Understanding Citizen's Continuance Intention to Use e-Government Website: a Composite View of Technology Acceptance Model and Computer Self-Efficacy

Sivaporn Wangpipatwong [1], Wichian Chutimaskul [2], and Borworn Papasratorn [2]
[1] Bangkok University, Thailand
[2] King Mongkut's University of Technology Thonburi, Thailand
sivaporn.w@bu.ac.th
wichian@sit.kmutt.ac.th
borworn@sit.kmutt.ac.th

Abstract: This study aims to understand the fundamental factors influencing the citizen's continuance intention to use e-Government websites by using the Technology Acceptance Model (TAM) as a based theoretical model. Computer self-efficacy is adopted as an additional factor that influences the citizen's continuance intention to use e-Government websites. To empirically test the proposed research model, the web-based survey was employed. The participants consisted of 614 country-wide citizens with at least a bachelor's degree and an experience with e-Government websites. Regression analysis was conducted to test the model. The results revealed that perceived usefulness and perceived ease of use of e-Government websites and citizen's computer self-efficacy directly enhanced citizen's continuance intention to use e-Government websites. In addition, perceived ease of use of e-Government websites indirectly enhanced citizen's continuance intention through perceived usefulness.

Keywords: e-Government, technology acceptance model, computer self-efficacy, continuance intention

1. Introduction

In recent years, information and communication technology (ICT) has played a pivotal role in the digital economy. It currently becomes one of the core elements of managerial reform around the world. Without doubt, governments from all over the world are fully cognizant of this potential and thereby employ ICT to support government activities. Hence, electronic government, so called e-Government, has emerged. The Internet is indeed the most powerful and popular means of delivering e-Government.

By using e-Government websites, citizens can conveniently access government information and services and gain greater opportunities to participate in democratic processes (Fang 2002) as they can access government information and services anywhere and anytime. The time spent in traveling and waiting is reduced. Apart from that, online services are normally faster and more accurate than traditional services. From the government's point of view, the more citizens use e-Government, the more operation and management costs are reduced.

To obtain these benefits, the initial adoption and subsequent continued usage of e-Government websites by citizens are required. In general, an information system indicates that its eventual success depends on its continued use rather than first-time use (Bhattacherjee 2001; Limayem et al. 2003). Likewise, initial use of e-Government websites is an important indicator of e-Government success. However, it does not necessarily lead to the desired outcome unless a significant number of citizens move beyond the initial adoption and use e-Government websites on a continued basis. Furthermore, discontinuance may occur after the adoption of innovation if the system does not meet the user's needs regardless of its successful prior adoption (Roger 1995; Limayem et al. 2003).

To eradicate discontinuance, satisfaction is one of the salient factors. Oliver (1980) postulated that user's satisfaction of a system leads to continuance intention whereas dissatisfaction leads to discontinue subsequent use. Similarly, Roger (1995) mentioned that there are two types of discontinuance: replacement and disenchantment. A replacement discontinuance is a decision to reject an idea in order to adopt a better idea that supersedes it whereas a disenchantment discontinuance is a decision to reject an innovation as a result of dissatisfaction with its performance.

As for the case of e-Government, government should consider citizen's perceptions toward e-Government websites and investigate the significant factors influencing citizen's continuance intention to use e-Government websites. Whereas several recent studies (Carter and Belanger 2004; Phang et al. 2005; Treiblmaier et al. 2004; Wang 2002) have investigated the factors influencing the initial intention to use e-

Government websites, the investigation of continuance intention or intention to continue using e-Government websites has not been found yet.

This study therefore aims to understand the fundamental factors that influence the citizen's continuance intention to use e-Government websites by investigating data collected from citizens who have experienced e-Government websites. A very well-known model in information system literature, Technology Acceptance Model (TAM) (Davis 1989), and the concept of computer self-efficacy (Compeau and Higgins 1995) are composed into a model that reflects the continuance intention to use e-Government websites.

TAM is regarded as the most prominent model because it includes factors which are specific, simple, easy to understand, and can be manipulated through system design and implementation. Additionally, it has not yet been apparently validated in the context of e-Government website continuance. When applied in the context of ongoing use, continuing capability to overcome obstacles is necessary for continuance intention. As such, computer self-efficacy - a belief of one's capability to use the computer to accomplish of a task (Compeau and Higgins 1995) - is then integrated into TAM.

For contribution, this study is the first study to understand continuance intention to use e-Government websites by using the Technology Acceptance Model (TAM) incorporated with computer self-efficacy. As such, it is the first study that empirically confirms the excellence of the Technology Acceptance Model (TAM) in predicting e-Government website continuance intention. It also provides a theoretical foundation for researching e-Government website continuance in the future.

To the practitioners (or governments in this context), this study provides a useful guideline for achieving better e-Government websites and increasing citizen's continuance intention by identifying specific continuance intention factors which are simple, easy to understand, and can be manipulated through system design and implementation. It thereby assists governments in considering the findings for development and evaluation of e-Government websites.

2. Theoretical developments

The research model used to guide the study is shown in Figure 1. In the following, the meaning and the theories supporting the relationship are presented.
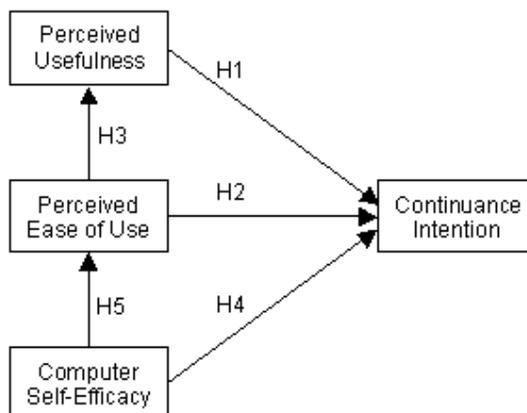

Figure 1: Research model of citizen's continuance intention to use e-Government websites

2.1 Technology acceptance model (TAM)

Technology Acceptance Model (TAM) (Davis 1989), adapted from the Theory of Reasoned Action (TRA) (Fishbein and Ajzen 1975), posits that user's behavioral intention is the single best predictor of actual system use. Behavioral intention is, in turn, determined by two particular beliefs, namely perceived usefulness and perceived ease of use**.**

Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, p. 320), whereas perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p. 320). Further, TAM suggests that perceived usefulness is influenced by perceived ease of use because the easier a system is to use, the more useful it can be.

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TAM is considered as one of the most influential and commonly employed theories for explaining an individual's acceptance of information systems (Lee et al. 2003) because it suggests a small number of factors − perceived usefulness and perceived ease of use − which jointly account for usage. These factors are specific, simple, easy to understand, and can be manipulated through system design and implementation (Taylor and Todd 1995a). Furthermore, it has been tested several times in empirical research and the tools used with the model have proven to be of quality and have yield statistically reliable results (Legris et al. 2003; Moon and Kim 2001).

Although TAM has generally been used to explain users' initial intention to adopt an information system after a brief period of interaction with the system, it has also been employed for predicting users' intention to use an information system after having a long period of experience with the system. Taylor and Todd (1995b) illustrated that TAM can be applied to understand the behavior of both inexperienced and experienced users, with different emphasis on the determinants of intention. In addition, TAM has been used in longitudinal studies (Venkatesh and Davis 2000; Venkatesh and Morris 2000; Kim and Malhotra 2005) and the studies confirmed that both perceived usefulness and perceived ease of use remain significant determinants of behavioral intention over time, as well as the significant influence of perceived ease of use on perceived usefulness. This evidence implies that TAM trends to appropriate for predicting the intention to continue using the information system. Therefore, this study postulates that:

> *H1: Perceived usefulness of e-Government websites will positively influence citizen's continuance intention to use e-Government websites.*
>
> *H2: Perceived ease of use of e-Government websites will positively influence citizen's continuance intention to use e-Government websites.*
>
> *H3: Perceived ease of use of e-Government websites will positively influence perceived usefulness of e-Government websites.*

Nevertheless, researchers suggested that there is the need for TAM to be given additional factors or incorporated with other IT acceptance models to provide an even stronger model and account for specific task (Legris et al. 2003; Lu et al. 2003; Moon and Kim 2001). When applied in the context of ongoing use, continuing capability to overcome obstacles would be necessary for continuance intention. Hence, computer self-efficacy is integrated into TAM as an additional factor.

2.2 Computer self-efficacy

Compeau and Higgins (1995, p. 191) defined computer self-efficacy as "an individual's perceptions of his or her ability to use computers in the accomplishment of a task". The definition is based on the concept of self-efficacy introduced by Bandura (1986, p. 391) as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not only with the skills one has but with judgments of what one can do with whatever skill one possesses".

Besides, Compeau and Higgins (1995) discussed three distinct but interrelated dimensions of self-efficacy: magnitude, strength, and generalizability in the context of computer usage. Individuals with a high computer self-efficacy magnitude would see themselves as able to accomplish difficult computing tasks and would judge themselves as capable of operating with less support and assistance than those with lower computer self-efficacy magnitude. Individuals with high computer self-efficacy generalizability would expect to be able to competently use different software packages and different computer systems, while those with low computer self-efficacy generalizability would perceive their capabilities as limited to particular software packages or computer systems. Also, individuals with low computer self-efficacy strength will be frustrated more easily by obstacles.

Studies of computer self-efficacy suggest that computer self-efficacy is a significant determinant of an individual's decision to use computers. Hill et al. (1987) reported that computer self-efficacy influences an individual's expectation of the outcomes of using computers and ultimately affects his/her decision to use computers. Compeau and Higgins (1995) also reported that computer self-efficacy plays an important role in shaping an individual's feeling and behavior. Individuals with high computer self-efficacy used computers more frequently, derived more enjoyment from their use, and experienced less computer anxiety.

Importantly, in the context of e-Government, Wangpipatwong et al. (2005a) empirically confirmed that the adoption of e-Government websites depends on the computer self-efficacy of citizens. Thus, this study proposes these set of hypotheses:

H4: Computer self-efficacy of citizen will positively influence citizen's continuance intention to use e-Government websites.

H5: Computer self-efficacy of citizen will positively influence perceived ease of use of e-Government websites.

3. Research methodology

3.1 Participants

The participants of this study were 614 citizens who hold a university degree and currently live in 46 provinces of 76 provinces across Thailand. The majority of the participants are living in the capital of Thailand (Bangkok) and vicinity (77.4%), followed by the central region (9.8%), the northern region (5.7%), the northeast region (3.6%), and the southern region (3.6%) as shown in Table 1.

Table 1: Living region of participants

Region	Frequency	Percent
Bangkok and vicinity	475	77.4
Central	60	9.8
North	35	5.7
Northeast	22	3.6
South	22	3.6

Demographic characteristics of the overall participants are presented in Table 2. The proportion of gender of participants is equal. Most of them are between 21–30 years of age (64.0%), have a bachelor's degree (54.9%), work in private sectors (58.8%), and have monthly income between 10,001–20,000 Baht (36.6%).

Table 2: Demographic characteristics of participants

Characteristics		Frequency	Percent
Gender	Female	307	50.0
	Male	307	50.0
Age	21–30 years	393	64.0
	31–40 years	179	29.2
	41–50 years	35	5.7
	Older than 50 years	7	1.1
Highest Level of Education	Bachelor's Degree	337	54.9
	Master's Degree	268	43.6
	Doctorate Degree	9	1.5
Occupation	Student	51	8.3
	Government Employee	113	18.4
	State Enterprises Employee	30	4.9
	Private Sector Employee	361	58.8
	Self Employment	54	8.8
	Unemployed	3	.5
	Retiree	2	.3
Monthly Income	Lower than or equal to 5,000 Baht	12	2.0
	5,001–10,000 Baht	75	12.2
	10,001–20,000 Baht	225	36.6
	20,001–30,000 Baht	130	21.2
	Higher than 30,000 Baht	172	28.0

As required by this study, all participants have experienced e-Government websites. Participants' experience with e-Government websites is illustrated in Table 3. The most frequently mentioned experience is searching, inquiry, or complaint (79.3%), followed by online transactions (68.2%) and downloading forms (60.7%).

Table 3: Participants' experience with e-Government websites

Experience	Frequency	Percent
Search/Inquire/Complain	487	79.3
Conduct Online Transaction	419	68.2
Download Form	373	60.7

Note: Participants could tick all that apply.

The dispersion of participants in this study is comparable to Internet user profile of Thailand wherein Internet users are concentrated in Bangkok and vicinity and the rest are distributed in other regions with nearly equivalent proportion (NECTEC 2005). Figure 2 shows the participant dispersion in this study compared to the Internet user profile of Thailand.
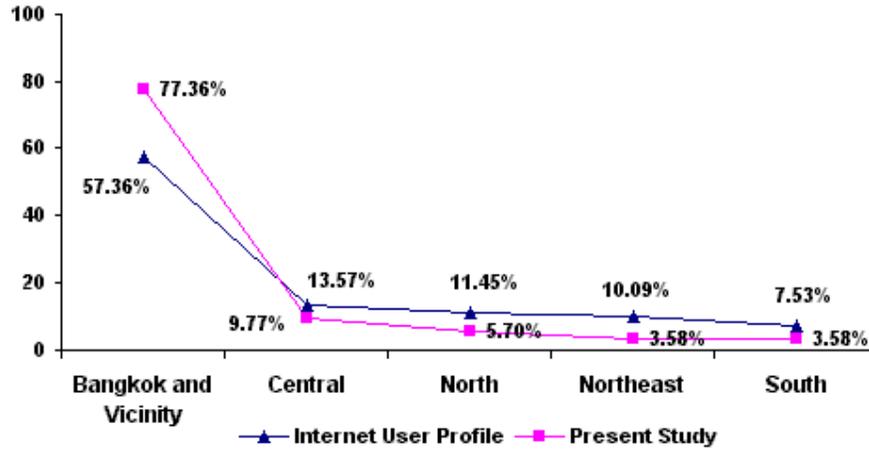

Figure 2: Dispersion of participants compared to Internet user profile of Thailand

3.2 Instrument development

The surveyed items were adapted from previous studies. The items for measuring computer self-efficacy were adapted from Compeau and Higgins (1995). The items used to measure perceived usefulness and perceived ease of use were adapted from Technology Acceptance Model (TAM) with some modification to reflect the context of e-Government websites. The measures of continuance intention to use were adapted from the measures of intention to use of Technology Acceptance Model (TAM) with modification to reflect the intention to continue using e-Government websites. To measure perceived usefulness, perceived ease of use, citizen's computer self-efficacy, and continuance intention to use, 5 items, 4 items, 3 items, and 3 items were used respectively. Each item was rated on a scale of 1 to 5 (Strongly Disagree to Neutral to Strongly Agree). A list of all items is provided in Table 4.

Table 4: List of items in survey

Construct	Items	
Perceived Usefulness (PU)	PU1	Using e-Government websites enables me to accomplish tasks more quickly.
	PU2	The results of using e-Government websites are apparent to me.
	PU3	Using e-Government websites can cut traveling expense.
	PU4	Using e-Government websites can lower traveling and queuing time.
	PU5	Using e-Government websites enables me to do business with the government anytime, not limited to regular business hours.
Perceived Ease of Use (PEOU)	PEOU1	I can easily login to e-Government websites.
	PEOU2	Getting the information that I want from e-Government websites is easy.
	PEOU3	It is easy for me to complete a transaction through an e-Government website.
	PEOU4	The organization and structure of e-Government websites is easy to follow.
Computer Self-Efficacy (CSE)	CSE1	I feel confident working on computer although there was no one around to tell me what to do.
	CSE2	I feel confident troubleshooting computer problems.
	CSE3	I feel confident using software that I have never used before.
Continuance Intention (CI)	CI1	In the future, I would not hesitate to use e-Government websites.
	CI2	In the future, I will consider e-Government websites to be my first choice to do business with the government.
	CI3	In the future, I intend to increase my use of e-Government websites.

The questionnaire was originally designed in English and then translated into Thai for the survey. Afterwards, the Thai version of questionnaire was checked and translated back into English by an independent translator to ensure there was no loss of meaning during the translation as suggested by Zikmund (2003). The process showed there were no discrepancies between the two versions. In addition to the back-translation process, the validity and the reliability of the instrument were confirmed.

The validity of the questionnaire, the ability to measure what it is supposed to measure (Zikmund 2003), was strengthened through an extensive review of the literature and an agreement among professionals in both information technology and statistics areas. In addition, the pretest through 25 convenience samples was employed to determine if the intended audiences had any difficulty understanding the questionnaire and whether there were any ambiguous or biased questions. Based on the feedback of the pretest, one reverse word item was dropped since it caused confusion.

To ensure that the measurement items are measuring the same construct, Cronbach's alpha was employed to measure the internal consistency of multi-item scales. The results of the reliability analysis are presented in Table 5. As the table shows, the reliability analysis gave alpha coefficients exceeding .70 which are typically regarded as an acceptable reliability coefficient (Nunnaly 1978). Furthermore, the reliability analysis results show that the alpha coefficients would not be higher even though an individual item is removed from the scale. This implies that no items contributed to a low internal consistency. Therefore, items measuring the construct dimensions are acceptable and reliable.

Table 5: Descriptive statistics of items and Cronbach's Alpha

Construct	Mean	SD	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
Perceived Usefulness (PU)				.878
PU1	3.024	.889	.868	
PU2	2.927	.864	.870	
PU3	3.643	1.003	.832	
PU4	3.713	1.056	.826	
PU5	3.550	1.110	.858	
Perceived Ease of Use (PEOU)				.872
PEOU1	2.893	.858	.871	
PEOU2	2.813	.825	.815	
PEOU3	2.933	.840	.807	
PEOU4	2.860	.845	.851	
Computer Self-Efficacy (CSE)				.745
CSE1	4.469	.860	.714	
CSE2	3.640	1.117	.590	
CSE3	3.389	1.023	.623	
Continuance Intention (CI)				.873
CI1	3.235	.937	.838	
CI2	3.142	1.013	.788	
CI3	3.319	.955	.833	

3.3 Data collection

A web-based survey with a probability list-based method, which samples participants based on a list, was employed to collect data in order to eliminate costs, data coding time, and human-error, and to easily reach citizens in different geographic areas across the country. In addition, the bundled script program was used to check and advise participants, thereby ensuring that all items in the questionnaire were filled in completely and appropriately. To take steps toward ensuring the integrity of the data, the IP address of each participant and the time used for completing the survey were recorded.

After the survey was uploaded to the server, the 3,600 invitations for participation, including a link to the website, were randomly emailed to an alumni mailing list of a variety of faculties (i.e. science, agriculture, engineering, pharmacology, liberal arts, business administration, information technology, and humanities) of five universities across five regions of Thailand. The selection of these five universities resulted from a three-stage sampling. First, a stratified sampling was performed to cluster Thailand into five regions. Second, a simple random sampling was done to select a university corresponding to each of the five regions. Third, simple random sampling was employed to select some email addresses corresponding to each of the five selected universities. Sending the invitation emails to the alumni mailing list can guarantee that the participants have experience with the Internet and hence probably enable us to reach citizens who have some experience with e-Government websites. In addition, previous studies indicated that e-Government websites are particularly popular among those who have at least a college education (Larsen and Rainie 2002; Wangpipatwong et al. 2005b). Finally, 1,159 e-mail addresses turned out to be invalid and the invitation emails could not be delivered to the recipients. However, there were 2,441 valid e-mails that did reach the recipients.

Responses to the survey were collected for a two-month period. Respondents were screened according to whether they had experience with e-Government websites. Only those who had previous experience continued with the survey. Out of 799 responses, 614 responses indicated experience with e-Government websites. All these 614 responses were then used in the analysis after they were verified to be valid and complete without any unusual data or multiple responses. The number of valid responses conformed to finite population sampling formula (Yamane 1973), along with a 95% confidence level and a 5% precision level.

3.4 Data analysis

A series of linear regression analyzes were performed to estimate the path coefficients (standardized regression weights, β). Together with the analysis, the assumptions of regression were examined. There were no problems associated with violations of the regression assumptions.

4. Analysis and results

Table 6 contains the descriptive statistics and correlation matrix for all constructs in the research model. As can be seen from the matrix, there is a significant relationship between the continuance intention (CI) and the rest of constructs, although the relationship varies in strength from one construct to the next. Overall, the correlations provided confidence that the measures were functioning effectively.

Table 6: Descriptive statistics and correlation matrix

| Construct	Mean	SD	Correlation Matrix			
			PU	PEOU	CSE	CI
PU	3.372	.811	1	.587**	.110**	.635**
PEOU	2.875	.716		1	.033	.493**
CSE	3.833	.819			1	.160**
CI	3.232	.865				1

** $p < .01$

Table 7 contains the results of regression analysis based on the relationships proposed in the research model and Figure 3 is a graphical depiction of the analysis results. To investigate hypothesis 1, 2, and 4, perceived usefulness, perceived ease of use, and computer self-efficacy were simultaneously regressed on continuance intention. The results revealed that the three constructs significantly accounted for 43.5% of the variance in continuance intention ($R^2 = .435$, F = 156.477, $p < .001$). Perceived usefulness (β = .514, t = 13.599, $p < .001$) was found to be the greatest influence on continuance intention, followed by perceived ease of use (β = .188, t = 4.999, $p < .001$) and computer self-efficacy (β = .097, t = 3.175, $p < .01$). Therefore, hypothesis 1, 2, and 4 were supported.

To investigate hypothesis 3 and 5, perceived ease of use was regressed on perceived usefulness and computer self-efficacy was regressed on perceived ease of use. The results revealed that about 34.4% of the variance in the perceived usefulness can be significantly accounted for by perceived ease of use ($R^2 = .344$, F = 321.010, $p < .001$; β = .587, t = 17.917, $p < .001$). On the other hand, computer self-efficacy had no influence on perceived ease of use ($R^2 = .001$, F = .650, $p > .05$; β = .033, t = .806, $p > .05$). Therefore, hypothesis 3 was supported whereas hypothesis 5 was rejected.

Table 7: Regression analysis results

Model		R^2		β		Hypothesis (Supported)	
(a)	CI = PU + PEOU + CSE	.435	***				
	PU			.514	***	H1	(Yes)
	PEOU			.188	***	H2	(Yes)
	CSE			.097	**	H4	(Yes)
(b)	PU = PEOU	.344	***	.587	***	H3	(Yes)
(c)	PEOU = CSE	.001		.033		H5	(No)

** $p < .01$;   *** $p < .001$
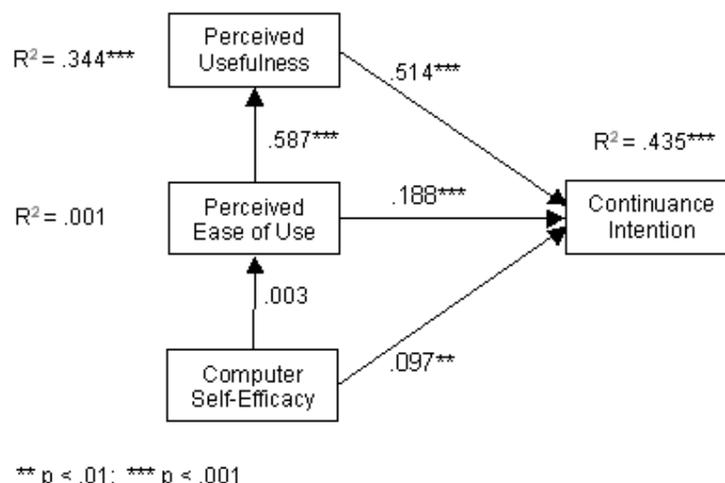
Figure 3: Model testing results

5. Discussion

The primary purpose of this study is to understand fundamental factors influencing the citizen's continuance intention to use e-Government websites. There are three interesting factors – perceived usefulness, perceived ease of use, and computer self-efficacy – based on the Technology Acceptance Model (TAM) and concept of computer self-efficacy literature. The participants in this study consisted of 614 country-wide citizens with at least a bachelor's degree and an experience with e-Government websites. Regression analysis was conducted to test the proposed hypotheses.

Consistent with TAM, the analysis results revealed that the citizen's higher perception of usefulness and ease of use of e-Government websites directly enhanced the level of the citizen's continuance intention to use e-Government websites. Perceived usefulness was the strongest predictor of continuance intention. This outcome yields the implication that usefulness is more interesting to some citizens than others.

In addition, perceived ease of use of e-Government websites indirectly enhanced a citizen's continuance intention through perceived usefulness. The influence of perceived ease of use on perceived usefulness was strong. This supports TAM which asserts the easier a system is to use, the more useful it can be. Hence, developing e-Government websites that are easy to use will enhance the usefulness of the websites and indirectly increase the continuance intention to use the websites.

The results also revealed that the citizen's computer self-efficacy was positively related to the continuance intention to use e-Government websites. Thus, the higher the computer self-efficacy of the citizen, the higher the continuance intention to use e-Government websites. The finding coincides with Compeau and Higgins' (1995) study that higher computer self-efficacy will contribute to higher computer usage. However, the results demonstrated that computer self-efficacy was the least significant predictor. A plausible explanation is that computer self-efficacy may diminish the significance when citizens gain increasing experience with e-Government websites. Contrary to our expectations, computer self-efficacy had no influence on perceived ease of use. This outcome may occur because computer self-efficacy does not specifically focus on the ability to use the Internet with respect to e-Government websites. Thus, further research may investigate the importance of Internet self-efficacy.

In practice, there is a need for government to understand the citizen's perceptions and factors influencing the continuance intention to use e-Government websites in order to increase the citizen's continuance intention and maintain better e-Government websites. Government should not only develop and maintain useful websites but it also needs to engage with the ease of use regarded to a variety level of the citizen's computer self-efficacy. Since perceived usefulness is considered the most significant factor, government should continue developing the websites which possess a competitive advantage (i.e. cost advantage and differentiation advantage) over the traditional way of services and publicize this advantage to the public. The citizen's understanding of these benefits will increase their intention to continue using e-Government websites. The government should promote the citizen's computer self-efficacy by organizing training courses

on various computer and Internet applications to increase citizen familiarity with computer and information technologies.

Before drawing definitive conclusion from these results, it is important to consider the study's limitations and future research directions. First, although the response rate of this study can be considered high in terms of a web-based survey, the mixed-mode survey which uses several ways of data collection together with the choice of completion method may be employed to increase responses. Second, this study intends to elicit data from knowledgeable citizens who are ready for e-Government. However, there are other citizens who have lower levels of education, lower income, and weaker computer self-efficacy. To regard the digital divide, future research should elicit the data from those citizens who have lower levels of education, lower income, and also citizens who lack access to the Internet. The differences among these groups of citizens should be further explored. Third, the roles of other factors that may correlate with continuance intention were not examined in this study. Thereby, there may be a need to search for additional factors in order to improve the ability to predict the citizen's continuance intention to use e-Government websites more accurately.

To conclude, the results from this study suggest that TAM together with computer self-efficacy can be applied to understand the citizen's continuance intention to use e-Government websites. Nevertheless, it is important to note that citizens place a different emphasis on the determinants of continuance intention. They focus primarily on perceived usefulness and perceived ease of use, but place less emphasis on computer self-efficacy.

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