



Received: 07 September 2018  
Accepted: 02 January 2019  
First Published: 04 January 2019

\*Corresponding author: Sulaiman Ainin, Department of Operations and Management Information Systems, Faculty of Business and Accountancy, University of Malaya, 50603 Kuala Lumpur, Malaysia  
E-mail: [ainins@um.edu.my](mailto:ainins@um.edu.my)

Reviewing editor:  
Guangchao Charles Feng, Shenzhen University, China

Additional information is available at the end of the article

## MEDIA & COMMUNICATION STUDIES | RESEARCH ARTICLE

# Malaysian urban poor adoption of e-government applications and their satisfaction

Liyana Shuib<sup>1</sup>, Elaheh Yadegaridehkordi<sup>1</sup> and Sulaiman Ainin<sup>2\*</sup>

**Abstract:** The aim of this research is to examine factors that influence citizens' adoption of the e-government applications in Malaysia. In addition, their satisfaction is also analyzed. The research model was developed based on the integration of the Technology Acceptance Model and Diffusion of Innovation as well as trust in the government, information quality, computer self-efficacy, and customer satisfaction constructs regarding e-government applications in Malaysia. The data was collected using a Likert-scale questionnaire from 801 Malaysian urban poor citizens. Results revealed that compatibility, relative advantage, image, trust in the government, computer self-efficacy, and customer satisfaction have significant impacts on the use of e-government applications. In turn, customer satisfaction was itself positively influenced by the use of e-government applications. This research has provided in-depth understanding of critical factors in enhancing adoption and citizens' satisfaction with e-government applications.

**Subjects:** ICT; Public Relations; Information Technology

**Keywords:** e-government applications; adoption; satisfaction

### ABOUT THE AUTHOR

The authors in this paper were involved in the research "ICT usage in delivering government initiatives and programs to the B40 group" (Grant number: RP032C-16SBS). This research group is headed by Sulaiman Ainin. Ainin is now attached to University of Malaya Halal Research Center and her research interest includes organizational performance, Information, Computer and Communication Technology (ICT), big data and social network. Shuib and Yadegaridehkordi are both from the Faculty of Computer Science and Technology, University of Malaya. Shuib's research interests include educational technology, information retrieval, recommender systems, and decision support systems. Yadegaridehkordi's research interests include big data analytics, tourism management, cloud computing, mobile learning, and recommendation systems. This paper is part of the larger research that was carried out on ICT usage among the B40 groups in selected areas in urban Kuala Lumpur.

### PUBLIC INTEREST STATEMENT

E-government applications are implemented in Malaysia to improve the quality of delivery of government services and to make it more efficient and effective. Its adoption however is still rather low, particularly among the urban poor communities. Hence, this study was as understand to understand the factors that influence e-government applications usage and their satisfaction towards it. It was found that compatibility, relative advantage, image, trust in the government, computer self-efficacy, and customer satisfaction have significant impacts on the use of e-government applications. Subsequently, satisfaction was observed to be positively influenced by e-government applications usage indicating that the users are satisfied with the applications.

## 1. Introduction

Electronic government (e-government) was originally considered the application of the Internet in the delivery of government services and activities. E-government is the latest form of government contribution in enhancing communications with citizens and organizations through modern connectivity and offers higher quality services, processes, and systems. From a broader perspective, it is the adoption of multimedia technologies and the Internet to ensure the accuracy, effectiveness, and efficiency of exchanged information and transactions among government leaders and all citizens and organizations (Lin, Fofanah, & Liang, 2011). As more and more citizens become aware of the unique services provided through the Internet, governments all around the world are highly interested in making their services more competent and accessible in order to gain more citizens' trust (Carter, Weerakkody, Phillips, & Dwivedi, 2016). Countries worldwide are implementing e-government (Ahmad and Othman, 2007). Apparently, Canada and the U.S. are the most successful developed countries in the context of e-government (Lin et al., 2011). However, discovery of the implications and status of e-government in developing and even less developed countries is still slower than anticipated (Bwalya, 2009; Carter et al., 2016). Despite the fact that successful e-government services are greatly dependent on the greater public engagement, governments are still struggling with the immature adoption status of e-government (Al-Hujran, Al-Debei, Chatfield, & Migdadi, 2015).

The e-government in Malaysia originated in 1996 with the introduction of the Multimedia Super Corridor (MSC) (Othman, 1997). One of the main priorities of the Malaysian vision 2020 is smooth implementation of government development programs to offer seamless online services to users, businesses, and the government through a connected public service (Ahmad and Othman, 2007). However, according to a comprehensive study conducted by the Economist Intelligence Unit, Malaysia places 24<sup>th</sup> among 43 countries in terms of its Government E-Payment Adoption Ranking (GEAR). These results indicate that Malaysia is still in the early stages of utilizing e-government applications (Lean, Zailani, Ramayah, & Fernando, 2009). Therefore, more in-depth studies must be conducted to investigate citizens' perceptions towards e-government applications in Malaysia. Previous studies have extensively examined different aspects of adoption and usage of e-government applications in developed countries (Al-Hujran et al., 2015; Belanche, Casaló, & Flavián, 2012; Carter et al., 2016; Karavasilis, Zafiroopoulos, & Vrana, 2010; Liu et al., 2014; Shyu & Huang, 2011).

There are also studies conducted in developing countries. For example, Kumar, Sachan, and Mukherjee (2018) identified the factors that directly or indirectly influence e-government adoption in India while Verkijika and De Wet (2018) studied adoption of e-government in Africa. Meanwhile, Rosenberg (2018) examined usage behavior of e-government services among Israeli citizens and Abu-Shanab (2017) examined the role of e-government familiarity on intentions of citizens in Jordan. However, adoption of e-government applications by citizens in Malaysia remains largely less explored in the literature. It is obvious that this gap needs vital research consideration, as the e-government success is greatly connected to perceptions of citizens (Al-Hujran et al., 2015; Carter & Bélanger, 2005). Therefore, the research objectives of this study are as follows:

- (1) To examine the factors that influence citizen to use e-government applications in Malaysia.
- (2) To analyze the level of satisfaction among the e-government applications users in Malaysia.

This study is structured as follows. An explanation of e-government in Malaysia is outlined in Section 2. Section 3 presents technology adoption theories. Next section, reviews studies on e-government. Section 5, represents model and hypotheses development. In Section 6, the research method is described. Results are presented in the next section. Section 8 contains the discussion and Section 9 provides the conclusions and implications.

## 2. E-government in Malaysia

E-government was initially launched in Malaysia by MSC (Othman, 1997). Since 2004, the broadest e-government flagship projects have been developed by MSC, which was categorized into distinct

e-government applications including the Generic Office Environment (GOE), Electronic Procurement (EP), Human Resource Management Information System (HRMIS), Project Monitoring System (PMS), Electronic Services Delivery (E-Services), Electronic Labour Exchange (ELX), and e-Syariah, e-Zakat, e-Kasih, and BRIM 2.0.

The main aim of e-government development in Malaysia is to improve the convenience, accessibility and quality of delivery of government services as well as improve the information flows and processes in order to increase the speed and quality of policy development, coordination and enforcement (Kamaruddin & Noor, 2017). The scope of e-government in Malaysia includes all government agencies, civil servants, business community and citizens. It is hoped that communication among the various stakeholders would be more efficient and effective. Without a doubt, the Malaysian government will continue to move forward to achieve Vision 2020 by transforming service delivery and the administrative process using e-government applications. Generally, it can be concluded that E-government is a vital part of the public service delivery system. However, problems associated with e-government applications such as proper privacy and security mechanisms, confidentiality and substantiation, technical issues, maintainability, infrastructure, and usability need to be considered to increase adoption of applications (Lean et al., 2009).

expectation-con-

firmation

theory

(ECT)

### 3. Studies on e-government adoption and use

E-government has increasingly become a hot topic of research for practitioners and academics (Wirtz & Daiser, 2018). Previous research has broadly considered different factors for enhancing e-government adoption, use, and service delivery success. According to Sun, Wang, Guo, and Peng (2013), among the key theories used to study adoption or use are the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Unified Theory of Technology Acceptance and use of Technology (UTAUT), Innovative Diffusion (DOI), IS Success Model and Task-Technology Fit. Nevertheless, TAM has been the commonly utilized model and has gained great attention and agreement from academics for technology adoption. Results of a comprehensive meta-analysis showed that TAM is one of the most frequently theories applied in e-government studies (Rana, Dwivedi, & Williams, 2015). This is also supported by Alzahrani, Al-Karaghoul, and Weerakkody (2017) who believed that TAM is the most fitting model in e-government context. For example, Husin, Loghmani, and Zainal Abidin (2017) investigated e-government use in Malaysia. They asked respondents to compare the developed prototype with current Malaysian e-government services in terms of compatibility, trust, image, PU, and PEOU. Warkentin, Sharma, Gefen, Rose, and Pavlou (2018) used TAM to survey undergraduate student population of three large universities within the United States on their perceptions towards iVoting system.

Although TAM is recognized as the best theory to study technology adoption, Gillenson and Sherrell (2002), Karavasilis et al. (2010) and Lean et al. (2009) believed that to improve the explanatory and predictive power of TAM, it has to be combined with other adoption and diffusion theories. A review of the literature on fourteen articles (see Table 1), related to e-government adoption, found ten articles adopted TAM into their study while another four combined TAM with DOI.

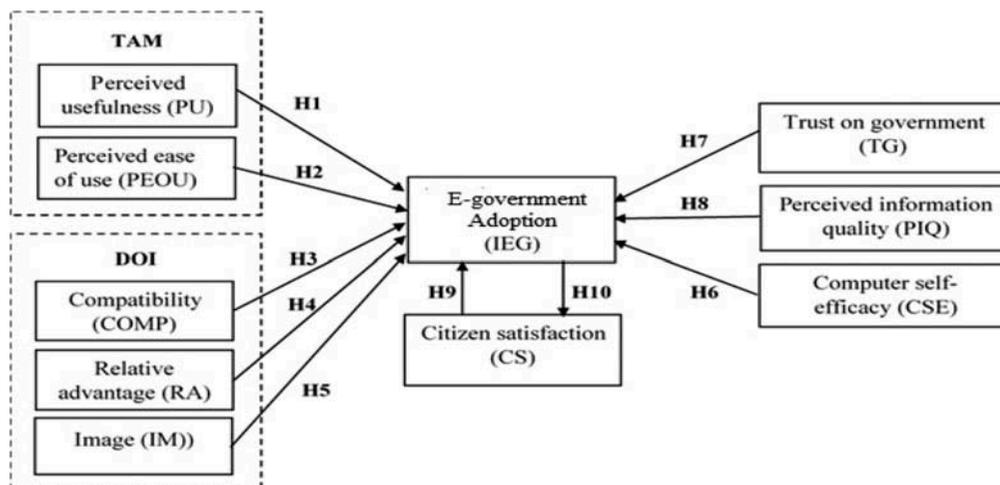
It is believed that TAM and DOI can complement each other. TAM theorizes linkages among individual's intentions of system and individual's actual system use and action. On the other hand, DOI considers the formation of a favorable attitude toward a new technology (Gillenson & Sherrell,

**Table 1. Studies using the TAM and/or DOI models for predicting e-government adoption**

Study	Theory used	Variables
(Warkentin et al., 2018)	TAM	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>Extra factors:</b> Trust in the agency, agency made of people like me
(Husin et al., 2017)	TAM	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>Extra factors:</b> Trust, compatibility, image
(Abu-Shanab, 2017)	TAM	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>Extra factors:</b> privacy and security assurance, trust
(Carter et al., 2016)	TAM	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>Extra factors:</b> Trust, perceived risk
(Al-Hujran et al., 2015)	TAM	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>Extra factors:</b> Trust, national culture
(Liu et al., 2014)	TAM	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>Extra factors:</b> Trust, image, social influence
(Belanche et al., 2012)	TAM	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>Extra factors:</b> Trust
(Lin et al., 2011)	TAM	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>Extra factors:</b> Information system quality, information quality
(Karavasilis et al., 2010)	TAM+ DOI	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>DOI:</b> Compatibility, Relative advantage <b>Extra factors:</b> Trust, risk and personal innovativeness
(Lean et al., 2009)	TAM+ DOI	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>DOI:</b> Compatibility, Image, Complexity, Relative advantage, culture <b>Extra factors:</b> Trust
(Colesca & Dobrica, 2008)	TAM	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>Extra factors:</b> Perceived trust, perceived quality, user satisfaction
(Wangpipatwong, Chutimaskul, & Papsratorn, 2008)	TAM	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>Extra factors:</b> Self-efficacy
(Christian Schaupp & Carter, 2005)	TAM+ DOI	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>DOI:</b> Compatibility, image, complexity, relative advantage <b>Extra factors:</b> Trust
(Carter & Bélanger, 2005)	TAM+ DOI	<b>TAM:</b> Perceived usefulness, perceived ease of use <b>DOI:</b> Compatibility, image, relative advantage, culture <b>Extra factors:</b> Trustworthiness

2002). For example, Karavasilis et al. (2010) integrated TAM and DOI to examine adoption of e-governance by teachers in Greece.

**Figure 1. Theoretical research model.**



It was observed from the review of the literature pertaining to technology adoption many studies incorporated other constructs (not from TAM or DOI) into their final model when studying adoption. Among the constructs were trust, perceived quality and self-efficacy. Warkentin et al. (2018), Alzahrani et al. (2017), Carter et al. (2016), Al-Hujran et al. (2015) and Liu et al. (2014) included the construct trust while Rehman, Esichaikul, and Kamal (2012), Lin et al. (2011), Shareef, Kumar, Kumar, and Dwivedi (2011), and Colesca and Dobrica (2008) included the construct perceived quality. On the other hand, Lallmahomed, Lallmahomed, and Lallmahomed (2017), Hung, Chang, and Kuo (2013), Shareef et al. (2011) added self-efficacy into their model. In addition to trust, perceived quality and self-efficacy, some studies (Alzahrani et al., 2017; Colesca & Dobrica, 2008; Kumar, Mukerji, Butt, & Persaud, 2007; Wang & Liao, 2008) incorporated citizen satisfaction into their model.

#### 4. Research model and hypotheses development

Based on the review of literature discussed above, this study employed TAM constructs (PU, PEOU) and DOI constructs (compatibility (COMP), relative advantage (RA), image (IM)) combined with trust in government (TG), perceived information quality (PIQ), computer self-efficacy (CSE), and citizen satisfaction (CS) to predict intention to use e-government (IEG) (See Figure 1). Each of these constructs and related hypotheses is discussed in the following paragraphs.

PU is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance,” while PEOU is defined as “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989). Davis, Bagozzi, and Warshaw (1989) claimed that higher PEOU and PU of a technological innovation increased its use behavior. According to Belanche et al. (2012), citizens’ decision making regarding e-government adoption is based on their insights regarding its effort and performance. It is obvious that citizens expect the e-government services to be useful resources which can help them require needed information or accomplish administrative transactions effectively and efficiency (Lin et al., 2011). Thus, users are more likely to refer to e-government websites if they can provide them useful information and procedure easily. Thus, we proposed the following:

**H1:** A higher level of PU increases the level of IEG.

**H2:** A higher level of PEOU increases the level of IEG.

COMP is defined as the “degree to which a technological innovation is seen to be compatible with values, experiences, beliefs, and needs of adopters” (Rogers, 1995). Generally, citizens will be more interested in using online government services which are more compatible with the method

through which they prefer to cooperate with others (Carter & Bélanger, 2005). Findings of Hung et al. (2013) and Christian Schaupp and Carter (2005) showed that a high level of compatibility will positively influence the adoption of e-government portals. Therefore, it is expected that citizens who perceive e-government portals/websites match with his/her current skills and needs will be more positive toward the adoption of provided services. Thus, we proposed the following:

**H3:** A higher level of COMP increases the level of IEG.

RA is defined as “the degree to which a technological innovation is seen as being superior to its predecessor” (Rogers, 1995). In this study, it is considered the level to which e-government services are perceived by citizens as being more beneficial in comparison to traditional services. According to Christian Schaupp and Carter (2005), citizens who distinguish these unique benefits are more interested in adopting e-government systems. Lean et al. (2009) reported a significant influence of RA on e-government adoption in Malaysia. It is expected that, if e-government applications help citizens to accomplish tasks more effectively than the existing system, they will understand the differences and will be more likely to use these applications. Thus, we proposed:

**H4:** A higher level of RA increases the level of IEG.

IM refers to “one’s perceptions of a technological innovation as a status symbol” (Moore & Benbasat, 1991). Social environmental conditions play a significant role in e-government adoption (Liu et al., 2014). In connection with this argument, previous researchers have broadly incorporated the construct of image in e-government adoption studies (Christian Schaupp & Carter, 2005; Lean et al., 2009; Liu et al., 2014). According to Lean et al. (2009), citizens who care more about their personal image show significantly higher IEG. It is expected that citizens are more interested in using e-government services if their social environmental surroundings encourage the activity. Thus, we proposed:

**H5:** A higher level of IM increases the level of IEG.

CSE is defined as the “judgment of one’s capability to use a technology to perform a particular task” (Compeau & Higgins, 1995). In this study, CSF is considered as an citizens’ self-confidence in her/his ability to properly engage in e-government service (Susanto & Goodwin, 2013). Literature has marked CSF as a significant predictor of behavioral intention towards e-government services (Lallmahomed et al., 2017; Wangpipatwong et al., 2008). Citizens with a high level of CSF consider themselves able to manage complicated tasks with less assistance than those with weak CSF. It is expected that performing tasks and procedures through e-government services will be easier for citizens with higher self-confidence. Thus, we proposed:

**H6:** A higher level of CSF increases the level of IEG.

TG is defined as “the extent of individual trusts the government agency and the technology and believes that using the service may not cause problems for him/her” (Susanto & Goodwin, 2013). Successful e-government applications adoption links to the citizens’ perception of ability of government agencies in providing necessary resources to launch electronic services effectively (Lallmahomed et al., 2017). According to Hung et al. (2013), higher trust will lead to a more positive sense of mobile government (m-government) services in Taiwan. Generally, trust is considered an important determinant of users’ behavior with e-government. Thus, we proposed:

**H7:** A higher level of TG increases the level of IEG.

Performance IQ (PIQ) is defined as “the degree to which an individual perceives the information provided by an e-government service to be valuable, accurate, up to date, and relevant to the

users' needs" (Susanto & Goodwin, 2013). The potential characteristics of the PIQ of e-government services include current information, accuracy, integration, relevancy, linkage, completeness, and timeliness of information (Shareef et al., 2011). According to Lin et al. (2011), PIQ can significantly influence users' perception of system usefulness and thus their attitude toward using e-government services. In fact, information quality is the element of user satisfaction that ultimately leads to regular adoption (Wang & Liao, 2008). PIQ is reported to be significant factor which influences IEG (Rana et al., 2015; Rehman et al., 2012; Susanto & Goodwin, 2013). Thus, we proposed:

**H8:** A higher level of PIQ increases level of IEG.

CS is defined as "the extent to which an e-government service helps a citizen to achieve his/her needs" (Alzahrani et al., 2017). Customer satisfaction must be examined during or after system adoption. However, interaction is dynamic, as "satisfaction can have an impact on the individual's decision regarding whether or not he or she will reuse the service. (Dis)satisfaction can also influence individual reactions to (use) e-government services". A number of e-government studies have discussed the interrelationship between citizens' satisfaction and use behavior (Alzahrani et al., 2017; Colesca & Dobrica, 2008; Kumar et al., 2007; Wang & Liao, 2008). Citizens' satisfaction influences their positive perceptions towards e-government services adoption (Alzahrani et al., 2017). On the other hand, significant connection between user satisfaction and system use has been supported in the literature (Dwivedi, Kapoor, Williams, & Williams, 2013; Wang & Liao, 2008). Thus, we proposed:

**H9:** A higher level of CS increases the level of IEG.

**H10:** A higher level of IEG increases the level of CS.

## 5. Research methodology

In this research, Structural Equation Modelling with Partial Least Squares (PLS-SEM) was employed to assess the hypothesized relationships and theoretical model. PLS is a component-based SEM approach which is commonly employed to examine the linkages between independent and dependent constructs in e-government adoption related studies (Al-Hujran et al., 2015; Carter et al., 2016; Lallmahomed et al., 2017). PLS-SEM is an advanced statistical method to examine complex models (Hair, Hult, Ringle, & Sarstedt, 2014), as was the case for this study. Meanwhile, it is also powerful in prediction and theory development (Hair, Hult, Ringle, & Sarstedt, 2013). Thus, in this study, a two-stage approach was applied using SmartPLS 2.0 M3. In the first stage, the measurement model is assessed in order to ensure that the items used for measuring each construct are best suited for this purpose. After passing the first stage successfully and completing the corrections, if any, the second stage (structural model) is started, which involves assessing the constructs relationships (Hair et al., 2014).

### 5.1. Measurement

All measurement items of these constructs were collected from the related literature and were revised to fit the purpose of this study. All items were based on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). PU and PEOU were measured with eight and seven items, respectively. Related questions were adopted from the measures proposed and validated by (Alawadhi & Morris, 2008; Viswanath Venkatesh, Morris, Davis, & Davis, 2003). Items for measuring CS were adopted from (Colesca & Dobrica, 2008; Davis, 1989). Items for measuring PIQ were adopted from the study conducted by (Colesca & Dobrica, 2008). Items for measuring TG were adopted from (Carter & Bélanger, 2005). Items for measuring RA were adopted from the study conducted by (Carter & Bélanger, 2005; Wangpipatwong et al., 2008). Items for measuring IEG were adopted from (Shareef et al., 2011; Viswanath Venkatesh, Thong, & Xu, 2012). Items for measuring IM were adopted from (Liu et al., 2014). Items for measuring COMP and CSE were adopted from (Carter & Bélanger, 2005; Shareef et al., 2011). Two experts in the field of

e-government services and two university professors were asked to check and review the designed instrument for content validity. Then, to further change and revise the measurement items, a pilot study was conducted based on a convenience sampling of 50 citizens who have experience using the Malaysian e-government applications. Each respondent was asked to fill in the questionnaire, and then they were given additional time to comment on any positive and negative parts of the questionnaire. According to the feedback, a few questions were slightly rephrased.

### **5.2. Sampling and data collection procedure**

In this study, the targeted sample were Malaysians living within the Kuala Lumpur area (capital city of Malaysia) with a household monthly income of RM3, 800 or less. These groups of Malaysians are known as the B40 group. (Generally, Malaysians are categorized into three income groups, T20, M40, and B40). The B40 group was chosen, as generally they would have less access to the IT infrastructure, thus designating them as a better sample to reflect adoption of the e-government applications.

The questionnaires were distributed to households living in The People's Poorest Housing Program (PPRT) areas in Kuala Lumpur, as these areas are reserved for the B40 group, thus ensuring that only the targeted samples are included in the survey. One thousand questionnaires were distributed in four PPRT areas in Kuala Lumpur. In each area, 250 questionnaires were distributed. Potential respondents were approached personally, and before they were given the questionnaire, the aim of survey was explained to ensure that the correct responses were collected. Most of the respondents filled in the questionnaire on the spot, while some opted to return them later at an agreed-upon location, such as a nearby shop or place of worship. The data collection was carried out over a period of three months. After removing the questionnaires with incomplete responses, 801 questionnaires were used for analysis.

In addition, to ensure the adequacy of the sample size, the "10 times rule", which is the most applicable guideline for calculating sample size in PLS (Peng & Lai, 2012), was considered. According to this rule, "the minimum sample size for performing PLS-SEM is 10 times the most complex relationship within the structural model" (Chin, 1998; Gefen, Straub, & Boudreau, 2000; Hair et al., 2013). Thus, based on the developed model in this study, the minimum number of respondents should be 90 respondents.

Table 2 depicts the profile of e-government service users who properly completed the survey. Of the respondents, 62% were male and 38% were female. 37.70% of the respondents were between 26 and 35 years old, and 28.90% were 36–45 years old. The educational level of most respondents was high school (54.18%), followed by certificate/diploma (36.95%). The majority of respondents were Malay (71.41%). The estimated income of respondents per month mainly fell into the RM2, 001-RM3,000 category (44.06%).

## **6. Results**

### **6.1. Measurement model assessment**

The validity and reliability of measurement instrument were firstly assessed. An item is reliable if its factor loading exceed 0.70 (Chin, 1998), However, a value of greater than 0.6 is also accepted by researchers (Hoyle, 1999). Construct reliability is calculated by the internal consistency reliability using Composite Reliability (CR) (Straub, Boudreau, & Gefen, 2004) and Cronbach's Alpha coefficient (CA) (Cronbach, 1971). The acceptable value for CA and CR is equal to or above 0.7 (Babin, Hair, Hair, Anderson, & Black, 2010; MacKenzie, Podsakoff, & Podsakoff, 2011). Convergent validity demonstrated by Average Variance Extracted (AVE) and AVE of all constructs needs to be greater than 0.5 to be considered at a satisfactory level (Fornell & Larcker, 1981).

The results of running the PLS algorithm for the first time showed that some items (PEOU1, PEOU6, PEOU7, COMP1, IM2, PU5, PU6, PU7, PU8, CSE2, CS1, PIQ4) did not meet the acceptable

**Table 2. Demographic profiles of respondents**

Category	Frequency	Percentage
Gender		
Male	497	62
Female	304	38
Age		
18–25 years	123	15.35
26–35 years	302	37.70
36–45 years	232	28.96
46–55 years	104	12.98
> 55 years	40	4.99
Education		
Primary school	15	1.74
High School	434	54.18
Certificate/Diploma	296	36.95
Graduate (Bachelor Degree)	53	6.61
Others	4	0.49
Race		
Malay	572	71.41
Chinese	100	12.48
India	128	15.98
Others	1	0.12
Estimated Income per month		
< RM1,000	51	6.36
RM1,001–RM2,000	302	37.70
RM2,001–RM3,000	353	44.06
RM3,001–RM3,800	95	11.86

value of greater than 0.6 for factor loading, which resulted in unacceptable AVE values for their respected constructs. Therefore, based on the recommendations by Hair et al. (2014), the items were deleted one by one from the measurement model. Finally, as illustrated in Table 3, all constructs reached a cut-off value of less than 0.7 and thus showed satisfied CA and CR.

Meanwhile, all constructs showed AVE of greater than 0.5, thus confirming good convergent validity. To check the discriminant validity, AVEs' square root for every single construct needs to be higher than the shared correlations between other constructs (Fornell & Larcker, 1981). At the same time, it confirms that every component used to measure a single construct shows greater factor loading compared to other related cross-loadings in both column and row (Chin, 1998).

Table 4 and Appendix A imply that discriminant validity is reached in the measurement model, meaning that the items of each construct are fully distinct from the items belonging to other constructs.

### 6.2. Structural model assessment

In this phase, PLS algorithm was performed in order to obtain  $\beta$  for each path as well as  $R^2$  values of dependent constructs. Next, a bootstrap procedure was performed to calculate t-statistics. Figure 2 and Table 5 represent the overall outcomes of structural model assessment.

**Table 3. Reliability and convergent validity assessment**

Variables	Items	Indicator reliability	Convergent validity	Construct reliability	
		Factor loading	AVE	Cronbach's Alpha (CA)	Composite Reliability (CR)
Perceived Ease of Use (PEOU)	PEOU2	0.739	0.512	0.784	0.807
	PEOU3	0.753			
	PEOU4	0.725			
	PEOU5	0.639			
Perceived Usefulness (PU)	PU1	0.711	0.574	0.739	0.782
	PU2	0.753			
	PU3	0.638			
	PU4	0.645			
Relative Advantage (RA)	RA1	0.762	0.597	0.787	0.797
	RA2	0.696			
	RA3	0.661			
	RA4	0.696			
Compatibility (COMP)	COMP2	0.904	0.831	0.796	0.907
	COMP3	0.918			
Image (IM)	IM1	0.828	0.615	0.877	0.761
	IM3	0.738			
Trust on Government (TG)	TG1	0.673	0.533	0.786	0.842
	TG2	0.650			
	TG3	0.704			
	TG4	0.643			
	TG5	0.696			
	TG6	0.632			
	TG7	0.601			
Perceived information quality (PIQ)	PIQ1	0.841	0.600	0.768	0.817
	PIQ2	0.804			
	PIQ3	0.669			
Computer self-efficacy (CSE)	CSE1	0.671	0.533	0.783	0.770
	CSE3	0.763			
	CSE4	0.831			
Adoption of e-government (IEG)	IEG1	0.653	0.507	0.747	0.834
	IEG2	0.778			
	IEG3	0.798			
	IEG4	0.804			
	IEG5	0.682			
Citizen satisfaction (CS)	CS2	0.648	0.505	0.756	0.836
	CS3	0.705			
	CS4	0.734			
	CS5	0.742			
	CS6	0.719			

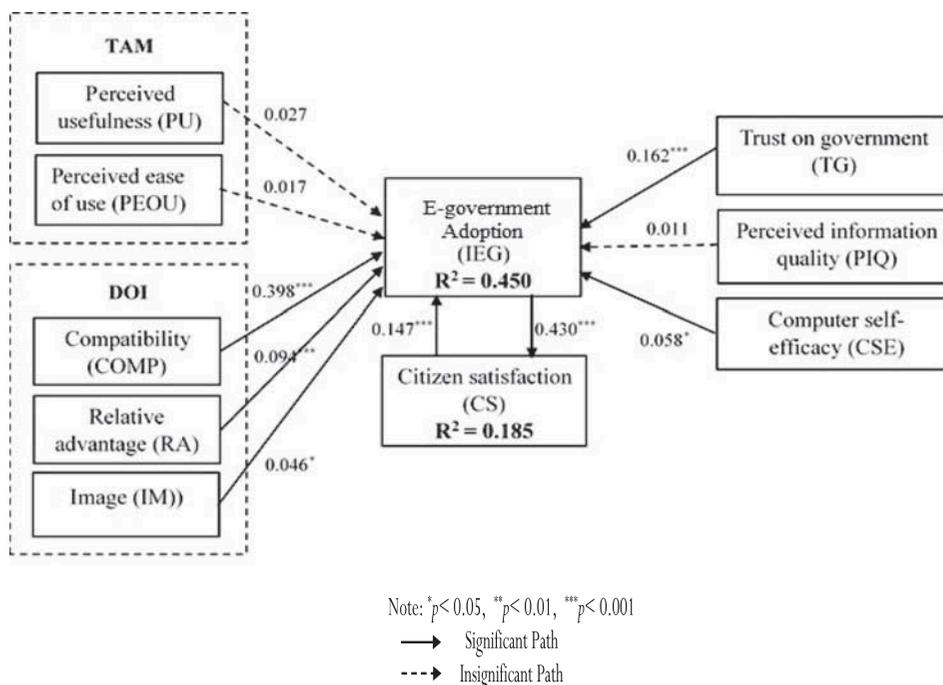
According to the results, IEG was positively influenced by COMP ( $\beta = 0.398, p < 0.001$ ), RA ( $\beta = 0.094, p < 0.001$ ), IM ( $\beta = 0.046, p < 0.05$ ), CSE ( $\beta = 0.058, p < 0.05$ ), TG ( $\beta = 0.162, p < 0.001$ ), and CS ( $\beta = 0.147, p < 0.001$ ), thus supporting H3, H4, H5, H6, H7, and H9. However,

**Table 4. Results of discriminant validity**

	COMP	IM	PEOU	PU	PIQ	RA	CSE	TG	IEG	CS
COMP	<b>0.916</b>									
IM	0.343	<b>0.784</b>								
PEOU	0.261	0.234	<b>0.716</b>							
PU	0.307	0.153	0.338	<b>0.758</b>						
PIQ	0.257	0.184	0.407	0.289	<b>0.775</b>					
RA	0.118	0.101	0.283	0.340	0.356	<b>0.772</b>				
CSE	0.360	0.349	0.346	0.226	0.352	0.281	<b>0.730</b>			
TG	0.427	0.324	0.426	0.474	0.384	0.312	0.290	<b>0.730</b>		
IEG	0.577	0.322	0.318	0.332	0.317	0.279	0.359	0.480	<b>0.712</b>	
CS	0.322	0.324	0.389	0.303	0.439	0.327	0.360	0.426	0.430	<b>0.711</b>

Note: Bold items in diagonal cells represent square root of AVEs

**Figure 2. Structural model assessment.**



the effects of PU ( $\beta = 0.027, p > 0.05$ ), PEOU ( $\beta = 0.017, p > 0.05$ ), and PIQ ( $\beta = 0.011, p > 0.05$ ) on IEG were found to be insignificant, which resulted in the rejection of H1, H2, and H8. As hypothesised, CS was positively influenced by IEG ( $\beta = 0.430, p < 0.001$ ). Therefore, H10 was also supported. The  $R^2$  value for IEG was 0.450, showing that 45% of the variance in this dependent construct can be predicted by RA, IM, CSE, TG, and CS constructs. Meanwhile, 18.5% of the variance in CS can be predicted by IEG.

### 7. Discussion

This study aimed to identify the significant factors that influence citizen adoption and satisfaction with e-government applications in Malaysia based on the developed model in Section 3. The basic theoretical models used in this study were TAM and DOI, combined with TG, PIQ, CSE, and CS constructs. This study offers significant insights that can assist the Malaysian government as well as other developing countries in planning their policies with regards to e-government implementation. According to the results, DOI constructs (COMP, IM, and RA) demonstrated significant

**Table 5. Hypothesis testing results**

Hypotheses	Path links	Path coefficients ( $\theta$ )	t-value	Supported
H1	PU→IEG	0.027	1.136	NO
H2	PEOU →IEG	0.017	0.725	NO
H3	COMP→IEG	0.398	17.042***	YES
H4	RA→ IEG	0.094	3.543***	YES
H5	IM→IEG	0.046	1.918*	YES
H6	CSE→IEG	0.058	2.252*	YES
H7	TG→IEG	0.162	6.128***	YES
H8	PIQ→IEG	0.011	0.423	NO
H9	CS→IEG	0.147	5.345***	YES
H10	IEG→CS	0.430	19.094***	YES

Note: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

influence on IEG. The positive effects of COMP on IEG show that citizens are more interested in using online government applications which are more compatible with the way they like to interact with others. This finding is consistent with the findings of (Carter & Bélanger, 2005; Karavasilis et al., 2010; Susanto & Goodwin, 2013). Liu et al. (2014) could not find any substantial connection between IM and intention to use mobile government in China, thus our results were supported by many other studies (Carter & Bélanger, 2005; Christian Schaupp & Carter, 2005; Lean et al., 2009) confirming the positive effects of perceived image on IEG. In fact, Malaysian respondents seek more positive social status, and they feel that using e-government applications can improve their social status and image. The significant influence of RA on IEG is mainly due to the fact that respondents feel that they can gather useful and reliable information from e-government applications without wasting time travelling to the respective organizations personally. This result is also supported by (Carter & Bélanger, 2005; Lean et al., 2009). Regarding the positive effects of the core constructs of TAM (PU and PEOU) on IEG, the findings did not support the related hypotheses. This result was in contrast to the previous studies by (Lean et al., 2009; Lin et al., 2011). However, it can be explained by the fact that respondents have already received enough support and help while using e-government applications and they no longer care about the amount of effort they need to devote to dealing with different aspects of the applications.

CSE showed the direct and positive influence on IEG; this finding is also in line with the work of (Lallmahomed et al., 2017; Wangpipatwong et al., 2008). According to Lean et al. (2009), Malaysia is a country with low uncertainty avoidance index (UAI) culture, thus it is reasonable to say that respondents feel more confident with unknowns and when trying out new systems. Since most of the respondents are not highly educated, it is clear that CSE is still an important factor for them in using information systems. TG was proven to have a positive influence on IEG. This finding is also supported by (Carter & Bélanger, 2005; Christian Schaupp & Carter, 2005; Lallmahomed et al., 2017). This confirms the claim that respondents trust in the reliability, privacy, and validity of an online application provided by the government can significantly influence their intention to use the provided applications.

Unexpectedly, the findings presented an insignificant relationship between PIQ and IEG. Rehman et al. (2012) and Wang and Liao (2008) supported the direct and positive influence of PIQ on e-government adoption in Pakistan and Taiwan, respectively. However, Shareef et al. (2011) argued that PIQ is a significant factor in the interaction stage and that the positive influence will gradually decrease in the adoption stage of e-government. This result showed that citizens believe that e-government applications provide relative benefits, thus they are not concerned about its PIQ. Our findings also showed that CS has a positive influence on IEG and, in turn, a higher level of

IEG leads to higher levels of CS. This finding is in line with the work of (Wang & Liao, 2008), who reported the significant effects of e-government adoption on the overall satisfaction of citizens in Taiwan. Meanwhile, Colesca and Dobrica (2008) asserted that citizens' satisfaction positively impact on the adoption of an e-government applications. It is obvious that the e-government applications have provided better accessibility and convenience, faster response, and reduced waiting time for the B40 group, whose satisfaction encourages them to continue to use these applications.

## 8. Conclusion and implications

This study developed and validated a theoretical model for assessing adoption and satisfaction towards the e-government applications from the B40 group perspective in Malaysia. So far, the majority of e-government attempts have focused on developed countries (Lin et al., 2011) and focused mainly on mobile services (Hung et al., 2013). This study is one of the first attempts that focused on citizen satisfaction towards e-government applications from the B40 group perspective in Malaysia, a developing country. The results of this study can assist the government in improving their knowledge based on the specific needs and interests of citizens. Discovering the determinants of IEG and CS can help the government and policy makers to provide and execute more effective approaches in their e-government portals. This research contributes to the existing literature in the following imperative approaches.

There are different ways that government agencies can receive assistance with improving the RA of the services. The provided information in the portals needs to be timely, precise, and relevant to the needs and preferences of the citizens. An effective portal and website should provide reliable information in perfectly user-friendly ways. Search and help functions should be formulated on the websites in order to help all users obtain different levels of knowledge and background to quickly obtain relevant information and effortlessly complete their transactions. TG is found to be an important predictor of IG. Thus, the government is urged to consider and implement the best strategy to enhance the positive feelings of Malaysian citizens' trust in utilizing e-government applications. This situation will cause an increase in the number of transactions over the provided services and thus increase the effectiveness and efficiency of public services in general. To increase the perception of IM, the government should promote the belief among citizens that using e-government applications will enable them to be more involved in the society and upgrade their social status. It is also recommended that appropriate samples of successful use of e-government applications by popular (such as celebrities) citizens is an effective way to improve positive word of mouth about an application and the consequent encouragement towards adoption of the application. COMP is an important factor in encouraging citizens to use e-government applications. Thus, government agencies are recommended to ensure the compatibility of e-service applications with the newest technology and style for citizens to adopt in their daily life and society; users will consider it the standard for a superior online experience. The government should play an active role in preparing compatible and convenient e-government applications for citizens at all levels to motivate them to engage in the provided applications. Apparently, citizens will not accept e-government portals and websites that are very complicated with the wrong design features and functionalities. Government and policy makers are advised to increase the level of CSE among citizens. For instance, by offering e-services applications that look like traditional government services, they can inspire citizens to adopt them. E-government programs should be available to promote a trial of the provided applications. Meanwhile, different free seminars and programs should be organized in order to increase the level of awareness and ability of under-privileged citizens to use e-government applications. The positive relation between CS and IEG was also supported in this study. Therefore, governments are advised to wisely determine the significant pre-requisite of CS in order to better plan and move forward. Proper and up-to-date information on application

adoption and the superiority of system output should be provided for users either in the system itself or on the printed form. Higher trust of users toward the government will also increase customer satisfaction with e-government applications. Since IEG was also found to have a significant influence on CS, it is critical that governments encourage and motivate users to use the applications. They are expected to have enthusiastic support staff to ease users' anxiety regarding the use of the applications.

### 8.1. Research limitations and future directions

The research model in this study was developed based on the core constructs of TAM and DOI as well as some exogenous variables based on a review of the literature. Future studies may consider additional factors by leveraging qualitative research approaches (interview, case study, and group discussion) in enriching the findings of this study. Meanwhile, this study can be conducted in other developing countries in order to confirm the research model and its generalizability. This study employed a questionnaire and the PLS-SEM technique to explore Malaysian citizens' perspective on e-government services. Future study may consider soft computing techniques such as Preference by Similarity to Ideal Solution (TOPSIS) and Analytic Network Process (ANP) combined with SEM to yield more in-depth results or even compare the differences between the results of different techniques.

#### Acknowledgements

The authors would like to thank the Equitable Society Research Cluster, University of Malaya for providing the funds to conduct this research (Grant Number: **RP032C-16SBS**).

#### Funding

This work was supported by the University of Malaya [RP032C-16SBS].

#### Competing Interests

The authors declare no competing interest

#### Author details

Liyana Shuib<sup>1</sup>  
E-mail: [liyanashuib@um.edu.my](mailto:liyanashuib@um.edu.my)  
ORCID ID: <http://orcid.org/0000-0002-7907-0671>  
Elaheh Yadegaridehkordi<sup>1</sup>  
E-mail: [e.yadegari@um.edu.my](mailto:e.yadegari@um.edu.my)  
Sulaiman Ainin<sup>2</sup>  
E-mail: [ainins@um.edu.my](mailto:ainins@um.edu.my)  
ORCID ID: <http://orcid.org/0000-0002-8989-712X>  
<sup>1</sup> Department of Information Systems, Faculty of Computer Science & Information Technology, University of Malaya, 50603 Kuala Lumpur, Malaysia.  
<sup>2</sup> Department of Operations and Management Information Systems, Faculty of Business and Accountancy, University of Malaya, 50603 Kuala Lumpur, Malaysia.

#### Citation information

Cite this article as: Malaysian urban poor adoption of e-government applications and their satisfaction, Liyana Shuib, Elaheh Yadegaridehkordi & Sulaiman Ainin, *Cogent Social Sciences* (2019), 5: 1565293.

#### References

- Abu-Shanab, E. A. (2017). E-government familiarity influence on Jordanians' perceptions. *Telematics and Informatics*, 34(1), 103–113. doi:10.1016/j.tele.2016.05.001
- Ahmad, M., & Othman, R. (2007). Implementation of electronic government in Malaysia: The status and potential for better service to the public. *Public Sector ICT Management Review*, 1(1), 2–10.
- Alawadhi, S., & Morris, A. (2008). The use of the UTAUT model in the adoption of e-government services in Kuwait. In Proceedings of the 41st Hawaii international conference on system sciences, IEEE Computer Society, Washington, DC, USA.
- Al-Hujran, O., Al-Debei, M. M., Chatfield, A., & Migdadi, M. (2015). The imperative of influencing citizen attitude toward e-government adoption and use. *Computers in Human Behavior*, 53, 189–203. doi:10.1016/j.chb.2015.06.025
- Alzahrani, L., Al-Karaghoul, W., & Weerakkody, V. (2017). Analysing the critical factors influencing trust in e-government adoption from citizens' perspective: A systematic review and a conceptual framework. *International Business Review*, 26(1), 164–175. doi:10.1016/j.ibusrev.2016.06.004
- Babin, B., Hair, J. F., Hair, J., Anderson, R., & Black, W. C. (2010). *Multivariate data analysis: A global perspective* (7th ed.). New Jersey: Prentice Hall PTR.
- Blanche, D., Casalo, L. V., & Flavián, C. (2012). Integrating trust and personal values into the technology acceptance model: The case of e-government services adoption. *Cuadernos de Economía y Dirección de la Empresa*, 15(4), 192–204. doi:10.1016/j.cede.2012.04.004
- Bwalya, K. J. (2009). Factors affecting adoption of e-government in Zambia. *The Electronic Journal of Information Systems in Developing Countries*, 38(1), 1–13. doi:10.1002/(ISSN)1681-4835
- Carter, L., & Bélanger, F. (2005). The utilization of e-government services: Citizen trust, innovation and acceptance factors. *Information Systems Journal*, 15(1), 5–25. doi:10.1111/isj.2005.15.issue-1
- Carter, L., Weerakkody, V., Phillips, B., & Dwivedi, Y. K. (2016). Citizen adoption of e-government services: Exploring citizen perceptions of online services in the United States and United Kingdom. *Information Systems Management*, 33(2), 124–140. doi:10.1080/10580530.2016.1155948
- Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In A. M. George (Ed.), *Modern methods for business research* (pp.295–336). New York, NY: Lawrence Erlbaum Associates.
- Christian Schaupp, L., & Carter, L. (2005). E-voting: From apathy to adoption. *Journal of Enterprise Information Management*, 18(5), 586–601. doi:10.1108/17410390510624025
- Colasca, S., & Dobrica, L. (2008). Adoption and use of e-government services: The case of Romania. *Journal of Applied Research and Technology*, 6(3), 204–217.

- Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, 19, 189–211. doi:10.2307/249688
- Cronbach, L. (1971). Test validation. *Educational Measurement, Issues and Practice*, 2, 443–507.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13, 319–340. doi:10.2307/249008
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982–1003. doi:10.1287/mnsc.35.8.982
- Dwivedi, Y. K., Kapoor, K. K., Williams, M. D., & Williams, J. (2013). RFID systems in libraries: An empirical examination of factors affecting system use and user satisfaction. *International Journal of Information Management*, 33(2), 367–377. doi:10.1016/j.ijinfomgt.2012.10.008
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research (JMR)*, 34(2), 161–188.
- Gefen, D., Straub, D. W., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association for Information Systems*, 4(7), 1–70. doi:10.17705/1CAIS.00407
- Gillenson, M. L., & Sherrell, D. L. (2002). Enticing online consumers: An extended technology acceptance perspective. *Information & Management*, 39(8), 705–719. doi:10.1016/S0378-7206(01)00127-6
- Hair, J., Hult, G. T., Ringle, C., & Sarstedt, M. (2013). *A primer on partial least squares structural equation modeling (PLS-SEM)* (1st ed.). London: SAGE Publication.
- Hair, J. F., Jr, Hult, G. T. M., Ringle, C., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling*. Thousand Oaks, CA: Sage.
- Hoyle, R. H. (1999). Structural equation modeling analysis with small samples using partial least squares. In R. H. Hoyle (Ed.), *Statistical strategies for small sample research* (pp. 307–341). London: Sage Publications.
- Hung, S.-Y., Chang, C.-M., & Kuo, S.-R. (2013). User acceptance of mobile e-government services: An empirical study. *Government Information Quarterly*, 30(1), 33–44. doi:10.1016/j.giq.2012.07.008
- Husin, M. H., Loghmani, N., & Zainal Abidin, S. S. (2017). Increasing e-government adoption in Malaysia: MyEG case study. *Journal of Systems and Information Technology*, 19(3/4), 202–227. doi:10.1108/JSIT-01-2017-0007
- Kamaruddin, K., & Noor, N. L. (2017). From e-government to t-government: A Malaysian citizens' readiness study. *Journal of Telecommunication, Electronic and Computer Engineering*, 9(2–9), 15–21.
- Karavasilis, I., Zafiropoulos, K., & Vrana, V. (2010). Extending TAM to understand E-governance adoption by teachers in Greece. *Communications in Computer and Information Science*, 112, 57–68.
- Kumar, R., Sachan, A., & Mukherjee, A. (2018). Direct vs indirect e-government adoption: An exploratory study. *Digital Policy, Regulation and Governance*, 20(2), 149–162. doi:10.1108/DPRG-07-2017-0040
- Kumar, V., Mukerji, B., Butt, I., & Persaud, A. (2007). Factors for successful e-government adoption: A conceptual framework. *Electronic Journal of e-Government*, 5(1), 63–76.
- Lallmahomed, M. Z., Lallmahomed, N., & Lallmahomed, G. M. (2017). Factors influencing the adoption of e-government services in Mauritius. *Telematics and Informatics*, 34(4), 57–72. doi:10.1016/j.tele.2017.01.003
- Lean, O. K., Zailani, S., Ramayah, T., & Fernando, Y. (2009). Factors influencing intention to use e-government services among citizens in Malaysia. *International Journal of Information Management*, 29(6), 458–475. doi:10.1016/j.ijinfomgt.2009.03.012
- Lin, F., Fofanah, S. S., & Liang, D. (2011). Assessing citizen adoption of e-government initiatives in Gambia: A validation of the technology acceptance model in information systems success. *Government Information Quarterly*, 28(2), 271–279. doi:10.1016/j.giq.2010.09.004
- Liu, Y., Li, H., Kostakos, V., Goncalves, J., Hosio, S., & Hu, F. (2014). An empirical investigation of mobile government adoption in rural China: A case study in Zhejiang province. *Government Information Quarterly*, 31(3), 432–442. doi:10.1016/j.giq.2014.02.008
- MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly*, 35(2), 293–334. doi:10.2307/23044045
- Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, 2(3), 192–222. doi:10.1287/isre.2.3.192
- Othman, Y. (1997). MSC and the vision on electronic government. In *Proceedings of the National Symposium on Electronic Government*, Kuala Lumpur, 18.
- Peng, D. X., & Lai, F. (2012). Using partial least squares in operations management research: A practical guideline and summary of past research. *Journal of Operations Management*, 30(6), 467–480. doi:10.1016/j.jom.2012.06.002
- Rana, N. P., Dwivedi, Y. K., & Williams, M. D. (2015). A meta-analysis of existing research on citizen adoption of e-government. *Information Systems Frontiers*, 17(3), 547–563. doi:10.1007/s10796-013-9431-z
- Rehman, M., Esichaikul, V., & Kamal, M. (2012). Factors influencing e-government adoption in Pakistan. *Transforming Government: People, Process and Policy*, 6(3), 258–282. doi:10.1108/17506161211251263
- Rogers, E. (1995). *Diffusion of Innovations* (4th ed.). New York: The Free Press.
- Rosenberg, D. (2018). Use of e-government services in a deeply divided society: A test and an extension of the social inequality hypotheses. *New Media & Society*, 1461444818799632.
- Shareef, M. A., Kumar, V., Kumar, U., & Dwivedi, Y. K. (2011). e-Government Adoption Model (GAM): Differing service maturity levels. *Government Information Quarterly*, 28(1), 17–35. doi:10.1016/j.giq.2010.05.006
- Shyu, S. H.-P., & Huang, J.-H. (2011). Elucidating usage of e-government learning: A perspective of the extended technology acceptance model. *Government Information Quarterly*, 28(4), 491–502. doi:10.1016/j.giq.2011.04.002
- Straub, D., Boudreau, M. C., & Gefen, D. (2004). Validation guidelines for IS positivist research. *Communications of the Association for Information Systems*, 13(24), 380–427. doi:10.17705/1CAIS.01324
- Sun, Y., Wang, N., Guo, X., & Peng, Z. (2013). Understanding the acceptance of mobile health services: A comparison and integration of alternative models. *Journal of Electronic Commerce Research*, 14(2), 183.
- Susanto, T. D., & Goodwin, R. (2013). User acceptance of SMS-based e-government services: Differences between adopters and non-adopters. *Government*

*Information Quarterly*, 30(4), 486–497. doi:10.1016/j.giq.2013.05.010

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). User acceptance of information technology toward a unified view. *MIS Quarterly*, 27(3), 425–478. doi:10.2307/30036540

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 36(1). doi:10.2307/41410412

Verkijika, S. F., & De Wet, L. (2018). E-government adoption in sub-Saharan Africa. *Electronic Commerce Research and Applications*, 30, 83–93. doi:10.1016/j.elerap.2018.05.012

Wang, Y.-S., & Liao, Y.-W. (2008). Assessing eGovernment systems success: A validation of the DeLone and McLean model of information systems success. *Government Information Quarterly*, 25(4), 717–733. doi:10.1016/j.giq.2007.06.002

Wangpipatwong, S., Chutimaskul, W., & Papasratorn, B. (2008). Understanding citizen's continuance intention to use e-government website: A composite view of technology acceptance model and computer self-efficacy. *Electronic Journal of e-Government*, 6(1), 55–64.

Warkentin, M., Sharma, S., Gefen, D., Rose, G. M., & Pavlou, P. (2018). Social identity and trust in internet-based voting adoption. *Government Information Quarterly*, 35(2), 195–209. doi:10.1016/j.giq.2018.03.007

Wirtz, B. W., & Daiser, P. (2018). A meta-analysis of empirical e-government research and its future research implications. *International Review of Administrative Sciences*, 84(1), 144–163. doi:10.1177/0020852315599047

Witarsyah, D., Sjafrizal, T., Fudzee, M., Farhan, M., & Salamat, M. A. (2017). The critical factors affecting e-government adoption in Indonesia: A conceptual framework. *International Journal on Advanced Science, Engineering and Information Technology*, 7(1), 160–167. doi:10.18517/ijaseit.7.1.1614

### Appendix A. Factor loadings compared to the cross-loadings

	COMP	IM	IEG	PEOU	PIQ	PU	RA	CS	CSE	TG
COMP2	<b>0.904</b>	0.271	0.506	0.201	0.224	0.289	0.095	0.285	0.275	0.388
COMP3	<b>0.918</b>	0.351	0.545	0.272	0.244	0.271	0.120	0.301	0.378	0.390
IM1	0.241	<b>0.828</b>	0.274	0.244	0.201	0.162	0.146	0.309	0.336	0.284
IM3	0.304	<b>0.738</b>	0.228	0.112	0.077	0.071	0.000	0.191	0.201	0.220
IEG1	0.229	0.133	<b>0.553</b>	0.232	0.209	0.240	0.367	0.258	0.243	0.254
IEG2	0.516	0.248	<b>0.778</b>	0.197	0.177	0.216	0.122	0.255	0.201	0.362
IEG3	0.484	0.306	<b>0.798</b>	0.193	0.218	0.257	0.109	0.323	0.273	0.393
IEG4	0.477	0.232	<b>0.804</b>	0.254	0.210	0.232	0.144	0.339	0.269	0.394
IEG5	0.297	0.201	<b>0.582</b>	0.265	0.322	0.239	0.313	0.347	0.294	0.279
PEOU2	0.223	0.173	0.267	<b>0.739</b>	0.269	0.194	0.193	0.287	0.226	0.341
PEOU3	0.240	0.195	0.241	<b>0.753</b>	0.270	0.236	0.211	0.303	0.267	0.288
PEOU4	0.168	0.163	0.190	<b>0.725</b>	0.327	0.278	0.204	0.247	0.289	0.327
PEOU5	0.093	0.132	0.198	<b>0.639</b>	0.318	0.281	0.207	0.271	0.218	0.260
PIQ1	0.212	0.170	0.296	0.351	<b>0.841</b>	0.239	0.292	0.374	0.258	0.324
PIQ2	0.150	0.130	0.227	0.330	<b>0.804</b>	0.229	0.317	0.333	0.254	0.317
PIQ3	0.242	0.121	0.201	0.257	<b>0.669</b>	0.204	0.213	0.309	0.326	0.246
PU1	0.203	0.094	0.241	0.260	0.220	<b>0.711</b>	0.273	0.220	0.134	0.362
PU2	0.298	0.126	0.279	0.178	0.126	<b>0.753</b>	0.215	0.180	0.141	0.322
PU3	0.120	0.091	0.147	0.289	0.234	<b>0.638</b>	0.189	0.213	0.209	0.294
PU4	0.178	0.108	0.213	0.245	0.256	<b>0.645</b>	0.258	0.238	0.170	0.328
RA1	0.183	0.181	0.272	0.251	0.225	0.269	<b>0.762</b>	0.360	0.237	0.318
RA2	0.011	0.028	0.131	0.132	0.253	0.209	<b>0.696</b>	0.120	0.192	0.154
RA3	0.018	-0.062	0.123	0.174	0.296	0.235	<b>0.661</b>	0.166	0.126	0.175
RA4	0.039	0.035	0.193	0.200	0.271	0.237	<b>0.696</b>	0.176	0.205	0.168

(Continued)

	COMP	IM	IEG	PEOU	PIQ	PU	RA	CS	CSE	TG
<b>CS2</b>	0.203	0.187	0.275	0.283	0.357	0.267	0.354	<b>0.648</b>	0.294	0.273
<b>CS3</b>	0.161	0.165	0.266	0.294	0.340	0.252	0.295	<b>0.705</b>	0.219	0.275
<b>CS4</b>	0.304	0.282	0.377	0.258	0.244	0.199	0.110	<b>0.734</b>	0.274	0.316
<b>CS5</b>	0.161	0.250	0.255	0.254	0.309	0.148	0.204	<b>0.742</b>	0.268	0.235
<b>CS6</b>	0.273	0.247	0.321	0.296	0.334	0.213	0.243	<b>0.719</b>	0.223	0.390
<b>CSE1</b>	0.176	0.205	0.160	0.310	0.331	0.150	0.168	0.281	<b>0.571</b>	0.216
<b>CSE3</b>	0.236	0.228	0.237	0.249	0.279	0.142	0.226	0.208	<b>0.763</b>	0.133
<b>CSE4</b>	0.340	0.314	0.345	0.247	0.226	0.199	0.223	0.310	<b>0.831</b>	0.279
<b>TG1</b>	0.232	0.183	0.259	0.243	0.246	0.297	0.169	0.302	0.180	<b>0.673</b>
<b>TG2</b>	0.195	0.203	0.258	0.296	0.304	0.295	0.247	0.320	0.233	<b>0.650</b>
<b>TG3</b>	0.241	0.241	0.310	0.324	0.281	0.306	0.257	0.291	0.206	<b>0.704</b>
<b>TG4</b>	0.196	0.148	0.251	0.373	0.351	0.340	0.325	0.290	0.216	<b>0.643</b>
<b>TG5</b>	0.371	0.241	0.376	0.313	0.235	0.307	0.185	0.266	0.162	<b>0.696</b>
<b>TG6</b>	0.196	0.085	0.220	0.268	0.325	0.311	0.222	0.241	0.178	<b>0.632</b>
<b>TG7</b>	0.404	0.295	0.422	0.181	0.121	0.321	0.101	0.260	0.177	<b>0.601</b>



© 2019 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.

You are free to:

Share — copy and redistribute the material in any medium or format. Adapt — remix, transform, and build upon the material for any purpose, even commercially.

The licensor cannot revoke these freedoms as long as you follow the license terms.

Under the following terms:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made.

You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

No additional restrictions

You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.



**Cogent Social Sciences (ISSN: 2331-1886) is published by Cogent OA, part of Taylor & Francis Group.**

**Publishing with Cogent OA ensures:**

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

**Submit your manuscript to a Cogent OA journal at [www.CogentOA.com](http://www.CogentOA.com)**

