TRUST AND ELECTRONIC GOVERNMENT WEBSITE SUCCESS:

AN EMPIRICAL STUDY

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ABSTRACT

Electronic government (e-Government) is transforming the way of public governance and countries around the world are embarking on the e-Government journey to deliver online services to citizens. However, many citizen-oriented e-Government websites are virtually sitting unvisited, and the outcomes of the e-Government websites may not commensurate with the resources and efforts expended. Thus, there is a growing need to assess the factors associated with the success of e-Government websites. To fill this gap, this study proposes a model to assess e-Government website success by integrating two streams of research: (1) the updated DeLone and McLean information systems success model; and (2) trust in the online environment. The model suggests that citizen's trusting beliefs towards an e-Government website will affect its success by influencing the quality perceptions of the website.

The model was tested via a survey of 214 Singapore e-Government website users. The results also show that trust in government, but not trust in technology, is positively related to trust in e-Government website. Further, trust in e-Government website is positively related to information quality, system quality and service quality. The results show that quality variables have different effects on intention to continue using the website and satisfaction with the website. Two post-hoc analyses were done to (1) verify the mediating role of quality variables, and (2) split the sample according to different user groups to understand different nature of usage. The results from post-hoc analyses indicate the partial mediating role of quality variables, and that the impact of different types of trust and quality variables varies across the nature of usage. Implications of the results are discussed.

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CHAPTER 1. INTRODUCTION

Electronic Government, which can be broadly defined as the use of technology to enhance the access to and delivery of government services to benefit citizens, business partners and employees (Deloitte Research 2000), has been transforming public service delivery (Accenture 2006, Marchionini *et al.* 2003, West 2004). After the pervasive adoption of the Internet and the global e-commerce wave in the private sector since the late 1990s, websites for e-Government have increasingly emerged as well. Given the nature that online services tend to be cheaper and more efficient, many countries are embarking on e-Government development. According to a survey by the United Nations conducted in 2005, online e-Government services are already available in 179 of its total 191 member countries (United Nations 2005).

E-Government websites are mainly concerned with providing quality public services and value-added information to citizens (Lee *et al.* 2005). Much research has been done to report innovative practices in developing e-Government websites in a myriad of nations (e.g. Ke and Wei 2004, Samet *et al.* 2003, United Nations 2005). Despite the world-wide enthusiasm towards e-Government and the expanding number of ".gov" websites, previous research has found that e-Government endeavors have mostly fallen short of its potential (West 2000). Past studies have shown that creation of e-Government websites is only the first necessary, but not sufficient step towards e-Government usage. Creation of e-Government websites alone does not guarantee their usage by citizens (United Nations 2005). Many e-Government websites are virtually sitting unvisited, with less than five hits per day (The Guardian 2005). This issue is even more visible in developing countries, where only 15% of all

e-Government initiatives have successfully attained the major goals of e-Government without significant undesirable outcomes (Heeks 2003). The usage of e-Government websites in general can be divided into two stages: initial usage and continued usage. It is observed that in many cases after initial usage of e-Government websites, citizens still revert to traditional ways for acquiring information and services, such as telephone inquiry (Andersen and Henriksen 2006). Therefore, engaging and retaining citizens in using e-Government websites for continued usage is a challenge being faced by all government agencies that are providing online public services.

On one hand, an e-Government website is a technological innovation. This implies that the technological attributes of the website may affect users' attitudes and behaviors towards the website. Previous research has examined this aspect in terms of the role played by website quality perceptions in influencing users' adoption and consequent satisfaction with the website (DeLone and McLean 2003, 2004). Extrapolating this argument for e-Government website, positive or negative perceptions of users towards the e-Government website quality attributes (information quality, system quality, and service quality) may influence their intention for continued usage of e-Government website as a means for interacting with the government agency.

On the other hand, however, a website is more than an information technology (IT) interface. Different types of risk and uncertainty prevail in online transactions (Pavlou *et al.* 2005). Therefore, a vital key element in retaining website users is the establishment and maintenance of their trust in the party interacted online (Gefen *et al.* 2003). Trust has been one of the crucial enablers in e-commerce including the business-to-customer (Gefen and Straub 2003, Jarvenpaa *et al.* 2000, Pavlou 2003),

business-to-business (Pavlou 2002), and customer-to-customer contexts (Ba and Pavlou 2002, Hu *et al.* 2004, Pavlou and Gefen 2004). In general, trusting beliefs of whether the other party online will behave in accordance with the trusting party's expectations without taking advantage of the trusting party's vulnerability will increase the trusting party's willingness to be engaged in online transactions and interactions. In the context of e-Government, the role of trust for continued usage can be even more important as citizens using e-Government websites are unlikely to find alternative websites serving the same purpose. In the absence of sufficient trust in e-Government websites, users may be motivated to revert to the traditional offline means of interaction with the government. Therefore, building citizen trust is often considered as a key factor for successful implementation of e-Government websites (Warkentin *et al.* 2002).

Although some research has been done to examine website adoption and success, relatively little is known about the factors associated with the success of an e-Government websites, especially in the post-adoption stage. In order to address this research gap, this study examines the following research questions:

1. How are trust in technology and trust in government related to trust in e-Government websites?
2. How is trust in e-Government websites related to its consequent success as defined by the DeLone and McLean's framework of IS success?

The current study attempts to answer these two questions by integrating the DeLone and McLean's (2003) IS Success Model (henceforth called D&M) and the trust literature in the IS field. It contributes to our knowledge in three aspects. First, this study extends the multidimensional concept of IS success (DeLone and McLean 1992,

2003) by addressing user's post-adoption behavior. While initial acceptance of IS is an important initial step towards realizing IS success, user's continued use will account for the system's eventual success (Bhattacherjee 2001). Second, this study integrates the D&M model and the literature on online trust to provide a more comprehensive understanding of website success. To the best of our knowledge, this is the first study that attempts to integrate these two research streams in assessing website success. Third, this study also facilitates our understanding of website adoption in the public sector. Although developing e-Government websites have already become a global trend in recent years, the mechanism pertaining to how quality beliefs and trusting beliefs will affect citizen's long-term adoption of an e-Government website still remains unclear and few studies have provided empirical evidence on this issue (e.g. Carter and Belanger 2005). Thus, this study extends our understanding of website adoption and usage (including both IT aspect as well as trust aspect) to the e-Government context. Further, testing the updated D&M model in a different context helps us gauge the consistency of the various factors affecting IS success and consequently aids in claims about empirical generalizations (Bass, 1995).

The rest of this thesis is organized as follows. Chapter 2 presents a review of the literature on the D&M model as well as the relationship between trust and website success. Chapter 3 proposes a research framework by hypothesizing how website quality perceptions affect the two dependent variables: satisfaction and intention to continue using the website. In this chapter, I also discuss how trust matters in the evaluation of e-Government website quality. Chapter 4 addresses the methodology and results. Findings and implications are discussed in Chapter 5.

CHAPTER 2. LITERATURE REVIEW

This chapter reviews the key concepts and theoretical development of the two research streams: the D&M model and online trust. The first section reviews the literature on e-Government website success in the Government-to-Citizen (G2C) context and proposes that this body of literature can be broadened by our current knowledge on website success in the IS field, especially the D&M model and online trust theories in the e-commerce context. The following section reviews the variables and interrelationships of the updated D&M model and summarizes empirical results for the updated D&M model. Then I argue that the updated D&M model can be respecified to incorporate a variable in the IS continuance literature in assessing e-Government website success: intention to continue using. The following sections review definitions, antecedents and consequences of online trust literature.

2.1 E-Government Website Success

This section reviews the literature on e-Government success in the G2C context and proposes that at the current stage, this literature can substantially benefit from e-commerce theories on trust and website success. Previous research on G2C e-Government website success has focused on factors associated with individual citizen's adoption and its impact on citizens. These studies apply different theoretical perspectives in understanding and assessing e-Government website success, as summarized in Table 1. For example, Warkentin *et al.* (2002) suggested that citizen's intention to engage in e-government is affected by factors such as trust in e-Government, perceived usefulness (PU), and perceived ease of use (PEOU). Based on the Technology Acceptance Model (TAM), Chang *et al.* (2005) found that

citizen's adoption intention of online tax filing is affected by PU and PEOU. In turn, PU and PEOU are determined by information quality, system quality and perceived credibility of the website. In another study, Carter and Belanger (2005) integrated three theoretical perspectives in predicting e-Government service adoption, namely the TAM model, the Diffusion of Innovation theory and the trustworthiness theory. However, their study provides different results: while compatibility, PEOU and perceived trustworthiness are significantly related to intention to use an e-Government website, PU, relative advantage and image are not. These insignificant links may be explained by the mandatory nature of particular e-Government services (Warkentin *et al.* 2002).

The quality of online government services is believed to have impact on citizen attitude and behavior. In particular, a few studies have examined factors that affect citizen's satisfaction as an outcome of e-Government. Using data from the July 2003 Pew E-Government Survey, Cohen (2006) found that citizen's satisfaction with contacting government on the Internet is affected by citizen's personal characteristics, reason to contact, level of government and the processes and outcomes of the experience. Welch *et al.* (2005) identified a reciprocal relationship between government website use, website satisfaction and trust in government. Apart from satisfaction, previous research on e-Government has also examined the relationship between e-Government usage and citizen's attitudes and/or behavior towards the government. For example, West (2004) found that Federal government website usage is significantly related to political activity and citizen's evaluation of the government's effectiveness. Tolbert and Mossberger (2006) found that visiting

Table 1 Previous Studies on e-Government Website Success

Article	Objective	Findings
Carter and Belanger (2005)	Examines e-Government adoption through three theoretical perspectives: trust, diffusion of innovation (DOI), TAM (UK)	Trustworthiness, PEOU, and compatibility of an e-Government system are significantly related to e-Government adoption. Two other constructs of DOI (Relative advantage, image) turn out insignificant. PU is dropped during CFA.
Chang *et al.* (2005)	Studies quality variables (IQ, SQ) and TAM variables (PU, PEOU) in the adoption of online tax-filing system (Taiwan)	IQ, SQ are significantly related to PU and PEOU, which in turn significantly related to adoption intention.
Cohen (2006)	Examines the impact of e-Government on citizen satisfaction (US)	Satisfaction with contacting government on the Internet is affected by citizen's personal characteristics, reason to contact, level of government and the processes and outcomes of the experience.
Parent *et al.* (2005)	Examines the relationship between e-Government experience and trust (Canada)	Service quality of e-Government is significantly related with political trust
Tolbert and Mossberger (2006)	Examines the effects of e-Government on trust and confidence in government at federal, state, and local levels (US)	E-Government website usage is proposed to be related to government performance, which then lead to trust in government. Yet mixed results are found at different levels of government.
Welch *et al.* (2005)	Examines the impact of e-Government website usage on satisfaction and trust (US)	Government website use and trust in government are significantly related to government website satisfaction. Trust in government is also significantly predicted by satisfaction.
West (2004)	Examines e-Government impacts and consequences (US)	E-Government process is at its early stage and is featured by the incremental nature. E-Government website usage is only found to be significantly related to citizens' political activity, but not trust and confidence in government, nor the belief of government effectiveness.
Warkentin *et al.* (2002)	Studies trust in the adoption of online tax-filing system (US)	Trust in e-Government (including institutional structures, disposition to trust, characteristics-based trust, and familiarity), among with other factors (PU, PEOU, perceived control, perceived risk, etc.) should affect e-Government adoption. Model was not tested.

government websites will improve interaction with the government and thus may lead to trust in government. Similarly, Parent *et al.* (2005) found that the quality of e-Government services will affect citizen's trust in the government.

While these studies have examined factors and consequences of the implementation and usage e-Government website, we do not yet have a theoretical conceptualization of e-Government website success. From the preceding literature review, it can be summarized that e-Government success involves both IT attributes and their impact on citizen's beliefs, attitudes and behaviors. However, although previous studies have examined a number of factors (e.g. trust, IT attributes, satisfaction etc.), the relationships among these factors still remain unclear. In order to provide a more comprehensive view of e-Government website success in the G2C context, we suggest that the D&M IS success framework from the e-commerce literature (DeLone and McLean 2003, 2004) can be applied to examine e-Government website success, since it provides a theoretical framework to integrate the factors studied in previous e-Government literature. Further, while the importance of trust has been discussed in previous e-Government literature, we do not yet have a theoretically grounded understanding and empirical evidence for conclusively arriving at the relationship between trust and e-Government website success. Previous literature on trust in the online environment, especially in the e-commerce context, can definitely provide some initial insights on this question. In the following sections, I review the literature on the D&M model and online trust as a basis for our research model.

2.2   The DeLone and McLean's IS Success Model

The D&M model is a widely cited framework in the IS literature which provides a comprehensive view of the "IS success" concept. Based on the framework of previous

communication research, DeLone and McLean (1992) suggest that IS success is a multidimensional concept consisting of six interrelated variables: System Quality, Information Quality, Use, User Satisfaction, Individual Impact, and Organizational Impact. According to this taxonomy, these six variables are organized at three different levels. The first level involves two variables measuring system characteristics. System Quality denotes the technical aspects of an information system, such as whether the system is accessible and technically reliable. Information Quality denotes the output of an information system, such as whether the reports generated by the system make sense to the information receivers and are able to meet their information needs.

The second level includes variables on the recipient side, including Use and User Satisfaction. Use denotes the consumption of the outcome of an information system, and Satisfaction captures the recipient's affective response to usage. Finally, the impact level of the D&M model includes both Individual Impact of how the information system changes individual behavior, and Organizational Impact of how the information system affects the adopting organization's performance.

The D&M model has received significant attention in the IS field (DeLone and McLean 2003). Seddon (1997:242) raises challenge to the Use variable in the model, arguing that the "IS Use" variable entails diverse interpretation. This may lead to the confusion of inappropriately incorporating process model variable in a variance model. Responding to this issue, DeLone and McLean (2003) propose an updated D&M model and argue that using "intention" in place of "use" can be an alternative in some contexts. In their updated model, these authors also incorporate Service Quality together with the original two quality variables to capture user's perceptions

of the overall support and services provided by the information system provider. The updated D&M model is shown in Figure 1.

Both original and updated D&M models have been tested and validated by a number of studies. Rai *et al.* (2002) suggest a theoretical understanding of the D&M model by applying the Theory of Planned Behavior (Ajzen 1991). According to these authors, the quality measures in the success model can be conceptualized as user's beliefs towards an information system, which will lead to attitudinal and behavioral outcomes, i.e. satisfaction and usage. Although very few studies have had a direct purport of testing and validating the D&M model (e.g. Seddon and Kiew 1994, Rai *et al.* 2002), many studies have implicitly tested the model by investigating multiple success variables and their interrelationship. DeLone and McLean (2003) provide a review of articles testing the original D&M model. The next section will review the studies testing the updated D&M model.
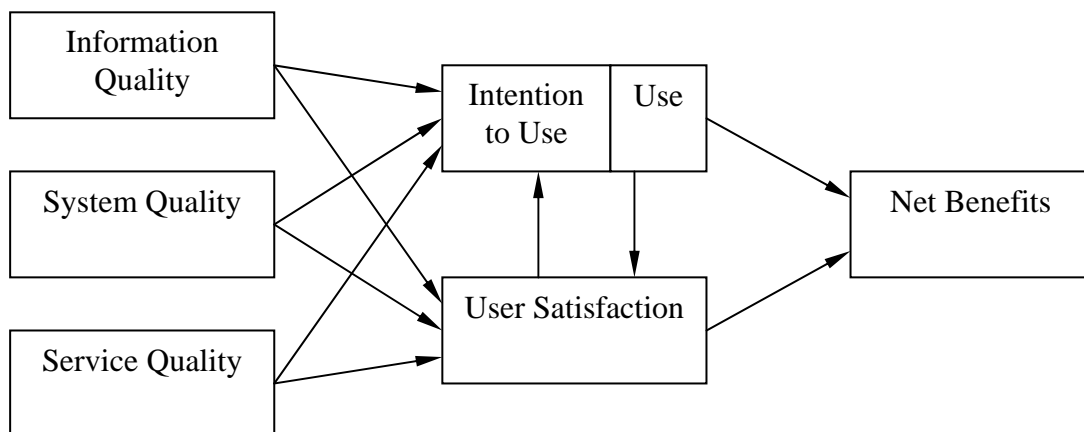
Figure 1 The Updated DeLone and McLean Model for IS Success

Adopted from DeLone and McLean (2003)

2.3   Empirical evidence for the updated D&M model

A citation search in July 2006 yielded 48 referred journal papers and conference proceedings that have referenced the updated D&M model during the period of 2003 to 2006. Among these papers, twelve of them have cited the updated D&M model and provided empirical results for interrelationships among the success variables in the model. DeLone and McLean (2004) use two case examples to illustrate how the full updated model can be applied to the e-commerce world. Other empirical studies have partially tested the updated D&M model by incorporating the D&M success variables into their own research model. The associations among the variables identified in the updated D&M model are generally supported.

Table 2 summarizes these studies. Except for DeLone and McLean's two case illustrations (2004), the updated D&M model is mostly treated as a reference framework for researchers to develop their own research models in different research contexts. The interrelationships among the six success variables as suggested by DeLone and McLean have been tested in different ways by different studies. Nine of these twelve studies have incorporated Information Quality and System Quality in their respective research model with slightly different definitions and measurements based on their research contexts. Similar to previous studies and some later studies that cite the original D&M model (e.g. Lee *et al.* 2002, Liu and Arnett 2000, McKinney *et al.* 2002, Nelson *et al.* 2005), information quality denotes system output that is measured by accuracy (reliability), comprehensiveness, timeliness, relevance (usefulness), and completeness. System quality, on the other hand, is measured by the system's reliability, flexibility, response time, and ease-of-use.

Table 2 Dimension Association Tests for the Updated D&M Model

Article	Objective	Interrelationship examined	Findings
Byrd *et al.* (2006)	Studies IT impact on firm's total operational cost by surveying influential CIOs in the US	IQ -> use; SQ -> use; use -> total operational cost (use measured by benefits of use, i.e. usefulness and impact of use *	All supported
Cao *et al.* (2005)	Examines B2C website quality and user's intention to revisit	IQ, SQ, SVQ -> intention to revisit, mediated by TAM variables (PU and PEOU)	Paths are not tested
Chang *et al.* (2005)	Internet tax-filing system adoption in Taiwan	IQ, SQ -> intention to use, mediated by TAM variables (PU and PEOU)	All supported
Chang and King (2005)	Develops IS functional instruments by surveying CIOs in US medium/large companies	IQ, SQ, SVQ -> net benefits (business process effectiveness and organizational performance)	All supported
Cheung and Lee (2005)	Studies the difference between negative/positive website quality perceptions by surveying first-year undergraduate students	IQ, SQ -> satisfaction of e-portal. IQ is measured by understandability, usefulness, and reliability; SQ is measured by navigation, access and usability. Negative performance of IQ/SQ dimensions is hypothesized to have different impact on satisfaction than positive performance.	Mixed. Certain dimensions under IQ/SQ are found significantly related to satisfaction. The asymmetry between positive and negative attribute performance is inconclusive.
DeLone and McLean (2004)	Two cases to illustrate e-commerce website success by applying the updated D&M model	All paths	Not tested

Table 2 Dimension Association Tests for the Updated D&M Model **(Continued)**

Article	Objective	Interrelationship examined	Findings
Iivari (2005)	A study on mandatory information systems	IQ/SQ -> use/satisfaction; use/satisfaction -> individual impact	Mixed. Satisfaction is significantly related to IQ/SQ and is also a significant predictor of individual impact. By comparison, IS use is not significantly related with IQ, SQ, and individual impact.
Lin and Wang (2006)	Examines customer loyalty for mobile commerce users	satisfaction -> net benefits (customer loyalty)	Supported
Park (2006)	Examines the impact of data warehouse (DSS of a food company)	use -> net benefits (user's performance on marketing decision)	Supported
Schaupp *et al.* (2006)	Studies the impact of different success factors for websites with different goals (information searching vs. community)	IQ -> satisfaction; SQ -> satisfaction; satisfaction -> intention to reuse	SQ not significantly related with satisfaction for online community websites. Other relationships supported
Wu and Wang (2006)	Measures knowledge management systems (KMS) success	IQ/SQ -> perceived benefits/satisfaction; perceived benefits -> satisfaction; perceived benefits/satisfaction -> KMS use	All supported except SQ -> perceived benefits
Zhang and Prybutok (2005)	Studies customer e-satisfaction in B2C context	SVQ -> satisfaction; satisfaction -> intention to use; SVQ -> intention to use	All supported

Note: IQ: Information Quality; SQ: System Quality; SVQ: Service Quality; "->" indicates the path between two variables.

Among these studies, service quality is conceptualized as the overall service delivered with or through the particular information system. Measurement of service quality is derived from the SERVQUAL instrument (Pitt *et al.* 1995), including service reliability, assurance, empathy, responsiveness etc. of the IS people implementing or maintaining the system (e.g. IS support staff) or the customer service from a website. Satisfaction captures the affective state of user's experience with the information system. For the controversial "IS Use" construct, four of these twelve studies measure intention instead of actual usage. Byrd *et al.* (2006) measure use as the benefits of use, which is consistent with the first interpretation of the "IS Use" construct given by Seddon (1997). By comparison, three studies adopted actual usage measures (Iivari 2005, Park 2006, Wu and Wang 2006). The measurement of "Net Benefits" differs with research context, including customer loyalty (Lin and Wang 2006), organizational performance (Chang and King 2005), operational cost reduction (Byrd *et al.* 2006), and decision performance (Park 2006). In general, these empirical studies have provided evidence for the multidimensional nature of IS success, yet the interrelationships among these success factors remain inconclusive.

Echoing DeLone and McLean's (2003) call for applying the updated D&M model to the emerging e-commerce world, seven of the twelve articles examine the success of websites. Information quality, system quality and service quality of a website are found related to website user's satisfaction and intention to use. However, two articles have measured "intention to reuse" instead of actual usage or intention to use. In line with these two articles, this study posits that applying "intention to continue using" from the IS continuance literature to the updated D&M model can be another worthwhile alternative in understanding website success.

2.4   IS continuance and the D&M model

DeLone and McLean (2003) claim that Seddon's (1997) respecification of the D&M model that replaces "IS Use" with perceived usefulness "unduly complicates the model" (2003:16). They further suggest that "intention to use" which measures attitude can be a worthwhile alternative measure for measuring use as behavior in some contexts. Based on this view, these authors have suggested a feedback loop between use, user satisfaction, and intention to use. They argue that use should precede user satisfaction in a process sense and positive experience in using a system will also lead to higher level of satisfaction. Higher satisfaction will lead to greater intention to use, and in turn affect use. Nevertheless, this view indicates a clear sense of IS continuance: satisfaction must be an outcome of previous usage. Citing Agarwal and Prasad (1997) and Karahanna *et al.* (1999), DeLone and McLean (2003) suggest that different factors are associated with early use as compared to continued use. Hence, although information quality, system quality and service quality may affect the first-time adoption of an information system, the link between satisfaction and intention needs to be understood in terms of continued use. Further, continued use is necessary for an information system to be truly able to generate net benefits (e.g. Bhattacherjee 2001). Following this argument, I use "intention to continue using" for operationalizing the "intention to use/use" variable in the updated D&M model.

Previous studies have discussed IS continuance from the perspective of expectation-disconfirmation theory, which holds that user satisfaction towards a system as an affective state is formed based on the discrepancy between the expectation and the perceived performance of the system (Bhattacherjee 2001, Oliver 1980). Based on this theoretical framework, Bhattacherjee (2001) finds that

satisfaction mediates the beliefs towards the IT attributes of a system (i.e. perceived usefulness) and intention to continue using the system. Similarly, Bhattacherjee and Premkumar (2004) find that beliefs and attitudes towards a system will change based on the level of disconfirmation and satisfaction. In this sense, the satisfaction-intention relationship suggested by the updated D&M model can be appropriately used to predict continuance intention of using a system in the post-adoption stage.

Other studies have used different theoretical frameworks for understanding IS continuance. For example, Kim and Malhotra (2005) identify four mechanisms for IS continued use: (1) the sequence suggested by the TAM model that beliefs in IT attributes affect intention to use, (2) sequential updating mechanism where users change their evaluation over time, (3) a feedback mechanism where past use affects user evaluation, and (4) repeated behavioral patterns where past use affects future use as a habit. All these findings suggest that the updated D&M model can be conceptualized for the long-term success of an information system.

On the other hand, respecifying the updated D&M model in the post-adoption stage will raise another question that is already being noticed in the IS literature: whether to measure intention to use or actual usage (DeLone and McLean 2003)? In the context of e-Government, however, it needs to be noted that actual usage of an e-Government website can be largely featured by its mandatory nature and the impact of the success antecedents in the updated D&M may be better reflected by the intention rather than actual usage. Thus, this study posits that "intention to continue using" is appropriate and necessary in validating the full updated D&M model in a post-adoption context.

2.5 Trust and website success

A major framework on which DeLone and McLean developed their IS success model is Mason's framework of information output (Mason 1978), which has implicitly separated the IS provider and the recipient. However, this logic under the D&M model is insufficient in understanding the complex nature of website success. A website virtually connects different parties with technological means and the relationships among these parties are often beyond the provider-recipient relationship. Given the uncertainties involved in most online transactions, a website user will not make decisions solely based on the perceived IT attributes of a website. Rather, a belief that online transactions will be "appropriately handled" appears to be imperative for the adoption and usage of a website. Therefore, previous research on the subject has emphasized on the role of trust in website success in terms of adoption (or behavioral intention to adopt, e.g. Gefen *et al.* 2003, Pavlou 2003) and satisfaction (e.g. Balasubramanian *et al.* 2003), but relatively little work has focused on continued usage.

Previous IS research on trust has addressed three questions which will be included in the following review: (1) What is trust in the online environment? (2) Why does trust matter in online activities? (3) What are the antecedents and outcomes of trust in the online environment?

2.5.1 Conceptualization of trust in the online environment

The definition of trust varies across disciplines. Economists view trust in a calculative way (Williamson 1993), posing that the trustee is unlikely to take opportunistic behaviors if the loss of being caught outweighs the benefit of doing so. Psychologists commonly view trust as a psychological state taken individually (Deutsch 1962),

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while sociologists emphasize the nature of social collectiveness where trust resides in social relationships (Lewis and Weigert 1985) or institutions (Shapiro 1987, Zucker 1986). Although researchers in different disciplines define trust from different perspectives, they share one common ground: trust is necessary for a party to rely on another party when uncertainty is involved in the relationship and trust acts as a mechanism to reduce such uncertainty based on positive expectation towards the trusted party (Luhmann 1979).

Such uncertainty is particularly salient in the online environment, where people often interact and transact with unfamiliar or even unknown parties. Hence, trust is a key enabler for most online activities (Friedman *et al.* 2000). In the literature on online trust, three major views of trust can be identified. The first view holds the tenets of the Theory of Reasoned Action and defines trust as one party's trusting beliefs that the trustee online will behave appropriately in the interests of the trusting party (e.g. McKnight *et al.* 2002a). The second view defines trust as the intention of "willingness to be vulnerable" to the trusting party (e.g. Bhattacherjee 2002, Lee and Turban 2001, cf. Mayer *et al.* 1995). The third view regards trust as the outcome of rational evaluation, which holds that trust is the "subjective assessment of one party that another party will perform a particular transaction according to his or her confident expectations, in an environment characterized by uncertainty" (Ba and Pavlou 2002) or a "perceived attribute" of the trustee (Pennington *et al.* 2003). Although definitions of online trust also differ across various studies, one element of trust is held common: trust involves the positive beliefs, attitudes, or expectations towards the other party of an exchange relationship when uncertainty is perceived by the trusting party, which may lead to negative or less favorable outcomes to the trusting party. In this sense,

uncertainty and trust appears inseparable. Table 3 summarizes the three groups of trust definition in the online environment.

2.5.2 Risk and uncertainty

The central reason why trust is important for online interactions and transactions is that risks and uncertainty are perceived in the online environment. Trust is argued to be a mechanism to reduce social complexity (Luhmann 1979). As well, trust in online activities is often argued to be a risk-reducing mechanism in the online environment (Jarvenpaa *et al.* 2000, Lee and Turban 2001, Pavlou 2003). Previous research on online trust has proposed different types of uncertainties or risks that drive the website user's trusting beliefs or behaviors. In their study of e-service adoption, Featherman and Pavlou (2002) identify seven types of risks that are salient to the customer of services delivered through the Internet, namely performance risk, financial risk, time risk, psychological risk, social risk, privacy risk, and overall risk, as Table 4 shows. They find that customer's perceived risk negatively affects perceived usefulness, ease of use, and adoption intention for e-service.

Other studies use different taxonomies to conceptualize risks and uncertainty in the online environment. In another study of customer's adoption of online prescription filling, Pavlou *et al.* (2005) identify three antecedents of uncertainty: (1) information asymmetry, (2) fear of seller opportunism, and (3) privacy concerns. Based on this classification, they argue that trust is a key factor in the online environment to mitigate these sources of uncertainty. Similarly, in a study of 6831 online consumers of 25 websites, Bart *et al.* (2005) identify five categories of website factors where different risks are involved, namely financial risk, information risk (privacy concerns

Table 3 Different Views and Definitions of Trust in the Online Environment

Category	Articles	Definition
Belief that other online party will behave appropriately	Bhattacherjee 2002	A multidimensional view of trust consisting of beliefs in ability, benevolence and integrity.
	Gefen and Straub 2003	The belief that other people will react in predictable ways.
	Gefen *et al.* 2003	A set of specific beliefs dealing with benevolence, integrity, and ability with another party (this definition relies on separation between trust and actual behavioral intentions in the ongoing economic relationship between customers and e-vendors).
	Hampton-Sosa and Koufaris 2005	Trusting party's beliefs regarding the trustee's integrity, benevolence, and ability.
	Kim *et al.* 2004	The belief that the other party will behave in a dependable manner in an exchange relationship.
	McKnight *et al.* 2002a	The confident truster perception that the trustee has attributes which are beneficial to the truster.
	Pavlou 2003	Beliefs that the other party will behave in a responsible manner
	Pavlou and Fygenson 2006	The belief that the trustee will act cooperatively to fulfill the trustor's expectations without exploiting its vulnerabilities.
	Pavlou and Gefen 2004	A generalized trust belief in the community of sellers (contrasting to dyadic trust in online transactions).
	Schlosser *et al.* 2006	Online consumer's trusting beliefs in terms of benevolence, integrity, and ability.
	Suh and Han 2003	The belief that one can rely upon a promise made by another and that the other, in unforeseen circumstances, will act towards oneself with goodwill and in a benign fashion.

Table 3 Different Views and Definitions of Trust in the Online Environment **(Continued)**

Category	Articles	Definition
Willingness or intention to rely on the other online party	Balasubramanian *et al.* 2003	The level of trust an investor reposes in the online broker in the expectation that the broker will act in the investor's best interests.
	Bart *et al.* 2005	A psychological state comprising the intention to accept vulnerability based on positive expectations of the intentions or behaviors of another.
	Belanger *et al.* 2002	Willingness to depend on another exchange partner.
	Gefen 2002	The willingness to make oneself vulnerable to actions taken by the trusted party based on the feeling of confidence or assurance.
	Lee and Turban 2001	Expectations and willingness of the trusting party in a transaction.
	McKnight *et al.* 2002a	The truster is securely willing to depend, or intends to depend, on the trustee.
Rational assessment of the trustee's attributes	Ba and Pavlou 2002	The subjective assessment of one party that another party will perform a particular transaction according to his or her confident expectations, in an environment characterized by uncertainty.
	Jarvenpaa *et al.* 2000	A governance mechanism in exchange relationships that are characterized by uncertainty, vulnerability, and dependence.
	Pennington *et al.* 2003	System trust as a belief that the proper impersonal structures have been put into places enabling one party to anticipate successful transactions with another party.

Table 4 Definition of Perceived Risk Facets in the Online Environment

Perceived Risk Facet	Description - Definition
Performance Risk	"The possibility of the product malfunctioning and not performing as it was designed and advertised and therefore failing to deliver the desired benefits." (Grewal *et al.* 1994)
Financial Risk	"The potential monetary outlay associated with the initial purchase price as well as the subsequent maintenance cost of the product" (ibid). The current financial services research context expands this facet to include the recurring potential for financial loss due to fraud.
Time Risk	Consumers may lose time when making a bad purchasing decision by wasting time researching and making the purchase, learning how to use a product or service only to have to replace it if it does not perform to expectations.
Psychological Risk	Potential loss of self-esteem (ego loss) and ego frustration based on feelings about oneself. Consumers feel unwise if they experience a non-performing product and may experience feelings of harm to their self-image from the frustration of not achieving their buying goals.
Social Risk	Potential loss of status in one's social group as a result of adopting a product or service, looking foolish or untrendy.
Privacy Risk	Potential loss of control over personal information, such as when information about you is used without your knowledge or permission. The extreme case is where a consumer is "spoofed" meaning a criminal uses their identity to perform fraudulent transactions.
Overall Risk	A measure of perceived risk when all criteria are evaluated together.

Adopted from Featherman and Pavlou (2002)

of personal information), involvement with the product or service of the website, information on the website, and search function. They find that the determinants of online trust are different across website categories where different types of website factors (risks) are involved. Their findings suggest that although trust is a mechanism to reduce perceived risk in the online environment, different drivers of trust are salient for different types of risks.

An underlying logic held by these studies is that different types of online interactions, transactions and services will involve different types of risks. Therefore, the nature of online services where different types of risks are involved also needs to be taken into account in understanding the role of online trust in different contexts. Similarly, for e-Government websites, different types of risks involved in citizens' e-Government activities will influence the perception and behavior towards e-Government websites. Moreover, different types of risks are antecedents of different types of trust (Featherman and Pavlou 2002). Therefore, it can be posited that the impact of risk perception can be captured by measuring different types of trust.

2.5.3 Antecedents of online trust

Another central research question in the online trust literature is what leads to trust online. The antecedents of online trust studied in previous literature are summarized in Table 5. Antecedents of online trust can be generally classified into three categories: (1) characteristics of the user, (2) characteristics of the website, and (3) contextual factors (Shankar *et al.* 2002). User characteristics denote characteristics of the trusting party in the online environment. This category of trust antecedents includes the trust disposition of the user, i.e. the user's general willingness to depend on others (Mayer *et al.* 1995), and user's knowledge and attitude of a website developed from the past

Table 5 Antecedents of Trust in the Online Environment

Article	Trust antecedents	Results
Ba and Pavlou 2002	Trust is affected by positive and negative feedback in the C2C context	Supported
Balasubramanian *et al.* 2003	Perceived trustworthiness of online investing is affected by trust disposition, perceived environment security and perceived operational competence	All supported
Bhattacherjee 2002	Consumer's familiarity with the online firm will affect trusting beliefs	Supported
Everard and Galletta 2005	Perceived site quality (i.e. style, completeness and language error) will affect trust	Supported
Gefen *et al.* 2003	Online consumer's trusting beliefs with e-vendors are affected by calculative-based trust, knowledge-based familiarity, institutional-based situational normality and structural assurance, and ease of use	All supported
Gefen and Struab 2003	Social presence will influence trust in e-service	Supported
Hampton-Sosa and Koufaris 2005	Initial trust towards a web vendor is affected by trust propensity, website appeal (perceived usefulness and perceived enjoyment); website usability (perceived ease of use and perceived control)	Only website appeal is significantly related to trust
Jarvenpaa *et al.* 2000	Trust in an online store is affected by perceived reputation and perceived size	Only perceived reputation is significant
Kim *et al.* 2004	Trust antecedents for potential user include website quality (information quality, system quality), reputation, and structural assurance. Service quality (service level and empathy) and satisfaction will also affect trust for repeat users	System quality, structural assurance, and empathy are not significantly related to trust for either potential or repeat users. Other links are supported

Table 5 Antecedents of Trust in the Online Environment **(Continued)**

Article	Trust antecedents	Results
Lee and Turban 2001	Customer's trust in online shopping is affected by vendor trustworthiness (benevolence, integrity, competence), technology medium trustworthiness, and contextual factors (third party certification and security infrastructure). All relationships are proposed to be moderated by trust propensity	Only vendor's integrity is significantly related to trust for both direct effect and interaction effect with trust propensity
McKnight *et al.* 2002a	Initial trusting beliefs towards a web vendor are affected by disposition to trust, institutional-based trust, and perceived site quality	All supported
McKnight *et al.* 2002b	Initial trusting beliefs are affected by perceived website quality, structural assurance, and vendor reputation	All supported
Pavlou 2003	Trusting beliefs in a web vendor is related to experience (satisfaction with past outcomes), frequency of using web-shopping , and perceived vendor reputation	Experience and reputation are significant
Pavlou and Gefen 2004	Trust in online seller community is affected by institutional mechanisms, I.e. feedback function; escrow service; credit card guarantee; and trust in intermediary	All supported except credit card guarantee
Pennington *et al.* 2003	Trust is related to system trust (seal, rating, guarantee) and perceived vendor reputation	System trust and reputation are significantly related to perceived trust in vendor. Only guarantee is significantly related to system trust
Ridings *et al.* 2002	Disposition to trust, others' behavior of providing personal information, and perceived responsiveness are related to trust in virtual community	All supported
Suh and Han 2003	Trust is influenced by perceived strength of security control	Supported
Teo and Liu 2006	Online consumer trust is affected by e-vendor characteristics (reputation, size, multiple integration, system assurance) and consumer characteristics (disposition)	Size and multiple integration are not significant. All the rest are significant

experience with it. Several authors have discussed the role of trust disposition, or trust propensity, of online trust formation. Uslaner (2004) distinguishes between strategic trust that reflects a person's experience with particular people doing particular things, and moralistic trust which indicates a more general value people learn early in life. He further argues that people who have the tendency to trust each other are more likely to be comfortable with new technology. Thus, trust in the online environment may depend on a more general faith in humanity rather than in the technology itself. Similarly, trust disposition is also found related to the initial trust formation towards the party behind a website (Hampton-Sosa and Koufaris 2005, McKnight *et al.* 2002a). McKnight *et al.* (2002) use two dimensions, faith in humanity and trusting stance, to conceptualize trust disposition. Faith in humanity means one assumes others are usually upright, well meaning, and dependable, while trusting stance means that one tends to assume better outcomes result from dealing with people regardless of what one believes about people's attributes. They find that trust disposition will significantly influence a person's trusting beliefs towards a web vendor. In the contexts where business transactions are not involved, such as virtual communities, trust disposition is also found to be positively related to the formation of trusting beliefs in these online communities (Leimeister *et al.* 2005, Ridings *et al.* 2002).

Another user-side antecedent of online trust is the user's familiarity with a website based on knowledge and past experience with the website. In studying repeated usage of an e-vendor website, Gefen *et al.* (2003) finds that knowledge-based trust will affect customer's trusting beliefs in the e-vendor. Knowledge with the transacting party provides the basis to predict that party's behavior, and thus reduces user's feeling of uncertainty towards the online transaction. Although uncertainty is a necessary condition for trust to play a role, trust will not be formed based on total

ignorance, but rather "reside somewhere between total ignorance and total knowledge" (Lewis and Weigert 1985:970). In another study, Bhattacherjee (2002) finds that familiarity in using a website of an online company is positively related to trust in that particular online company. These studies suggest that besides trust disposition, an online user's past experience will also affect trust in the website.

A second group of online trust antecedents examines the characteristics of the trusted party online, which involves the attributes of the online party. Because online transactions often involve transactions with unfamiliar parties, a number of studies have emphasized the institutional features of a website that may serve as another base for trust formation. Institutional-based trust, or system trust, indicates the trusting party's sense of security based on the social structure (Shapiro 1987). An online service provider or e-vendor can enhance user's perception of trustworthiness by manifesting certain institutional traits on their websites, such as seals, ratings, and guarantees (Pennington *et al.* 2003). Institutional-based trust includes two dimensions: situational normality and structural assurance (McKnight *et al.* 2002a). Situational normality of a website means whether the website appears in a proper order or functions in an appropriate manner to the users. Structural assurance means that certain social structures are present by a website to make the environment feel trustworthy. Both situational normality and structural assurance of a website are found positively related to online trusting beliefs (e.g. Gefen *et al.* 2003, Kim *et al.* 2004, McKnight *et al.* 2002a, 2002b). On the other hand, different mechanisms of how website can build institutional-based trust have also been discussed in previous online trust literature, including escrow service (e.g. seals), feedback system (e.g. rating and feedback forum), and guarantees (Ba and Pavlou 2002, Hu *et al.* 2004, Pavlou and Gefen 2004, Pennington *et al.* 2003). Although mixed results have been

reported on these institutional features in the formation of trust, it can be generally construed that websites can effectively build trust through these institutional mechanisms.

Apart from institutional features, IT attributes of a website are also found to be related to online trust. These IT attribute include perceived website quality (Kim *et al.* 2004, McKnight *et al.* 2002b), website appeal and playfulness (Hampton-Sosa and Koufaris 2005), usability and/or ease-of-use (Gefen *et al.* 2003, Hampton-Sosa and Koufaris 2005, Wang and Benbasat 2005), and perceived control (Suh and Han 2003). Online users are likely to infer the trustworthiness of an online entity from its IT attributes of its website, because high quality perception of a website will indicate the intention and competence of the party running the website.

In addition to user characteristics and website characteristics, several contextual factors are also found related to the formation of online trust. In the context of e-commerce, previous studies suggest that user's trusting beliefs towards a website is found related to factors such as the reputation of the online firm (e.g. Pavlou 2003, Pennington *et al.* 2003), the size of the firm (e.g. Jarvenpaa *et al.* 2000), and the security of the Internet infrastructure (e.g. Lee and Turban 2001). However, mixed results are found with these contextual factors.

2.5.4   Outcomes of online trust

This section reviews the literature on the outcomes of trust in online interactions and transactions. Dependent variables in the IS literature on trust include trust-related behavioral intention and satisfaction of the online users. In addition, perception of certain website attributes is also found to be affected by trust. Table 6 summarizes the outcomes of online trust.

Trust is a significant antecedent of participation in online interactions and transactions because it serves as a central mechanism to reduce perception of uncertainty and risk. With high level of trust towards a website, users will have lesser doubts that the other party may behave opportunistically against their interests. They will also tend to believe that the online entity that is operating the website will be responsible in facilitating a secure online transaction environment. On the contrary, if a website user does not have trust in the website, then his experience with the website will be plagued with doubts and concerns about the online party's integrity, in addition to privacy and security issues (Light 2001). Such an untrusting environment may motivate the user to use only the most basic informational functions of a website (e.g. online news) and withdraw from any kind of online transactions and interactions whenever risks may be perceived.

Most studies of online trust treat behavioral intentions as the final dependent variable (e.g. Gefen *et al.* 2003, McKnight *et al.* 2002a, Pavlou 2003, Salam *et al.* 2005). Some authors have also distinguished the nature of different trust-related behaviors towards a website. For example, Pavlou and Fygenson (2006) differentiate getting information and making purchase from a website in conceptualizing and extending the framework of Theory of Planned Behavior for B2C e-commerce. This is because different types of uncertainties are underlying different behaviors (Pavlou *et al.* 2005). Similarly, McKnight *et al.* (2002b) find that trusting beliefs that a web vendor is trustworthy in terms of benevolence, competence and integrity, and trusting intentions to be willing to depend on that vendor, affect three different kinds of behavioral intentions, namely following vendor advice, providing personal information, and making purchase. In the context of virtual community, however, trust is found related

Table 6 Outcomes of Trust in the Online Environment

Article	Outcomes of online trust	Results
Balasubramanian *et al.* 2003	Satisfaction	Perceived trustworthiness is positively related to investor's satisfaction with online investing
Bhattacherjee 2002	Willingness to transact	Trust in an e-vendor, in terms of benevolence, competence and integrity, is positively related to willingness to transact with the e-vendor.
Everard and Galletta 2005	Intention to purchase	Presentation flaws will negatively affect trust in a website, which then influence customer's intention to purchase from that website.
Gefen *et al.* 2003	Perceived usefulness; perceived ease of use; intended use	Trust is positively related to perceived usefulness and intended use of an e-vendor's website. Two antecedents of trust, institutional situational normality and knowledge-based familiarity are positively related to perceived ease of use.
Gefen and Straub 2003	Purchase intention	Trust is positively related to customer's purchase intention of B2C e-service.
Hampton-Sosa and Koufaris 2005	Intention to use	Initial trust in an online company is positively related to customer's intention to use the company's website.
Jarvenpaa *et al.* 2000	Attitude; willingness to purchase	Trust in an online store is positively related to customer's attitude and negatively related to risk perception, and thus indirectly affects willingness to purchase from that store.
Liang *et al.* 2005	Behavioral intention	Trust is positively related to user's intention of online prescription filling and negatively related to perceived uncertainty
McKnight *et al.* 2002a	Trust intention	Based on TRA, trusting beliefs in a web vendor's competence, benevolence and integrity are positively related to trusting intentions.
McKnight *et al.* 2002b	Behavioral intention	Trusting beliefs and trusting intentions are positively related to behavioral intention online in terms of following advice, giving personal information, and making purchase.

Table 6 Outcomes of Trust in the Online Environment (Continued)

Article	Outcomes of online trust	Results
Pavlou 2003	Perceived usefulness; perceived ease of use; intention to transact	By integrating TAM and trust under TRA, the author finds that trust in a website is positively related to perceived usefulness, perceived ease of use, and intention to transact with the website, and is negatively related with perceived risk.
Pavlou and Fygenson 2006	Attitude; behavioral intention (get information and make purchase)	Based on TPB, trusting beliefs towards getting information or product purchasing online are found positively related to a B2C customer's attitude towards getting information or purchasing product, which then leads to behavioral intentions.
Pavlou and Gefen 2004	Transaction intention	Trust in the online community of sellers affects buyer's intention to transact with them in e-marketplaces.
Pennington *et al.* 2003	Attitude; purchase intention	Trust in a website will affect customer's attitude towards online purchasing with that website, which will then lead to purchase intention
Ridings *et al.* 2002	Intention to use (desire to give or get information)	Trust in terms of trust in other participants' ability and benevolence of a virtual community is positively related to user's desire to give and get information.
Salam *et al.* 2005	Intention to use	By integrating TAM, trust and relational dependence under TRA, these authors find that vendor trustworthiness will positively influence customer's intention to visit vendor website.
Suh and Han 2003	Attitude; behavioral intention	Trust is positively related to customer's attitude towards and behavioral intention of using e-commerce.
Wang and Benbasat 2005	Perceived usefulness; adoption intention	Trust in the online agent is positively related to perceived usefulness and adoption intention of online recommendation agents.
Yoon 2002	Satisfaction	Trust and satisfaction are found to be correlated in website user's online purchase decision.

to the intention of either getting information or giving information (Ridings *et al.* 2002).

Another group of studies have discussed the relationship between trust and users' affective outcomes with their online experience, which is equivalent to the "Satisfaction" variable in the D&M model. In the online environment, satisfaction reflects the affect status which is shaped by the user's previous experience with the website, and trust refers to the user's expectation towards the future behavior of the trustee (Kim *et al.* 2004, Mayer *et al.* 1995). Thus, satisfaction is sometimes regarded as an antecedent of trust. On the other hand, in a single transaction event, satisfaction is also argued to be an outcome of trust (Balasubramanian *et al.* 2003, Yoon 2002). Balasubramanian *et al.* (2003) find that perceived trustworthiness of an online broker is directly related to the online investor's satisfaction. Yoon (2002) also argues that satisfaction can be an outcome of online trust and suggests a positive correlation between trust and satisfaction. Some other studies have also suggested an interaction effect of trust on satisfaction (Shankar *et al.* 2002). Therefore, the relationship between trust and satisfaction may need to be specified based on the research context.

Finally, previous research on online trust also finds positive relationship between trust and user's perception of website attributes. Based on the Theory of Reasoned Action (Ajzen and Fishbein 1980), a few studies have linked trust to TAM variables, i.e. perceived usefulness and perceived ease of use of a website (Gefen *et al.* 2003, Gefen and Straub 2003, Pavlou 2003, Salam *et al.* 2005). Pavlou (2003) argues that both perceived usefulness and perceived ease of use will be affected by trust, and Gefen *et al.* (2003) posit that only perceived usefulness will be directly affected by website user's trusting beliefs, while perceived ease of use will be affected by two trust

antecedents: institutional situational normality and knowledge-based familiarity. Trust is an antecedent of perceived usefulness in the online environment because the user's perception of whether a website is useful is partly formed based on the expectation of the website (or the trusted party behind the website). On the other hand, trust will influence perceived ease of use of a website because trust reduces the user's need to "understand, monitor, and control the situation" in using the website (Pavlou 2003:111). The same logic also applies to the relationship between institution-based trust and ease of use (Gefen *et al.* 2003).

In summary, a number of factors have been found to be associated with the "online trust" concept, which is defined as either trusting beliefs or intentions. Different antecedents of online trust have been identified in the literature, including factors from the user (the trusting party) perspective, the website (the trusted party) perspective, and contextual factors. Direct relationships are also identified between online trust and several consequent variables, including the online user's behavioral intention, satisfaction, and perceived attributes of the website. Most of these studies of online trust are done in the context of e-commerce and we still know quite little about how online trust will matter in delivering public services online.

2.6 Summary

This chapter provides literature review on (1) G2C e-Government website success literature, (2) the updated D&M model, and (3) trust. Based on the literature review, I argue that our understanding of e-Government website success can benefit from these two streams of research. It can be seen that the updated D&M model and trust represent two interrelated perspectives in assessing website success: a website attribute perspective and an online relationship perspective. Website attributes, which

are captured by the quality variables in the D&M model as well as the perception variables (PU and PEOU) in the TAM model, represents the technology side of a website, while trust captures the subjective factors related to online interactions and transactions. Previous research has already noted that the trusting relationship and website attributes are both important for website success (Gefen *et al.* 2003). Intuitively, these two aspects of website success should also contribute to e-Government website success. On one hand, quality information and service from these websites are still key determinants of success (e.g. Chang *et al.* 2005). On the other hand, trust may also influence the adoption of these websites (Carter and Belanger 2005). Yet, although the current literature of e-Government has documented many "best practices" of e-Government on the quality side (e.g. Marchionini et al. 2003), as well as provided evidence for the importance of trust, no empirical study has been done to examine both website attributes and trust in assessing e-Government success. The relationship between trust and quality perception of a website, as well as their influence on the outcomes of the G2C e-Government endeavors, still remains unclear. To fill this research gap, an integrated research model is proposed in the next chapter in assessing e-Government website success.

CHAPTER 3. RESEARCH MODEL AND HYPOTHESES

In this chapter, I develop the research model and hypotheses to assess e-Government website success. The research model is shown in Figure 2. E-Government success in this study is defined within the DeLone and McLean's (2003) framework, in particular the links between the three variables of website quality perceptions: information quality, system quality, and service quality, and two dependent variables: user satisfaction and user continuance intention. The research model also examines the role of trust in e-Government website success in terms of whether trust affects quality perceptions of an e-Government website, and whether quality perceptions influence satisfaction and intention to continue using that website. This chapter is organized as follows. The first section defines citizen trust in e-Government website and proposes two dimensions of trust: trust in government and trust in technology. The next section proposes the relationship between trust and the D&M model by hypothesizing that citizen's trust in an e-Government website is positively related to quality perceptions of the website, . Finally, the interrelationships among the success variables suggested by the updated D&M model are hypothesized.

3.1   The role of trust in e-Government website

Similar to e-commerce, trust matters in e-Government website success because certain level of uncertainty is involved when citizens are having interaction and transaction with e-Government websites. Citizens to e-Government can be considered analogous to customers to e-commerce (Kannabiran *et al.* 2004, Lee *et al.* 2005). Therefore, trust also assumes a key role in e-Government website success because different types of risks are associated with e-Government websites. Based on
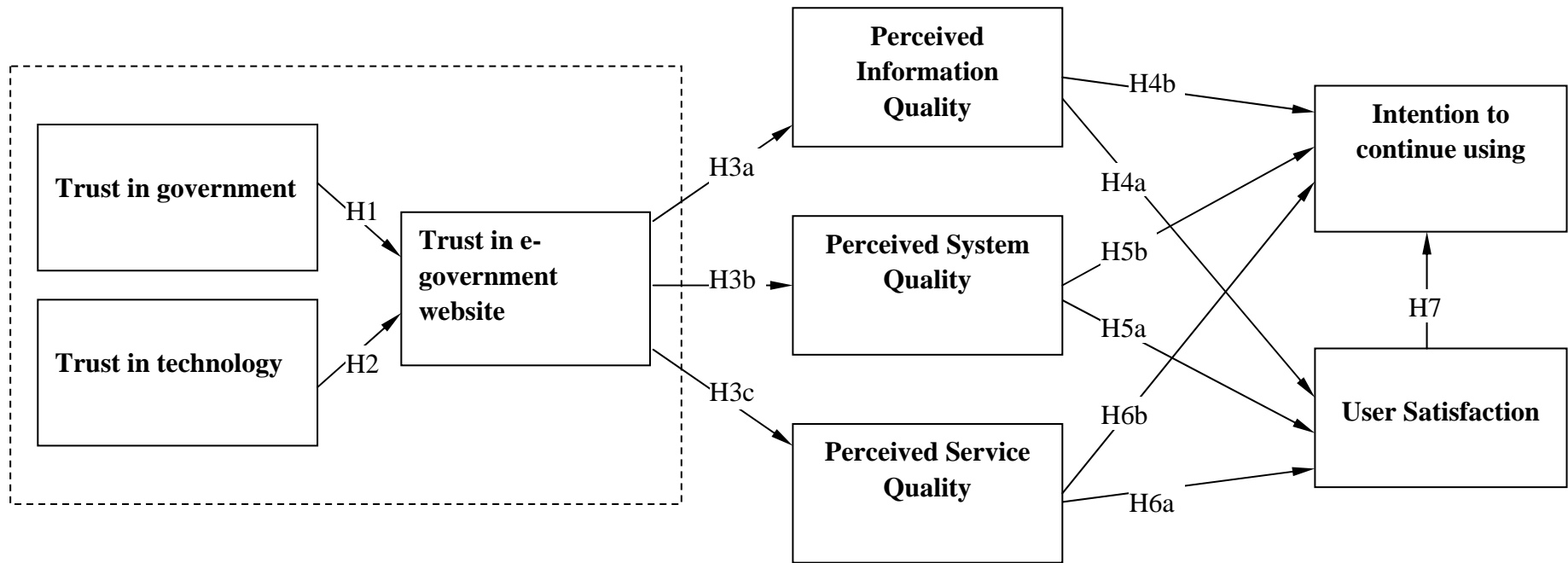
Figure 2 Research Model

Featherman and Pavlou's (2002) classification, it can be construed that performance risk, time risk, and privacy risk are salient in the e-Government context. When using an e-Government website, a citizen may have performance risk if he follows inaccurate or outdated information presented on the website. Time risk refers to the situation where citizens may waste time and effort if they cannot find what they want from the website. Lastly, privacy risk is also involved in transacting with an e-Government website because it is often mandatory for citizens to provide private information if they want to use e-services provided by the government agency. Because all these risks are beyond citizens' control, they need to have trust in the other party running an e-Government website prior to conducting online activities with the website.

Citizen's trust in using e-Government website is defined in this study as the beliefs that the other party will behave in a responsible manner in the best interest of citizens. Responsibility is a central concern for many activities performed by e-Government websites, e.g. whether information on the website is updated regularly, or whether applications will be handled attentively. By comparison, opportunistic behaviors may be less important in the context of e-Government. This definition of trust is consistent with previous research in e-Government (e.g. Warkentin *et al.* 2002) and e-commerce that conceptualizes trust as trusting beliefs in other parties (e.g. Gefen *et al.* 2003, McKnight *et al.* 2002a, Pavlou 2003).

3.1.1   Dimensions of trust

As already discussed, trust has a major impact on the relationship between transacting groups. It is believed that the trusted party will behave in a socially responsible manner to meet the expectations of the trusting party (Gefen, 2000; Lewis and

Weigert, 1985; Mayer *et al.* 1995). Trust is also conceptualized as an expectation that alleviates the fear that one's exchange partner will act opportunistically (Bradach and Eccles, 1989). These definitions take the perspective where the interacting partners are 'individuals or groups'. But the concept of trust has wider implications. It can be used with reference to an object of use, for example, technology. Sitkin and Roth (1993) define trust as a set of expectations that tasks will be accomplished reliably. So in the context of technology, trust in technology, implies, believing that the technology can be used to get the desired task accomplished satisfactorily. Hence there are two dimensions of citizen's trusting beliefs toward an e-Government website: trust in government and trust in technology (Srivastava and Teo 2005a). We discuss each of these two dimensions separately.

Commercial websites are much more than their technological interface. More often than not, it is the quality of relationship among the transacting parties that constitutes the foundation of trust for most online interactions. Similar to the situation where the success of an e-vendor's website is influenced by online customer's trust towards the vendor (Lee and Turban 2001), the success of an e-Government website is also related to citizen's trust in the government entity. The government-citizen relationship plays a central role in the formation of trust in government websites leading to its consequent success. Hence, citizen's trust in government should directly affect their trust in government websites.

Citizen's trust in government denotes the general beliefs about whether the government can efficiently perform its duty in the best interests of citizens. An e-Government website is actually a proxy for the government to provide public services to the citizens and the services provided on the web are actually an extension

of the traditional offline services (Accenture 2006). Therefore, if a government shows sincere care for the citizens and is able to effectively conduct its duties, citizens are more likely to believe that the e-Government websites developed and maintained by the government are able to serve their needs. On the contrary, if a citizen's trust in the government is low, he/she will then tend to doubt the policies made and actions taken by the government. Since e-Government is also a government sponsored initiative, trust in e-Government website emanates from the trust in government. Citizens usually make subjective judgment towards the government endeavors based on their past experience with the government. A citizen with low trust in government thus may doubt the intention of the e-Government endeavor or question the government's ability of maintaining effective online services. Summarizing the discussion above, this study posits the following hypothesis:

> ***Hypothesis 1: Trust in government is positively associated with trust in an e-Government website.***

Trust in government is necessary but not sufficient for website users to form the belief that tasks will be completed successfully in the e-Government environment. There are also concerns about the reliability of the Internet transactions (Neumann 2006). Trust in technology can be defined as the extent to which the website users trust the competence and security of the Internet when conducting transactions on the Web. Past literature has discussed different sources of risks in transactions over the Internet, especially risk of privacy and security (Belanger *et al.* 2002). Privacy risk pertains to the loss of control over personal information (Culnan and Armstrong 1999). Because websites frequently ask users for personal information to complete transactions, privacy concern is found to be a key driver of trust in technology (Hoffman *et al.*

1999). For government websites, privacy concern becomes even more important as detailed private information is usually required to register and apply for services. If the citizen does not feel safe to provide private information through the Internet, then he is unlikely to expect successful completion of online transactions with the government website. Security risk, on the other hand, refers to risk related to the robustness of IT applications against unintended damage or loss, such as the leakage of ID and password or the infection of computer virus. High level of trust in technology will ensure the citizen's belief that online transactions and interactions with government agencies can be conducted successfully.

It might be argued that trust in government and trust in technology are not defined on the same basis of trust, i.e. when the concept of "trust in government" clearly specifies another party (the government) in online transactions, "trust in technology" seems not. However, in the special context of the online environment, it is appropriate to define both trust in government and trust in technology based on the conceptualization of trust as trusting beliefs. In this case, the "other party" in forming trust with e-Government transactions should not only be the government agency running the website. Rather, the belief towards the Internet should also serve as a basis for the formation of trust in e-Government website. Thus, trust in government and trust in technology are two trust dimensions that share the similar basis of trust conceptualization. The preceding discussion leads to the following hypothesis:

> *Hypothesis 2: Trust in technology is positively associated with trust in an e-Government website.*

3.1.2 Trust and quality perceptions

This study then posits that citizen's trusting beliefs towards an e-Government website will affect the quality perception of that website in terms of information quality, system quality and service quality. The relationship between citizen's trusting beliefs and website quality perceptions can be generally explained through the perspective of cognitive consistency theory. Cognitive consistency theory (Festinger 1957, Szajna and Scamell 1993) contends that human beings strive for harmony in their beliefs. In the e-Government context, an e-Government website serves as the interface for interactions between citizens and the government agency. If a citizen's trusting beliefs towards an e-Government website is high, he will then expect the government agency behind the website to behave in a responsible manner, e.g. being efficient, sincere and honest towards citizen's requests. These beliefs will then affect the citizen's perceptions of the outcomes of online interaction and transaction such that the more positive the beliefs are (e.g. high level of trusting beliefs), the more likely that the citizen will form positive perceptions or judgments about the outcomes (e.g. the quality of email reply). These perceptions cumulated from the experience of using online services serve as the basis for the formation of citizen's overall quality perception for a particular e-Government website. Hence, a citizen's trusting beliefs will affect perceived information quality, system quality, and service quality of an e-Government website.

Trust is important for perceived information quality of an e-Government website. Information quality denotes citizen's assessment of whether the information on the website is accurate, valid, and timely. However, citizens may not have objective criteria to make such assessment and will have different interpretations of the

information presented on the website. Most government agencies use websites to announce and publish their policies, plans, and programs. If trust is absent, a citizen may have concerns over (1) whether the government agency is publishing accurate and timely information, e.g. their policies and programs; and (2) whether these policies and programs are by themselves trustworthy, or there is some hidden political purpose other than for the best interests of citizens. Therefore, perceived information quality will vary based on the level of trust.

In addition, trusting beliefs will affect perceived system quality of an e-Government website. This is similar to the context of e-commerce. In e-commerce, trust is argued to reduce customer's need to understand, monitor, and control the situation and thus making online transactions effortless (Pavlou 2003). Trust in an e-vendor involves the belief that the e-vendor will take the responsibility to ensure the technical reliability and ease of use of a website, thus leading to higher perception of the system quality for that website. Extrapolating from this argument, since citizens are uncertain about the detailed technical features of an e-Government website, trust enables citizens to believe that the government agency will design and operate the website in a reliable manner. This may result in a more positive perception of system quality.

Further, trust will also affect perceived service quality of an e-Government website. In studying trust in virtual teams, Jarvenpaa *et al.* (2004) argue that if trust exists among team members, then errors are more likely to be attributed to external factors. In the context of e-Government, service quality perceptions involve direct interactions between citizens and government officials. Following a similar line of argument as trust among team members, if trust in e-Government is high, citizens are likely to be more tolerant and less demanding, and thus attribute negative experience (e.g.

transaction delay or prolonged application processing time) to reasons other than poor service. The preceding discussion leads to the following hypothesis:

> *Hypothesis 3: Trust in an e-Government website is positively associated with (a) information quality, (b) system quality, and (c) service quality of that website.*

3.2 Quality perceptions, satisfaction, and intention to continue

This study posits that citizen's perceptions of website attributes, i.e. information quality, system quality and service quality of an e-Government website, are related to citizen's satisfaction and intention to continue using the website. Information quality of a government website is the quality of the content provided on the website. Online information dissemination is the primary target of e-Government (Layne and Lee 2001). Essential public data online include legal, administrative, cultural, environmental, traffic information, etc (Lee *et al.* 2005). A US survey has shown that "looking up information" accounts for 63 percent of total online activities with e-Government websites (Council for Excellence in Government 2003). This suggests that searching for information is the most common reason for citizens to visit e-Government websites and thus in many cases, citizens are using e-Government websites for their informational needs. For example, citizens may expect the Immigration and Checkpoints Authority (ICA) website to provide the detailed steps for visa application, or expect the Ministry of Education (MOE) website to provide exam-related information. If they finally only find irrelevant or outdated information on the website, they will be dissatisfied with the website. Furthermore, with the experience that an e-Government website cannot provide quality information, citizens are more likely to resort to other ways of getting information the next time, e.g.

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calling the government agency directly or asking friends, etc. Thus perceived information quality is also related to citizen's intention to continue using an e-Government website. This leads to the following hypothesis:

> ***Hypothesis 4: Information quality of an e-Government website is positively associated with citizen's (a) satisfaction towards that website, and (b) intention to continue using that website.***

When perceived information quality denotes citizen's perception of the quality of web content presented on an e-Government website, perceived system quality denotes the citizen's perception of the website's technical performance of the website in information retrieval and delivery (Seddon 1997). A technically sound government website should provide easy and prompt access to information as well as reliable and secure functioning. System quality is an important determinant of a website user's satisfaction (e.g. McKinney *et al.* 2002, Nelson *et al.* 2005) and continuance intention (e.g. Cheung and Lee 2005, Schaupp *et al.* 2006). In the context of e-Government, system quality of an e-Government website can be the information accessibility, flexibility, response time, usability, integration, and so on (Chang *et al.* 2005). A citizen is unlikely to be satisfied if he has experienced problems in navigation or has to wait a long time for loading webpages. Similarly, if a citizen feels that an e-Government website is cumbersome to use, the citizen may give up the website and rather use alternative channels, such as making telephone inquiry or conducting transactions in person.

In accordance with DeLone and McLean (2003), perceived information quality and system quality may not necessarily be related in the context of e-Government. The search engine on a technically sound website may also generate long lists of irrelevant

information. On the other hand, some government agencies have a good sense of what information should be listed on the website even though they are less developed in terms of technology. The discussion above leads to the following hypothesis:

Hypothesis 5: System quality of an e-Government website is positively associated with citizen's (a) satisfaction towards that website, and (b) intention to continue using that website.

Service quality is especially important for e-Government website success. The technical features and web contents account only for the basic requirements of a government website. The ultimate goal of e-Government is to provide quality services to citizens. E-Government should not only be regarded as mere automation of existing services provided by the government. It is also about transforming the current service delivery (Accenture 2006) and reengineering processes within the government (Srivastava and Teo 2005b). Service quality is originally introduced in the D&M model by Pitt and his colleagues (1995) to measure the services provided by the IS department. In a similar vein, an e-Government website can be analogically compared to a service agency with an IT interface that delivers services online. These services can include many interactions and transactions with the government, e.g. payment service, tax filing, passport application, etc. Further, services can also be provided for e-participation, which involves engaging citizens in the operation of the government by such means as online forums (United Nations 2005). The government officials behind the e-Government websites are involved in delivering these services, including updating information, answering questions, providing feedback, and handling applications. Therefore, service quality of an e-Government website should include

the overall service delivered by the government agency through the website where the interaction and transaction with the government agency are involved.

Relatively few studies have incorporated service quality for measuring IS success. In the field of e-commerce, Liu and Arnett (2000) propose that service quality is an important measure of website success. In the e-commerce context, service quality is found to be related to customer's satisfaction of online experience (Devaraj *et al.* 2002, Zhang and Prybutok 2005). Extrapolating from these arguments, I propose that service quality influences citizen's satisfaction of an e-Government website. Further, following DeLone and McLean (2003), the quality of online service delivery will affect citizen's continuance intention. This leads to the following hypotheses:

> *Hypothesis 6: Service quality of an e-Government website is positively associated with citizen's (a) satisfaction towards that website, and (b) intention to continue using that website.*

3.3   Relationship between satisfaction and intention to continue

The purpose of an e-Government website is to provide "quality public services and value-added information to citizens" (Lee *et al.* 2005:99). Therefore, citizen's satisfaction and continued use of an e-Government website are vital to e-Government success. In addition, government agencies not only regard technology as a means to automate the current government services, but also as an opportunity to "be ready and willing to change legislation to support new service models, and to make the necessary investments on a large enough scale to enable the real benefits possible for these new models" (Accenture 2006:73). Thus, citizen's satisfaction towards these online services and their continued use of these services are key to realizing the

ultimate potential of a country's e-Government endeavor, e.g. the efficiency of government processes and citizen's attitude towards their government (West 2004).

Satisfaction towards an e-Government website measures a citizen's psychological or affective state related to and resulting from a cognitive appraisal of the experience with that website (Bhattacherjee 2001). DeLone and McLean (1992) use satisfaction to capture IS user's cumulative satisfaction with the experience of using IS over time, which implies that satisfaction is regarded more as a long-term factor. Seddon (1997) defines satisfaction in the D&M model as "a subjective evaluation of the various consequences evaluated on a pleasant-unpleasant continuum" (p.246). In the public administration literature, researchers have defined satisfaction towards an e-Government website as "the perceived level of competence and effort regarding such factors as service convenience and effectiveness, information quality and quantity, ease of access, and interactive communication" (Welch *et al.* 2005), where satisfaction is conceptualized as a result of citizen's experience with the e-Government website in terms of transactions, transparency, and interactivity.

There are two paradigms to conceptualize satisfaction in previous research on online behavior: the expectation-disconfirmation paradigm (e.g. McKinney *et al.* 2002) and the experience-based paradigm (e.g. Balasubramanian *et al.* 2003). Balasubramanian *et al.* (2003) suggest that customers are unlikely to articulate preconsumption expectations in the online context, thus the experience-based measures on satisfaction should be preferred. In order to capture satisfaction as a cumulative outcome of citizen's experience with e-Government websites over time, this study applies the experience-based paradigm to operationalize satisfaction. This is also consistent with

previous operationalization of the D&M model (e.g. Seddon and Kiew 1994, Rai *et al.* 2002, Schaupp *et al.* 2006, Zhang and Prybutok 2005).

In contrast, intention to a behavior denotes the motivational factor that captures how hard a person is willing to try to perform a behavior (Fishbein and Ajzen 1975). A citizen's intention to continue using an e-Government website is similar to a website user's revisit or repurchase decision (e.g. Gefen *et al.* 2003). In the post-adoption stage, user's continuance intention towards using a website (1) follows previous decision of using the website, which indicates a repeated behavior mechanism, and (2) is influenced by the evaluation from previous use of the website, which indicates a feedback mechanism (Kim and Malhotra 2005). In the light of this argument, the link between satisfaction and intention in the D&M model can be explained through the feedback mechanism where satisfaction, as an affective state formed from prior use, will influence user's intention of whether to continue using in the future. Previous research has also explained the satisfaction-intention link based on TRA where satisfaction is conceptualized as attitude preceding the actual behavior (Rai *et al.* 2002). Applied to the context of e-Government, for example, if a citizen has had a pleasant and easy experience of finding the information he needed from an e-Government website, he is more likely to use the website the next time he needs similar information. This leads to the following hypothesis:

> *Hypothesis 7: Citizen's level of satisfaction towards an e-Government website is positively associated with his/her intention to continue using that website.*

3.4 Summary

This section (1) provides the definition of e-Government website success based on DeLone and McLean's (2003) IS success framework; (2) provides the definition of trust in the context of e-Government and proposes two dimensions under the concept of trust; and (3) develops a research model that integrates trust and IS success variables. This research model has led to seven hypotheses, which will be tested in the following sections.

CHAPTER 4. METHODOLOGY

This chapter discusses key methodological issues adopted in this study. This study applies both quantitative and qualitative methods. Primary data were collected via a survey of 214 Singapore e-Government users. The main statistical method employed in this study was partial least squares (PLS) regression. To supplement the survey results, interviews were conducted with twenty-three e-Government website users. This chapter begins with the description of the survey instrument and data collection process. Afterwards, the results of data analysis are presented. Finally, two post-hoc analyses are done to examine the result in greater depth.

4.1 Instrument development

Validated scales from literature were adapted for this research. Items measuring various constructs were adapted from previous research where psychometric properties have already been established. In operationalizing the D&M model, I adapted the scales for information quality, system quality and satisfaction from Seddon and Kiew (1994). I adapted the items to operationalize intention to continue using the website based on Bhattacherjee (2001). I adapted service quality measurement from the SERVQUAL instrument (Pitt *et al.* 1995). Pitt *et al.* (1995) propose that service quality is better measured by the gap between the expectation and perception, yet Van Dyke *et al.* (1997) point out that the gap measurement incurs difficulty in both interpretation and empirical operationalization. Although gap measurement has been found to have adequate reliability in measuring service quality (Jiang *et al.* 2002), the reliability of the gap construct will still be questionable when it acts as a dependent variable in the research model (Pitt *et al.* 1997). Because I treat

service quality as a dependent variable in this study, I followed Van Dyke *et al.*
(1997)'s suggestion to measure service quality as direct perception.

Items for trust in government and trust in technology were developed based on
McKnight *et al.*'s (2002a) measurement for trusting beliefs in government and
technology. Items for trust in e-Government website were developed from Wakefield
et al. (2004). All items were measured using a 7-point Likert Scale. The items and
sources are listed in Table 7.

4.2 Data collection

Data for this study were collected through questionnaires distributed to 214 university
students in Singapore. The questionnaire was divided into two parts. The survey
participants began by completing the first part that included measures of trust in
government and trust in technology. And then they were asked to choose an
e-Government website they were most familiar with and answer the rest questions
with reference to the particular website they chose, including trusting beliefs,
information quality, system quality, service quality, intention to continue, and
satisfaction. The survey questionnaire is listed in Appendix A.

University students from Singapore were chosen as the subject of this study. First,
Singapore university students provided a good sample to study e-Government website
behaviors because e-Government in Singapore was well developed (Srivastava and
Teo 2005b). Singapore ranked eighth and seventh respectively in the United Nation's
2004 and 2005 global e-Government benchmark reports (United Nations 2005).
Singapore has also ranked second in Accenture's surveys for three

Table 7 Survey Items and Sources

Item	Wording	Source
	Trust in technology	
TIT1	The Internet has enough safeguards to make me feel comfortable using it	McKnight *et al.* (2002a)
TIT2	I feel assured that legal and technological structures adequately protect me from problems on the Internet	
TIT3	I feel confident that encryption and other technological advances on the Internet make it safe for me to transact there	
	Trust in government	
TGV1	I feel that government acts in citizen's best interest	McKnight *et al.* (2002a)
TGV2	I feel fine interacting with the government since government generally fulfills its duties efficiently	
TGV3	I always feel confident that I can rely on government to do their part when I interact with them	
TGV4	I am comfortable relying on the government to meet their obligations	
	Trust in e-Government website	
TEG1	This website is trustworthy	Wakefield *et al.* (2004)
TEG2	This website seems to be honest and truthful to me	
TEG3	This website can be trusted	
	Information quality	
IQ1	This website provides sufficient information	Seddon and Kiew (1994)
IQ2	Through this website I get the information I need in time	
IQ3	I am satisfied with the accuracy of this website	
IQ4	Information provided by this website meets my needs	
IQ5	Information provided by this website is in a useful format	
IQ6	Information provided by this website is clear	
IQ7	Information provided by this website is accurate	
IQ8	Information provided by this website is up-to-date	
IQ9	Information provided by this website is reliable	
	System quality	
SQ1	This website is easy to use	Seddon and Kiew (1994)
SQ2	This website is user friendly	
SQ3	I find it easy to get this website to do what I want it to do	
SQ4	I believe that this website is cumbersome to use (reverse coding)	
SQ5	Using this website requires a lot of effort (reverse coding)	
SQ6	Using this website is often frustrating (reverse coding)	

Table 7 Survey Items and Sources (Continued)

Item	Wording	Source
	Service quality	Pitt *et al.* (1995)
SVQ1	This website provides dependable services	
SVQ2	This website provides services at times, it promises	
SVQ3	This website gives prompt service to citizens	
SVQ4	This website is responsive to citizen's request	
SVQ5	This website is designed with citizen's best interests at heart	
SVQ6	This website is designed to satisfy the needs of citizens	
	Satisfaction	Seddon and Kiew (1994)
SAT1	How adequately do you feel this website meets your needs of interaction with the government agency?	
SAT2	How efficient is this website in fulfilling your needs of interaction with the government agency?	
SAT3	How effective is this website in fulfilling your needs of interaction with the government agency?	
SAT4	Overall, are you satisfied with this website?	
	Intention to continue using	Bhattacherjee (2001)
CONT1	I intend to continue using this website rather than discontinue it	
CONT2	My intention are to continue using this website than use any alternative means (e.g. offline interaction with the government agency)	
CONT3	I would not discontinue my use of this website	

consecutive years (Lee *et al.* 2005). According to a survey conducted by the

Infocomm Development Authority (IDA) of Singapore in 2005, 86% Singapore

citizens had used electronic means (e.g. using Internet or email) to interact or transact

with government agencies (IDA 2006). Given the high adoption rate of e-Government

websites, Singapore appears to be an appropriate choice of research site. Second,

given that most Singapore students had e-Government experience, using student

sample was also appropriate for this study. The sample demographic also supports its

appropriateness for this study, which will be discussed in the next section.

Qualitative data were collected to supplement the survey results. Qualitative data were

collected through two sources: open-ended interviews with e-Government website

users and the comments students provided in the survey questionnaire. Twenty-three

interviewees in all were invited for interview to give comments on their experience

with e-Government websites, including full-time students, part-time students and staff.

The selection of interviewees was based on the consideration to complement the

possible bias of the survey sample and to gather more information on the actual usage

of e-Government websites in Singapore, so I included users who were not full-time

students. The age of the interviewees ranged from 22 to 30. Interviews were

conducted either face-to-face or through the telephone. The aim of the interviews was

to (1) offset the possible bias of using student sample; (2) triangulate the quantitative

findings; and (3) assess the plausibility of competing explanations of the results. The

interview protocol is listed in Appendix B.

4.3   Demographic of the sample

The sample demographic is shown in Table 8. Although previous research highlights

certain drawbacks of using student samples (Gordon *et al.* 1986), the sample

demographic together with other evidences suggest that using student sample is

appropriate for the current study and does not present a significant threat to validity.

The first reason that using student sample may be inappropriate is that students are

sometimes asked to respond to questions about situations that are unrealistic and

unfamiliar. In this study, however, respondents were familiar with the Internet,

averaging 7.90 years of Internet experience and 3.37 years of experience using

e-Government websites, as shown in Table 8. Second, online users tend to be younger

and more educated than offline users of services (McKnight *et al.*, 2002a). This

provides further support for the use of students for our study. Third, interaction with

government websites is common for the young population in Singapore for various

purposes, for example, education, national service, youth activities, sports, etc. Hence,

the respondents were being asked about situations they are familiar with. This is

supported by the results from the 2006 IDA survey report (IDA 2006), which points

out that the majority of e-Government users in Singapore are aged between 20 and 39.

Therefore, using Singapore university students as sample for the current study is

appropriate as they fall within this age range. Fourth, 57.9 % of respondents were

male (Table 8). This is close to the proportion of 57% male Internet users in

Table 8 Demographic Statistics

		Number	Percentage
Sex	Male	124	57.9
	Female	90	42.1
		Mean	S.D.
Age (years)		23.51	2.48
Internet Experience (years)		7.90	1.92
SG e-Gov Experience (years)		3.37	1.74

Singapore (Dholakia *et al.* 2004), thereby eliminating any bias due to gender ratio.

Fifth, the student sample included both full-time and part-time students, and thus

covered a wide range of e-Government activities, including both information search

and transaction activities (e.g. tax filing through IRAS or CPF transactions). Further,

we asked them to describe their experiences in using e-Government websites. Of the

214 respondents, 201 (93.9%) provided detailed comments on their experience using

e-Government website, which indicated that respondents were frequent users of

e-Government websites.

Because respondents were asked to choose an e-Government website that they are

most familiar with and to respond with reference to that website which they chose, a total of 45 government websites were mentioned by the students, indicating that respondents were also using a wide range of online public services. The list of websites is shown in Appendix C.

4.4 Data analysis

Data analysis was done with partial least squares (PLS-Graph 3.0). PLS differs from the covariance-based structural equation modeling techniques (such as analysis performed by LISREL, EQS, or AMOS) in that PLS places minimal restrictions on measurement scales, sample size, and residual distributions (Chin 1998, Chin *et al.* 2003). Another advantage which PLS offers is that the PLS analysis is distribution free and does not assume true independence of the variables, leading to more reliable results (Gefen *et al.* 2000, Tobias 1999). PLS is also robust against other data structural problems such as skew distributions and omissions of regressors (Cassel *et al.* 1999). Many information systems (IS) studies have found it to be an effective method of analysis (Bock *et al.* 2005, Subramani 2004). Chin (1998) states three essential distinctions between covariance-based methods and PLS, which are (1) whether the underlying constructs are modeled as indeterminate or determinate; (2) the extent to which one is confident in one's theoretical model and auxiliary theory linking measures to constructs; and (3) whether one is parameter oriented or prediction oriented (p.299). When the answer is likely to be the latter in each instance, then the PLS approach is more suitable. In the current study, the constructs of the theoretical model are well determinate based on the previous literature (DeLone and McLean 2004) and the purpose here is more focused on the prediction power of the integrated model. Thus, I used the PLS approach for data analysis.

4.4.1 Measurement model

The data analysis began by testing the measurement model. Testing the measurement model involves examining the internal consistency, convergent validity, and discriminant validity of the constructs. Internal consistency was assessed using composite reliability (or C.R., Chin 1998). Compared to the traditional Cronbach's alpha which assumes equal weights of all the items of a construct and is influenced by the number of items, composite reliability relies on actual loadings to compute the factor scores and thus provides a better indicator for measuring internal consistency (Fornell and Larcker 1981, Werts *et al.* 1974). Composite reliability is used to measure the internal consistencies of a construct, which is calculated as:

$$\rho_c = (\Sigma_i \lambda_i)^2 / [(\Sigma_i \lambda_i)^2 + \Sigma_i \text{Var}(\varepsilon_i)]$$

where λ_i is the i*th* indicator loading of that construct, and $\text{Var}(\varepsilon_i)$ is the variance of the residual of the indicator and $\text{Var}(\varepsilon_i) = 1 - \lambda_i^2$. Composite reliability is considered acceptable at a 0.7 threshold (Fornell and Larcker 1981). According to Table 9, the composite reliability values all the constructs in the model were above the 0.85, thereby satisfying the 0.7 threshold.

Convergent validity refers to the extent to which the items under each construct are actually measuring the same construct. Two methods were applied to assess convergent validity. First, item reliability was examined for each items, which suggested that the factor loading of each item on its corresponding construct must be higher than 0.55 (Falk and Miller 1992). As shown in Table 10, all the items had a loading above the suggested threshold. Second, we assessed convergent validity by examining the average variance extracted (AVE) for each construct. The AVE for a

construct reflects the ratio of the construct's variance to the total variances among the items of the construct, which is calculated as:

$$AVE = (\Sigma_i \lambda_i^2) / [\Sigma_i \lambda_i^2 + \Sigma_i Var(\varepsilon_i)]$$

Table 9 Descriptive Statistics, Composite Reliability, AVE

Construct	Mean	S.D	C.R.	AVE
Trust in Technology (TIT)	4.09	1.13	0.91	0.78
Trust in Government (TGV)	4.85	0.89	0.91	0.73
Trust in e-Government website (TEG)	5.64	0.77	0.95	0.85
Information Quality (IQ)	5.44	0.75	0.93	0.60
System Quality (SQ)	5.28	0.96	0.93	0.68
Service Quality (SVQ)	5.18	0.85	0.92	0.67
Satisfaction (SAT)	5.25	0.90	0.94	0.79
Intention to continue using (CONT)	5.53	0.93	0.85	0.65

Fornell and Larcker (1981) also suggest that AVE should be greater than 0.5, meaning that 50% or more variance of the indicators should be accounted for. As can be seen in Table 9, all AVEs were above the 0.5 threshold suggested by Fornell and Larcker (1981).

Discriminant validity refers to the extent to which a given construct differs from other constructs. At the item level, no item should load more highly on another construct than it does on the one it intended to measure (Ranganathan *et al.* 2004). To test discriminant validity for the items applied in this study, a factor analysis was conducted. Factor loadings were calculated using the following method (Agarwal and Karahanna 2000). First, the PLS-Graph software automatically calculated the loadings

Table 10 Factor Loadings

	TIT	TGV	TEG	IQ	SQ	SVQ	SAT	CONT
TIT1	**0.858**	0.281	0.138	0.083	0.009	0.183	0.014	0.140
TIT2	**0.900**	0.336	0.168	0.151	0.078	0.263	0.113	0.205
TIT3	**0.884**	0.392	0.198	0.097	0.027	0.207	0.092	0.153
TGV1	0.308	**0.846**	0.253	0.281	0.339	0.401	0.327	0.280
TGV2	0.395	**0.824**	0.282	0.277	0.165	0.397	0.214	0.184
TGV3	0.337	**0.891**	0.200	0.284	0.308	0.439	0.357	0.315
TGV4	0.317	**0.846**	0.297	0.242	0.220	0.375	0.364	0.344
TEG1	0.179	0.258	**0.924**	0.551	0.243	0.529	0.472	0.520
TEG2	0.112	0.255	**0.925**	0.493	0.192	0.491	0.448	0.422
TEG3	0.236	0.308	**0.921**	0.552	0.291	0.549	0.381	0.398
IQ1	0.093	0.147	0.397	**0.754**	0.460	0.401	0.384	0.338
IQ2	0.114	0.202	0.438	**0.760**	0.407	0.460	0.430	0.403
IQ3	0.123	0.346	0.508	**0.773**	0.363	0.523	0.361	0.378
IQ4	0.084	0.290	0.416	**0.793**	0.489	0.584	0.539	0.485
IQ5	0.079	0.157	0.298	**0.736**	0.538	0.357	0.374	0.378
IQ6	0.069	0.262	0.369	**0.758**	0.631	0.426	0.407	0.417
IQ7	0.084	0.306	0.537	**0.841**	0.397	0.519	0.374	0.372
IQ8	0.085	0.182	0.476	**0.756**	0.275	0.497	0.359	0.323
IQ9	0.150	0.272	0.574	**0.786**	0.348	0.500	0.361	0.343
SQ1	0.092	0.258	0.295	0.573	**0.884**	0.429	0.450	0.346
SQ2	0.027	0.209	0.278	0.523	**0.890**	0.389	0.434	0.308
SQ3	0.084	0.302	0.292	0.582	**0.803**	0.555	0.456	0.357
SQ4	0.032	0.239	0.147	0.316	**0.753**	0.298	0.280	0.222
SQ5	-0.075	0.232	0.092	0.293	**0.801**	0.252	0.285	0.224
SQ6	-0.004	0.282	0.106	0.334	**0.795**	0.367	0.315	0.205
SVQ1	0.168	0.370	0.490	0.552	0.387	**0.827**	0.462	0.384
SVQ2	0.254	0.402	0.417	0.493	0.348	**0.817**	0.500	0.325
SVQ3	0.163	0.373	0.490	0.481	0.397	**0.853**	0.518	0.341
SVQ4	0.165	0.361	0.471	0.431	0.299	**0.815**	0.527	0.402
SVQ5	0.307	0.425	0.457	0.525	0.455	**0.787**	0.442	0.362
SVQ6	0.165	0.378	0.463	0.556	0.485	**0.810**	0.474	0.383
SAT1	-0.001	0.250	0.433	0.467	0.336	0.460	**0.877**	0.467
SAT2	0.090	0.361	0.389	0.418	0.332	0.539	**0.909**	0.439
SAT3	0.123	0.358	0.401	0.398	0.376	0.534	**0.912**	0.519
SAT4	0.094	0.360	0.433	0.543	0.590	0.571	**0.843**	0.555
CONT1	0.169	0.263	0.388	0.397	0.361	0.390	0.475	**0.827**
CONT2	0.141	0.220	0.360	0.396	0.180	0.331	0.436	**0.764**
CONT3	0.148	0.327	0.418	0.402	0.313	0.367	0.446	**0.822**

for each indicator of its respective construct. Second, a factor score for each case in the items loaded much higher on their hypothesized factor than on other factors. At the construct level, discriminant validity can be inferred when the variance of each construct is larger than the variance shared by this construct with any other construct in the model (Chin 1998). The variance of a construct is indicated by AVE, while the variance shared by two constructs can be calculated by squaring the correlation between them. As shown in Table 11, the square roots of all AVEs are much larger than correlations among constructs, thereby satisfying the criteria for discriminant validity.

Table 11 Correlation Table

	TIT	TGV	TEG	IQ	SQ	SVQ	SAT	CONT
TIT	0.880							
TGV	0.373	0.852						
TEG	0.193	0.319	0.923					
IQ	0.127	0.319	0.580	0.773				
SQ	0.045	0.230	0.267	0.562	0.822			
SVQ	0.247	0.434	0.568	0.619	0.482	0.819		
SAT	0.088	0.339	0.470	0.523	0.476	0.598	0.886	
CONT	0.190	0.322	0.484	0.496	0.358	0.450	0.566	0.805

Diagonal: Square Root of AVE

4.4.2   The structural model

The hypotheses were tested using PLS-Graph 3.0. The path coefficients with the corresponding significant level are shown in Figure 3. Trust in government, but not trust in technology, is found to be positively related to trust in e-Government website, explaining $R^2 = 0.11$ variance of trust in e-Government website. Hence, H1 is supported (path = 0.29, t = 2.79, p < 0.01) and H2 is not supported (path = 0.09, t =

0.21, p > 0.05). Trust in e-Government website is found to be significantly related to information quality (path = 0.58, t = 9.50, p < 0.01, R^2 = 0.34), system quality (path = 0.27, t = 2.34, p < 0.05, R^2 = 0.07), and service quality (path = 0.57, t = 7.37, p < 0.01, R^2 = 0.32), thereby supporting H3a, H3b, and H3c.

The results also show that information quality is not significantly related to satisfaction (path = 0.17, t = 1.65, p > 0.05). Hence, H4a is not supported. Further, among the quality perceptions, only information quality (path = 0.25, t = 2.90, p < 0.01) is found significantly related to intention to continue using the website, thereby supporting H4b. System quality (path = 0.19, t = 3.38, p < 0.01) and service quality (path = 0.40, t = 3.79, p < 0.01) is significantly related to user satisfaction (R^2 = 0.42), thereby supporting H5a and H6a. However, the relationships between system quality (path = 0.00, t = 0.87, p > 0.05) and service quality (path = 0.05, t = 0.76, p > 0.05) to intention to continue using the website are not significant. Hence, H5b and H6b are not supported. In addition, user satisfaction is significantly related to user's intention to continue using the chosen e-Government website (path = 0.40, t = 5.07, p < 0.01), thereby supporting H7. R^2 = 0.38 variance of intention to continue is explained by quality perceptions and satisfaction.
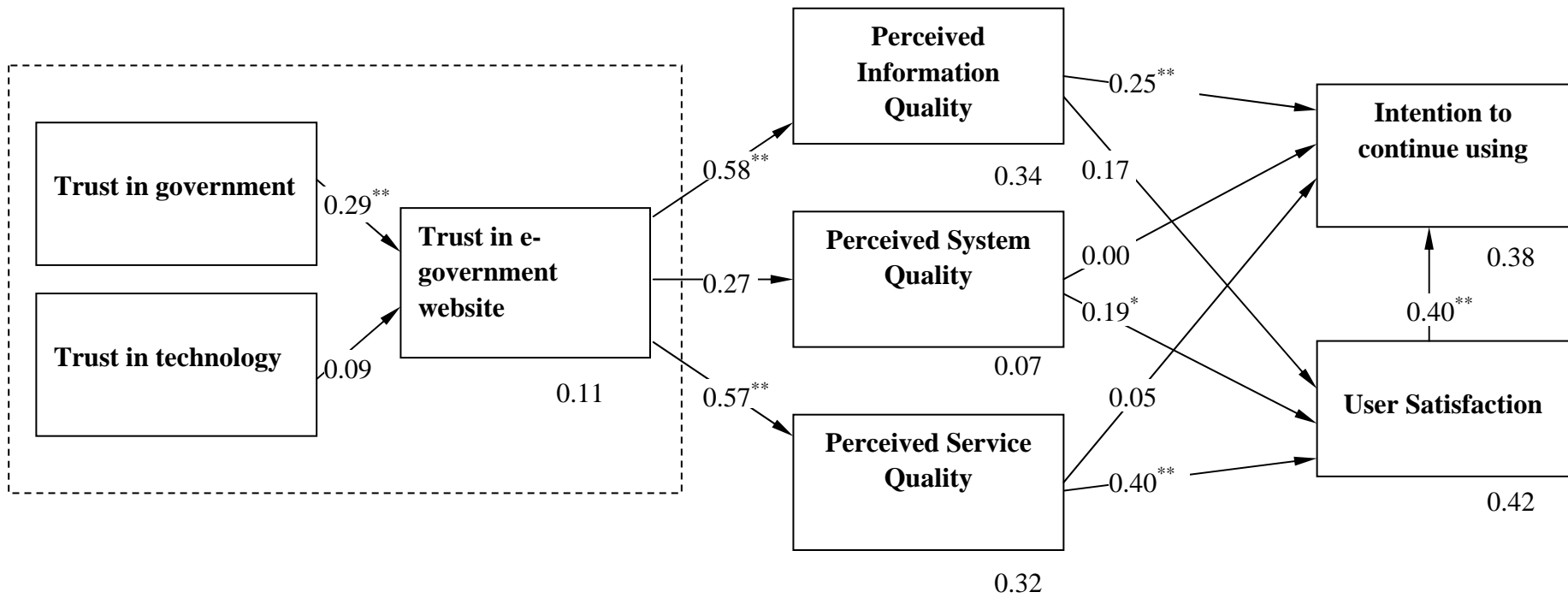
Figure 3 Hypotheses Testing

(** p < 0.01, * p < 0.05)

4.5 Post-hoc analysis 1

Two post-hoc analyses were conducted after the primary data analysis. The first

post-hoc analysis to test the direct effect of trust on satisfaction and continuance

intention, because several authors suggest that online trust will have direct effect on

satisfaction (e.g. Balasubramanian *et al.* 2003) and behavioral intention (e.g. Gefen *et*

al. 2003). This analysis examined the path coefficients and their respective

significance level of the modified model, as well as compared the modified model

with the original model in terms of the change of R^2 in the two dependent variables:

satisfaction and intention to continue using. For R^2 comparison, I use Cohen's (1988)

formula for calculating effect size f^2 as:

$$f^2 = (R^2_{included} - R^2_{excluded})/(1 - R^2_{included})$$

The value of f^2 captures whether the impact of a particular independent construct on a

dependent construct is substantive. This study uses f^2 to test the mediation effect of

website quality perceptions between trust and satisfaction as well as intention.

For the modified model, R^2 of satisfaction has increased to 0.43 from 0.42 ($f^2 = 0.03$)

and intention to continue using has increased to 0.40 from 0.38 ($f^2 = 0.04$). The f^2

value suggests that the modified model does not have better predictive power than the

original model (Chin 1998). By linking trust directly to intention to continue using

and satisfaction, the results of this post-hoc analysis show that both paths between

trust and intention and that between trust and satisfaction are significant. The path

coefficients and related significant level are shown in Figure 4. The results suggest

that the effect of trust on satisfaction as well as intention to continue using is partially

mediated by different quality perception variables, i.e. information quality appears to

mediate the relationship between trust and intention to continue, while system quality

and service quality appears to mediate the relationship between trust and satisfaction.

In order to further verify the mediating role of quality perception variables, a

mediation test was done following Baron and Kenny's (1986) suggestion. They

suggest that a fully mediating relationship exists if (1) the regression coefficient of an

independent variable on the final dependent variable is significant; (2) the regression

coefficient of an independent variable on the mediator is significant; and (3) when the

mediator is controlled, no significant relationship is found between the independent

variable and the dependent variable. The results are presented in Figure 5. The results

show that trust in e-Government website is significantly related to both satisfaction

(path = 0.47, t = 7.45, p < 0.01) and intention to continue using (path = 0.28, t = 4.25,

p < 0.01), which confirm the effect of trust on both satisfaction and intention to

continue is partially mediated by quality perception variables.

4.6   Post-hoc analysis 2

The second post-hoc analysis was done to better explain the results from the primary

data analysis. This analysis aimed to identify different patterns for different usage of

e-Government websites. Previous research on e-Government identifies different

functions of e-Government website, e.g. providing government information and

enabling online transactions (Layne and Lee 2001, Lee *et al.* 2005). Previous IS

research on website adoption has also noticed the complexity pertaining to different
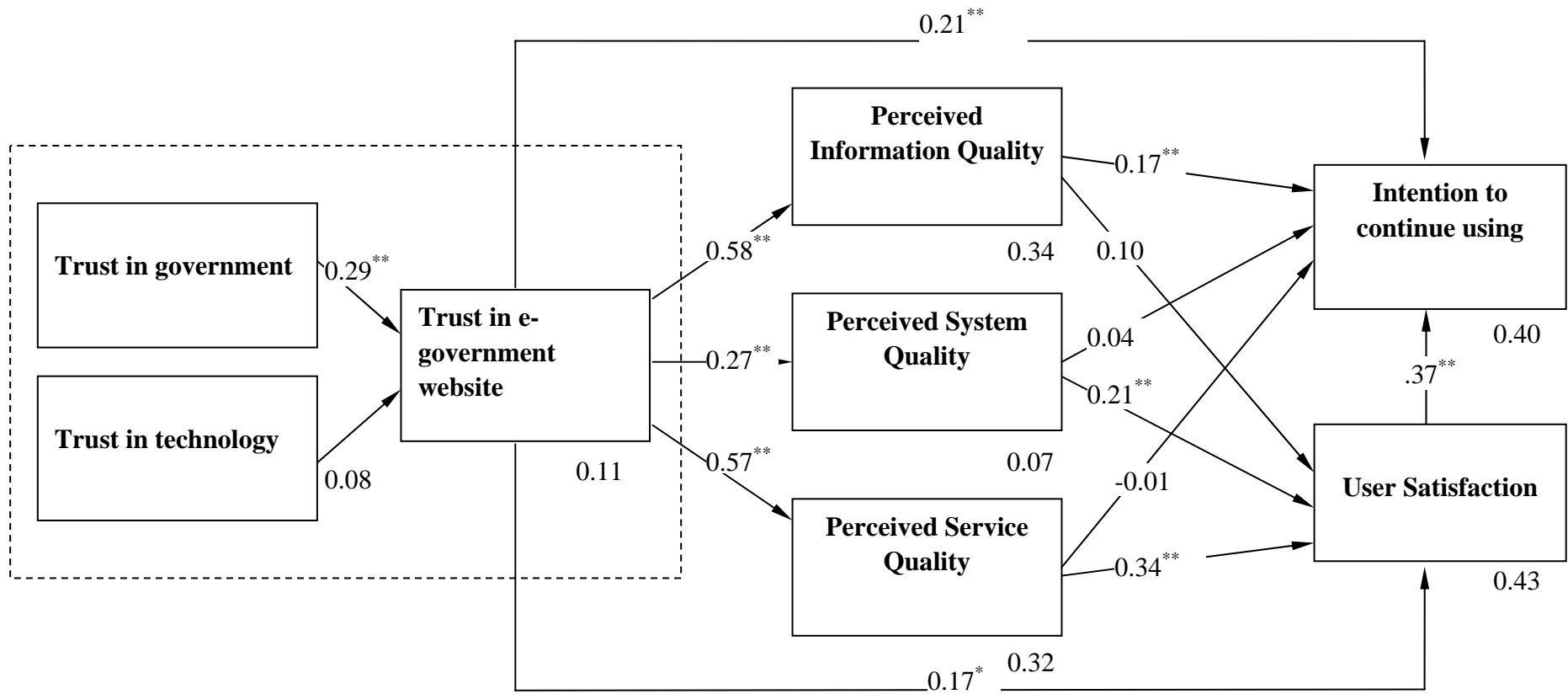
Figure 4 Testing Mediating Role of Quality Perceptions

(** p < 0.01, * p < 0.05)
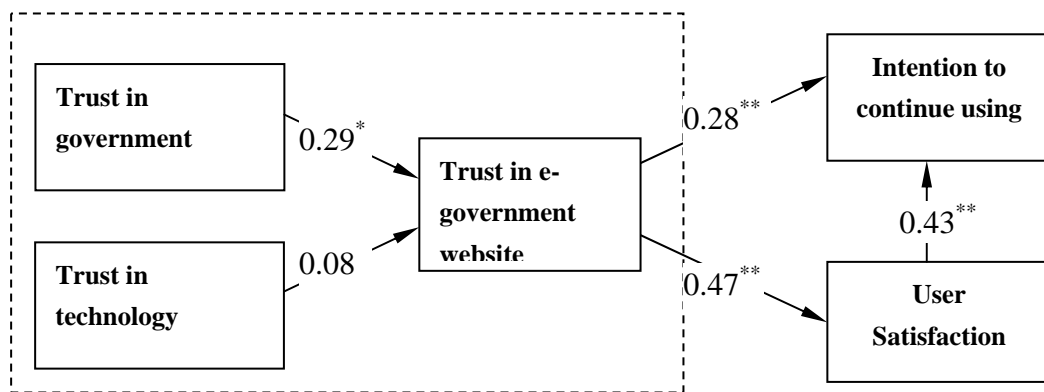
Figure 5 Testing Direct Effects of Trust

(** p < 0.01, * p < 0.05)

usage and distinguished different online activities in conceptualizing and measuring

intention to use to include activities such as getting information, providing private

information, and making purchase (cf. Gefen *et al.* 2003, McKnight *et al.* 2002b,

Pavlou and Fygenson 2006). In the current study, using an e-Government website also

involves different purposes and activities. For example, citizens who use

e-Government website for tax filing may display different usage patterns from those

who use the same website for information search. In order to be consistent with the

updated D&M model that conceptualizes intention/use and satisfaction in a broad

sense towards the whole system, this study did not distinguish different usage in

measuring intention to continue using e-Government website (DeLone and McLean

1992, 2003, Rai *et al.* 2002). However, the insignificant relationships among quality

perception variables and the two dependent variables (intention to continue and

satisfaction) indicate that further examination of different usage may shed light on

explaining these results. Thus, this post-hoc analysis was conducted to identify

potentially different patterns for different user-groups.

Four activities were identified in the survey questionnaire: browsing, downloading, messaging, and transacting (Teo *et al.* 1997). The first two represented the information needs served by the e-Government website, and the last two involved interaction and transaction with the government agency through the website. All the survey respondents have used e-Government websites for information needs, and a number of them have used these websites for interaction and transaction. Therefore, the active user subsample comprised those respondents who have used e-Government websites for their interaction and transaction needs and the rest constituted the passive user subsample. Note that although passive users did not use e-Government websites for transactions, it did not mean that they intentionally avoid online transactions with these websites. Rather, some students did not need to use e-Government transactions such as tax-filing or CPF transactions.

The results are presented in Table 12. For the passive user group, the results are similar to the results of the whole sample, except that (1) information quality perception is significantly related to satisfaction and (2) system quality perception is not significantly related to satisfaction. For the active user group, however, trust in technology is a significant predictor of trust in an e-Government website, and none of the quality perceptions is significantly related to citizen's intention to continue using the e-Government website. Furthermore, a t-test was conducted to compare the means of Internet experience and Singapore e-Government experience of the two subsamples. The t-test results indicate that these two subsamples do not differ significantly for either Internet experience ($t = 0.14$, $p > 0.05$) or Singapore e-Government experience ($t = 0.26$, $p > 0.05$).

The results suggest that when separating different user groups, the relationships

among trust, quality perceptions, attitude (satisfaction) and behavioral intention also

change. This further supports the findings that the effects of trust and quality variables

on intention to continue using and satisfaction may vary with the nature of usage in

the context of e-Government. The next chapter will provide further discussion of

these results.

Table 12 Comparison of Active Users and Passive Users

Paths examined	Original	Passive	Active
TIT->TEG	.09 (0.21)	-.05 (0.86)	.24 (2.21*)
TGV->TEG	.29 (2.79**)	.35 (3.72**)	.21 (1.82*)
TEG->IQ	.58 (9.50**)	.61 (9.21**)	.55 (4.00**)
TEG->SQ	.27 (2.34*)	.39 (5.40**)	.13 (0.67)
TEG->SVQ	.57 (7.37**)	.66 (11.91**)	.46 (2.72**)
IQ -> SAT	.17 (1.65)	.25 (2.12*)	.09 (0.04)
SQ -> SAT	.19 (3.38**)	.05 (0.05)	.36 (3.51**)
SVQ -> SAT	.40 (3.79**)	.47 (4.45**)	.30 (1.84*)
IQ -> CONT	.25 (2.90**)	.41 (3.52**)	.08 (0.82)
SQ -> CONT	.00 (0.87)	-.02 (0.55)	.04 (0.04)
SVQ -> CONT	.05 (0.76)	.12 (0.85)	.00 (0.14)
SAT -> CONT	.40 (5.07**)	.47 (2.41**)	.52 (4.57**)
Sample size	214	122	92
Internet experience	7.90 (1.92)	7.89 (2.03)	7.92 (1.77)
SG eGov experience	3.37 (1.74)	3.36 (1.80)	3.39 (1.68)

Note: Numbers in parentheses besides path coefficients indicate the corresponding t-statistics and significant level; numbers listed for Internet and SG eGov experience indicate the mean with standard deviations in parentheses.

CHAPTER 5. DISCUSSION

This study aims to investigate e-Government website adoption by integrating two streams of research in the IS literature: the updated D&M model and trust. The purpose is, in particular, to (1) understand the role of trust in e-Government, especially in terms of trust in technology and trust in government; and (2) examine the relationship between trust and its consequent success as defined by the DeLone and McLean's framework of IS success. Data analysis shows a number of interesting results. This chapter discusses the findings and insights of the results. Findings of this study are summarized in the first section. The second section lists several limitations of this study. The following two sections discuss the implications for both research and practice. Finally, future directions are charted.

5.1   Summary of findings

There are many factors associated with e-Government website success. In order to identify the interrelationship between website attributes and trust, as well as their impact on the overall website success, this study conceptualizes e-Government website success within the DeLone and McLean's framework and links the D&M success variables with trust. I identify two dimensions of trust: trust in government and trust in technology, and suggest that trust towards an e-Government website will influence quality perceptions. This study corroborates previous studies on the importance of citizen trust in e-Government endeavor (e.g. Carter and Belanger 2005, Warkentin *et al.* 2002). However, the survey results do not support all hypotheses.

Given that many studies have tested the D&M model (e.g. Seddon 1997) and have

applied the D&M model in the e-Government context (Chang et al. 2005), the current

study differs from previous studies in two aspects. First, this study integrates trust into

the D&M model and finds that trust is a significant antecedent influencing the

succeeding "IS success constructs" proposed in the D&M framework. This finding

reveals the relationships between trust perceptions and quality perceptions. Second,

the results show few insignificant relationships among the D&M constructs. Given

that the relationships among the IS success variables in the D&M model are generally

supported (DeLone and McLean 2003), the results from the current study shed new

light on these relationships that may contribute to providing a more complete

understanding of the D&M model itself. In the following sections, I discuss these

differences in more details.

5.1.1   The importance of trust in the e-Government context

This study finds that trust in e-Government website is significantly associated with

perceived website quality, i.e. information quality, system quality, and service quality.

Post-hoc analysis shows that the relationship between trust and satisfaction is partially

mediated by perceived system quality and service quality, while the relationship

between trust and continuance intention is partially mediated by perceived

information quality. It also reveals that the role of trust varies across different usage.

In general, these results suggest that (1) building citizen's trust is indispensable for

e-Government websites' long-term success; and (2) trust will affect e-Government

website success through different mechanisms. Trust is found to be associated with

different usage of these websites. Thus, in the absence of trust building mechanisms,

citizens may feel reluctant to adopt and continue using e-Government initiatives. In

this sense, lack of trust may be one essential reason to explain the low visiting rate of many e-Government websites.

While this study finds that citizen trust is vital for e-Government website success, the results show that trust affects different quality perceptions to different extent. While trust in e-Government website explains 34% and 32% of the variance of information and service quality, it only explains 7% variance of system quality. Post-hoc analysis reveals that trust is not significantly related to system quality perception for citizens who use e-Government websites for messaging and transaction. The weaker link between trust and system quality indicates that system quality perception is often resulted from a more objective sense. As one respondent mentioned:

> *I think our online government is trustworthy, but you know, technology always has problems. The system will hang when I'm filing my annual tax online…I think it's because too many people are using it simultaneously. Then I have to reboot, and it may hang again… You can't help.*

By comparison, the stronger links from trust to information quality and service quality suggest that perceptions towards the information and services delivered online are more subjective. Citizens may not form their judgment of e-Government website information quality or service quality solely based on the manifest features of that website. This finding indicates that e-Government can be implemented not only with investment on the website, but also with offline trust-building mechanisms.

In summary, although trust in e-Government website is found to be a significant determinant for website quality perceptions as suggested by DeLone and McLean (2003), further research is required to provide deeper insight on trust-building mechanisms and their impact on different quality perceptions.

5.1.2   Difference between trust in government and trust in technology

This study also finds that trust in government and trust in technology have different impact on trust in e-Government website. First, trust in government is a significant predictor of trust in e-Government. One respondent has commented on the importance of trust in government in conducting online transactions with e-Government websites:

> *They have access to all our personal particulars. They know if we are married, have children, how old are our parents, and so on... It's a little bit scary, of course, to have all your information stored in their database. But in most cases I believe the government is doing the right job. They have our information, so they can predetermine the tax rebate amount for us, which makes things easier. I don't think they'll abuse our information, so it's quite safe using these e-services.*

Another said:

> *Trust is definitely important for e-Government. We have the least corrupted government in the world. It may not be thoroughly transparent, but it's more transparent than many other countries. You can simply follow what they say and don't need to worry whether your information will be abused when you provide your information to them... I have confidence in our government, so I'm willing to use the e-service they provide.*

For information needs served by the e-Government websites, one respondent mentioned:

> *I think that all the information provided on the government websites is trustable. Of course, this is something to do with the government reputation among the public.*

These quotes indicate that trust towards the online information and services provided by the e-Government website is determined by citizen's trust in the government, i.e. whether the offline government agencies provide reliable information and services to citizens. Citizens will form their perceptions of the e-Government website trustworthiness based on their perceptions of the government itself. Apart from trust in government, trust in technology is found insignificant in predicting trust in

e-Government for the whole sample. The post-hoc analysis shows that trust in technology is significant only when active interactions and transactions are involved in e-Government usage. This result is similar to Lee and Turban's (2001) finding that trust in the technology medium is not significantly related to customer's intention to do online shopping. This finding indicates that the impact of trust in technology is contingent on the nature of usage. When the respondents were asked to comment on the role of technology in the services provided by e-Government websites, it is quite surprising that almost all of them expressed their concerns over online transactions. None of the interviewees believe that Internet transactions are safe. One mentioned:

> *Technology is bound to have problems one of these days. This is not a problem if I only use these websites for information search, but it's definitely a problem if I'm about to provide my information to them. We are just normal users who have no knowledge of all the background processing, software and hardware.*

Another said:

> *I don't quite trust technology. There are quite many "fraud websites" these days and you can only be careful by yourself, such as type the URL and avoid clicking on shortcut links. You can't be too careful on this...So I type every time for online transactions, although I've not yet seen a fraud CPF website till today.*

Technological and security concerns do not exist when citizens are not providing any personal information to the website. Trust in technology is important when citizens feel that the desired outcome from their interaction with an e-Government website will be hampered by technical flaws or weaknesses, which is related to the nature of the task the citizen has to complete with the website. Hence, while trust in government is a significant antecedent of citizen's trust towards an e-Government website, trust in technology appears to play a less determinant role for e-Government and is likely to matter when online activities with the website involve high interaction with technology, such as engaging in online transactions. However, since more online

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services are going to be put online as e-Government evolves, enhancing trust in technology may still be important for e-Government website success.

5.1.3 The complex nature of e-Government use

The results show that some interrelationships suggested by the updated D&M model are insignificant. First, only information quality perception is directly related to intention to continue using a particular e-Government website. This finding can be explained by the nature of e-Government website usage. A citizen will use an e-Government website for information search and/or online services which involve transactions with the government agencies; hence fulfilling citizen's information and transaction needs are two basic functions of an e-Government website (Layne and Lee 2001, Lee *et al.* 2005). However, information needs and transaction needs differ in frequency and mandate level. On one hand, much public information is available on most Singapore e-Government websites. Many respondents mentioned their information needs in using government website:

> *I have to check the MOE [Ministry of Education] websites regularly because I'm under MOE teaching scholarship. Basically, I will get some updated information such as any activities or seminars held by MOE and more important, adjustment of pay level.*

Another respondent also mentioned:

> *Because of my personal interests in the social services and volunteering scene, I often check out updates on the websites in the relevant government agencies such as MCYS [Ministry of Community Department], NCSS [National Council of Social Service], youth.sg. I'm also interested in what's happening in the arts scene so occasionally browsing through NAC [National Arts Council], helps me update myself on events that may be coming up. I enjoy picking up new skills so I'm always pleasantly surprised to browse through PA [People's Association] online to see what are the courses I may sign up for at a course center near me. The websites are always fun, fresh and appeal to a young audience like me who wants to get information about how to make meaningful use of our time.*

These quotes show that search for public information is a major activity for citizens to use e-Government websites. Under these circumstances, citizen's interactions with e-Government websites are a one-way process where they do not have to provide any private information to these websites. Yet citizens also use e-Government websites for personal information, such as checking and downloading CPF statements and balance sheets. However, no matter what kind of information needs is solved by the website, using e-Government websites for information is a less mandatory task compared to online transactions such as tax filing. Thus, information quality perception is related to continuance intention as citizens can have more options in deciding whether to use the website for future information needs. As a respondent said:

> *Singapore e-Government websites provide rich information and statistics so I used them for some research projects. I used singstats.gov to check regional economic data for my project in the "Asian Global Economy" course. It's a very rich information source and I believe it will be helpful for my future projects.*

On the other hand, online services are more mandatory. Citizens may continue using these services because no alternatives are actually available. As one respondent mentioned:

> *I have no choice because this is the only way to file tax since I have used it previous years. Government assumes you'll continue... actually it is very difficult to get through by phone. You have to wait, and never know when they'll answer your call. But email inquiry is more convenient...at least they assure you they'll reply within several working days.*

Therefore, compared to information quality, system quality and service quality appear more tolerable because of the mandatory nature of task. Many government services are characterized by such mandatory nature since the only alternative for citizens will involve a trip to the government agency and several hours in the queue. Hence, no matter how well the government provides online services, citizens may have to use

them as long as these websites provide the necessary functions. This is evident in the following quote:

> *The ICA website provides us with useful information for various applications, such as application for social visit pass for overseas friends who intend to visit this country, so that the applicants will be clear what documents need to be prepared for such application without paying a visit to the ICA department.*

Thus, in contrast with the situation of e-commerce websites (e.g. Zhang and Prybutok 2005), citizens' intention to continue using an e-Government website will depend mostly on their needs to do the task because their choices are much limited. This explanation is also supported by the post-hoc analysis where none of the quality perceptions are found significantly related to intention to continue using for active users (e.g. email inquiries and transactions).

5.1.4   Different impact of quality perceptions on satisfaction

The survey results show that information quality perception is not significantly associated with satisfaction for the original research model. Post-hoc analysis also indicates that information quality affects satisfaction only when citizens use the e-Government website for information needs. These results suggest that for an e-Government website, information quality plays a less important role in terms of citizen's overall satisfaction towards an e-Government website compared with service quality. The interview results also show that citizens hardly mention information quality when commenting on whether they are satisfied with Singapore e-Government websites. Rather, most respondents mentioned the convenience and efficiency of transactions through these websites:

> *I'm generally satisfied with Singapore e-Government websites because they are fast and convenient. I can now login with my I/C number and print all*

the forms for future reference. Now most tasks can be done at home, which
saves much of my time.

Singapore Government aims to be a world-class exploiter of information technology

(Srivastava and Teo 2005b) and has made an early start of e-Government. Singapore

citizens have been able to interact with the government through their first G2C

website, eCitizen Portal, since 1999 (Singapore e-Government Website 2006). Up to

the year of 2006, a total of 157 e-Government websites were listed on the Singapore

e-Government Website. According to Layne and Lee (2001), most e-Government

endeavors start by publishing public information online. However, providing

integrated public services are more focused in the later stages of e-Government

development (Layne and Lee 2001, West 2004). It can be extrapolated from this

argument that Singapore e-Government websites are already at a fairly mature stage

where online public information is regarded mostly as a fundamental function of these

websites. Actually, any online interactions with the government agencies are done

based on the necessary information and after years of e-Government development in

Singapore, citizens already presume that e-Government websites will provide

sufficient and accurate information. Thus, citizen's overall satisfaction towards

e-Government websites is more likely to be determined by the services provided by

the websites rather than the information on the websites when considering citizen's

general experience with e-Government websites. This suggests that enhancing the

quality of online services and the technical functionality is comparatively more

important in the later stage of e-Government development. However, as the post-hot

analysis reveals, if the website is solely used for information needs, perception of information quality still affects citizen's satisfaction.

The post-hoc analysis reveals that the impact of system quality on satisfaction also varies with different usage. System quality is found not significant for information search, but highly significant for active interactions and transactions. One reason for this finding is that system requirements may vary with different e-Government usage, e.g. information search or online transactions. Some respondents mentioned the high level of system involvement in conducting transactions:

> *I have had difficulties in filling online applications. When I applied for my passport online, they asked me to attach a photo to the e-form. It's big trouble, you know, because they asked for that exact size. It took me quite sometime to resize my picture, but the system still rejected my form and said the file is too big! So I had to adjust the resolution of my picture then…very troublesome.*

Therefore, the effects of quality perceptions on satisfaction also vary with different types of usage of e-Government websites. The role of system quality becomes more salient when the task with e-Government websites requires a higher level of system functionality. Compared to previous findings where quality variables generally has a positive effect on satisfaction (e.g. Seddon and Kiew 1994, Rai *et al.* 2002), this finding provides new insights for the D&M model and indicates that the different role of quality variables related to different tasks still requires a deeper understanding.

5.1.5   The mediating role of quality perceptions

The results show that the relationship between trust and satisfaction is partially mediated by system quality and service quality, while the link between trust and continuance intention is partially mediated by information quality. This finding suggests that building user's trust is necessary for e-Government website success, yet

trust affects e-Government website success in different ways. The significant link between trust and intention to continue suggests that implementation and adoption of e-Government websites can be improved by adding trust features to the websites. Therefore, many e-Government websites that have few visits may consider spending some resource on trust building with the citizens, either online or offline. On the other hand, the significant link between trust and satisfaction is consistent with previous research in the e-commerce context (e.g. Balasubramanian *et al.* 2003). Further, this study suggests besides the direct link between trust and satisfaction as suggested by Balasubramanian *et al.* (2003) and Yoon (2002), the mediating role of quality perceptions between trust and satisfaction also needs to be noted. Future research may provide a more complete view for the relationship between trust and satisfaction.

5.2   Limitations

This study has three limitations. The first limitation comes with the sample. Although Singapore is well developed in terms of e-Government, it is a small country compared to other bigger countries with more complex government structure. However, e-Government at different levels (e.g. central, federal, local, etc.) may face different objectives and challenges (Irani *et al.* 2005; Jorgensen and Cable 2002; West 2004). Future research can explore the role of trust in e-Government for different levels.

Second, results of this study indicate that there is a need to examine the nature of e-Government website usage in a more detailed manner. In operationalizing the D&M model, this study does not make a priori distinction of the nature of usage in conceptualizing use of e-Government website. However, as the results of post-hoc analysis reveal that the effect of trust and quality perceptions varies across different

usage, detailed examination is preferred in future research to give a more comprehensive view of e-Government website success.

Third, this study mainly focuses on the direct effects that trust may have on the IS success variables in the D&M model. However, the interaction effect of trust and other variables may provide other insights (Dirks and Ferrin 2001, Jarvenpaa *et al.* 2004). Since citizen's needs are the ultimate reason for them to use e-Government websites and quality perceptions may serve as a proxy for these needs, trust may also moderate the relationship between perceptions and adoption behaviors. Studying the interaction effects of trust and quality perceptions on use and/or satisfaction can extend our understanding of IS success (cf. Chin *et al.* 2003).

5.3   Implications for research

The results of this study have implications for research on (1) online trust, (2) IS success, and (3) e-Government.

5.3.1   Implications for research on online trust

This study has several implications for online trust research. First, this study examines the role of trust in predicting website success in the e-Government context. The online trust literature examines why and how trust matters in online activities (Shankar *et al.* 2002). Trust has been argued to be a vital enabler for a wide range of activities online, e.g. information searching, monetary transactions, and community interactions (e.g. Leimeister *et al.* 2005, McKnight *et al.* 2002b, Pavlou and Fygenson 2006, Ridings *et al.* 2002). However, most studies of online trust are done in the context of e-commerce where the adoption of these websites is mostly voluntary and plenty of alternatives are available for users. By examining the role of trust in the

e-Government context, this study widens our knowledge of online trust such that trust is an important predictor for continued use where usage is less voluntary and other options for the same task are much limited. Second, this study suggests different mechanisms by which trust may affect usage. Previous research on online trust has conceptualized trust according to TRA, where trusting beliefs are (1) positively related to attitudes and behavioral intentions, and (2) correlated with other beliefs (e.g. TAM beliefs) (Gefen *et al.* 2003, Pavlou 2003, Pavlou and Fygenson 2006). Based on the D&M model, however, this study reveals the quality perceptions, which are often understood as the outcome of the IT characteristics of a system (e.g. Nelson *et al.* 2005), are also a function of trusting beliefs which reside in the relationship between the online parties. However, how the formation of quality perceptions is affected by subjective beliefs and then leads to actual behaviors is beyond the scope of the current study and requires further research (Price and Shanks 2005).

Third, this study contrasts our normal conceptualization of online trust such that online trust is an outcome of the technological presentation of a website (Kim *et al.* 2004). Note that as this research is done in the post-adoption stage where citizens are supposed to have enough information and experience to form trusting beliefs, trust may have stronger influence on quality perceptions than for initial adoption because citizens may spend less effort to look for signs from the system itself to form quality perceptions. Yet considering that trust evolves over time, the intertwined relationship between trust and quality still requires further research. Fourth, the fully mediating role of quality perceptions on the relationship between trust and satisfaction also calls for deeper understanding of the link between these two variables (cf. Balasubramanian *et al.* 2003, Yoon 2002). Fifth, this study proposes two dimensions of citizen's trust in e-Government website and identifies different role of these

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dimensions regarding different nature of usage. This finding indicates that although a website can be viewed as an online party enabled by technology, beliefs of the party and beliefs of the technology may play different role in determining user's behavior. The results from the post-hoc analysis suggest that such difference, especially the insignificant role of trust in technology, is likely to be caused by different usage. This finding provides some insight for our understanding of trust towards the technology medium (e.g. Lee and Turban 2001).

5.3.2 Implications for research on IS success

This study also has implications for research on information systems success. The IS success literature focuses on understanding various success variables and their interrelationships. The D&M model proposes a high-order framework to conceptualize IS success and this framework is widely adopted in studying e-commerce (DeLone and McLean 2004, Straub and Watson 2001). However, the increasingly expanding impact of technology in different domains gives rise to the need for a broader understanding and conceptualization of IS success. By applying the updated D&M model in an e-Government context, this study provides three implications for the IS success literature. First, taking a long-term perspective, this study demonstrates the appropriateness of applying the updated D&M model to understanding IS success at post-adoption stage and suggests that placing intention to continue using can be a worthwhile alternative to the controversial "use" construct in the D&M model. This suggests that IS success literature and IS continuance literature can benefit from each other to provide a more comprehensive view of long-term success.

Second, the insignificant interrelationships among the success variables reported in this study call for deeper understanding of the nature of use. The results suggest that the interrelationships among the quality perceptions and recipient side variables under the updated D&M model may be contingent on the nature of use. Therefore, a careful examination of "IS use" is required for the conceptualization of online behaviors. However, up to now no one has explicitly addressed to what extent should "IS use" be conceptualized in detail, as well as how to break the "IS use" construct to details. Users may enact very different understanding and usage even towards the same technology (Orlikowski and Gash 1994) and usage patterns of a system may also change over time. Given the fact that technology is evolving fast nowadays, conceptualizing "IS use" appropriately will be a serious challenge to future research on IS success.

Third, this study extends the updated D&M model by integrating trust as an overall antecedent of quality perception variables. While DeLone and McLean (2003, 2004) claim that the updated D&M model is applicable in the growing e-commerce context, the findings of this study suggest that incorporating trust in the updated D&M model can provide a more complete understanding of e-Government website success.

5.3.3   Implications for research on e-Government

The newly emerged e-Government trend has attracted serious attention of researchers in the recent years. Most existing literature on e-Government is based on surveys and case studies documenting many "best practices" (e.g. Lee *et al.* 2005, Marchionini *et al.* 2003, United Nations 2005). Under the government-to-citizen (G2C) category, government's informational website is a common practice of e-Government endeavor in many countries. However, in developing e-Government websites to provide greater

citizen access to and interaction with the government, the driving force of such endeavor in many cases turns out to be a "technological initiative" rather than a "citizen orientation" (Srivastava and Teo 2005b). In this sense, e-Government websites should emphasize more on service delivery rather than technological functionality. Extrapolating from the online trust literature which is mostly done under the e-commerce context, this study finds that variables regarding the relationships between citizens and the government, i.e. citizen's trusting beliefs, is an overall antecedent of e-Government website success besides variables of technological features of the website. When the government agencies have developed practices to well organize and maintain online information and services, how these information and services are interpreted and accepted by the citizens still requires more research. Along with a few other studies (e.g. Carter and Belanger 2005, Warkentin *et al.* 2002), this study serves as a call for deeper investigation of factors associated with e-Government website success other than those from the technological perspective.

5.4   Implications for practice

The results of this study also have implications for government agencies that are providing or planning to provide online service delivery. As many countries have already caught on the bandwagon of e-Government, they are now facing the challenge of citizen's continued use of those e-Government websites. This study investigates two aspects for this purpose: (1) the IT attributes of an e-Government website; and (2) trust building in e-Government. The results indicate that (1) building citizen's trust is crucial in citizen's continued usage of e-Government websites besides putting resources directly to enhance the IT attributes of the websites; and (2) different IT

attributes of e-Government websites play different roles in citizen's continuance intention.

First, offline trust building mechanisms are indispensable in the e-Government endeavor, because citizen's quality perception of an e-Government website will largely depend on trust. Governments need to take action to establish trust. For example, the Singapore government has long been dedicated to building trusting relationship with the citizens when implementing e-Government. The National Trust Council (NTC) was formed in February 2001 and implemented the first nationwide TrustMark Program, the TrustSg seal. In the meantime, the government has also made effort to establish trust by manifesting top leadership commitment and raising citizen's awareness of e-Government. For example, at the launch of e-Government Action Plan II (eGAP II) in July 2003, the Deputy Prime Minister (now the Prime Minister) stated:

> *Ultimately, eGAP II is not about IT, but about changing the approach to Government. The default answer to any request is not to say 'no' and preserve the status quo, but to ask why the status quo should be remain... This is the biggest chance we are aiming for, which will go a long way to Remaking Singapore. (Singapore e-Government Website 2006)*

Second, the results from this study suggest that government agencies need to pay attention to the different roles of the IT attributes presented on an e-Government website. Providing relevant and accurate information is of vital importance to engage citizens in using these websites and to retain these citizens after initial adoption, especially at the beginning stages of e-Government. Compared to transactions or other administrative duties, information search is often much less mandatory and citizens can turn to alternative means if they fail to find information they need from the e-Government website. Therefore, government agencies need to focus on the

efficiency and effectiveness of their web content updating process (cf. Eschenfelder 2004). However, service delivery needs to be focused at later stages. For these e-services, citizens may not have alternatives for certain online government services and their continuance of these e-services can be largely due to their habit of using these services as long as the services ensure the functionality to finish their tasks. Hence, as long as an e-Government website can meet the basic requirements of service quality, initial adopters of these online services are likely to continue using them. In this sense, government agencies should focus on the reliability of their online service processes.

5.5   Future directions

This study attempts to integrate the updated D&M model and online trust in assessing e-Government website success. The results of this study chart three future directions: (1) the conceptualization and validation of the D&M model in different research context; (2) the role of trust in different online environment; and (3) a broader and deeper understanding of the e-Government phenomenon. First, this study shows that the updated D&M model can be applied to conceptualizing and investigating website success in many different contexts. Given that the Internet has already penetrated our daily life and many new trends and waves of Internet applications have emerged, the D&M model provides a useful framework to predict IS success in many different contexts. Further, this study point out that different nature of usage may lead to different results when applying the D&M model. Thus, future research should continue to test and refine the D&M model.

Second, the role of trust in the online environment still requires further research, especially in the e-Government context. This study conceptualizes trust as trusting

beliefs and regards these trusting beliefs towards a particular e-Government website as stable attributes of a citizen in the post-adoption stage. However, this study does not explicitly discuss the details of the dynamics of trust building that may involve different processes and different mechanisms, which has been already mentioned in previous trust literature (e.g. Warkentin *et al.* 2002, Zucker 1986). Trusting beliefs may evolve over time, and previous experience with the website may also impose a feedback effect on trust (Kim *et al.* 2004).

Third, the process of how trust leads to behavioral intention as well as how trust affects satisfaction also needs a more comprehensive understanding. This study broadens our understanding on this issue by demonstrating the mediating effect of quality perceptions. However, interaction effect of trust in the online environment also needs further study. Finally, the results of this study suggest that more research should be done on the topic of e-Government success so as to further identify and explain the impact of different success factors in different e-Government domains. E-Government is a global trend and covers a number of domains. Besides the relationship between citizens and the government, trust also matters in the G2B context where e-procurement with business partners is involved, as well as the G2G context where different government agencies need to cooperate for new government processes (e.g. Snijkers 2004). Future research may focus on these different e-Government domains.

Fourth, the current study mainly treats trust as an overall antecedent of e-Government website success. However, it is conceivable that other success variables in the revised D&M model can have reverse impact on trust itself. The e-Government literature has provided some insights on such reverse causality between trust and satisfaction (e.g.

Welch *et al.* 2005). Therefore, future research could also test such reverse causality

with temporal measures of actual use, satisfaction and trust.

CHAPTER 6. CONCLUSIONS

By integrating the updated D&M model and the online trust literature, this study proposes a model to assess e-Government website success in the post-adoption stage. The results suggest examining websites attributes, which are reflected by citizen's quality perception variables of the e-Government website, are not enough to explain the success of e-Government websites. Rather, trust is found to have positive influence on quality perceptions of e-Government websites. Further, this study proposes two dimensions of trust: trust in government and trust in technology, and finds that citizen's trust in e-Government website is positively affected by trust in government. Therefore, while website attributes, such as information quality, system quality, and service quality perceptions, are usually regarded as key success factors that will have impact on the adoption and continued use of e-Government websites, these perceptions are in fact staked by the trusting relationship between citizens and the government. However, the role of trust in technology is found to be contingent on the nature of usage. Hence, while trust building is vital to retain citizens for online public services, the nature of e-Government website usage also needs to be considered in designing trust-building mechanisms for online service delivery. Meanwhile, a few insignificant interrelationships between the success variables also call for deeper understanding of e-Government website success as well as IS success in general with regard to the nature of usage.

Both trust and the D&M model have attracted serious attention of IS scholars in the past few years. The current research has integrated these two research streams in the context of e-Government. By taking satisfaction and intention to continue using as

two final dependent variables, this study finds that factors from both theoretical

perspectives are not only good predictors of e-Government website success but also

inexorably intertwined. Future research will hopefully provide a more comprehensive

view of how countries can successfully engage citizens in their e-Government

endeavor.

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APPENDIX A. SURVEY QUESTIONNAIRE

> INSTRUCTIONS: The questionnaire consists of two parts: Part A and Part B. Please answer all questions of Part A before proceeding to Part B

PART A

SECTION I

Please write your personal details in the space provided or tick (√) the relevant choice

Faculty _____   **Year of Study**_____

Age (Years) _____   **Sex**   ☐   Male   ☐   Female

How long have you been using the Internet?   _____ **years**

How long have you been using the Internet to access Singapore Government websites ? _____ **years**

Please list up to five (5) Singapore Government Websites that you access and also indicate the broad reason for accessing in the table below (tick √ all the facilities that you use, an example is given) :-

Sl.No.	Name of the Agency	Browsing	Downloading	Messaging (e-mailing, etc.)	Transacting (Money)
Example:	ICA	√	√	√	
1					
2					
3					
4					
5					

SECTION II

Please respond to all statements below in SECTION II on a seven point scale as below by encircling the number of your choice.

①=strongly disagree	②=disagree	③=somewhat disagree	④=neither	⑤=somewhat agree	⑥= agree	⑦= strongly agree

Please circle the number that best reflects your views about the Internet in general

	Strongly disagree					Strongly agree	
The Internet has enough safeguards to make me feel comfortable using it	1	2	3	4	5	6	7
I feel assured that legal and technological structures adequately protect me from problems on the Internet	1	2	3	4	5	6	7
I feel confident that encryption and other technological advances on the Internet make it safe for me to transact there	1	2	3	4	5	6	7

Please circle the number that best reflects your views about Singapore Government

	Strongly disagree					Strongly agree	
I feel that government acts in citizens' best interest	1	2	3	4	5	6	7
I feel fine interacting with the government since government generally fulfils its duties efficiently	1	2	3	4	5	6	7
I always feel confident that I can rely on government to do their part when I interact with them	1	2	3	4	5	6	7
I am comfortable relying on the government to meet their obligations	1	2	3	4	5	6	7

PLEASE CHECK THAT YOU HAVE ANSWERED ALL QUESTIONS IN PART A

NOW PROCEED TO PART B

INSTRUCTIONS: Please choose **one** **SINGAPORE GOVERNMENT AGENCY WEBSITE** that you have used and answer all the questions in **Part B.** The word **WEBSITE** refers to your *chosen* government agency website. Please respond to all items in the context of the *chosen* Singapore government agency website.

My Chosen Singapore Government Agency WEBSITE is (Name)

_____

SECTION I

Please respond to all statements below in SECTION I on a seven point scale as below

①=never	②= very rarely	③= rarely	④=sometimes	⑤=often	⑥= very often	⑦= always

With reference to the chosen WEBSITE, how often is the following true?

	Never						Always
This WEBSITE provides sufficient information	1	2	3	4	5	6	7
Through this WEBSITE I get the information I need in time	1	2	3	4	5	6	7
I am satisfied with the accuracy of this WEBSITE	1	2	3	4	5	6	7
Information provided by this WEBSITE (i) meets my needs	1	2	3	4	5	6	7
(ii) is in a useful format	1	2	3	4	5	6	7
(iii) is clear	1	2	3	4	5	6	7
(iv) is accurate	1	2	3	4	5	6	7
(v) is up-to date	1	2	3	4	5	6	7
(vi) is reliable	1	2	3	4	5	6	7

SECTION II

Please respond to all statements below in SECTION II on a seven point scale as below.

①=strongly disagree	②=disagree	③=somewhat disagree	④=neither	⑤=somewhat agree	⑥= agree	⑦= strongly agree

With reference to the chosen WEBSITE, how well do the following describe your <u>perception</u>?

	Strongly disagree						Strongly agree
This WEBSITE is easy to use	1	2	3	4	5	6	7
This WEBSITE is user friendly	1	2	3	4	5	6	7
I find it easy to get this WEBSITE to do what I want it to do	1	2	3	4	5	6	7
I believe that this WEBSITE is cumbersome to use	1	2	3	4	5	6	7
Using this WEBSITE requires a lot of effort	1	2	3	4	5	6	7
Using this WEBSITE is often frustrating	1	2	3	4	5	6	7
This WEBSITE (i) provides dependable services	1	2	3	4	5	6	7
(ii) provides services at the times, it promises	1	2	3	4	5	6	7
(iii) gives prompt service to users	1	2	3	4	5	6	7
(iv) is responsive to users' request	1	2	3	4	5	6	7
(v) is designed with users' best interests at heart	1	2	3	4	5	6	7
(vi) is designed to satisfy the needs of its users	1	2	3	4	5	6	7

Please circle the number that best reflects your <u>intention to continue</u> using WEBSITE for interaction with the chosen Singapore Government agency

	Strongly disagree						Strongly agree
I intend to continue using this WEBSITE rather than discontinue it	1	2	3	4	5	6	7
My intentions are to continue using this WEBSITE than use any alternative means (e.g. offline interaction with the government agency)	1	2	3	4	5	6	7
I would not discontinue my use of this WEBSITE	1	2	3	4	5	6	7

Please circle the number that best reflects your <u>views</u> about the chosen WEBSITE

	Strongly disagree						Strongly agree
This WEBSITE (i) is trustworthy	1	2	3	4	5	6	7
(ii) seems to be honest and truthful to me	1	2	3	4	5	6	7
(iii) can be trusted	1	2	3	4	5	6	7

SECTION III

On the following scales of 1-7, (1 being the lowest and 7 being the highest) please circle the number which best reflects your <u>overall satisfaction</u> with the chosen WEBSITE

	inadequate						adequate
How adequately do you feel this WEBSITE meets your needs of interaction with the government agency?	1	2	3	4	5	6	7

	inefficient						efficient
How efficient is this WEBSITE in fulfilling your needs of interaction with the government agency?	1	2	3	4	5	6	7

	ineffective						effective
How effective is this WEBSITE in fulfilling your needs of interaction with the government agency?	1	2	3	4	5	6	7

	dissatisfied						satisfied
Overall, are you satisfied with this WEBSITE?	1	2	3	4	5	6	7

Please share your experiences with Singapore Government websites

_____
_____
_____
_____
_____
_____
_____
_____

THANK YOU

APPENDIX B. INTERVIEW PROTOCOL

The interviews with e-Government website users in Singapore were conducted in a semi-structured manner and the purpose was basically to understand citizen's usage of Singapore e-Government websites. Particularly, citizens were asked for their experience with these websites as well as comments on the survey results.

The interviews began with the following opening, informing the interviewees that this interview would be part of a study on Singapore e-Government website adoption (e.g. the website of CPF, ICA, MOE etc.) and then asked them to give comments on their experience with e-Government websites. Then the following questions were covered in the interview.

1. Could you give some examples on your using e-Government websites (e.g. information search, email inquiry, tax filing, or CPF transactions)?

2. Do you trust the government? Do you think the government is providing trustworthy information and sincere concerns on their websites?

3. What is your major concerns about using e-Government websites?

4. What is your perception of the Internet security? Do you trust the technology (e.g. the safety of the Internet)? How does security issues influence your experience with e-Government websites?

5. Based on your experience, **do you still want to use** the e-Government website? What will make you stop using it?

6. Are you satisfied with these websites? What makes you feel satisfied or dissatisfied?

APPENDIX C. LIST OF E-GOVERNMENT WEBSITES

Government Agency	URL	Frequency
Attorney-General's Chambers	http://www.agc.gov.sg/	3
Agency for Science, Technology and Research (A*STAR)	http://www.a-star.edu.sg/	1
Building and Construction Authority	http://www.bca.gov.sg/	1
Accounting and Corporate Regulation Authority	http://www.acra.gov.sg/	1
Centers for Disease Control and Prevention	http://www.cdc.gov/	1
Central Provident Fund Board	http://mycpf.cpf.gov.sg/	17
Defence Science and Technology Agency	http://www.dsta.gov.sg/	2
eCitizen - Your Gateway to All Government Services: Home	http://www.ecitizen.gov.sg/	4
Singapore Economic Development Board	http://www.edb.gov.sg/	2
Singapore Government Flu Website	http://www.flu.gov.sg/	1
Singapore Government Website	http://www.gov.sg/	2
Housing Development Board	http://www.hdb.gov.sg/	3
Health Sciences Authority	http://www.hsa.gov.sg/	1
Immigration & Checkpoints Authority (ICA) - Singapore	http://app.ica.gov.sg/	20
International Enterprise (IE) Singapore	http://www.iesingapore.gov.sg/	1
IPOS - Intellectual Property Office of Singapore	http://www.ipos.gov.sg/	1
Inland Revenue Authority of Singapore (IRAS)	http://www.iras.gov.sg/	3
Land Transport Authority	http://www.lta.gov.sg/	7
Monetary Authority of Singapore (MAS)	http://www.mas.gov.sg/	1
MenAfterWork	http://www.menafterwork.com/	2
Ministry of Community Development, Youth and Sports	http://www.mcys.gov.sg/	4
Ministry of Defence, Singapore	http://www.mindef.gov.sg	14
Ministry of Foreign Affairs, Singapore	http://www.mfa.gov.sg/	1

Government Agency	URL	Frequency
MIW-Singapore website for national service	http://www.miw.com.sg	24
Ministry of Education (MOE)	http://www.moe.gov.sg/	58
Ministry of Manpower	http://www.mom.gov.sg/	1
National Arts Council (NAC)	http://www.nac.gov.sg/	1
National Council of Social Service (NCSS)	http://www.ncss.org.sg/	1
National Environment Agency (NEA)	http://app.nea.gov.sg/	1
National Library Board (NLB) of Singapore	http://www.nlb.gov.sg/	3
National Parks Board	http://www.nparks.gov.sg/	1
National Service	http://www.htns.com.sg/	1
People's Association	http://www.pa.gov.sg/	3
People's Action Party	http://www.pap.org.sg/	1
Parliament Homepage	http://www.parliament.gov.sg/	2
Singapore Government SARS Website	http://www.sars.gov.sg/	1
Singapore Department of Statistics	http://www.singstats.gov.sg/	7
Singapore Institute of Planners	http://www.sip.org.sg/	1
Singapore Police Force	http://www.spf.gov.sg/	4
SSC Sports Web	http://www.ssc.gov.sg/	2
Singapore Statutes OnLine	http://statutes.agc.gov.sg/	2
Singapore Tourism Board	http://www.stb.gov.sg/	2
Straits Times	http://www.straitstimes.com/	1
Urban Redevelopment Authority URA)	http://www.ura.gov.sg	3
People's Action Party for the Young	http://www.youngpap.org.sg/	1
Total	**45**	**214**

This list contains the e-Government websites the respondents referred to. *Frequency* indicates the number of respondents that referred to that particular website to answer their survey questionnaire.