E-Government Web Portal Adoption: The Effects of Service Quality[1]

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ABSTRACT

E-government Web portal service quality is a critical factor that determines user's adoption and continuance use. The article examines Chinese citizens' adoption and continuance intention (CI) of e-government Web portal from the perspective of service level and service quality. Three types of user groups are identified based on the purposes of use and the primary activities: information acquisition, information exchange, and transaction processing. Service quality is measured by Web portal's information quality, design/function, reliability, security and privacy, and system responsiveness. A research model is proposed and tested using data based on a sample of 630 individual e-government Web portal users in China. Our findings revealed that Web portal's service quality affects user's adoption and continuance intention and the effect differs among different types of user groups. Finally, Implications of these findings are discussed.

1. INTRODUCTION

E-government services are typically delivered through Web portals built and maintained by the government. Web portal's quality, functionality, reliability, and security and privacy protection features affect the use of e-government services, hence, user's adoption of e-government systems. A Web portal is a website that brings information together and

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provides various functions such as search engine, news, email, financial news, and entertainment news, and many different applications, e.g., Yahoo.com.

By the end of 1990s, many governments had started to build and implement government Web portals, as an important part of e-government initiatives, to provide government services to their citizens. Initially, many government Web portals, similar to many commercial portals, are designed to provide citizen with information only. As a result of ICT and e-commerce advancement, many governments have extended Web portal's functions to additional services such as information exchange and transactional processing. However, the level of e-government services and the degree of maturity differs a great deal among different countries and different level of governments within a country. For instance, in case of Canada, the Canada Revenue Agency (CRA) (http://www.cra-arc.gc.ca), the federal government agency, has been taking the lead in e-government practices. Individual Canadian can access, through its Web portal, tax related information, download tax forms and file tax return online. For example, currently CRA receives about 2/3 of its annual tax filings through its Web portal.

There are many factors/variables that can affect the use of Web portal and Web-based application and ultimately the adoption and success of e-government. For the purpose of this paper, e-government adoption is examined from the perspective of user's continuance intention to use for different types of services, i.e., service level, as well as service quality. Specifically, it is argued that due to differences in citizen's intended use of e-government portals, there are differences in user's requirements in terms of service types and service quality. Hence the effect of Web portal's overall quality of services (in the form of information quality, reliability, security and privacy protection, and responsiveness) on user's satisfaction, perceived usefulness, and continuance use might differ among different user groups. Accordingly, three types of users are identified based on the primary purpose of the use of government Web portal: for information inquiry, for information exchange, and for transaction.

2. THEORETICAL BACKGROUND AND RESEARCH MODEL

Applying the Expectation-Confirmation Theory (ECT), Bhattacherjee (2001) studied (online banking) user's intention to continue using information systems (IS) and introduced IS Continuance Model (ISCM). According to Bhattacherjee (2001), among factors that affect user's IS continuance intention (CI), an important factor is user's satisfaction and perceived usefulness of the system based on his/her previous experience of use. In addition, it was found that user's satisfaction is affected by perceived usefulness and confirmation.

Similarly, other studies have found that user's perceived usefulness of the system determines user's satisfaction (Seddon and Kiew, 1994; Seddon, 1997; Alawneh et al., 2013). For example, it was found that system and information quality are important antecedents of user's perceived system's usefulness (Seddon and Kiew, 1994; Seddon, 1997),

while user's satisfaction is viewed as an important variable that moderates the relationship between IS characteristics (functions) and user's behavior. Alawneh et al., (2013) found that the following factors affect e-government user's satisfaction in the context of Jordan, e.g., security and privacy, trust, accessibility, awareness of public services, and quality of public services. In addition to individual users, efforts have been made to include other type of users such as business organizations as well as different level of government services and different geographical and demographical regions (Reddick and Roy, 2013; Detlor et al., 2013; Hsieh et al., 2013). For instance, Reddick and Roy (2013) conducted a study that investigates user's satisfaction of e-government from the perspective of business organizations in Canada. Detlor et al. (2013) examined the role of information quality in citizen's use of e-government Web portal in the context of community municipal portals and found that "information quality plays a critical but indirect role in influencing a person's use of a community municipal portal (p. 23)." Hsieh et al. (2013) reported results of a study based on data collected in Taiwan and concluded that to be more effective and efficient e-government Web portal design must consider differences in different level/region due to different size of population and citizen's background.

In the pursuit of our understanding of what make e-government Web portal more effective, researchers have been examining the issue from two aspects: e-government Web portal adoption using traditional technology adoption model (TAM) (Alshehri et al., 2012; Wangpipatwong et al., 2008) and e-government Web portal continuance use (CI) (Venkatesh et al., 2011). For the purpose of this paper, we report our results from the aspect of CI. As a subset of a large scale e-government study conducted in China, applying the model and concepts introduced in ISCM, this paper reports results that examine user's adoption of e-government Web portal and continuance intent. It is argued that user's continuance intent (CI) to use the system is determined by user's satisfaction (US) and perceived usefulness (PU). Perceived usefulness affects user's satisfaction. The following system's characteristics affect both satisfaction and perceived usefulness of the system: information quality (IQ), design and functions (DF), reliability (RL), security and privacy protection (SP), and system's responsiveness (RP). In addition, we argue and speculate that user's use and continuance intention are affected by their intended purpose, i.e., the primary purpose and activities for using the e-government services. For example, some individual users might use the e-government Web portal to acquire information and for individual use. Some individual might use it for transactions, e.g., paying property tax online or obtaining government services such as vehicle license plate registration and renewal. Still, some organizational users, i.e., those who work for business or other types of organizations, might need to use government Web portal to conduct businesses, or to perform business transactions. We believe that due to the differences in different users and user's intended use, it might be beneficial for Web portal designers to consider how to improve effectiveness of government services through Web portal.

2.1. User satisfaction, perceived usefulness, and continuance intention

Broadly speaking, the issue addressed in this paper falls in the domain of technology acceptance at individual level (i.e., Technology Acceptance Model) (Davis, 1989; Venkatesh et al., 2003) and IS success and ISCM (DeLone and McLean, 1992, 2003 and 2004). A number of studies (e.g., DeLone and McLean, 1992; Bhattacherjee, 2001; Cheung and Lee, 2011; Alshehri et al., 2012; Alryalat et al., 2012) have been conducted over the last two decades to examine the application of these models in online environment, i.e., e-commerce, e-learning, and e-government. It is found that, among other factors, user's satisfaction and perceived usefulness play important roles in user's intention to continue use the system. It's also found that user's satisfaction is affected by user's perceived usefulness of the system. By the same token, we believe that these findings are applicable to e-government Web portal use. Hence, the following hypotheses are proposed: user's satisfaction positively affects user's continuance intention to use the Web portal (H1); user's perceived usefulness positively affects user's continuance intention to use the Web portal (H2); user's perceived usefulness positively affects user's satisfaction (H3).

2.2. System's characteristics, user satisfaction and perceived usefulness

The impact of confirmation on user's satisfaction and perceived useful is considered in Bhattacherjee (2001). Although user's confirmation describes the general perception during the using process of the system, system's characteristics are not explicitly expressed. To gain a better understanding the causes of satisfaction and usefulness, one needs to include such system's characteristics as information quality, system's design and functions, reliability, responsiveness, and security and privacy protection in order to provide better theoretical explanation and useful guidance for system design and development.

In case of e-commerce and Web-based application portals, it was found that website's overall quality affects user's satisfaction (Lee and Lin, 2005; Yang et al., 2005; McKinney et al., 2002) and perceived usefulness (Chang et al., 2005; Lin and Wu, 2002), and trust (Tan et al., 2008; Teo et al., 2008). While there is no single definition, a website's overall quality and success can be generally described by using DeLone and McLean's framework for e-commerce success (DeLone and McLean, 2004). DeLone and McLean (2004) identified three antecedents that enable the use and user satisfaction: information quality, system quality, and service quality. Information quality refers to the content of the website (e.g., relevancy, accuracy, and timeliness of information). System's quality refers to the website's overall functional and non-functional design (i.e., navigation, usability, consistency, reliability, availability, and system's security and individual user's privacy protection). Service quality refers to the timely support provided to the website users (i.e., user's login support, fixing broken link). In this context, service quality refers to various characteristics of e-government Web portal. Based on previous

Table 1. Hypotheses: continuance intention, user satisfaction, perceived usefulness, and system quality

	Description
H1	User's satisfaction positively affects user's continuance intention to use the Web portal.
H2	User's perceived usefulness positively affects user's continuance intention to use the Web portal.
H3	User's perceived usefulness positively affects user's satisfaction.
H4a	Information quality is positively related to user's satisfaction.
H4b	Design and function is positively related to user's satisfaction.
H4c	Reliability is positively related to user's satisfaction.
H4d	Security and privacy feature is positively related to user's satisfaction.
H4e	Responsiveness is positively related to user's satisfaction.
H5a	Information quality is positively related to user's perceived usefulness.
H5b	Design and function is positively related to user's perceived usefulness.
H5c	Reliability is positively related to user's perceived usefulness.
H5d	Security and privacy is positively related to user's perceived usefulness.
H5e	Responsiveness is positively related to user's perceived usefulness.

discussion, we proposed a number of hypotheses (shown in Table 1) the relationships between e-government Web portal's characteristics and user satisfaction and perceived usefulness. Accordingly, a research model is proposed and shown in Figure 1 which describes the relationship between e-government Web portal's characteristics, user satisfaction and perceived usefulness, and continuance intention.

2.3. E-government Web portal and service level

The use of e-government Web portal is often different from using other types of Web portal such as e-commerce and e-learning applications in terms of user's objectives and requirements. For example, in case of e-government, users (citizens or organizations) may require different level of services. Some may use the e-government Web portal for information only (e.g., finding and downloading tax forms), some may use it for information exchanges (e.g., sending an email to government agencies to request certain services), some may use it to perform transactions (e.g., submitting annual tax return online). Often the use of these services is non-mandatory. Web portal's overall quality might have different effect on user's satisfaction and perceived usefulness depending on what the users want to do with their uses. Therefore it's important to consider the primary objectives of the users and the level of services provided. As such, some previous studies on e-government adoption (Howard, 2001; Bélanger and Carter, 2008) grouped users by the type of services or user's objectives for using the services. This study classifies

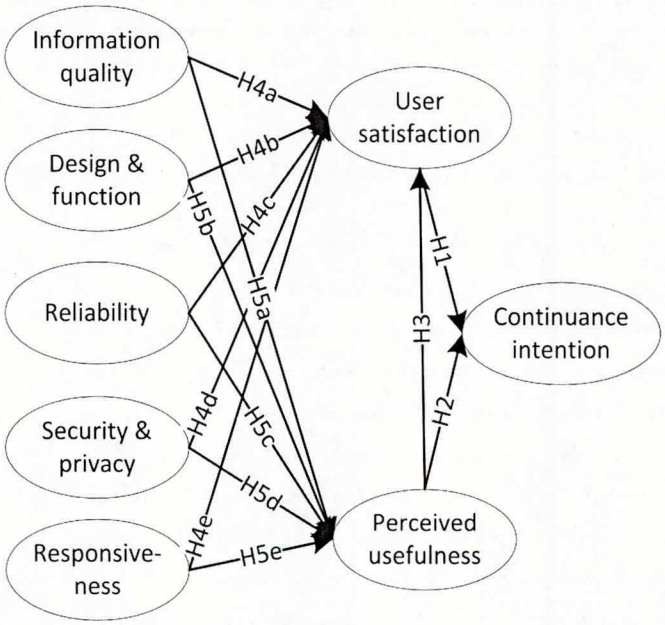

Figure 1. A research model of e-government Web portal continuance intention

e-government Web portal service level into three categories based on the primary objectives of the users: information acquisition, information exchange, and transaction processing. Information acquisition includes such activities as information acquisition (e.g., checking for information and file download). This is a one-way communication. At the information exchange service level, users can submit request for certain information and receive feedbacks from the website (e.g., sending a request for information by e-mails or by posting comments/request on bulletin board). The transaction processing level includes any kinds of transactions (e.g., online tax filing, paying license fee).

3. METHODOLOGY

A cross-sectional research design is used for the study. Measurement for each variables included in the research model were developed and the questions associated with each variable was adapted from previous studies. The targeted population is individual who has the Internet access and had used e-government Web portal. Data were collected by using an online questionnaire.

3.1. Research design

According to the classification characteristics of research design in Bryman and Bell (2007), it is obviously not possible and not appropriate to control the independent and the dependent variable in this study, so the experimental design is not suitable for the

study. Longitudinal design can reflect dynamic changes of individual behaviors in the time series. This research mainly discusses the relationship between variables, while not about the changes of each factor in time series, so the longitudinal design is not suitable for the study. The study discusses on the Chinese citizens' general behaviour, not on behaviour details of a particular person or an instance. So the case study design is not suitable for this study. Since this study emphasizes the localization research in Chinese context, so the comparison design is also not suitable.

As shown in Figure 1, the study speculates that individual's e-government Web portal continuance use intention is affected primarily by his/her satisfaction and perceived usefulness of the Web portal and that Web portal's overall features affect user's satisfaction and perceived usefulness. As such, a priori hypotheses are derived. From the characteristics of cross-sectional design, this study is the need to obtain more data in a relatively short period of time, to identify and validate the relationship between variables, so a cross-sectional research design (social survey design) and a questionnaire based data collection approach seem to be appropriate.

3.2. Measurement

Instrument is developed to measure each variables included in the research model. Questions associated with each variable were identified based on previous studies. In addition to demographic information, each question is scaled using 5 point Likert scale ranging from strongly agree (5) and strongly disagree (1) for each statement. Detailed description of each variable measurement can be found in Table 2 below.

Table 2. List of construct, measurement, and reference source

Construct	Measurement/Question	Source
Information quality (IQ)		
IQ1	Information on the website is updated in time.	Wixom and Todd, (2005), Wang and Liao(2008)
IQ2	Information on the website is accurate.	
IQ3	Information on the website meets my needs.	
IQ4	Information on the website is complete.	
Design and functions (DF)		
DF1	The website function is sufficient for me.	Wangpipatwong et al. (2009), Wolfinbarger and Gilly (2003)
DF2	The website provides me with personalized service function.	
DF3	The website has a clear navigation bar.	
DF4	The website is easy to use.	
DF5	The website is attractive.	

Table 2 (Cont.)

Reliability (RL)		
RL1	The website runs stably.	Chang et al. (2005), Wangpipatwong et al. (2009),
RL2	The website is available at all times.	
RL3	The website can perform the operation accurately.	
RL4	The website functions 24/7.	
Security and privacy protection (SP)		
SP1	The website can protect my personal privacy.	Wolfinbarger and Gilly (2003), Parasuraman et al. (2005)
SP2	The website does not misuse my personal information.	
SP3	The website has adequate security protection.	
SP4	Using transaction services provided by the website is safe.	
System responsiveness (RP)		
RP1	The website quickly responds the public problem.	Lee and Lin (2005). Collier and Bienstock (2006)
RP2	The feedback solves the user's problem.	
RP3	The website provides effective communication service.	
RP4	The website asks if I am satisfied and my requirements are met.	
Perceived usefulness (PU)		
PU1	The website provides useful information for me	Davis (1989), Gefen, and Straub (2000), Carter and Bélanger (2005)
PU2	The website provides valuable service for me	
PU3	Using the website improves my job efficiency	
PU4	In general, I think the website is useful	
User satisfaction (US)		
US1	I am satisfied with the service provided.	Lee and Lin (2005), Yang et al. (2005), Wang and Liao (2008)
US2	I am satisfied with the using experience.	
US3	Overall, I am satisfied with the website.	
Continuance intention (CI)		
CI1	I would like to continue to use the website.	Roca et al., (2006), Hsu and Chiu (2004)
CI2	I will continue to use the website.	
CI3	I will recommend the website to my relatives and friends.	

3.3. Sample and data collection

Since the targeted population for the study is individual citizen who has used e-government Web portal previously, it was decided that an online data collection approach be used since the potential respondents would have had access to the Internet. A data collection service provider, iResearch was hired to collect data (http://www.iresearchchina.com/). Data were collected over a 2–week period. Sample was randomly selected among

Table 3. Sample distribution (by user type, gender, and age)

User type	Information acquisition	Information exchange	Transaction
Number	268	187	175
(In %)	(42.5%)	(29.7%)	(27.8%)
Gender		Female	Male
Number		284	346
(In %)		(45.1%)	(54.9%)
Age		Number	In %
<19		23	3.7%
20–29		379	60.2%
30–39		175	27.8%
40–49		34	5.4%
50–59		16	2.5%
>60		3	0.4%

the Chinese Internet users from the database maintained by iResearch. A total of 932 online questionnaires were completed. After removing the conventional missing values (referring to the problems caused by lacking of some questions, which is unable to display as the browser restrictions), basic attribute missing values (referring to the contradiction in the sample's basic attributes, such as the age is greater than 45 years, while the occupation is student, while degree is lower than undergraduate), and after sample selection (removing the samples of all questions have the same answer), finally 651 valid questionnaires are recovered, the proportion of valid sample is 69.8%. Among the 651 usable samples, 21 were excluded in the final data analysis since they had indicated that they had not visited any e-government Web portal. This results a sample size of 630. To classify the samples according to service level, the following question is adapted from Jap and Ganesan (2000) and included in the questionnaire "What is your main purpose of using the e-government Web portal". Table 3 shows the sample distribution by respondent's user type, gender and age.

4. DATA ANALYSIS

Data analyses were performed to test 1) research instrument's reliability and validity and 2) research model validation.

4.1. Measurement instrument

Factor analysis was performed using SPSS for each dimension of Web portal characteristics measurement. The KMO value is 0.969 which indicates that the data collected meet

Table 4. Measurement instrument reliability

Factor	Item	Mean	Std.D	Loading	Alpha
IQ	IQ1	3.55	0.884	0.72	0.912
	IQ2	3.47	0.910	0.73	
	IQ3	3.39	0.879	0.75	
	RP1	3.16	1.052	0.83	
	RP2	3.27	0.987	0.85	
	RP3	3.36	0.950	0.81	
	RP4	3.16	1.003	0.72	
DF	DF1	3.45	0.906	0.78	0.880
	DF2	3.51	0.893	0.79	
	DF3	3.59	0.863	0.80	
	DF4	3.61	0.868	0.79	
	DF5	3.34	0.926	0.71	
RL	RL1	3.84	0.796	0.77	0.856
	RL2	3.78	0.854	0.78	
	RL3	3.64	0.859	0.80	
	RL4	3.67	0.886	0.75	
SP	SP1	3.56	0.807	0.78	0.854
	SP2	3.66	0.800	0.74	
	SP3	3.59	0.865	0.80	
	SP4	3.65	0.773	0.76	
PU	PU1	3.92	0.713	0.78	0.855
	PU2	3.80	0.748	0.82	
	PU3	3.80	0.829	0.78	
	PU4	3.95	0.796	0.72	
US	US1	3.68	0.861	0.80	0.879
	US2	3.63	0.864	0.88	
	US3	3.62	0.852	0.84	
CI	CI1	3.87	0.767	0.89	0.863
	CI2	3.92	0.751	0.90	
	CI3	3.56	0.900	0.71	

the factor analysis requirement. As result of analysis, a total of 4 factors emerged (with loading of >=0.5 for each item included). Results show that items included in information quality (IQ) and system's responsiveness (RP) converged into one single factor (information quality). One explanation is that the responsiveness is viewed by the respondents as

the quality of information due to the fact that users receive feedback (i.e., responses by Web portal) primarily in the form of information such as answers to inquiries, online help, and request status. Shown in Table 4, Cronbach's alpha for each item is between 0.85 and 0.91 which indicates that the measurement instrument's high reliability.

4.2. Research model and hypothesis testing

Research model was validated using a structural equation modeling technique. LISREL 8.7 software package is used for data analysis. Results of structuring equation modeling for three different types of user groups are presented in Table 5, and Figure 2, 3, 4.

As mentioned in Section 4.1, measurement items for "responsiveness" (RP) converged with items included in information quality (IQ), therefore, only one factor, IQ, is kept in the final model for data analysis.

Table 5. Results of structuring equation modeling: three type of user group comparisons

Index	Thresh-hold	Information acquisition	Information exchange	Transaction
χ^2/df	<5	2.30	1.99	1.68
RMSEA	<0.08	0.07	0.08	0.07
NFI	>0.90	0.98	0.94	0.96
NNFI	>0.90	0.99	0.97	0.98
CFI	>0.90	0.99	0.97	0.98
IFI	>0.90	0.99	0.97	0.97
GFI	>0.80	0.84	0.83	0.82
AGFI	>0.80	0.81	0.81	0.80

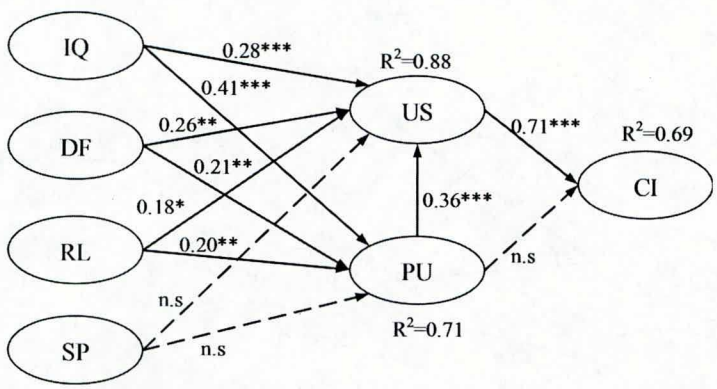

Figure 2. Information acquisition user group *p<0.05; **p<0.01; ***p<0.001; n.s. Non-significant

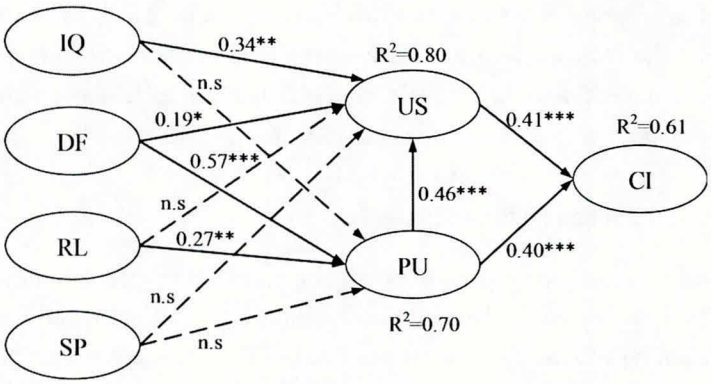

Figure 3. Information exchange user group *p<0.05; **p<0.01; ***p<0.001; n.s. Non-significant

Shown in Figure 2, 3, 4, for all three types of user groups, i.e., service level, with the exception of H2 in case of information acquisition user group, H1, H2, and H3 are supported. In other words, it's found that user's continuance use intention is positively related with user's satisfaction and perceived usefulness. And in all three groups it is found that perceived usefulness is positively related to user's satisfaction (PU→US: β=0.36, t-value=5.14, p<0.001; β=0.46, t-value=4.12, p<0.001; and β=0.37, t-value=3.78, p<0.001 for acquisition, exchange, and transaction user groups respectively). In the context of Web portal's features and their relationship with user's satisfaction and perceived usefulness, hypotheses are partially supported.

In case of information acquisition user group, all hypotheses are supported except H2 (i.e., User's perceived usefulness positively affects user's continuance intention to use the Web portal), and H4d and H5d (i.e., security and privacy feature is positively related to user's satisfaction and Security and privacy is positively related to user's perceived usefulness). In case of information exchange user group, H5a (i.e., information quality is positively related to user's perceived usefulness), H4c (i.e., reliability is positively related to user's satisfaction) and H4d (i.e., security and privacy feature is positively related to

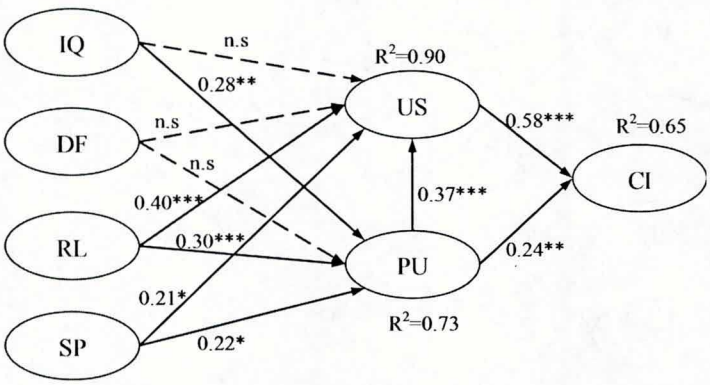

Figure 4. Transaction user group *p<0.05; **p<0.01; ***p<0.001; n.s. Non-significant

user's satisfaction) and H5d (i.e., security and privacy is positively related to user's perceived usefulness) are not supported. In case of transaction user group, H4a (i.e., information quality is positively related to user's satisfaction), H4b (i.e., design and function is positively related to user's satisfaction) and H5b (i.e., design and function is positively related to user's perceived usefulness) are not supported.

5. RESULT AND DISCUSSION

Applying IT/IS adoption theories, the study explored and tested the overall Web portal's service quality and its impact on user's continuance intention by service level. It's found that, among information exchange and transactional processing users, user's satisfaction and user's perceived usefulness of the Web portal affect the continuance intention. Among information acquisition users, user's satisfaction shows significant effect on user's continuance intention and perceived usefulness does not show significant effect on user's continuance intention.

From the perspective of Web portal's service quality and perceived usefulness, with the exception of security and privacy, information quality, design and function, and reliability show significant effect on perceived usefulness among information acquisition users (IQ→PU: $\beta=0.41$, t-value=3.87, $p<0.001$; DF→PU: $\beta=0.21$, t-value=2.72, $p<0.01$; RL→PU: $\beta=0.20$, t-value=2.62, $p<0.01$). For information exchange user group, Web portal's design and function as well as reliability were found to show significant effect on user's perceived usefulness (DF→PU: $\beta=0.57$, t-value=3.76, $p<0.001$; RL→PU: $\beta=0.27$, t-value=2.70, $p<0.01$). Information quality and security and privacy's effect on perceived usefulness were found non-significant for this group. For transaction user group, reliability, information quality, and security and privacy show significant effect on perceived usefulness (e.g., RL→PU: $\beta=0.30$, t-value=3.46, $p<0.001$; IQ→PU: $\beta=0.28$, t-value=2.68, $p<0.01$; SP→PU: $\beta=0.22$, t-value=2.60, $p<0.05$). The results are not unexpected and can be explained according to user's primary objective, i.e., service level, in using the website. For information acquisition users, their primary objective for using the government website is to seek and to acquire information. There is limited use for exchanging information and performing transactions in this context. Accurate, up-to-date, and reliable information is considered as the most important aspect, i.e., usefulness, of the website for this group of users. In addition, a well-designed, easy to use and reliable website allows information acquisition users to find and acquire information efficiently.

For information exchange users, their primary concern is to be able to send and receive information via government websites. For example, a user might want to send a request for information with regard to a specific taxation question, or send a request to create a user account, or contact a government agency for help via online chat (similar to many commercial business's online help desks). A Web portal is considered "useful" if it can enable a user to accomplish these tasks efficiently and effectively. Since information

exchange user's primary objective is not conducting transactions, security and privacy is considered as "less important".

For transaction user group, the data show that perceived usefulness is impacted by, with the exception of design and function, all of Web portal quality factors, i.e., information quality, reliability, and security and privacy. This result is expected since a useful system (i.e., Web portal) is expected to be reliable, secure, and with adequate and accurate information to complete a transaction. In case of design and function, our interpretation is that, compared with other non-functional factors such as security (and privacy protection) and system's reliability, design and function is considered by transaction user group as "a must have" or "a given" feature of a website. In other words, user cannot perform any transactions without functions being included in the Web portal.

From the perspective of Web portal's service quality and user's satisfaction, information quality shows the most effect on information acquisition user's satisfaction (IQ→US: $\beta=0.28$, t-value=3.60, $p<0.001$). This is followed by design and function, and Web portal's reliability (DF→US: $\beta=0.26$, t-value=3.12, $p<0.01$; RL→US: $\beta=0.18$, t-value=2.11, $p<0.05$). For information exchange user group, information quality, design and function shows significant effect on user's satisfaction (IQ→US: $\beta=0.34$, t-value=3.23, $p<0.01$; DF→US: $\beta=0.19$, t-value=2.06, $p<0.05$). For transaction users, reliability and security and privacy show significant effect on user's satisfaction (RL→US: $\beta=0.40$, t-value=4.07, $p<0.001$; SP→US: $\beta=0.21$, t-value=2.04, $p<0.05$).

From the perspective of perceived usefulness and user satisfaction, it's found that perceived usefulness is positively related to user's satisfaction in all three user groups. This result is consistent with theories in IT adoption, and evidences reported in many of previous studies in area of IT adoption, IS success and Web-based online applications (i.e., e-commerce, e-learning, and e-government). E-government Web portal, as a gateway between government and citizen (i.e., G2C), is no exception.

From the perspective of the level of impact of Web portal's service quality on user's continuance intention, it's found that (see data in Table 6 below): 1) for information acquisition users, information quality shows the most impact, followed by design and

Table 6. Web portal's service quality and its impact on user's continuance intention

Web portal features	Information acquisition user	Information exchange user	Transaction user
IQ	0.30	0.14	0.13
DF	0.24	0.41	-
RL	0.18	0.16	0.37
SP	-	-	0.22
Ordered degree of impact	IQ, DF, RL	DF, RL, IQ	RL, SP, IQ

function and reliability; 2) for information exchange users, design and function shows higher impact on other features; 3) for transaction users, reliability shows the most impact, security and privacy protection, information quality also show significant effect.

Overall, from the perspective of Web portal service quality, service level, perceived usefulness, user satisfaction, and continuance intention, data in this study indicates that 1) information quality shows significant effect on user's satisfaction and perceived usefulness for all three user groups with the most effect for information acquisition user group; 2) design and function shows significant effect on user's satisfaction and perceived usefulness which in turn affects continuance intention among information acquisition and information exchange users; 3) design and function however was not found to show significant effect on transaction user's continuance intention; 4) reliability affects user's continuance intention through user's satisfaction and perceived usefulness for all user groups, with the most effect among transaction users; 5) security and privacy protection shows significant effect, through user's satisfaction and perceived usefulness, on user's continuance intention for transaction user group. Its effect on information acquisition and information exchange users is not found to be significant.

6. CONCLUSION AND LIMITATION

In summary, the study provides evidences in citizen's continuance intention of using e-government services by examining the e-government Web portal (a.k.a., Website) from the perspective of service quality and service level. The service quality is operationalized by Web portal's information quality, reliability, Web design and functional features, security and privacy protection features, and Web portal's responsiveness. The service level is operationalized by the primary user objective for using the Web portal and determined by different user groups.

The finding of this study contributes to the literature in IT adoption by offering evidences in the context of citizen's use of e-government Web portal. It provides evidences of individual use (for personal and organizational use) and adoption of e-government services via e-government Web portal and establishes links between Web portal's service quality and citizen's adoption by the level of services provided.

Compared with previous TAM based studies in e-government Web portal adoption, this study contributes to the literature in the following ways. Using DeLone & McLean's IS Success Model as a research framework the study proposed, operationalized, and validated the service quality of the e-government Web portal. It provides evidence of e-government Web portal use and adoption in the following ways. With regard to service quality and CI, it was found that service quality affects indirectly (through user's satisfaction and perceived usefulness) user's CI. With regard to service level and CI, it was found that the effect of service quality on CI differs among different type of user groups. With regard to the service quality and the degree of impact on CI in terms of user groups, it was

found that the following service quality dimensions have significant effects on all three types of user groups, information quality, design and function, and system's reliability.

Practically, the finding of this study might be useful for system designer and developer in terms of building the e-government Web portal. Web portal can be designed and developed with citizen's primary objective in mind, i.e., providing different type (or multiple version) of website design based on service level requirement.

The study is limited by its research scope, data collection method, and source of data. One important issue not addressed by the study is the question of the differences, if any, between private for profit organizations and government institutions in the context of providing services through Web based technologies. For instance, in case of security and privacy protection, one of the most important requirements for any government website is to assure its citizen's privacy. On one hand, as it's believed that, unlike organizations in private sector such as commercial banks, government agencies cannot (or should not) set its security standards based on cost/benefit or trade-off for sake of ease of use in order to encourage more citizens to use services through the Internet. On the other hand, unlike many private for profit businesses, government agencies can typically force citizens to use services only through the Internet, e.g., distribution of tax form, passport and visa applications. What can be done to make sure that Web portal serves as a complimentary channel of services and communications to other means such as paper-based, face to face and phone call? Furthermore, do citizens expect more from public sector than private sector relating to services offered through Web portal? Should government build the Web portal according to service level? Or should government build the Web portal that provides a full service?

The finding is limited by the data collection method. Other methods such an in-depth interview and observation can complement and provide richer picture in our understanding citizen's use of e-government Web portal. The source of data might also limit the applicability of the findings in different context where different culture, political, economic, social, and technological differs. The data for this study were collected in China where much difference exists compared with western countries in terms of, particularly, social, cultural, and political systems. For example, from the aspect of institutional environment, China has very different political and legal systems compared with those of the west where command and control is still the dominant governance structure. The trust between citizens and government might differ between China and other countries. Ultimately, these contextual factors, i.e., macro environment factors, can and do affect citizen's adoption of e-government services.

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7. REFERENCES

Alawneh, A., Al-Refai, H., and Batiha, K. "Measuring User Satisfaction from e-Government Services: Lessons from Jordan", *Government Information Quarterly*, 30(3), 2013, pp. 277–288.

Alryalat, M., Dwivedi, Y.K. and Williams, M.D. "A Conceptual Model for Examining e-Government Adoption in Jordan", *International Journal of Electronic Government Research*, 8(2), 2012, pp. 1–31.

Alshehri, M., Drew, S., Alhussain, T. and Alghamdi, R. "The Effect of website Quality on Adoption of e-Government Service: An Empirical Study Applying UTAUT Model Using SEM", *The 23rd Australasian Conference on Information Systems*, Geelong, Australia, 2012, December 2–5.

Bélanger, F. and L. Carter, "Trust and Risk in E-Government Adoption", *Journal of Strategic Information Systems*, 17(2), June 2008, pp. 165–176 F..

Bhattacherjee, A. "Understanding Information Systems Continuance: An Expectation Confirmation Model", *MIS Quarterly*, 25 (3), 2001, pp. 351–370.

Bryman, A., and Bell, E. *Business research methods*, Oxford University Press, New York, 2007.

Carter, L. and Bélanger, F. "The Utilization of E-Government Services: Citizen Trust, Innovation and Acceptance Factors", *Information Systems Journal*, 15(1), 2005, pp. 5–25.

Chang, I.C., Li, Y.C., Hung, W.F. and Hwang, H.G., "An Empirical Study on the Impact of Quality Antecedents on Tax Payers' Acceptance of Internet Tax-Filing Systems", *Government Information Quarterly*, 22(3), 2005, pp. 389–410.

Cheung, C.M.K. and Lee, M.K.O. "Antecedents and Consequences of User Satisfaction with an e-Learning Portal", *International Journal of Digital Society*, 2(1), 2011, pp. 373–380.

Colesca, S.E. and Dobrica, L. "Adoption and Use of E-Government Services: The Case of Romania", *Journal of Applied Research and Technology*, 6(3), 2008, pp. 204–217.

Collier, J.E. and Bienstock, C.C. "Measuring Service Quality in E-Retailing", *Journal of Service Research*, 8(3), 2006, pp. 260–275.

Davis, F.D. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology", *MIS Quarterly*, 1989, 13(3), pp. 319–339.

DeLone W.H. andMcLean, E.R. "The DeLone and McLean Model of Information Systems Success: A Ten-Year Update", *Journal of Management Information Systems*, 19(4), 2003, pp. 9–30.

DeLone, W.H. and McLean, E.R. "Information Systems Success: The Quest for the Dependent Variable", *Information Systems Research*, 3(1), 1992, pp. 60–95.

DeLone, W.H. and McLean, E.R. "Measuring e-Commerce Success: Applying the DeLone & McLean Information Systems Success Model", *International Journal of Electronic Commerce*, 9(1), 2004, pp. 31–47.

Detlor, B., Hupfer, M.E., Ruhi, U. and Zhao, L. "Information Quality and Community Municipal Portal Use", *Government Information Quarterly*, 30(1), 2013, pp. 23–32.

Gefen, D. and Straub, D. "The Relative Importance of Perceived Ease of Use in IS Adoption: A Study of E-Commerce Adoption", *Journal of the Association for Information Systems*, 1, Article 8, 2000, pp. 1–28.

Howard, M. "e-Government across the Globe: How Will "e" Change Government?", *Government Finance Review*, 17(4), August 2001, pp. 6–9.

Hsieh, P.H., Huang, C.S. , Yen, D.C. "Assessing Web Services of Emerging Economies in an Eastern Country – Taiwan's e-Government", *Government Information Quarterly*, 30(3), 2013, pp. 267–276.

Hsu, M.H. and Chiu, C. M. "Predicting Electronic Service Continuance with a Decomposed Theory of Planned Behaviour", *Behaviour & Information Technology*, 23(5), 2004, pp. 359–373.

Jap, S.D. and Ganesan, S. "Control Mechanisms and the Relationship Life Cycle: Implications for Safeguarding Specific Investments and Developing Commitment", *Journal of Marketing Research*, 37(2), 2000, pp. 227–234.

Lee, G.G. and Lin, H.F. "Customer Perceptions of E-Service Quality in Online Shopping", *International Journal of Retail & Distribution Management*, 33(2), 2005, pp. 161–176.

Lee, G.G. and Lin, H.F. "Customer Perceptions of E-Service Quality in Online Shopping", *International Journal of Retail & Distribution Management*, 33(2), 2005, pp. 161–176.

Lin, C.S. and Wu, S. "Exploring the Impact of Online Service Quality on Portal Site Usage", *Proceedings of the 35th Annual Hawaii International Conference on System Sciences*, Big Island, Hawaii, USA, 2002, pp. 201–206.

McKinney, V., Yoon, K. and Zehadi, F. "The Measurement of Web-Customer Satisfaction: An Expectation and Disconfirmation Approach", *Information Systems Research*, 13(3), 2002, pp. 296–315.

Parasuraman, A., Zeithaml, V.A. and Malhotra, A. "E-S-QUAL: A Multiple-Item Scale for Assessing Electronic Service Quality", *Journal of Service Research*, 7(3), 2005, pp. 213–234.

Reddick, C. and Roy, J. "Business Perceptions and Satisfaction with e-Government: Findings from a Canadian Survey", *Government Information Quarterly*, 30(1), 2013, pp. 1–9.

Roca, J.C., Chiu, C.M., and Martinez, F. J. "Understanding E-Learning Continuance Intention: An Extension of the Technology Acceptance Model", *International Journal of Human-Computer Studies*, 64(8), 2006, pp. 683–696.

Seddon, P. "A Respecification and Extension of the DeLone and McLean Model of IS Success", *Information Systems Research*, 8(3), September 1997, pp. 240–253.

Seddon, P. and Kiew, M.Y. "A partial test and development of the DeLone and McLean model of IS success", *Proceedings of the International Conference on Information Systems*, 1994, pp. 99–110.

Tan, C.W., Benbasat, I. and Cenfetelli, R.T. "Building Citizen Trust towards E-Government Services: Do High Quality Websites Matter?" *Proceedings of the 41st Annual Hawaii International Conference on System Sciences*, Big Island, Hawaii, USA, 2008, pp. 217–227.

Teo, T.S.H., Srivastava, S.C. and Jiang, J. "Trust and Electronic Government Success: An Empirical Study", *Journal of Management Information Systems*, 25(3), 2008, pp. 99–131.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. "User Acceptance of Information Technology: Toward a Unified View", *MIS Quarterly*, 27(3), 2003, pp. 425–478.

Venkatesh, V., Thong, J.Y.L., Chan, F.K.Y., Hu, P.J.H. and Brown, S.A. "Extending the Two-Stage Information Systems Continuance Model: Incorporating UTAUT Predictors and the Role of Context", *Information Systems Journal*, 21(6), 2011, pp. 527–555.

Wang, Y. and Liao, Y. "Assessing Egovernment Systems Success: A Validation of the DeLone and McLean Model of Information Systems Success", *Government Information Quarterly*, 25(4), 2008, pp. 717–733.

Wangpipatwong, S., Chutimaskul, W. and Papasratorn, B. "Quality Enhancing the Continued Use of E-Government Websites: Evidence from E-Citizens of Thailand", *International Journal of Electronic Government Research*, 5(1), 2009, pp. 19–35.

Wangpipatwong, S., Chutimaskul, W. and Papasratorn, B. "Understanding Citizen's Continuance Intention to Use E-Government Website: a Composite View of Technology Acceptance Model and Computer Self-Efficacy", *The Electronic Journal of e-Government*, 6(1), 2008, pp. 55 – 64.

Wixom, B. H. and Todd, P. A. "A Theoretical Integration of User Satisfaction and Technology Acceptance", *Information Systems Research*, 16(1), 2005, pp. 85–102.

Wolfinbarger, M.F. and Gilly, M.C. "ETAILQ: Dimensionalizing, Measuring and Predicting E-Tailing Quality", *Journal of Retailing*, 79(3), 2003, pp. 183–198.

Yang, Z., Cai, S. and Zhou, Z. "Development and Validation of an Instrument to Measure User Perceived Service Quality of Information Presenting Web Portals", *Information & Management*, 42(4), 2005, pp. 575–589.