, the e-government website service functionalities are delivered in a professional manner.</td>
<td>2.58 (1.159)</td>
<td>0.93</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>Overall, the service functionalities are delivered efficiently via e-government websites.</td>
<td>2.67 (1.171)</td>
<td>0.94</td>
<td>0.94</td>
</tr>
<tr>
<td>Overall e-Government Service Quality (SQ)</td>
<td>The website offers excellent overall service.</td>
<td>2.73 (1.199)</td>
<td>0.92</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>The website offers service of a very high quality.</td>
<td>2.75 (1.210)</td>
<td>0.92</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>The website offers a high standard of service.</td>
<td>2.91 (1.218)</td>
<td>0.92</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>The website offers superior service in every way.</td>
<td>3.26 (1.288)</td>
<td>0.84</td>
<td>Dropped</td>
</tr>
</tbody>
</table>

3 Though the SERVQUAL instrument (Parasuraman et al., 1985, 1988) presents another alternative to measuring e-government service quality, but due to ongoing controversies over its measurement technique (i.e., disconfirmation versus perceptual) (Dabholkar et al., 2000; Pitt et al. 1997) and number of sub-dimensions (Gefen, 2002), we opt for a more simplified measure of e-government service quality as it is not the intention of this study to engage in a rigorous debate over the reliability of the SERVQUAL items.
| Customer Trust | Even if not monitored, I trust the website to do the job right. | 3.15 (1.341) | 0.71 | Dropped |
|               | I trust the website.                                      | 2.74 (1.190) | 0.95 | 0.95    |
|               | The website is trustworthy.                               | 2.70 (1.171) | 0.94 | 0.95    |
|               | I am quite certain of what to expect from the website.     | 2.78 (1.215) | 0.79 | Dropped |
| Perceived Risk | There is a significant risk in transacting via the website.| 4.36 (1.477) | 0.79 | Dropped |
|               | My personal information may not be secure when transacting via the website. | 4.13 (1.488) | 0.84 | 0.90    |
|               | There is a significant potential for loss in transacting via the website. | 4.47 (1.480) | 0.72 | 0.67    |
| Perceived Ease of Use (PEOU) | Using the website enables me to complete my transactions with the government more quickly. | 2.24 (1.207) | 0.74 | Dropped |
|               | The website is easy to use.                               | 2.56 (1.214) | 0.92 | 0.92    |
|               | It is easy to become skilful at using the website.        | 2.63 (1.230) | 0.93 | 0.93    |
|               | Learning to operate the website is easy.                  | 2.57 (1.224) | 0.94 | 0.95    |
| Perceived Usefulness (PU) | Using the website increases the effectiveness in my transactions with the government. | 2.60 (1.259) | 0.85 | 0.85    |
|               | Using the website improves my performance in my transactions with the government. | 2.83 (1.243) | 0.84 | 0.84    |
|               | Overall, the website is useful for my transactions with the government. | 2.40 (1.211) | 0.90 | 0.89    |
| Customer Loyalty | I will recommend the website to others for carrying out their e-government transactions. | 2.67 (1.257) | 0.89 | 0.91    |
|               | I will encourage others to carry out their e-government transactions using the website. | 2.78 (1.260) | 0.91 | 0.94    |
|               | I will try using the website first whenever I have to carry out a transaction with the government. | 2.65 (1.253) | 0.81 | Dropped |
|               | I am inclined to perform my governmental transactions using the website as opposed to traditional offline methods. | 2.53 (1.297) | 0.82 | Dropped |

**Pre-Test**

Given the predominantly Internet-savvy target audience of e-government service participants, an electronic survey was deemed as the most appropriate forum for data collection (Boyer et al., 2002; Stanton and Rogelberg, 2001). Online questionnaires possess distinct advantages over physical surveys in that questions can be: (1) stipulated to be compulsory, and; (2) constrained to single responses. This eliminates common mistakes such as missing values or duplicate data entries. Once created, the online questionnaire was circulated among MIS graduate students and faculty members to solicit feedback on its presentation. We also assessed the proper functioning of the online questionnaire across different hardware and software configurations. The resultant online questionnaire was pre-tested on a sample of 25 e-government service participants selected with the help of a marketing research firm (52% females and on average, each respondent had accessed at least 4 different types of e-government services). Other than minor formatting issues, no major concerns surfaced during the pre-test.

**Data Collection**

An email invitation was broadcasted to members belonging to a nationwide (United States) panel of e-business consumers from a marketing research firm. Panelists were awarded points, from the firm in exchange for their participation, which can be reimbursed for tangible incentives. The computer logs of the web server on which the
electronic survey was hosted recorded a total of 2,203 unique visitors. Because the panel is primarily composed of e-business consumers, a single filtering question was inserted to identify respondents who match our targeted profile of citizens with previous e-government transactional experience. 689 out of 2203 visitors satisfy our sample criteria. While we were unable to draw any conclusion pertaining to the distribution of the online survey given the possibility of disabled email accounts or the existence of ‘spam’ filtering mechanisms, we can arrive at a conservative estimate of 31% (689/2203) response rate (Cenfetelli et al., 2005). Forty-two responses were deleted due to incompletion or data runs, thereby yielding a sample of 647 viable respondents for analysis. Table 3 summarizes the demographics for the sample. Paired t-test between our sample demographics and those reported in the Pew Internet and American Life Project’s (2002) survey of 815 American e-government service participants revealed no significant differences in distribution (i.e., \( t_{15} = 1.069, p > 0.30 \)).

### Table 3. Sample Demographics

<table>
<thead>
<tr>
<th>Demographic Characteristic</th>
<th>Respondents</th>
<th>Percentage</th>
<th>Comparison Study [Pew Internet and American Life Project (2002)]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>310</td>
<td>47.9%</td>
<td>53%</td>
</tr>
<tr>
<td>Female</td>
<td>334</td>
<td>51.6%</td>
<td>47%</td>
</tr>
<tr>
<td>Unwilling to Disclose</td>
<td>3</td>
<td>0.5%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 19-29</td>
<td>91</td>
<td>14.1%</td>
<td>21%</td>
</tr>
<tr>
<td>Age 30-49</td>
<td>315</td>
<td>48.7%</td>
<td>49%</td>
</tr>
<tr>
<td>Age 50-64</td>
<td>202</td>
<td>31.2%</td>
<td>21%</td>
</tr>
<tr>
<td>Age 65+</td>
<td>37</td>
<td>5.7%</td>
<td>6%</td>
</tr>
<tr>
<td>Unwilling to disclose</td>
<td>2</td>
<td>0.3%</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Educational Level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than college education</td>
<td>263</td>
<td>40.7%</td>
<td>52%</td>
</tr>
<tr>
<td>College education or higher</td>
<td>379</td>
<td>58.6%</td>
<td>48%</td>
</tr>
<tr>
<td>Unwilling to Disclose</td>
<td>5</td>
<td>0.8%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0-30,000</td>
<td>126</td>
<td>19.5%</td>
<td>15%</td>
</tr>
<tr>
<td>$30,000-50,000</td>
<td>227</td>
<td>35.1%</td>
<td>22%</td>
</tr>
<tr>
<td>$50,000-75,000</td>
<td>196</td>
<td>30.3%</td>
<td>19%</td>
</tr>
<tr>
<td>$75,000+</td>
<td>27</td>
<td>4.2%</td>
<td>0%</td>
</tr>
<tr>
<td>Unwilling to disclose</td>
<td>71</td>
<td>11.0%</td>
<td>14%</td>
</tr>
</tbody>
</table>

As can be seen from Table 4, respondents targeted a wide variety of e-government websites in replying to the online questionnaire, thereby assuring full variance on the constructs of interest.

### Table 4. Targeted e-Government Services

<table>
<thead>
<tr>
<th>Type of e-Government Service</th>
<th>Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online application for government benefits</td>
<td>49</td>
<td>7.6%</td>
</tr>
<tr>
<td>Online filing of taxes</td>
<td>301</td>
<td>46.5%</td>
</tr>
<tr>
<td>Online application/renewal of licenses</td>
<td>194</td>
<td>30.0%</td>
</tr>
<tr>
<td>Online payment of fines</td>
<td>18</td>
<td>2.8%</td>
</tr>
<tr>
<td>Online application for government jobs</td>
<td>32</td>
<td>5.0%</td>
</tr>
<tr>
<td>Others</td>
<td>53</td>
<td>8.2%</td>
</tr>
</tbody>
</table>
Data Analysis

Data was analyzed with LISREL 8.30 (Jöreskog and Sörbom 1999) because by taking into account all covariances in the dataset, LISREL examines all correlations and shared variances when estimating the path coefficients and their significance in the model (Bollen 1989). This yields more accurate parameter estimates (Bollen, 1989). Data analysis was split into two phases as recommended by Gerbing and Anderson (1988): “the measurement model first is developed and evaluated separately from the full structural model” (p. 191).

Assessing the Measurement Model

To establish convergent and discriminant validity of the constructs, a confirmatory eight-factor model was analyzed. In accordance with standard LISREL methodology (Gefen et al., 2000; Gerbing and Anderson, 1988) and Churchill’s (1979) scale development technique, the measurement model was revised by dropping items with high reported standardized residuals, i.e. measures exhibiting a significant degree of shared non-specified variance. Each dropped item was also carefully read to ensure that its residual variance makes sense theoretically. Table 1 contains standardized item loadings before and after cleaning the measurement model. After dropping items, the measurement model exhibited satisfactory fit with the dataset. The $\chi^2$ value of 451.54 with 161 degrees of freedom showed a $\chi^2$ to degrees of freedom ratio of less than 1:3. The measurement model’s GFI at 0.94, AGFI at 0.91, RMR at 0.043, RMSEA at 0.054, NFI at 0.97 and CFI at 0.98 are well within advocated thresholds. Internal consistency for the constructs was further validated through standard estimates of Cronbach’s alpha (Nunnally and Bernstein, 1994), composite reliability and the Average Variance Extracted (AVE) (Fornell and Larcker, 1981). All eight latent constructs exceeded the respective thresholds of 0.70 (Nunnally and Bernstein, 1994), 0.70 and 0.50 (Fornell and Larcker, 1981), thus supporting convergent validity (see Table 5).

Table 5. Inter-Construct Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Loyalty</th>
<th>PEOU</th>
<th>PU</th>
<th>Risk</th>
<th>CQ</th>
<th>DQ</th>
<th>SQ</th>
<th>Trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loyalty</td>
<td>0.92</td>
<td>0.96</td>
<td>0.96</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEOU</td>
<td>0.95</td>
<td>0.97</td>
<td>0.74</td>
<td>0.96</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU</td>
<td>0.90</td>
<td>0.94</td>
<td>0.78</td>
<td>0.77</td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>0.75</td>
<td>0.89</td>
<td>-0.21</td>
<td>-0.18</td>
<td>-0.24</td>
<td>0.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CQ</td>
<td>0.95</td>
<td>0.97</td>
<td>0.70</td>
<td>0.72</td>
<td>0.70</td>
<td>-0.21</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>DQ</td>
<td>0.94</td>
<td>0.96</td>
<td>0.68</td>
<td>0.73</td>
<td>0.75</td>
<td>-0.20</td>
<td>0.74</td>
<td>0.95</td>
</tr>
<tr>
<td>SQ</td>
<td>0.94</td>
<td>0.96</td>
<td>0.75</td>
<td>0.82</td>
<td>0.78</td>
<td>-0.17</td>
<td>0.77</td>
<td>0.78</td>
</tr>
<tr>
<td>Trust</td>
<td>0.95</td>
<td>0.98</td>
<td>0.77</td>
<td>0.75</td>
<td>0.77</td>
<td>-0.33</td>
<td>0.67</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Discriminant validity was verified by comparing the fit indices of the original eight-factor measurement model against other confirmatory factor models with only seven latent variables, thereby performing discriminant validity checks on every possible pairwise combination of two constructs (Segars, 1997). The fit indices of the original eight-factor measurement model were significantly better than the probable union of any other two constructs in the model (see Table 6). The square root of the AVE for each construct was also compared against its correlations with other constructs (Fornell and Larcker, 1981). For the criterion of 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 seen from Table 5, all eight constructs display sufficient discriminant validity.

Table 6. Pairwise Discriminant Analysis

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2_{df}$ [smaller]</th>
<th>$\chi^2/df$ [smaller]</th>
<th>GFI &gt; 0.9</th>
<th>AGFI &gt; 0.8</th>
<th>RMR &lt; 0.05</th>
<th>RMSEA &lt; 0.06</th>
<th>NFI &gt; 0.9</th>
<th>CFI &gt; 0.9</th>
</tr>
</thead>
</table>

According to most references in contemporary literature on Confirmatory Factor Analysis (CFA) using LISREL, $\chi^2$ to degrees of freedom ratio should be less than 1:3, GFI, CFI and NFI should be above 0.90, AGFI should be above 0.80, RMR should be below 0.05 whereas RMSEA should cutoff around 0.06 (Gefen et al., 2000; Hu and Bentler, 1999; Jarvenpaa et al., 2000).
### Assessing the Structural Model

Next, the structural relationships were analyzed based on the improved measurement model. All fit indices for the structural model are within acceptable thresholds: $\chi^2$ to degrees of freedom ratio of 1:3 ($\chi^2_{171} = 512.44$), GFI = 0.93, AGFI = 0.91, RMR = 0.049, RMSEA = 0.056, NFI = 0.97 and CFI = 0.98. Figure 2 depicts the fit indices for the structural model, standardized LISREL path coefficients and squared multiple correlations (SMC) for the endogenous latent variables. All hypothesized relationships are significant except for the path from content quality to trust ($f = 0.07, p > 0.12$) and the path from risk to loyalty ($f = 0.03, p > 0.14$). While the insignificant relationship between risk and loyalty is unexpected, it is not entirely unusual as Gefen (2002) has testified to similar observations in the domain of e-commerce. Conversely, contrary to our prediction, there was a surprising lack of effect of content quality on trust. A post hoc analysis was carried out to further explore whether content quality may be a salient predictor of trust but that this influence is mitigated through mediators such as overall service quality. We excluded

### Original Model

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2_{168}$</th>
<th>2.80</th>
<th>0.94</th>
<th>0.91</th>
<th>0.031</th>
<th>0.054</th>
<th>0.97</th>
<th>0.98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combining Loyalty with Risk</td>
<td>$\chi^2_{168} = 774.78$</td>
<td>4.61</td>
<td>0.90</td>
<td>0.86</td>
<td>0.091</td>
<td>0.073</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Combining Loyalty with Trust</td>
<td>$\chi^2_{168} = 879.06$</td>
<td>5.23</td>
<td>0.88</td>
<td>0.83</td>
<td>0.047</td>
<td>0.086</td>
<td>0.94</td>
<td>0.95</td>
</tr>
<tr>
<td>Combining Loyalty with PEOU</td>
<td>$\chi^2_{168} = 1021.32$</td>
<td>6.08</td>
<td>0.85</td>
<td>0.80</td>
<td>0.057</td>
<td>0.096</td>
<td>0.94</td>
<td>0.95</td>
</tr>
<tr>
<td>Combining Loyalty with PU</td>
<td>$\chi^2_{168} = 684.01$</td>
<td>4.07</td>
<td>0.90</td>
<td>0.87</td>
<td>0.037</td>
<td>0.071</td>
<td>0.96</td>
<td>0.97</td>
</tr>
<tr>
<td>Combining Loyalty with DQ</td>
<td>$\chi^2_{168} = 1164.90$</td>
<td>6.93</td>
<td>0.83</td>
<td>0.77</td>
<td>0.062</td>
<td>0.110</td>
<td>0.93</td>
<td>0.94</td>
</tr>
<tr>
<td>Combining Loyalty with CQ</td>
<td>$\chi^2_{168} = 1205.74$</td>
<td>7.18</td>
<td>0.83</td>
<td>0.77</td>
<td>0.086</td>
<td>0.100</td>
<td>0.92</td>
<td>0.93</td>
</tr>
<tr>
<td>Combining Loyalty with SQ</td>
<td>$\chi^2_{168} = 922.93$</td>
<td>5.49</td>
<td>0.87</td>
<td>0.82</td>
<td>0.045</td>
<td>0.089</td>
<td>0.94</td>
<td>0.95</td>
</tr>
<tr>
<td>Combining Risk with Trust</td>
<td>$\chi^2_{168} = 719.23$</td>
<td>4.28</td>
<td>0.91</td>
<td>0.87</td>
<td>0.088</td>
<td>0.069</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Combining Risk with PEOU</td>
<td>$\chi^2_{168} = 795.98$</td>
<td>4.74</td>
<td>0.90</td>
<td>0.86</td>
<td>0.100</td>
<td>0.075</td>
<td>0.96</td>
<td>0.96</td>
</tr>
<tr>
<td>Combining Risk with PU</td>
<td>$\chi^2_{168} = 765.23$</td>
<td>4.55</td>
<td>0.90</td>
<td>0.86</td>
<td>0.089</td>
<td>0.073</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Combining Risk with DQ</td>
<td>$\chi^2_{168} = 787.69$</td>
<td>4.69</td>
<td>0.90</td>
<td>0.86</td>
<td>0.096</td>
<td>0.074</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Combining Risk with CQ</td>
<td>$\chi^2_{168} = 787.97$</td>
<td>4.69</td>
<td>0.90</td>
<td>0.86</td>
<td>0.098</td>
<td>0.075</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Combining Risk with SQ</td>
<td>$\chi^2_{168} = 796.03$</td>
<td>4.74</td>
<td>0.90</td>
<td>0.86</td>
<td>0.100</td>
<td>0.075</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Combining Trust with PEOU</td>
<td>$\chi^2_{168} = 1207.83$</td>
<td>7.19</td>
<td>0.83</td>
<td>0.77</td>
<td>0.059</td>
<td>0.100</td>
<td>0.92</td>
<td>0.93</td>
</tr>
<tr>
<td>Combining Trust with PU</td>
<td>$\chi^2_{168} = 841.01$</td>
<td>5.01</td>
<td>0.88</td>
<td>0.84</td>
<td>0.043</td>
<td>0.083</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Combining Trust with DQ</td>
<td>$\chi^2_{168} = 1307.37$</td>
<td>7.78</td>
<td>0.82</td>
<td>0.75</td>
<td>0.059</td>
<td>0.110</td>
<td>0.92</td>
<td>0.93</td>
</tr>
<tr>
<td>Combining Trust with CQ</td>
<td>$\chi^2_{168} = 1519.04$</td>
<td>9.04</td>
<td>0.80</td>
<td>0.73</td>
<td>0.086</td>
<td>0.120</td>
<td>0.90</td>
<td>0.91</td>
</tr>
<tr>
<td>Combining Trust with SQ</td>
<td>$\chi^2_{168} = 1138.95$</td>
<td>6.78</td>
<td>0.84</td>
<td>0.78</td>
<td>0.051</td>
<td>0.100</td>
<td>0.93</td>
<td>0.94</td>
</tr>
<tr>
<td>Combining PEOU with PU</td>
<td>$\chi^2_{168} = 937.38$</td>
<td>5.58</td>
<td>0.85</td>
<td>0.80</td>
<td>0.054</td>
<td>0.096</td>
<td>0.94</td>
<td>0.95</td>
</tr>
<tr>
<td>Combining PEOU with DQ</td>
<td>$\chi^2_{168} = 1355.45$</td>
<td>8.07</td>
<td>0.79</td>
<td>0.72</td>
<td>0.050</td>
<td>0.120</td>
<td>0.91</td>
<td>0.92</td>
</tr>
<tr>
<td>Combining PEOU with CQ</td>
<td>$\chi^2_{168} = 1540.72$</td>
<td>9.17</td>
<td>0.78</td>
<td>0.69</td>
<td>0.057</td>
<td>0.130</td>
<td>0.90</td>
<td>0.91</td>
</tr>
<tr>
<td>Combining PEOU with SQ</td>
<td>$\chi^2_{168} = 968.71$</td>
<td>5.77</td>
<td>0.85</td>
<td>0.79</td>
<td>0.039</td>
<td>0.098</td>
<td>0.94</td>
<td>0.95</td>
</tr>
<tr>
<td>Combining PU with DQ</td>
<td>$\chi^2_{168} = 979.87$</td>
<td>5.41</td>
<td>0.85</td>
<td>0.79</td>
<td>0.055</td>
<td>0.099</td>
<td>0.94</td>
<td>0.95</td>
</tr>
<tr>
<td>Combining PU with CQ</td>
<td>$\chi^2_{168} = 1256.36$</td>
<td>7.48</td>
<td>0.80</td>
<td>0.73</td>
<td>0.068</td>
<td>0.120</td>
<td>0.92</td>
<td>0.93</td>
</tr>
<tr>
<td>Combining PU with SQ</td>
<td>$\chi^2_{168} = 815.52$</td>
<td>4.85</td>
<td>0.88</td>
<td>0.83</td>
<td>0.044</td>
<td>0.085</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Combining DQ with CQ</td>
<td>$\chi^2_{168} = 1329.00$</td>
<td>7.91</td>
<td>0.80</td>
<td>0.72</td>
<td>0.047</td>
<td>0.120</td>
<td>0.92</td>
<td>0.93</td>
</tr>
<tr>
<td>Combining DQ with SQ</td>
<td>$\chi^2_{168} = 1086.08$</td>
<td>6.46</td>
<td>0.84</td>
<td>0.77</td>
<td>0.042</td>
<td>0.100</td>
<td>0.93</td>
<td>0.94</td>
</tr>
<tr>
<td>Combining CQ with SQ</td>
<td>$\chi^2_{168} = 1250.12$</td>
<td>7.44</td>
<td>0.82</td>
<td>0.75</td>
<td>0.048</td>
<td>0.110</td>
<td>0.92</td>
<td>0.93</td>
</tr>
</tbody>
</table>

Note: Since the original measurement model differs by seven degrees of freedom from the remainder, a difference of 16.01 in $\chi^2$ values would imply a significant decrease in model fit.
all constructs except for content quality and trust before re-analyzing the structural model (e.g., Gefen et al., 2003). Results indicate a statistically significant relationship between content quality and trust in the absence of other latent constructs ($\Gamma = 0.64, p < .001$) with 49 percent of the variance being explained in the latter. The condensed structural model also demonstrated excellent fit: $\chi^2$ to degrees of freedom ratio of 1:2.09 ($\chi^2_{131} = 8.37$), GFI = 0.99, AGFI = 0.98, RMR = 0.013, RMSEA = 0.041, NFI = 1.00 and CFI = 1.00. Combined with our previous analysis of the full structural model, we can infer that content quality does exert a significantly positive influence on trust, just that this effect is channeled through overall service quality.

Two caveats may threaten the structural stability of our research model and thus call into question the underlying theoretical base upon which this study is founded. First, to ascertain that the pattern of relationships is not altered by dropping measurement items, the structural model was re-analyzed with the initial set of 28 measures. The analysis yields similar relational significance (see Table 7), albeit with fit indices slightly below respectable thresholds: $\chi^2$ to degrees of freedom ratio of 1:5.52 ($\chi^2_{332} = 1832.45$), GFI = 0.82, AGFI = 0.78, RMR = 0.081, RMSEA = 0.088, NFI = 0.91 and CFI = 0.93. Additionally, to affirm that the pattern of relationships is not an artifact of the selected analytical method, the structural model (with dropped measurement items) was rerun using the Partial Least Squares (PLS) technique. Unlike the covariance-based, population-sensitive LISREL method that seeks to determine whether the operationalization of the theory being examined is corroborated by the empirical data (Bollen, 1989), the statistical objective of PLS analysis is to produce high $R^2$ and significant $t$-values, thereby rejecting the null hypothesis of no-effect (Gefen et al., 2000; Thompson et al., 1995). Analyzing our research model with both LISREL and PLS analytical methods will hence offer an indication of: (1) whether hypothesized effects truly exist, and; (2) if the theoretical foundation from which these hypotheses are derived is verifiable by evidence collected from a representative sample of the target population of interest. As deducible from Table 7, our proposed e-government service quality model appears to be relatively stable in terms of its structural properties.
Discussion

Findings from this investigation raise several issues that deserve mention. First, 15 out of 17 hypotheses are substantiated by the empirical evidence (see Figure 2), thereby attesting to the applicability of our proposed e-government service quality model in predicting e-service loyalty among citizens. Second, we affirm the structural properties of our proposed e-government service quality model by verifying whether its predictive power is eroded by: (1) dropping unstable measurement items, and; (2) testing it with another analytical method such as the PLS. The stability of our conceptual model, as demonstrated by similar relational significance across differing measurement models and analytical strategies (see Table 7), reinforces past research from which the theoretical rationale for the majority of our hypothesized relationships was derived. Third, the insignificant effect of risk on loyalty is not entirely surprising. Gefen (2002) observed similar results in the domain of e-commerce. A viable explanation may be that risk, in the context of e-government services, deals with the degree of exposure to opportunistic behavior on the part of public institutions to amass huge amounts of confidential personal information on citizens (Seifert and Relyea, 2004). From this angle, whether or not unauthorized information closure permeates through e-government websites might not matter to citizens given the monopolistic mandate of public institutions to elicit personal data from any other form of governmental transactions (Tan et al, 2005), be it online or offline. Finally, one prevailing proposition in marketing literature is the delineation of between content and delivery in theorizing service quality. The conventional intertwining of service content and delivery for offline services has culminated in misconceptions that they are inseparable from each other (Parasuraman et al, 1988; Zeithaml and Bitner, 1996). The advent of e-service environments however, has opened up new debates on the feasibility and utility of comprehending such a distinction (e.g., Ancarani, 2005; Cenfetelli et al, 2005). Analytical results from this study, while constricted to the domain of e-governments, hint at the viability of differentiating between IT-mediated service content and delivery in the design of websites for a wider spectrum of e-services. Two simple reasons justify
our position: (1) our analysis of the measurement model points to service content and delivery quality as mutually
exclusive constructs in that their inter-construct correlation stands at 0.73 (see Table 5), and; (2) a pairwise
discriminant analysis of the union of measurement items from both constructs yields fit indices far below
recommended thresholds (see Table 6).

Managerial Implications

It is perhaps a truism that developers are hampered by the absence of actionable standards for designing citizen-
centric e-government websites (Gant and Gant, 2001, 2002). For this reason, the structural stability of our e-
government service quality model renders it exceedingly amenable as an analytical toolkit for practitioners to assess
citizens’ response towards the design of their web interface. Moreover, based on our empirical evidence, striking a
balance between IT-mediated service content and delivery in the design of e-government websites appears to be
paramount in the provision of efficacious public e-services. An overemphasis on service content can easily lead to
the creation of functionalities that could fulfill citizens’ transactional expectations but yet, could not provide
matching and inclusive accessibility to these functional capabilities (van Riel et al, 2001). Conversely, an over-
reliance on service delivery during website design may provide citizens with excellent accessibility to services
offered on e-government websites. But without the availability of transaction-oriented functional capabilities, it is
practically impossible for these public e-services to advance beyond informational offerings (West, 2004a, b).

Limitations

As observed by Reddick (2004), government transactions occur on one of three levels: Government to Citizen
(G2C), Government to Business (G2B) and Government to Government (G2G). From our choice of a convenient
citizen sample for empirical investigation, it is clear that our theoretical model is attuned to G2C transactions. To the
extent to which other e-government transactional domains share parallelism with G2C transactions, we speculate
that our theoretical model will hold across a more general population. Moreover, since measures for all constructs in
the study were collected at the same point in time and via the same instrument, common method variance may exist
(Straub et al, 1995). Another limitation pertinent to LISREL analysis is that when items are dropped in a purely
data-driven manner, the meaning of the constructs may be distorted (Bagozzi 1984). Though a standard procedure in
LISREL analyses (Gerbing and Anderson 1988), dropping measurement items to improve model fit may cause an
over fitting of the model to the sample data (Gefen et al, 2000) and correspondingly, increase the risk that the model
depicted in Figure 2 may be driven by specific characteristics inherent in the sample (Chin and Todd 1995;
MacCallum et al. 1992). Addressing this concern, we employed theory-based reasoning in dropping items. Utmost
care was taken during data analysis to ensure that items were dropped due to wording inconsistencies. As shown in
Table 7, the pattern of relational significance remains relatively unaltered both before and after dropping
measurement items (Gefen et al, 2003). Future research can re-validate our theoretical model and measurement
instrument across other target populations of e-government service participants with varying cultural characteristics
(e.g., Asia) in order to verify the validity of the scales and the proposed Nomological network.

Conclusion

There is general consensus among scholars that service quality is an elusive concept such that any attempt at
unraveling its antecedents, constituents and consequences is akin to hitting a moving target. The same sentiments
have been expressed for e-government services. Therefore, despite extensive debate on the importance of e-
government service quality as a predictor of citizens’ receptivity towards public e-services, both the academic and
practitioner communities know little more than they do with regards to this topic. As a preliminary step to be taken
towards raising awareness for the pivotal role of e-government service quality in informing website design, we
construct and test a model that integrates both antecedents leading to and consequences arising from e-government
service quality. Specifically, our findings substantiate drawing a distinction between service content and delivery in
the provision of e-government services. Due to the granularity of technological artifacts on e-service websites, it is
our primary contention that practitioners will find it easier to pinpoint whether citizens’ non-adoption behavior is
caused by the absence of effective transactional functionalities or is attributable to inefficient delivery which renders
the web content inaccessible to its target audience. Future research can thus proceed to identify and explicate generic
constituent dimensions of IT-mediated functionalities and delivery medium properties, which contribute to their
respective overarching quality constructs such as that attempted by Cenfetelli et al. (2005) in the domain of e-
commerce.
References


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