

Does digital literacy predict e-government performance? An extension of Delone and Mclean information system success model

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Abstract: This study empirically investigates the predicting role of digital literacy on e-government performance in Nigeria through the public value approach. Researches have advanced public value to evaluate government activities from the perspective of the citizens. Using an extended DeLone and McLean information system success model, with the underlying assumption that citizens with a high digital literacy will be able to use e-government services, which will, in turn, lead to satisfaction and high e-government performance. There is sparse literature on the predicting role of digital literacies on e-government performance. The study proposed a conceptual model based on 12 hypotheses that were tested using PLS-SEM. Data were collected through a structured questionnaire from e-government users in Nigeria. The major finding of this study is that digital literacy has a significant effect on the actual use of e-government, user satisfaction, and net benefits of e-government. The implications of the findings were discussed.

Keywords: digital literacy; e-government performance; public value; e-service; satisfaction.

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1 Introduction

The common reference to electronic government (e-government) is the usage of information and communication technology (ICT) to process, modernise and transform the operations of public sector organisations in order to deliver quality public services (Kurfalı et al., 2017). In other instances, it is a tool to foster transparency, accountability and accessibility to information of the government. E-government has the potential to facilitate the delivery of other socially desirable outcomes for the citizens such as bridging the public trust gap between the government and the citizens, environmental sustainability, encourage citizens participation and collaboration in policymaking (Rodríguez and Manuel, 2018). Due to the attendant socio-economic and political benefits of e-government, governments all over the world are investing hugely into it to fast track their socio-economic development. Also, to create values for their citizens as well as build an efficient, responsive, transparent and effective public service (Moullin, 2017).

Over the years, there has been growth in the demand for information technology (IT) in the dissemination of information and public service delivery (Liu and Yuan, 2015). Consequently, governments have invested in IT to meet their citizens' demands by bringing them up to date with government activities, among other benefits; this is the hallmark of e-government. E-government service adoption and usage have grown over the years, and citizens are increasingly interacting with them. However, studies have suggested that citizens can only realise the benefits associated with e-government if there is quality in the delivery of services and information. Quality service through electronic means is one of the rationales for the adoption of e-government as opposed to conventional means (Huang and Benyoucef, 2014). Similarly, the quality of information and services delivered inform how much citizens participate in policymaking and ultimately, the use of e-government services (Li and Feeney, 2014).

The evaluation of e-government performance is a central activity in e-government, and it has developed to be a fundamental segment of the e-government research (Andersen et al., 2011; Zoo et al., 2017). This is because of its importance in highlighting the results achieved over time. Among the benefits of evaluation is that it allows determination of the extent of the e-government implementation strategy and plans, ascertaining milestones accomplished, and identifying the strengths and weaknesses (Deng, 2008). It also assists in influencing new strategies, seeking best practices examples, and finally, comparing growths achieved with other countries (Kunstelj and Vintar, 2004).

Therefore, to ensure the success of e-government, it is essential to assess its progress and efficacy in order to take the necessary steps based on the results of the assessment (Gupta and Jana, 2003). Measuring the performance of e-government has generated a lot of perspectives, opinions and frameworks. Measuring the supply side of e-government has taken precedent in prior researches due to the perception of public authorities' view of e-government as an extension of e-commerce (Coursey and Norris, 2008). However, it has been argued that these prior evaluation researches did not account for the perceptions of users which has often resulted in restricted published work in the field (Helbig et al., 2009).

Although, in some of the previous studies on e-government evaluation, the perspectives of e-government users were the subject of many studies (Floropoulos et al., 2010; Rana et al., 2013; Ghareeb et al., 2019). However, most of them were conducted

using the technology acceptance model (TAM) (Davis, 1989), highlighting the perceived usefulness and ease of use, thereby measuring the willingness to use. At the same time, some measured the actual use of technology through behavioural actions by using the unified theory of acceptance and use of technology (UTUAT) (Venkatesh et al., 2003). Similarly, some studies used DeLone and McLean information systems success model (DMISSM) (Delone and McLean, 2003) to evaluate technology performance using the quality dimensions (information quality, service quality and system quality) without making changes to the original model. Some made user satisfaction as a secondary goal while at the same time, paying attention to the net benefits that government or organisations may obtain from it (Aldholay et al., 2018b). Gupta et al. (2018) stressed that e-government-related information and services are mostly intangible tools, making it difficult to determine their cost and value.

Efficiency and cost savings alone are not simply the bedrock of e-government initiative, there are, instead, other underlying important socio-political objectives such as equity, justice, environmental sustainability and democratic participation (Chircu and Lee, 2005). Moore (1995) advocated for these underlying objectives of public sector projects like e-government to be evaluated based on public value perspectives. Therefore, the evaluation of the net benefits of e-government ought to shift from the private-sector economic approach to a more user-centric approach, which is the hallmark of public value (Cordella and Bonina, 2012). Public value underlies the collective expectations of the citizens who are the beneficiaries of public services (Moore, 1995).

Similarly, recent literature has suggested that the failure of e-government is not only based on poor infrastructure and poor political will from political elites, especially in developing countries (Abdulkareem, 2015). User failure has also been accounted for, due to citizens inability to navigate websites and or cannot even use the internet at all (Gauld et al., 2010). Service delivery through electronic means requires some technical know-how in today's techno-centric world. However, there are little attempts in the literature with regards to the issue of insufficient ICT skills among the citizens, given the level of the digital divide (Okunola et al., 2017). Generally, it is expected that citizens with positive service delivery expectations and right ICT skills are more inclined to use e-government services. More so, their satisfaction level with the performance expected could likely inform their continuous usage in the future and help to improve the state of the service. Therefore, governments have attempted to provide ICT training to citizens, especially the vulnerable groups, to encourage more citizens to use the e-government services (Kim et al., 2017).

Studies have argued that the level of e-government use and performance depends on the extent of the digital literacy of citizens, especially in developing countries (Idoughi and Abdelhakim, 2018; Tomaszewicz, 2015). This can be attributed to the fact that not all citizens have adequate access and skills to use ICT. This is even though ICT skills are becoming indispensable as statistics have shown that by 2020, 85 to 90% of jobs will require these skills (Commission on Science and Technology for Development, 2018).

Therefore, only a few studies have addressed the relationship between digital literacy, use of e-government services, satisfaction and the performance of e-government in developing countries (Lee and Porumbescu, 2019). This study attempts to cover this gap by extending the updated DMISS model (Delone and McLean, 2003; Petter et al., 2012) to examine the performance of e-government. This study also improved on the Delone and McLean (2003) model by including digital literacy as a predictor of use, satisfaction and net benefits of e-government. To achieve the aim of this study, the remaining

sections of the paper were structured as follows. The next section deals with the theoretical background and hypotheses development. Methodology, analysis of findings, discussions and implications followed by the limitations.

2 Theoretical background

2.1 *DeLone and McLean information system success model*

The study on information system success has been primarily influenced by the DeLone and McLean model, which was first published in 1992 (Petter et al., 2012) and later revised in 2003. Because of several criticisms which followed the original model and the changing nature of IS, it was revised to include service quality as another indicator of success (Pitt et al., 1995). As part of the change, they further combined individual and organisational impacts to reflect the net benefits variable in order to accommodate for all stakeholders in the IS network and provide different levels of analysis (Delone and McLean, 2003).

The updated model depicts the interrelationships among the quality dimensions (quality of information, quality of system and service quality), actual use or intention to use, user satisfaction and net benefits (Delone and McLean, 2003). The model contends that the success and efficiency of an IS project or program is predicted by the joint or independent effect of the quality dimensions (quality of information, system and service) to influence use, user satisfaction and net benefits. Also, the model argues further that the quality of information is predicated upon the levels of accuracy, completeness, easy to comprehend and recency in the information available on web portals. This contrasts with the system quality, which measures the technical nature of the portal such as navigation, ease of use and security. The service quality is based upon the levels of responsiveness, reliability and tangibility of the web portal.

The model was initially designed for IS in the private sector e-commerce. However, it has been extended over the years to accommodate for other areas of IS such as smartphone use (Cho, 2012), social media use (Cho and Park, 2012), e-health system (Wu, 2018) e-procurement (Aminah et al., 2018), e-learning (Aldholay et al., 2018a), tax e-filing (Veeramootoo et al., 2018) and e-government system (Widiyanto et al., 2016). This is in response to the call of Delone and McLean (2003) to further test and validate the model. Thus, different studies have extended and revised the model (Urbach and Müller, 2012; Agbabiaka, 2018; Abdelsalam et al., 2012; Teo et al., 2008). Therefore, in the context of this study, the model was revised to measure the net benefits based on the public value perspective and investigate the predicting role of digital literacy in the determinant of the use, satisfaction and the performance of e-government.

2.2 *E-government performance*

The customer's ultimate expectation of the value of services or goods is considered to be profit dependent on the understanding of the benefits they might get through the difference between costs and benefits (Osborne, 2018). The private enterprise creates economic value by the delivery of commercial services, and governments create public value by delivering public services, laws, policies and regulations. While consumers assess private goods and services based on the trade-off between benefits and costs

(Cabral et al., 2019), public sector analyses the value of programs and their results in a more sophisticated way. The strategic priorities of the government in creating values are taken into account by the citizens (Panagiotopoulos et al., 2019). However, while the private sector concern for e-services is strictly for-profit concern, most e-government services are not-for-profit in many situations. Therefore, citizens assess public services based on their results and performance.

Public sector performance is a multifaceted concept which provides that government agencies often face competing demands from heterogeneous social groups, and their assessment is subjective in some respects (Brewer et al., 2006; Osborne et al., 2013). Considering public services in general, recent research on citizen-centred measurement focuses primarily on assessing public service efficiency (Holzer and Schweseter, 2007). The research further makes the important argument that citizen inclusion and literacy is of paramount importance in assessing government success.

Although new public management (NPM) can be viewed as an idea which offered the public sector a better productivity alternative compared to the conventional public administration. However, Schedler and Summermatter (2007) contend that one of the critical arguments of modern public administration is a citizen-centred approach to providing and measuring public services. That is, citizen orientation is used as a tool to emphasise the need for more detailed performance models that incorporate citizens' interests into performance measurement consideration.

Considering citizens centric approach, one of the recently promoted ideas is the public value. The concept of public value is a new paradigm for evaluating the performance of public administration (Moore, 1995). This concept is becoming popular in the present-day public administration (Esposito and Ricci, 2015) as it provides a comprehensive framework for examining the performance of public organisations in the delivery of social and economic services to the expectations of the citizens (Alford and O'Flynn, 2009; Kelly et al., 2002; Jussila et al., 2017). Benington (2011) defined public values in two ways: first, 'public value is what the public values' and second, 'public value is what adds value to the public sphere'. These two meanings give credence to the emergence of a new paradigm in assessing the activities of public organisations from the producers' point of view to the users. Therefore, public value delivers an unconventional and a better paradigm to explain the welfare of the general public through the influence on public services (Benington, 2011).

The concept of public value is one that is complex, unbounded and ambiguous (Jørgensen and Bozeman, 2007). Public values are political and context-dependent. The approaches to understanding what values are applicable may vary and cannot be universally defined in absolute terms (Alford and O'Flynn, 2009). Values are those underlying goals and motivations expressed in the actualisation of any project. They represent the 'worth, utility, or importance of an entity' which are considered good and 'ends-in-view' for the evaluation of certain programs or projects (Esteves and Joseph, 2008). Usually, values express the guiding principles or rationales behind the selection and evaluation of people, policies, events and actions serving as criteria for measurement. Also, values describe the desired goals that people look forward to or strive to attain.

Several studies have employed the public value as an analytical tool to analyse research in a variety of ways (Try and Radnor, 2007; Bossert et al., 1998; Talbot and Wiggan, 2010; Grimsley et al., 2007; Scott et al., 2016; Karunasena and Deng, 2012b; Try, 2007; Marie, 2016; Erridge, 2007). For instance, Try and Radnor (2007) employed the public value theory to understand the progress of implementing result-based

management within the Canadian Public Service. Talbot and Wiggan (2010) draw on the ideas of public value and the operation of organisationally specific performance regimes to consider the issue of how organisations such as the National Audit Office (NAO) establish, assess and communicate their performances. Also, Andersen et al. (2013) explored public service motivation in Denmark through the public value theory lens. Also, some studies within the context of e-government (Karunasena and Deng, 2012a; Deng et al., 2018; Lessa and Tsegaye, 2019; Lopes et al., 2019; Al-Hujran et al., 2015)

Due to the ambiguity of public value and what constitutes the measurement of public value, there have been variations in its assessment, particularly from the quantitative measurement point. However, from the systematic review of 19 contemporary studies on public value, Faulkner and Kaufman (2018) identified four broad dimensions: service delivery quality, efficiency, trust and outcome achievement.

The concept of public value is useful to evaluate the net benefits of e-government due to one of the underlying principles of public value which is to offer public managers a simple instrument to articulate the goals of their organisations (Yotawut, 2018). It offers the public managers the opportunity to design what is most valuable in the services they render to the public based on their preferences (Coats and Passmore, 2008). Also, based on the principles of public value theory that public managers rise above the short run and economic gains of the private sector (Moore, 1995). Rather, they deal with the social values of the society, which is well beyond the scope of the private sector (Kavanagh, 2014).

Therefore, in the context of this study, we have described the net benefits of e-government using the public value approach to gather and quantify both tangible and intangible values that encompass the broader non-economic objectives of e-government (Grimsley and Meehan, 2008). Thus, the dimensions of net benefits are narrowly categorised along with economic value-time and cost-savings benefits (Alshawhi and Alalwany, 2009). Social values are linked to issues such as social inclusion, equity and personalisation (Deng et al., 2018); and political value – fostering citizen participation in democratic processes (Scott et al., 2016).

2.3 Digital literacy

Digital literacy encompasses the skills and ability to use digital communication tools and networks to access, manage, integrate, evaluate and create information. It is a combination of technical-procedural and emotional skills to use the information system, including the skills needed to participate in social networking applications and ensure presence in an online collaboration event. Also, it helps to create awareness of security threats and risks that are present with online interaction (Buckingham, 2010). The acquisition of digital literacy offers individuals the opportunity to be included in the information society by moving them across the digital divide line. It is the ability to access and critically assess digital information in various formats and forms as well as to take part in the community's social and economic development practices, collaboration and sharing of digital contents (Sharma et al., 2016). Having access to ICT is no longer enough rather than having the necessary skills and knowledge to utilise ICT to achieve inclusiveness in the information society (Buckingham, 2010). Digital literacy is the key to overcome the problem of the digital divide (Nawaz and Kundi, 2010; Macleod, 2005).

Hague and Payton (2011) succinctly captured what it means to be digitally literate as to have access to a wide range of practices and cultural resources which individuals can

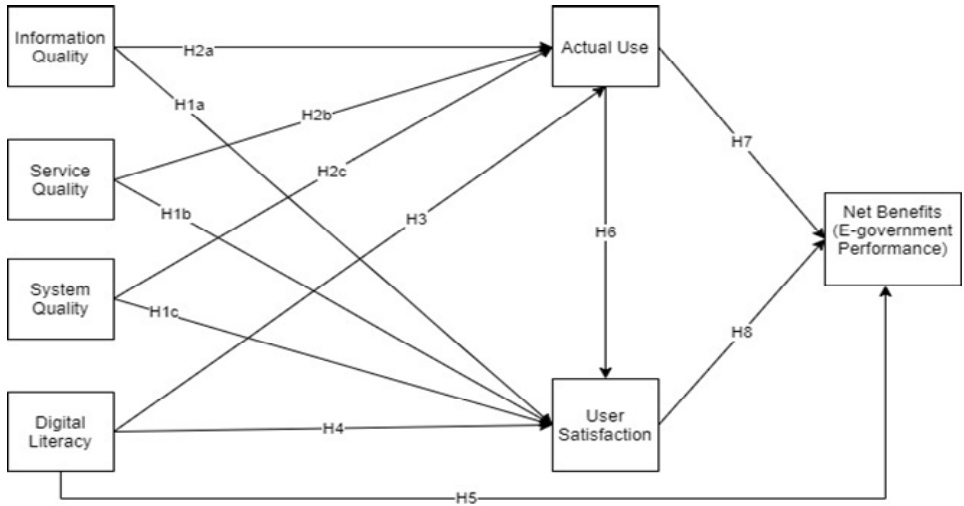
use as digital tools. It is the ability to make meanings of different formats; to effectively create, collaborate and communicate; and to understand how and when emerging technology can best be used to help these processes. Similarly, digital literacy is the people's understanding about, mindset and capacity to use digital tools and facilities effectively in recognising, accessing, handling, incorporating, assessing, interpreting and synthesising digital content, building new skills and producing media messages, as well as interacting with others, in specific life contexts, in order to enable positive social actions (Martin, 2005).

Therefore, for this study, digital literacy is conceived as any form of literacies or skills that are related to the use of e-government; which includes the ability to read and understand information on government websites, operate a smartphone or a computer to search for useful and relevant information on government websites. Also, it entails the ability and skills to pay for services online, navigate through webpages, send mail to or chat with government officials and able to respond accordingly (two-ways interaction). This underlines the capacity of individuals to construct meanings and communicate effectively through digital technologies, through the ability to access, analyse, assess and create digital tools being stressed more explicitly in the use of e-government.

2.4 *Research model and hypotheses*

Figure 1 shows the research model for this study, which is a combination of the quality dimensions (information quality, system quality and service quality) actual use, user satisfaction, digital literacy and net benefits (e-government performance).

Figure 1 Conceptual model



2.5 *Quality dimensions and satisfaction*

Services' importance or usefulness is a significant underlying factor affecting the perceptions of the quality of services provided on online platforms (Kearns, 2004). The perceived emphasis on citizens' usage of the e-government system involves the main

factors that influence expectations of service use or non-use. In the DMISS model, satisfaction is described as the level at which users of IS are fulfilled with the level of privacy, navigability, content, accuracy, completeness and usefulness of the information provided on the e-government platform based on the context of this study. Also, it depicts the level of satisfaction with the usefulness of the system functionalities and ability to deliver required services based on the request of the users (Delone and McLean, 2003). Information quality, service quality and system quality have all been found to be useful in determining the user satisfaction with IS in different ways such e-commerce (Wang, 2008) online tax filing (Chen et al., 2015; Floropoulos et al., 2010), e-learning (Mtebe and Raphael, 2018; Yakubu and Dasuki, 2018) and e-government system (Al-Haddad et al., 2011; Agbabiaka, 2018; Wang and Liao, 2008). Therefore, based on the foregoing, we hypothesise thus:

- H1a Information quality has a positive and significant influence on user satisfaction.
- H1b Service quality has a positive and significant influence on user satisfaction.
- H1c System quality has a positive and significant influence on user satisfaction.

2.6 *Quality dimensions and actual use*

The quality dimensions of IS have been studied and observed to be a predictor to determine the nature and the extent of actual use. The quality of an information system in terms of the level of accuracy, completeness, understandability, timeliness of the information made available on the e-government portal is useful to predict the degree and reason for its use by the citizens. Studies such as Susanto and Aljoza (2015) showed that information completeness, reducing cost, saving energy and time can translate to individual use of e-government services. Completeness, accuracy and easy to understand information are requirements for a good information system and predicts its usage (Hidayanto et al., 2017). Also, other qualities such as the presence of privacy and security, ease of surfing government websites, ability to navigate through the pages of government websites easily (Hirwade, 2010), presence of frequently asked questions (FAQ), ability to use site maps easily, remember simple and concise website addresses (Papadomichelaki and Mentzas, 2009; Deng et al., 2018), the simple and friendly interface of government websites will all influence citizens' use of government services rather than traditional methods (Lew et al., 2019). Therefore, we hypothesise thus:

- H2a Information quality has a positive and significant influence on actual e-government use.
- H2b Service quality has a positive and significant influence on e-government use.
- H2c System quality has a positive and significant influence on actual e-government use.

2.7 *Digital literacy and actual use*

In order for citizens to have access to quality information, quality services and ultimately be included in the information society, researchers such as Lozanova-Belcheva (2013), Grönlund et al. (2007) argue that citizens must possess digital literacy and skills in the field of basic informatics and the use of a computer. The importance of computer literacy

as a prerequisite for the use of e-government services by the citizens has been confirmed in the study various studies such as Alateyah et al. (2013). Similarly, Reddick and Anthopoulos (2014) also noted that those lacking adequate ICT skills might be at disadvantage of getting access to information and may be poorly placed to gain access to e-government services. Therefore, we hypothesise thus:

H3 Digital literacy has a positive and significant influence on actual e-government use.

2.8 Digital literacy and user satisfaction

Digital literacy is the use of technology and information literacy skills, knowledge and concepts to access, consume, understand, locate and operate online services (Khan et al., 2012). For users to be able to get fulfilment in the use of e-government services, they must acquire digital skills to be able to use the e-government system. Different studies have confirmed the positive and significant relationship between digital literacy and user satisfaction with IS. Bélanger and Carter (2006) found a positive and significant relationship between digital skills and satisfaction with e-government services. Similarly, Idoughi and Abdelhakim (2018) examined the predicting role of digital literacy on user satisfaction; the result was positive and significant. Therefore, we hypothesise thus:

H4 Digital literacy has a positive and significant influence on user satisfaction.

2.9 Digital literacy and net benefits (e-government performance)

The effect of digital literacy enhances the competence of individuals with the use of computer and internet in order to have better performance when they use ICT (Roca and Gagné, 2008). Olivier and Shapiro (1993) found a higher level of digital literacy as a source of motivation to encourage citizens to take more initiatives to realise expected performance. Arguing further, inequalities in the access to ICT skills, due to the social and economic complexities of developing countries is the main reason behind digital divide and exclusion of citizens in the information and digital service society (Hafeez and Sher, 2006; van Laar et al., 2017). In Africa, citizens' participation and usage of ICT is still relatively low compared to other regions like Europe and America. Low level of digital literacy among the citizens, particularly, the aged, women and the rural dwellers is a primary reason (Mutsvairo and Harris, 2016). Citizens with some levels of ICT education have better access to the features of e-government, transact with public organisations and give feedback to the government agencies for services delivered (Tomaszewicz, 2015). Thus, we hypothesise thus:

H5 Digital literacy has a positive and significant influence on net benefits.

2.10 Actual use and satisfaction

The actual use of IS is the degree, rate and frequency at which an individual makes use of the electronic medium for activities that could have been done manually (Delone and McLean, 2003). DMISS model in the IS literature is central to the notion that the actual use of IS influences user satisfaction (Delone and McLean, 2003). Based on the assumption of the theory, if consumers use an online service, they can determine their level of satisfaction with the service. Users are likely to be satisfied if the services met

their earlier anticipated expectations. Therefore, a positive experience with the use of e-government in this context can predict the level of satisfaction with the e-government system (Wang and Liao, 2008; DeLone and McLean, 2016). Several studies have found a positive and significant relationship between the use of IS and user satisfaction (Isaac et al., 2017; Mensah et al., 2017; Makokha and Ochieng, 2014). Therefore, we hypothesise thus:

H6 Actual Use of e-government services has a positive and significant influence on user satisfaction.

2.11 Actual use and net benefits (e-government performance)

Various studies have examined the interdependence between the use of IS and net benefits accrued to it (Martins et al., 2019; Aldholay et al., 2018a). Wang and Wang (2009) found that greater use of IS leads to a greater realisation of IS benefits. Also, Lin (2007) recognised the use of e-learning platform as part of other facilitating conditions for the predictors of the net benefits of using e-learning platforms. Similarly, Balaban et al. (2013) found a positive and significant relationship between actual usage of IS by students and the net benefits attached. Thus, we hypothesise thus:

H7 Actual use has a positive and significant influence on net benefits.

2.12 Satisfaction and net benefits (e-government performance)

Previous studies have observed satisfaction as a widely used determinant of the success of an IS (Gong et al., 2018; Ma and Zheng, 2019). It is the sense of fulfilment derived from the use of an online service which is usually driven by the level of attractiveness and efficiency of the system (Agbabiaka and Ugaddan, 2016; Wang and Chen, 2010). Based on the DMISS model, the satisfaction derived from the use of an online service determines the net benefits of the services (Hsu and Chiu, 2004; Li and Shang, 2019). Similarly, the study of Ma and Zheng (2019) on the e-government ranking (performance) found satisfaction with IS usage as a significant predictor. Studies such as Spreng et al. (1996) also found user satisfaction as an ultimate measure of e-government performance. Thus, we hypothesise thus:

H8 User satisfaction has a positive and significant influence on net benefits.

3 Methodology

The data that were used to test the earlier stated hypotheses emanated from a survey of e-government users in Nigeria selected randomly through a simple random sampling technique. However, emphases were placed on experience and previous interactions with the government on electronic portals. The survey collected information on the demographic details such as gender, age, education level, income status, employment status as well as access to e-government and interaction levels with e-government of the respondents.

Link to the questionnaire was sent to 885 respondents, and 250 (28.2%) were returned and duly completed. The low response rate is not unusual for this type of quantitative

research (Kolsaker and Lee-Kelley, 2008). The returned questionnaires were entered in the Statistical Packages for Social Sciences (SPSS Version 24) for initial data development and coding. SmartPLS 3.3.2 was used to record and analyse the screened data (Ringle et al., 2015). According to Hair et al. (2014), structural equation modelling (SEM) is one of the most widely accepted statistical tools used for quantitative data analysis. With the use of SEM, the researcher can carry out a confirmatory factor analysis. Both measurement and structural model assessments were required to carry out comprehensive data analyses using SEM.

3.1 *Scale and measurement of variables*

The survey included items used for the measurement of various constructs adopted for the study. The Likert scale adopted was the agreement scale of 1 to 5 ('strongly disagree to strongly agree') as shown in Table 1. Quality dimensions comprise of information quality (5 items), service quality (6 items) and system quality (5 items). All the quality dimensions were adapted from Delone and McLean (2003), Urbach and Müller (2012) and Wang and Liao (2008). Digital literacy was measured with five items adapted from Jaeger and Bertot (2012). Net benefit, which represents e-government performance, was measured using 15 items adapted from Scott et al. (2016) and Deng et al. (2018) public values of e-government. Satisfaction with e-government service was measured with five items adapted from Spreng et al. (1996) while the actual use of e-government was measured with four items adapted from the measurement scale of Urbach and Müller (2012) and Delone and McLean (2003).

Table 1 Items measurement scales and sources

<i>Constructs</i>	<i>Measurement items</i>	<i>Source</i>
Information quality	IFQ1: Information on the government portal is easy to understand	Delone and McLean (2003), Urbach and Müller (2012), Wang and Liao (2008)
	IFQ2: Information on the government portal is up to date	
	IFQ3: Information on the government portal is accurate	
	IFQ4: Information on the government portal is relevant	
	IFQ5: Information on the government portal is complete	
Service quality	SVQ1: Service delivered on the government portal is assuring	Delone and McLean (2003), Wang (2008), Wang and Liao (2008)
	SVQ2: Service delivered on the government portal is reliable	
	SVQ3: Service delivered on the government portal is tangible	
	SVQ4: Service delivered on the government portal is responsive	
	SVQ5: Service delivered on the government portal is dependable	
	SYQ6: Service delivered on the government portal is timely	
System quality	SYQ1: The e-government portal is secure	Delone and McLean (2003), Wang and Liao (2008)
	SYQ2: The e-government portal is well organised	
	SYQ3: The e-government portal is easy to navigate	
	SYQ4: The e-government portal is easy to use	
	SYQ5: The e-government portal is efficient	

Table 1 Items measurement scales and sources (continued)

<i>Constructs</i>	<i>Measurement items</i>	<i>Source</i>
Digital literacy	DGL1: I feel confident making payments online without any help	Jaeger and Bertot, (2012)
	DGL2: I can complete e-government tasks online without any help	
	DGL3: I feel confident finding information using the search engine	
	DGL4: I feel confident posting messages in a web bulletin board	
	DGL5: I feel confident chatting on the internet	
Satisfaction	SAT1: I feel more satisfied with the performance of the e-government portal	Wang and Liao (2008), Teo et al. (2008)
	SAT2: I feel more fulfilled with the experience of using e-government	
	SAT3: I am satisfied with the quality of information	
	SAT4: I am satisfied with the quality of e-service delivery	
Actual use	USE1: I use the e-government portal for information searching	Urbach and Müller (2012)
	USE2: I use the e-government portal for payment of public services	
	USE3: I use e-government to interact with government online	
	USE4: I prefer to use of e-government websites to carry out business with the government	
Net benefits	NBT1: Using e-government saves me money.	Scott et al. (2016)
	NBT2: Using e-government reduces the cost of assessing services.	
	NBT3: Using e-government is an effective way of communicating with government departments.	
	NBT4: Using e-government saves me time.	
	NBT5: E-government provides a quicker response to a question or request than other means (e.g., offline interaction).	
	NBT6: I can accomplish things more quickly because of using e-government.	
	NBT7: Using e-government enables me to avoid having to deal directly with government staff.	
	NBT8: It is important that I can use e-government around the clock.	
	NBT9: I always feel confident that I can rely on the e-government portal to do its part when I interact with it.	
	NBT10: using e-government portal helps me to understand more about government services.	
	NBT11: I feel comfortable interacting with e-government since it generally fulfils its duties efficiently.	

Table 1 Items measurement scales and sources (continued)

<i>Constructs</i>	<i>Measurement items</i>	<i>Source</i>
Net benefits	NBT12: E-government makes me feel that decision-makers listen to me.	
	NBT13: I value the personalised aspects of e-government portal.	
	NBT14: Using the e-government portal is an efficient way of communicating with government departments.	
	NBT15: E-government portal makes me feel that I am being consulted about important issues.	

3.2 Data analysis

3.2.1 Common method bias test

The only instrument used to collect data in this study was a survey questionnaire. In the survey design, multiple measures were used to avoid common method bias, such as different response formats. Although bias could still occur when the same participants react to the dependent and independent variables at the same time using the same form of Likert scale measurement (Yüksel, 2017). Such a bias can lead to inaccurate relationship estimates (Craighead et al., 2011). Since this study asked respondents to answer questions using a five-point Likert scale, the data were evaluated for the common method bias by using the post-hoc Harman single-factor test to identify common method bias (Jakobsen and Jensen, 2015). In this test, all elements used for this study (excluding demographic information) were put into a principal component analysis (PCA) using an unrotated factor approach to determine whether a particular factor appears or if a factor accounts for more than 50% of the co-variation. The findings based on seven constructs from 44 items accounted for 75.338% of the overall variance, while the first item accounted for 17.578% of the data variation. Therefore, the conclusion is that this study poses no significant problem with common method variance. The results are shown in Table 2.

Table 2 Common method bias

<i>Comp</i>	<i>Total variance explained</i>								
	<i>Initial eigenvalues</i>			<i>Extraction sums of squared loadings</i>			<i>Rotation sums of squared loadings</i>		
	<i>Total</i>	<i>% of variance</i>	<i>Cumulative %</i>	<i>Total</i>	<i>% of variance</i>	<i>Cumulative %</i>	<i>Total</i>	<i>% of variance</i>	<i>Cumulative %</i>
1	17.82	40.50	40.50	17.82	40.50	40.50	7.74	17.58	17.58
2	3.83	8.71	49.21	3.83	8.71	49.21	4.42	10.04	27.62
3	2.30	5.22	54.43	2.30	5.22	54.43	3.66	8.31	35.93
4	1.90	4.33	58.75	1.90	4.33	58.75	3.64	8.27	44.21
5	1.83	4.16	62.91	1.83	4.16	62.91	3.36	7.65	51.85
6	1.67	3.80	66.71	1.67	3.80	66.71	3.28	7.45	59.30
7	1.45	3.30	70.01	1.45	3.30	70.01	2.93	6.65	65.95
8	1.28	2.91	72.92	1.28	2.91	72.92	2.76	6.27	72.22

Note: Extraction method: PCA.

Table 2 Common method bias (continued)

<i>Comp</i>	<i>Total variance explained</i>								
	<i>Initial eigenvalues</i>			<i>Extraction sums of squared loadings</i>			<i>Rotation sums of squared loadings</i>		
	<i>Total</i>	<i>% of variance</i>	<i>Cumulative %</i>	<i>Total</i>	<i>% of variance</i>	<i>Cumulative %</i>	<i>Total</i>	<i>% of variance</i>	<i>Cumulative %</i>
9	1.07	2.42	75.34	1.07	2.42	75.34	1.37	3.12	75.34
10	0.95	2.16	77.50						
11	0.88	2.00	79.49						
12	0.78	1.78	81.27						
13	0.74	1.68	82.95						
14	0.64	1.45	84.40						
15	0.62	1.40	85.80						
16	0.56	1.28	87.08						
17	0.54	1.22	88.30						
18	0.50	1.14	89.44						
19	0.47	1.06	90.50						
20	0.42	0.96	91.46						
21	0.37	0.85	92.30						
22	0.36	0.81	93.11						
23	0.33	0.76	93.87						
24	0.31	0.71	94.58						
25	0.28	0.63	95.21						
26	0.25	0.57	95.78						
27	0.23	0.53	96.30						
28	0.22	0.49	96.79						
29	0.20	0.45	97.24						
30	0.17	0.38	97.61						
31	0.16	0.36	97.97						
32	0.15	0.34	98.31						
33	0.13	0.29	98.61						
34	0.11	0.26	98.86						
35	0.10	0.23	99.10						
36	0.10	0.22	99.31						
37	0.09	0.19	99.51						
38	0.08	0.18	99.69						
39	0.07	0.16	99.84						
40	0.04	0.09	99.93						
41	0.02	0.04	99.97						
42	0.01	0.02	99.99						
43	0.00	0.01	100.00						
44	0.00	0.00	100.00						

Note: Extraction method: PCA.

3.2.2 Profile of respondents

This survey generated responses from 133 males and 117 females. 75 of the respondents had a Master's degree, 37 had a PhD degree, 88 had a Bachelor's degree, 40 had Ordinary National Diploma (OND) and National Certificate of Education (NCE) while, ten were secondary school certificate holders. Majority of the respondents were between the ages of 21–35 years (85 respondents). There are 75 respondents within the ages of 36–45; 35 respondents are between the ages of 46–65; 30 respondents were above 66 years, while 25 were 18 years and below. 122 of the total respondents last used e-government within the last three months, 70 and 58 of the respondents used it in the last six months and beyond six months respectively. The response indicates that the experience of the respondents is useful to validate the response from the questionnaire. The majority (165) of the respondents have regular access to the internet, while only 56 and 29 use the internet often and occasionally, respectively.

3.3 Measurement model

In this study, the partial least squares structural equation modelling (PLS-SEM) was used, and SmartPLS version 3.3.2 (Ringle et al., 2015) software was selected as the analysis tool. The first form of assessment in a PLS-SEM is the measurement model (Hair et al., 2019) concerning the assessment of internal consistency reliability, indicator reliability, discriminant validity and convergent validity (Neuman, 2007). The result of the measurement model assessment is displayed in Table 3.

Table 3 Factor loadings, reliability and convergent validity

<i>Constructs/ items</i>	<i>Loadings</i>	<i>Cronbach's alpha</i>	<i>rho_A</i>	<i>Composite reliability</i>	<i>Average variance extracted</i>
<i>Information quality</i>					
IFQ1	0.820	0.836	0.874	0.883	0.603
IFQ2	0.751				
IFQ3	0.796				
IFQ4	0.846				
IFQ5	0.656 (deleted)				
<i>Service quality</i>					
SVQ1	0.689 (deleted)	0.876	0.897	0.905	0.614
SVQ2	0.819				
SVQ3	0.838				
SVQ4	0.769				
SVQ5	0.791				
SVQ6	0.785				
<i>System quality</i>					
SYQ1	0.905	0.882	0.896	0.915	0.683
SYQ2	0.810				
SYQ3	0.693 (deleted)				
SYQ4	0.839				
SYQ5	0.871				

Table 3 Factor loadings, reliability and convergent validity (continued)

<i>Constructs/ items</i>	<i>Loadings</i>	<i>Cronbach's alpha</i>	<i>rho_A</i>	<i>Composite reliability</i>	<i>Average variance extracted</i>
<i>Digital literacy</i>					
DGL1	0.805	0.844	0.85	0.889	0.615
DGL2	0.837				
DGL3	0.785				
DGL4:	0.753				
DGL5	0.738				
<i>Net benefits (e-government performance)</i>					
NBT1	0.837	0.956	0.965	0.962	0.636
NBT2	0.840				
NBT3	0.591 (deleted)				
NBT4	0.836				
NBT5	0.870				
NBT6	0.853				
NBT7	0.848				
NBT8	0.872				
NBT9	0.598 (deleted)				
NBT10	0.432 (deleted)				
NBT11	0.845				
NBT12	0.843				
NBT13	0.837				
NBT14	0.873				
NBT15	0.829				
<i>Satisfaction</i>					
SAT1	0.725	0.844	0.849	0.896	0.683
SAT2	0.881				
SAT3	0.848				
SAT4	0.845				
<i>Actual use</i>					
USE1	0.817	0.901	0.914	0.926	0.716
USE2	0.841				
USE3	0.825				
USE4	0.864				

The internal consistency reliability test by Dijkstra-Henseler's rho (ρ_A)'s measure (Dijkstra and Henseler, 2015) shows that all the latent variables satisfied the criteria, as the lowest latent variable was 0.725 and the highest was 0.905 as displayed in Table 3. Four items (IFQ5, SYQ3, NBT3,9&10) were deleted due to their respective low factor loadings. Also, the result met the requirement of convergent validity, which measures the extent of construct convergence to explain their items (Hair et al., 2019) as displayed in

Table 3. The AVE was examined, and all the constructs met the threshold of 0.5 (Fornell and Larcker, 1981).

Discriminant validity was also assessed to determine the extent to which constructs are empirically different from one another within the same model (Henseler et al., 2015). Two criteria were used to assess the discriminant validity: Fornell-Larcker criterion and Heterotrait-Monotrait ratio of correlations (HTMT) as prescribed by Henseler et al. (2015). The result of the Fornell-Larcker criterion, as displayed in Table 4a, showed that indicators loaded more strongly on their constructs than on other constructs in the model. Similarly, the result of the HTMT inference as displayed in Table 4b showed that the result fulfilled the criterion of HTMT.90 (Gold et al., 2001). Therefore, there is enough evidence to show that the model met discriminant validity satisfactorily.

Table 4a Discriminant validity (Fornell-Larcker criterion)

	<i>DGL</i>	<i>IFQ</i>	<i>NBT</i>	<i>SAT</i>	<i>SVQ</i>	<i>SYQ</i>	<i>USE</i>
DGL	0.784						
IFQ	0.323	0.777					
NBT	0.617	0.279	0.797				
SAT	0.654	0.399	0.659	0.827			
SVQ	0.508	0.436	0.526	0.519	0.783		
SYQ	0.594	0.213	0.662	0.495	0.384	0.827	
USE	0.560	0.344	0.671	0.617	0.450	0.545	0.846

Table 4b Discriminant validity (HTMT)

	<i>DGL</i>	<i>IFQ</i>	<i>NBT</i>	<i>SAT</i>	<i>SVQ</i>	<i>SYQ</i>	<i>USE</i>
DGL							
IFQ	0.376 (0.277, 0.487)						
NBT	0.786 (0.728, 0.840)	0.316 (0.232, 0.421)					
SAT	0.769 (0.698, 0.834)	0.461 (0.344, 0.570)	0.730 (0.666, 0.790)				
SVQ	0.569 (0.475, 0.656)	0.525 (0.436, 0.623)	0.551 (0.452, 0.640)	0.589 (0.502, 0.670)			
SYQ	0.684 (0.607, 0.749)	0.273 (0.186, 0.410)	0.712 (0.643, 0.773)	0.569 (0.455, 0.669)	0.416 (0.307, 0.531)		
USE	0.623 (0.516, 0.719)	0.377 (0.250, 0.503)	0.703 (0.609, 0.789)	0.691 (0.602, 0.774)	0.476 (0.374, 0.569)	0.600 (0.480, 0.695)	

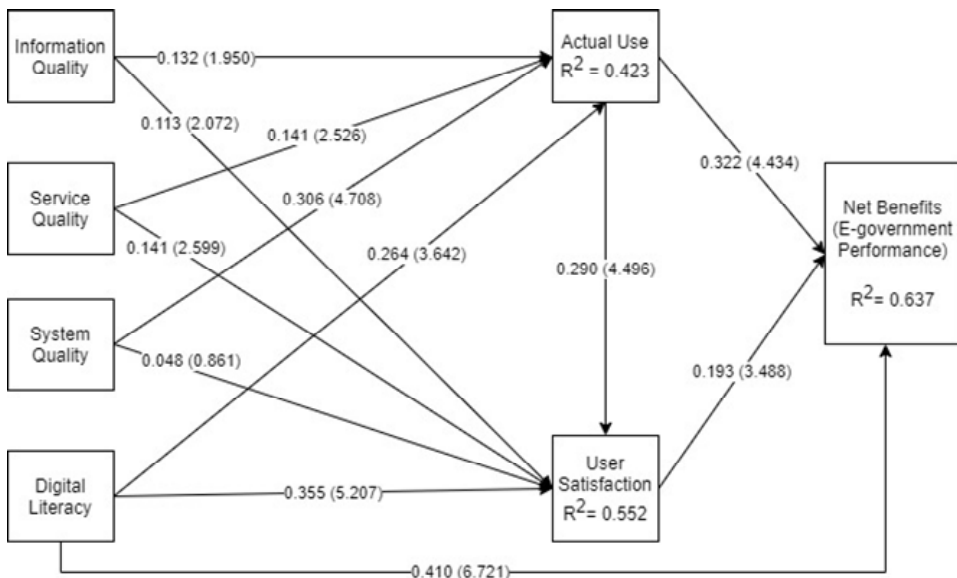
3.4 Structural model

The second part of the assessment is the structural model, which is applied when the measurement model assessment is found to be satisfactory. As described by Hair et al. (2019), four key criteria form the assessment for the structural model in PLS-SEM. These include examining the relevance of the path coefficients, coefficient of determination (R^2), effect size (f^2) and the statistical significance. As recommended by Hair et al. (2017), it is essential to first test for collinearity before proceeding with the structural relationship assessment. The variance inflation factors (VIF) were examined and the result as shown in Table 5, established that collinearity issues do not exist among the predictor constructs as all the values of the VIF were below the threshold of 3.3 and 5 (Hair et al., 2019).

3.4.1 Test of hypothesis: evaluation of the path coefficients, effect sizes and predictive relevance

The path coefficients in the SEM model represents standardised regression coefficients. It shows the relative importance of the exogenous variables in predicting the dependent variable. As shown in Table 6 and Figure 2, the path coefficient estimates the hypothesised relationships.

Figure 2 Result of the structural model



Eleven of the 12 paths drawn from the list of hypotheses were significant at $p < 0.05$. Digital literacy exhibited the strongest effect on the net benefits of e-government, followed by digital literacy on satisfaction. Among the quality dimensions, system quality exhibited the strongest effect on the actual use of e-government but was insignificant on user satisfaction with e-government. Also, service quality exhibited the same effect on both the actual use of e-government and user satisfaction. Both actual use and user satisfaction effect on net benefits were significant.

The explanatory power of research model as shown Figure 2 shows that the R^2 value of the quality dimensions, digital literacy and actual use of e-government explains 55% (moderate) of the variance total for user satisfaction with e-government. Also, a combination of quality dimensions and digital literacy explains 42% (near moderate) variance total for actual use of e-government. Similarly, user satisfaction, actual use and digital literacy explain 64% (moderate) variance total for net benefits of e-government.

Table 5 Test of hypothesis

<i>Hypo</i>	<i>Relationship</i>	β	<i>t-value</i>	<i>p-value</i>	<i>Confidence interval</i>		<i>Decision</i>	<i>VIF</i>	<i>F²</i>
					5%	95%			
H1a	IFQ -> SAT	0.113	2.072	0.019	0.025	0.202	Supported	1.287	0.022
H1b	SVQ -> SAT	0.141	2.599	0.005	0.053	0.223	Supported	1.572	0.028
H1c	SYQ -> SAT	0.048	0.861	0.195	-0.042	0.137	Not supported	1.731	0.003
H2a	IFQ -> USE	0.132	1.950	0.026	0.018	0.240	Supported	1.256	0.024
H2b	SVQ -> USE	0.141	2.526	0.006	0.051	0.231	Supported	1.538	0.022
H2c	SYQ -> USE	0.306	4.708	0.000	0.193	0.408	Supported	1.568	0.104
H3	DGL -> USE	0.264	3.642	0.000	0.140	0.381	Supported	1.828	0.066
H4	DGL -> SAT	0.355	5.207	0.000	0.245	0.466	Supported	1.949	0.144
H5	DGL -> NBT	0.410	6.721	0.000	0.309	0.505	Supported	1.876	0.246
H6	USE -> SAT	0.290	4.396	0.000	0.185	0.399	Supported	1.734	0.108
H7	USE -> NBT	0.322	4.434	0.000	0.208	0.439	Supported	1.734	0.156
H8	SAT -> NBT	0.193	3.488	0.000	0.102	0.285	Supported	2.078	0.049

4 Discussion and implications

The study examines the performance of e-government using an extended DMISS model. The findings from the study validate the existing theories and previous studies. From the findings, information quality and service quality exert influence on the actual use and user satisfaction with e-government. This result is in congruence with the studies of Chen et al. (2015) and Aldholay et al. (2018a). However, system quality was not significant with user satisfaction. The result is also consistent with the findings of Agbabiaka and Ugaddan (2016) and Chen et al. (2015), where system quality was not significant with user satisfaction. This proposition confirms the importance of providing accurate, easy to understand, up-to-date and reliable information for the e-service users. Likewise, service features such as the ability to pay for services online, reliability and tangibility of services delivered through government websites are essential for the delivery of quality e-services (Wangpipatwong et al., 2009). In all, they define the success or failure of the e-government program. All quality dimensions exhibited a significant effect on the actual use of e-government.

After using a service, citizens are expected to show either satisfaction or dissatisfaction with the service. The present study further confirms the significant positive relationship between the actual use of e-government and user satisfaction, as

seen in the previous studies (Karkin and Janssen, 2014; Idoughi and Abdelhakim, 2018). Therefore, it is until the citizens use e-government services before their level of satisfaction can be confirmed. Evidence from this study has also shown that digital literacy, actual use and user satisfaction with e-government are good predictors of the net benefits (performance of e-government).

The result also shows that digital literacy (DGL) had a significant influence on the use of e-services, user satisfaction and the net benefits of e-government. The implication of this suggests that citizens with ICT skills will perform better with the use of e-services, which is expected to inform their judgement on the level of satisfaction, success or failure of the e-government service (Idoughi and Abdelhakim, 2018; Oliver, 1980; Olivier and Shapiro, 1993). This result further implies that the capability to use ICT for e-services involves the ability to read and understand the information placed on the websites and use them appropriately (Bertot et al., 2012). Being digitally literate also involves having the mindset and capacity to use digital functions effectively such as payment for services online, send messages and make inquiries online. When citizens particularly, the vulnerable groups have necessary ICT skills to read and understand available information on government websites, it will help them to cut costs and time by limiting their frequency of physical visits to public organisations. The ability to operate ICT without assistance will limit physical interactions with public officials which is essential in curbing corruption. Help citizens to use FAQ on the public agencies' websites, use site maps and can remember concise and straightforward website addresses (Connolly et al., 2010).

Findings from this study have various implications for research as well as practice. First, this study tried to evaluate the performance of e-government by extending the updated DMISS model to include digital literacy as a predictor for the use of e-government services, user satisfaction and e-government performance. Although, digital literacy is seldom used in this respect, however, it is expected to contribute to the existing knowledge on e-government success or performance evaluation as it emphasises the need for ICT competence of the citizens to make use of digital services. Also, this result further reiterates the need for the government to bridge the digital divide gap which might have excluded some percentage of the citizens from the digital society and using the digital services due to lack or low ICT competence. It is also a wake-up call for the government to intensify on ICT training and skills enhancement through inculcating ICT into the curriculum of schools.

Theoretically, this study has further tested the DMISS model through a significant contribution to the development and validation of the model. The public value of e-government was used to assess the net benefits of e-government. This approach tilts research on the success of e-government away from the conventional and financial measures to a set of non-financial indicators. The implication of this is to provide future researchers point of reference for a citizen-centric approach to evaluate the performance of e-services. Also, it will provide public administrators with a more robust, practical, comprehensive and citizen-centric reference in the delivery of e-services and online information to the citizens who crave for good governance and better service delivery.

The result further indicated that quality dimensions had significant effects on user satisfaction, actual use and the performance of e-government. The implication of this further confirms previous studies on the need for the government to continue to upgrade digital services to simplify the ease of use through improved, responsive and interactive websites, adequate and easy to understand information for the citizens (Gilbert and

Callahan, 2005). Therefore, improving the service interface will guarantee continuous use and citizens satisfaction with the digital platform rather than resorting back to the traditional mode of service delivery.

5 Limitations and future research

Although, the findings of this study are inspiring and useful, however, there are limitations to its generalisations. First, this study adopted digital literacy as a predictor for the actual use, satisfaction and the net benefits of e-government, the theoretical support for these assumptions still require further necessary empirical support for generalisation. Secondly, the sample for the study is limited to a country-specific and a developing country where the level of digital literacy is lower compared to high-income countries with infrastructure to influence high digital literacy among the citizens. Therefore, further research is encouraged to verify the generalisation of these findings to developed countries, particularly, countries with high digital literacy and small digital divide gap. Thirdly, the samples for this study were drawn from the experienced e-government users, which may result in sample bias because respondents have some level of characteristics which may have enhanced the chances of participation in this research. Therefore, it is important further make an empirical investigation with a more diverse sample.

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References

- Abdelsalam, H.M., Reddick, C.G. and El Kadi, H.A. (2012) 'Success and failure of local e-government projects: lessons learned from Egypt', *Digital Democracy: Concepts, Methodologies, Tools, and Applications*, pp.183–201, IGI Global.
- Abdulkareem, A.K. (2015) 'Challenges of e-government implementation in the Nigerian public service', *Journal of Creative Writing*, Vol. 1, No. 4, pp.45–56.
- Agbabiaka, O. (2018) 'The public value creation of eGovernment: an empirical study from citizen perspective', *11th International Conference on Theory and Practice of Electronic Governance (ICEGOV 2018)*, Galway, Ireland, ACM pp.143–153.
- Agbabiaka, O. and Ugaddan, R. (2016) 'The public value creation of eGovernment: a test of the respecified is success model', *Proceedings of the 49th Hawaii International Conference on System Sciences (HICSS-49)*, Kauai, HI, USA, IEEE pp.2923–2932.
- Alateyah, S., Crowder, R.M. and Wills, G.B. (2013), 'Factors affecting the citizen's intention to adopt e-government in Saudi Arabia', *International Journal of Social, Human Science and Engineering*, Vol. 7, No. 9, pp.80–85.
- Aldholay, A.H., Isaac, O., Abdullah, Z., Alrajawy, I. and Nusari, M. (2018a) 'The role of compatibility as a moderating variable in the information system success model: the context of online learning usage', *International Journal Of Management And Human Science*, Vol. 2, No. 1, pp.9–15.

- Aldholay, A.H., Isaac, O., Abdullah, Z. and Ramayah, T. (2018b) 'The role of transformational leadership as a mediating variable in DeLone and McLean information system success model: the context of online learning usage in Yemen', *Telematics and Informatics*, Vol. 35, No. 5, pp.1421–1437.
- Alford, J. and O'Flynn, J. (2009) 'Making sense of public value: concepts, critiques and emergent meanings', *Intl. Journal of Public Administration*, Vol. 32, Nos. 3–4, pp.171–191.
- Al-Haddad, S.A., Hyland, P. and Hubona, G. (2011) 'An assessment tool for e-government system performance: a citizen-centric model', in *Seventeenth Americas Conference on Information Systems*, Detroit, Michigan, USA.
- Al-Hujran, O., Al-Debei, M.M., Chatfield, A. and Migdadi, M. (2015) 'The imperative of influencing citizen attitude toward e-government adoption and use', *Computers in Human Behavior*, Vol. 53, No. 1, pp.189–203.
- Alshawhi, S. and Alalwany, H. (2009) 'E-government evaluation: citizen's perspective in developing countries', *Information Technology for Development*, Vol. 15, No. 3, pp.193–208.
- Aminah, S., Ditari, Y., Kumaralalita, L., Hidayanto, A.N., Phusavat, K. and Anussornnitisarn, P. (2018) 'E-procurement system success factors and their impact on transparency perceptions: perspectives from the supplier side', *Electronic Government: An International Journal*, Vol. 14, No. 2, pp.177–199.
- Andersen, K.N., Medaglia, R., Vatrappu, R., Henriksen, H.Z. and Gauld, R. (2011) 'The forgotten promise of e-government maturity: assessing responsiveness in the digital public sector', *Government Information Quarterly*, Vol. 28, No. 4, pp.439–445.
- Andersen, L.B., Jørgensen, T.B., Kjeldsen, A.M., Pedersen, L.H. and Vrangbæk, K. (2013) 'Public values and public service motivation: Conceptual and empirical relationships', *The American Review of Public Administration*, Vol. 43, No. 3, pp.292–311.
- Balaban, I., Mu, E. and Divjak, B. (2013) 'Development of an electronic portfolio system success model: an information systems approach', *Computers & Education*, Vol. 60, No. 1, pp.396–411.
- Bélanger, F. and Carter, L. (2006) 'The effects of the digital divide on e-government: an empirical evaluation', *Proceedings of the 39th Hawaii International Conference on System Sciences (HICSS-39)*, Kauai, Computer Society Press, pp.81c (1–7).
- Benington, J. (2011) 'From private choice to public value', *Public Value: Theory and Practice*, pp.31–49.
- Bertot, J.C., Jaeger, P.T., Gorham, U., Greene, N.N. and Lincoln, R. (2012) 'Delivering e-government services through innovative partnerships: public libraries, government agencies, and community organizations', *13th Annual International Conference on Digital Government Research (dg.o '12)*, New York, NY, USA, ACM pp.126–134.
- Bossert, T., Hsiao, W., Barrera, M., Alarcon, L., Leo, M. and Casares, C. (1998) 'Transformation of ministries of health in the era of health reform: the case of Colombia', *Health Policy and Planning*, Vol. 13, No. 1, pp.59–77.
- Brewer, G.A., Neubauer, B.J. and Geiselhart, K. (2006) 'Designing and implementing e-government systems: critical implications for public administration and democracy', *Administration & Society*, Vol. 38, No. 4, pp.472–499.
- Buckingham, D. (2010) 'Defining digital literacy', *Medienbildung in neuen Kulturräumen*, Springer, pp.59–71.
- Cabral, S., Mahoney, J.T., McGahan, A.M. and Potoski, M. (2019) 'Value creation and value appropriation in public and nonprofit organizations', *Strategic Management Journal*, Vol. 40, No. 4, pp.465–475.
- Chen, J.V., Jubilado, R.J.M., Capistrano, E.P.S. and Yen, D.C. (2015) 'Factors affecting online tax filing – an application of the IS success model and trust theory', *Computers in Human Behavior*, Vol. 43, No. 1, pp.251–262.
- Chircu, A.M. and Lee, D.H-D. (2005) 'E-government: key success factors for value discovery and realisation', *Electronic Government, An International Journal*, Vol. 2, No. 1, pp.11–25.

- Cho, H-H. (2012) 'Study on influence of perceived quality factor of smartphone on satisfaction & continued use intention: from the standpoint of updated Delone & McLean's information system success model', *Entrue Journal of Information Technology*, Vol. 11, No. 2, pp.167–180.
- Cho, S.E. and Park, H.W. (2012) 'Government organizations' innovative use of the internet: the case of the Twitter activity of South Korea's Ministry for Food, Agriculture, Forestry and Fisheries', *Scientometrics*, Vol. 90, No. 1, pp.9–23.
- Coats, D. and Passmore, E. (2008) *Public Value: The Next Steps in Public Service Reform*, Work Foundation, London.
- Commission on Science and Technology for Development (2018) *Building Digital Competencies to Benefit from Existing and Emerging Technologies with Special Focus on Gender and Youth Dimensions*, 21st Session ed., United Nations Economic and Social Council, Geneva, Switzerland.
- Connolly, R., Bannister, F. and Kearney, A. (2010) 'Government website service quality: a study of the Irish revenue online service', *European Journal of Information Systems*, Vol. 19, No. 6, pp.649–667.
- Cordella, A. and Bonina, C.M. (2012) 'A public value perspective for ICT enabled public sector reforms: a theoretical reflection', *Government Information Quarterly*, Vol. 29, No. 4, pp.512–520.
- Coursey, D. and Norris, D.F. (2008) 'Models of e-government: are they correct? An empirical assessment', *Public Administration Review*, Vol. 68, No. 3, pp.523–536.
- Craighead, C.W., Ketchen, D.J., Dunn, K.S. and Hult, G.T.M. (2011) 'Addressing common method variance: guidelines for survey research on information technology, operations, and supply chain management', *IEEE Transactions on Engineering Management*, Vol. 58, No. 3, pp.578–588.
- Davis, F.D. (1989) 'Perceived usefulness, perceived ease of use, and user acceptance of information technology', *MIS Quarterly*, pp.319–340.
- Delone, W.H. and McLean, E.R. (2003) 'The DeLone and McLean model of information systems success: a ten-year update', *Journal of Management Information Systems*, Vol. 19, No. 4, pp.9–30.
- DeLone, W.H. and McLean, E.R. (2016) 'Information systems success measurement', *Foundations and Trends® in Information Systems*, Vol. 2, No. 1, pp.1–116.
- Deng, H. (2008) 'Towards objective benchmarking of electronic government: an inter-country analysis', *Transforming Government: People, Process and Policy*, Vol. 2, No. 3, pp.162–176.
- Deng, H., Karunasena, K. and Xu, W. (2018) 'Evaluating the performance of e-government in developing countries: a public value perspective', *Internet Research*, Vol. 28, No. 1, pp.169–190.
- Dijkstra, T.K. and Henseler, J. (2015), 'Consistent partial least squares path modeling', *MIS Quarterly*, Vol. 39, No. 2, pp.279–316.
- Erridge, A. (2007) 'Public procurement, public value and the Northern Ireland unemployment pilot project', *Public Administration*, Vol. 85, No. 4, pp.1023–1043.
- Esposito, P. and Ricci, P. (2015) 'How to turn public (dis) value into new public value? Evidence from Italy', *Public Money & Management*, Vol. 35, No. 3, pp.227–231.
- Esteves, J. and Joseph, R.C. (2008) 'A comprehensive framework for the assessment of eGovernment projects', *Government Information Quarterly*, Vol. 25, No. 1, pp.118–132.
- Faulkner, N. and Kaufman, S. (2018) 'Avoiding theoretical stagnation: a systematic review and framework for measuring public value', *Australian Journal of Public Administration*, Vol. 77, No. 1, pp.69–86.
- Floropoulos, J., Spathis, C., Halvatzis, D. and Tsipouridou, M. (2010) 'Measuring the success of the Greek taxation information system', *International Journal of Information Management*, Vol. 30, No. 1, pp.47–56.

- Fornell, C. and Larcker, D.F. (1981) 'Evaluating structural equation models with unobservable variables and measurement error', *Journal of Marketing Research*, Vol. 18, No. 1, pp.39–50.
- Gauld, R., Goldfinch, S. and Horsburgh, S. (2010) 'Do they want it? Do they use it? The 'demand-side' of e-government in Australia and New Zealand', *Government Information Quarterly*, Vol. 27, No. 2, pp.177–186.
- Ghareeb, A.M., Darwish, N.R. and Hefney, H.A. (2019) 'E-government adoption: literature review and a proposed citizen-centric model', *Electronic Government, An International Journal*, Vol. 15, No. 4, pp.392–416.
- Gilbert, G.R. and Callahan, R.F. (2005) 'End-user satisfaction and design features of public agencies', *American Review of Public Administration*, Vol. 35, No. 1, pp.57–73.
- Gold, A.H., Malhotra, A. and Segars, A.H. (2001) 'Knowledge management: an organizational capabilities perspective', *Journal of Management Information Systems*, Vol. 18, No. 1, pp.185–214.
- Gong, X., Lee, M.K., Liu, Z. and Zheng, X. (2018) 'Examining the role of tie strength in users' continuance intention of second-generation mobile instant messaging services', *Information Systems Frontiers*, Vol. 22, No. 1, pp.1–22.
- Grimsley, M. and Meehan, A. (2008) 'Attaining social value from electronic government', *Electronic Journal of e-Government*, Vol. 6, No. 1, pp.31–42.
- Grimsley, M., Meehan, A. and Tan, A. (2007) 'Evaluative design of e-government projects: a community development perspective', *Transforming Government: People, Process and Policy*, Vol. 1, No. 2, pp.174–198.
- Grönlund, Å., Hatakka, M. and Ask, A. (2007) 'Inclusion in the e-service society-investigating administrative literacy requirements for using e-services', in *International Conference on Electronic Government*, pp.216–227.
- Gupta, K.P., Singh, S. and Bhaskar, P. (2018) 'Citizens' perceptions on benefits of e-governance services', *International Journal of Electronic Governance*, Vol. 10, No. 1, pp.24–55.
- Gupta, M.P. and Jana, D. (2003) 'E-government evaluation: a framework and case study', *Government Information Quarterly*, Vol. 20, No. 4, pp.365–387.
- Hafeez, S. and Sher, S.W. (2006) *UN Global E-government Readiness Report 2005: From E-government to E-inclusion*, United Nations Publications, New York, USA.
- Hague, C. and Payton, S. (2011) 'Digital literacy across the curriculum', *Curriculum Leadership*, Vol. 9, No. 10, pp.243–269.
- Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019) 'When to use and how to report the results of PLS-SEM', *European Business Review*, Vol. 31, No. 1, pp.2–24.
- Hair, J.F., Sarstedt, M., Hopkins, L. and Kuppelwieser, V. (2014) 'Partial least squares structural equation modeling (PLS-SEM) an emerging tool in business research', *European Business Review*, Vol. 26, No. 2, pp.106–121.
- Hair, J.F., Sarstedt, M., Ringle, C.M. and Gudergan, S.P. (2017) *Advanced Issues in Partial Least Squares Structural Equation Modeling*, Sage Publications, California, USA.
- Helbig, N., Dawes, S.S., Mulki, F.H., Hrdinová, J.L., Cook, M.E. and Edwards, T. (2009) 'International Digital Government Research: A Reconnaissance Study (1994–2008)', pp.1–63, 63pp, Center for Technology in Government, University at Albany, SUNY.
- Henseler, J., Ringle, C.M. and Sarstedt, M. (2015) 'A new criterion for assessing discriminant validity in variance-based structural equation modeling', *Journal of the Academy of Marketing Science*, Vol. 43, No. 1, pp.115–135.
- Hidayanto, A.N., Purwandari, B., Kartika, D. and Kosandi, M. (2017) 'Factors influencing citizen's intention to participate electronically: the perspectives of social cognitive theory and e-government service quality', in *2017 International Conference on Advanced Computer Science and Information Systems (ICACSIS)*, pp.166–171.
- Hirwade, M.A. (2010) 'Responding to information needs of the citizens through e-government portals and online services in India', *The International Information & Library Review*, Vol. 42, No. 3, pp.154–163.

- Holzer, M. and Schwester, R.W. (2007) 'Citizen consultations via government web sites', in Anttiroiko, A.-V. and Mälikä, M. (Eds.): *Encyclopedia of Digital Government*, pp.163–168, Idea Group Reference, Hershey, PA.
- Hsu, M.-H. and Chiu, C.-M. (2004) 'Predicting electronic service continuance with a decomposed theory of planned behaviour', *Behaviour & Information Technology*, Vol. 23, No. 5, pp.359–373.
- Huang, Z. and Benyoucef, M. (2014) 'Usability and credibility of e-government websites', *Government Information Quarterly*, Vol. 31, No. 4, pp.584–595.
- Idoughi, D. and Abdelhakim, D. (2018) 'Developing countries e-government services evaluation identifying and testing antecedents of satisfaction case of Algeria', *International Journal of Electronic Government Research (IJEGR)*, Vol. 14, No. 1, pp.63–85.
- Isaac, O., Abdullah, Z., Ramayah, T. and Mutahar, A.M. (2017) 'Internet usage, user satisfaction, task-technology fit, and performance impact among public sector employees in Yemen', *International Journal of Information and Learning Technology*, Vol. 34, No. 3, pp.210–241.
- Jaeger, P.T. and Bertot, J.C. (2012) 'Designing, implementing, and evaluating user-centered and citizen-centered e-government', *Technology Enabled Transformation of the Public Sector: Advances in E-Government*, pp.105–122, IGI Global.
- Jakobsen, M. and Jensen, R. (2015) 'Common method bias in public management studies', *International Public Management Journal*, Vol. 18, No. 1, pp.3–30.
- Jørgensen, T.B. and Bozeman, B. (2007) 'Public values: an inventory', *Administration & Society*, Vol. 39, No. 3, pp.354–381.
- Jussila, J., Sillanpää, V., Lehtonen, T. and Helander, N. (2017) 'Value assessment of e-government service from municipality perspective', *Proceedings of the 50th Hawaii International Conference on System Science (HICSS-50)*, Waikoloa Village, Hawaii, USA, pp.2569–2578.
- Karkin, N. and Janssen, M. (2014) 'Evaluating websites from a public value perspective: a review of Turkish local government websites', *International Journal of Information Management*, Vol. 34, No. 3, pp.351–363.
- Karunasena, K. and Deng, H. (2012a) 'A citizen-oriented approach for evaluating the performance of e-government in Sri Lanka', *International Journal of Electronic Government Research*, Vol. 8, No. 1, pp.43–63.
- Karunasena, K. and Deng, H. (2012b) 'Critical factors for evaluating the public value of e-government in Sri Lanka', *Government Information Quarterly*, Vol. 29, No. 1, pp.76–84.
- Kavanagh, S. (2014) 'Defining and creating value for the public', *Government Finance Review*, Vol. 30, No. 5, pp.57–60.
- Kearns, I. (2004) *Public Value and E-government*, Citeseer, London.
- Kelly, G., Mulgan, G. and Muers, S. (2002) *Creating Public Value*, Cabinet Office, London.
- Khan, G.F., Moon, J., Swar, B., Zo, H. and Rho, J.J. (2012) 'E-government service use intentions in Afghanistan: technology adoption and the digital divide in a war-torn country', *Information Development*, Vol. 28, No. 4, pp.281–299.
- Kim, Y., Cho, Y. and Suh, Y. (2017) 'A study of the effectiveness of information literacy education among the elderly: a focus on digital literacy and quality of life', *Korean Journal of Policy Studies*, Vol. 55, No. 1, pp.229–259.
- Kolsaker, A. and Lee-Kelley, L. (2008) 'Citizens' attitudes towards e-government and e-governance: a UK study', *International Journal of Public Sector Management*, Vol. 21, No. 7, pp.723–738.
- Kunstelj, M. and Vintar, M. (2004) 'Evaluating the progress of e-government development: a critical analysis', *Information Polity*, Vol. 9, Nos. 3–4, pp.131–148.
- Kurfalı, M., Arifoğlu, A., Tokdemir, G. and Paçın, Y. (2017) 'Adoption of e-government services in Turkey', *Computers in Human Behavior*, January, Vol. 66, pp.168–178.
- Lee, J.B. and Porumbescu, G.A. (2019) 'Engendering inclusive e-government use through citizen IT training programs', *Government Information Quarterly*, Vol. 36, No. 1, pp.69–76.

- Lessa, L. and Tsegaye, A. (2019) 'Evaluation of the public value of e-government services in Ethiopia: case of court case management system', in *Proceedings of the 12th International Conference on Theory and Practice of Electronic Governance*, pp.21–26.
- Lew, S-L., Lau, S-H. and Leow, M-C. (2019) 'Usability factors predicting continuance of intention to use cloud e-learning application', *Heliyon*, Vol. 5, No. 6, p.e01788.
- Li, M-H. and Feeney, M.K. (2014) 'Adoption of electronic technologies in local U.S. governments: distinguishing between e-services and communication technologies', *American Review of Public Administration*, Vol. 44, No. 1, pp.75–91.
- Li, Y. and Shang, H. (2019) 'Service quality, perceived value, and citizens' continuous-use intention regarding e-government: empirical evidence from China', *Information & Management*, Vol. 57, No. 3, pp.1–15.
- Lin, H-F. (2007) 'Measuring online learning systems success: applying the updated DeLone and McLean model', *Cyberpsychology & Behavior*, Vol. 10, No. 6, pp.817–820.
- Liu, S.M. and Yuan, Q. (2015), 'The evolution of information and communication technology in public administration', *Public Administration and Development*, Vol. 35, No. 2, pp.140–151.
- Lopes, K.M.G., Macadar, M.A. and Luciano, E.M. (2019) 'Key drivers for public value creation enhancing the adoption of electronic public services by citizens', *International Journal of Public Sector Management*, Vol. 32, No. 5, pp.546–561.
- Lozanova-Belcheva, E. (2013) 'The impact of information literacy education for the use of e-government services: the role of the libraries', in *European Conference on Information Literacy*, pp.155–161.
- Ma, L. and Zheng, Y. (2019) 'National e-government performance and citizen satisfaction: a multilevel analysis across European countries', *International Review of Administrative Sciences*, Vol. 85, No. 3, pp.506–526.
- Macleod, H. (2005) 'What role can educational multimedia play in narrowing the digital divide?', *International Journal of Education and Development using ICT*, Vol. 1, No. 4, pp.42–53.
- Makokha, M. and Ochieng, D. (2014) 'Assessing the success of ICT's from a user perspective: a case of coffee research foundation', *Journal of Chemical Information and Modeling*, Vol. 53, No. 9, pp.1689–1699.
- Marie, T.T. (2016) 'Public values as essential criteria for public entrepreneurship: water management in France', *Utilities Policy*, Vol. 40, No. 1, pp.162–169.
- Martin, A. (2005) 'DigEuLit – a European framework for digital literacy: a progress report', *Journal of eLiteracy*, Vol. 2, No. 2, pp.130–136.
- Martins, J., Branco, F., Gonçalves, R., Au-Yong-Oliveira, M., Oliveira, T., Naranjo-Zolotov, M. and Cruz-Jesus, F. (2019) 'Assessing the success behind the use of education management information systems in higher education', *Telematics and Informatics*, Vol. 38, No. 1, pp.182–193.
- Mensah, I.K., Jianing, M. and Durrani, D.K. (2017) 'Factors influencing citizens' intention to use e-government services: a case study of South Korean Students in China', *International Journal of Electronic Government Research (IJEGR)*, Vol. 13, No. 1, pp.14–32.
- Moore, M.H. (1995) *Creating Public Value: Strategic Management in Government*, Harvard University Press, Cambridge, Massachusetts, USA.
- Moullin, M. (2017) 'Improving and evaluating performance with the public sector scorecard', *International Journal of Productivity and Performance Management*, Vol. 66, No. 4, pp.442–458.
- Mtebe, J.S. and Raphael, C. (2018) 'Key factors in learners' satisfaction with the e-learning system at the University of Dar es Salaam, Tanzania', *Australasian Journal of Educational Technology*, Vol. 34, No. 4, pp.107–122.
- Mutsvairo, B. and Harris, S.T.G. (2016) 'Rethinking mobile media tactics in protests: a comparative case study of Hong Kong and Malawi', *Mobile Media, Political Participation, and Civic Activism in Asia*, pp.215–231, Springer.

- Nawaz, A. and Kundi, G.M. (2010) 'Digital literacy: an analysis of the contemporary paradigms', *Journal of Science and Technology Education Research*, Vol. 1, No. 2, pp.19–29.
- Neuman, L.W. (2007) *Social Research Methods*, 6/E, Pearson Education, India.
- Okunola, O.M., Rowley, J. and Johnson, F. (2017) 'The multi-dimensional digital divide: Perspectives from an e-government portal in Nigeria', *Government Information Quarterly*, Vol. 34, No. 2, pp.329–339.
- Oliver, R.L. (1980) 'A cognitive model of the antecedents and consequences of satisfaction decisions', *Journal of Marketing Research*, Vol. 17, No. 4, pp.460–469.
- Olivier, T.A. and Shapiro, F. (1993) 'Self-efficacy and computers', *Journal of Computer-Based Instruction*, Vol. 20, No. 3, pp.81–85.
- Osborne, S.P. (2018) *From Public Service-Dominant Logic to Public Service Logic: Are Public Service Organizations Capable of Co-production and Value Co-creation?*, Taylor & Francis.
- Osborne, S.P., Radnor, Z. and Nasi, G. (2013) 'A new theory for public service management? Toward a (public) service-dominant approach', *American Review of Public Administration*, Vol. 43, No. 2, pp.135–158.
- Panagiotopoulos, P., Klievink, B. and Cordella, A. (2019) 'Public value creation in digital government', *Government Information Quarterly*, Vol. 36, No. 4, pp.1–8.
- Papadomichelaki, X. and Mentzas, G. (2009) 'A multiple-item scale for assessing e-government service quality', in *International Conference on Electronic Government*, pp.163–175.
- Petter, S., DeLone, W. and McLean, E.R. (2012) 'The past, present, and future of 'IS success'', *Journal of the Association for Information Systems*, Vol. 13, No. 5, pp.341–362.
- Pitt, L.F., Watson, R.T. and Kavan, C.B. (1995) 'Service quality: a measure of information systems effectiveness', *MIS Quarterly*, Vol. 19, No. 2, pp.173–187.
- Rana, N.P., Dwivedi, Y.K. and Williams, M.D. (2013) 'Evaluating alternative theoretical models for examining citizen centric adoption of e-government', *Transforming Government: People, Process and Policy*, Vol. 7, No. 1, pp.27–49.
- Reddick, C. and Anthopoulos, L. (2014) 'Interactions with e-government, new digital media and traditional channel choices: citizen-initiated factors', *Transforming Government: People, Process and Policy*, Vol. 8, No. 3, pp.398–419.
- Ringle, C., Wende, S. and Becker, J. (2015) *SmartPLS 3.2. 7*, SmartPLS GmbH: Bönningstedt, Germany.
- Roca, J.C. and Gagné, M. (2008) 'Understanding e-learning continuance intention in the workplace: a self-determination theory perspective', *Computers in Human Behavior*, Vol. 24, No. 4, pp.1585–1604.
- Rodríguez, B. and Manuel, P. (2018) 'User centric services under the Web 2.0 era. Coproduction, execution and efficiency of public services', *User Centric E-Government*, pp.137–158, Springer, Cham.
- Schedler, K. and Summermatter, L. (2007) 'Customer orientation in electronic government: motives and effects', *Government Information Quarterly*, Vol. 24, No. 2, pp.291–311.
- Scott, M., DeLone, W. and Golden, W. (2016) 'Measuring eGovernment success: a public value approach', *European Journal of Information Systems*, Vol. 25, No. 3, pp.187–208.
- Sharma, R., Fantin, A.-R., Prabhu, N., Guan, C. and Dattakumar, A. (2016) 'Digital literacy and knowledge societies: a grounded theory investigation of sustainable development', *Telecommunications Policy*, Vol. 40, No. 7, pp.628–643.
- Spreng, R.A., MacKenzie, S.B. and Olshavsky, R.W. (1996) 'A reexamination of the determinants of consumer satisfaction', *Journal of Marketing*, Vol. 60, No. 3, pp.15–32.
- Susanto, T.D. and Aljoza, M. (2015) 'Individual acceptance of e-government services in a developing country: dimensions of perceived usefulness and perceived ease of use and the importance of trust and social influence', *Procedia Computer Science*, Vol. 72, pp.622–629.
- Talbot, C. and Wiggan, J. (2010) 'The public value of the National Audit Office', *International Journal of Public Sector Management*, Vol. 23, No. 1, pp.54–70.

- Teo, T.S., Srivastava, S.C. and Jiang, L. (2008) 'Trust and electronic government success: an empirical study', *Journal of Management Information Systems*, Vol. 25, No. 3, pp.99–132.
- Tomaszewicz, A.A. (2015) 'The impact of digital literacy on e-government development', *Online Journal of Applied Knowledge Management*, Vol. 3, No. 2, pp.45–58.
- Try, D. (2007) '“Mind the gap, please” Using public value theory to examine executive take-up of results-based management', *International Journal of Productivity and Performance Management*, Vol. 57, No. 1, pp.22–36.
- Try, D. and Radnor, Z. (2007) 'Developing an understanding of results-based management through public value theory', *International Journal of Public Sector Management*, Vol. 20, No. 7, pp.655–673.
- Urbach, N. and Müller, B. (2012) 'The updated DeLone and McLean model of information systems success', *Information Systems Theory*, pp.1–18, Springer.
- van Laar, E., van Deursen, A.J.A.M., van Dijk, J.A.G.M. and de Haan, J. (2017) 'The relation between 21st-century skills and digital skills: a systematic literature review', *Computers in Human Behavior*, Vol. 72, No. 1, pp.577–588.
- Veeramootoo, N., Nunkoo, R. and Dwivedi, Y.K. (2018) 'What determines success of an e-government service? Validation of an integrative model of e-filing continuance usage', *Government Information Quarterly*, Vol. 35, No. 2, pp.161–174.
- Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003) 'User acceptance of information technology: toward a unified view', *MIS Quarterly*, Vol. 27, No. 3, pp.425–478.
- Wang, F. and Chen, Y. (2010) 'From potential users to practical users: use of e-government service by Chinese migrant farmer workers', *4th International Conference on Theory and Practice of Electronic Governance (ICEGOV 2010)*, Beijing, China, ACM pp.279–287.
- Wang, W-T. and Wang, C-C. (2009) 'An empirical study of instructor adoption of web-based learning systems', *Computers & Education*, Vol. 53, No. 3, pp.761–774.
- Wang, Y.S. (2008) 'Assessing e-commerce systems success: a respecification and validation of the DeLone and McLean model of IS success', *Information Systems Journal*, Vol. 18, No. 5, pp.529–557.
- Wang, Y-S. and Liao, Y-W. (2008) 'Assessing eGovernment systems success: a validation of the DeLone and McLean model of information systems success', *Government Information Quarterly*, Vol. 25, No. 4, pp.717–733.
- Wangpipatwong, S., Chutimaskul, W. and Papasratorn, B. (2009) 'Quality enhancing the continued use of e-government web sites: evidence from e-citizens of Thailand', *International Journal of Electronic Government Research (IJEGR)*, Vol. 5, No. 1, pp.19–35.
- Widiyanto, N., Sandhyaduhita, P.I., Hidayanto, A.N. and Munajat, Q. (2016) 'Exploring information quality dimensions of government agency's information services through social media: a case of the Ministry of Education and Culture in Indonesia', *Electronic Government, An International Journal*, Vol. 12, No. 3, pp.256–278.
- Wu, B. (2018) 'Patient continued use of online health care communities: web mining of patient-doctor communication', *Journal of Medical Internet Research*, Vol. 20, No. 4, p.e126.
- Yakubu, N. and Dasuki, S. (2018) 'Measuring e-learning success in developing countries: applying the updated DeLone and McLean model', *Journal of Information Technology Education: Research*, Vol. 17, No. 1, pp.1283–203.
- Yotawut, M. (2018) 'Examining progress in research on public value', *Kasetsart Journal of Social Sciences*, Vol. 39, No. 1, pp.168–173.
- Yüksel, A. (2017) 'A critique of 'response bias' in the tourism, travel and hospitality research', *Tourism Management*, Vol. 59, No. 1, pp.376–384.
- Zoo, H., Lee, H. and Yoon, J. (2017) 'Assessing the e-government maturity for public sector innovation in developing countries: case of national informatization assessment tool (NIAT)', in *International Conference on Social Implications of Computers in Developing Countries*, pp.778–789.