Clarifying the Role of E-Government Trust in E-Government Success Models: A Meta-analytic Structural Equation Modeling Approach

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Abstract

E-government implementation success is of critical importance for nations. Prior information systems (IS) success models emphasize the effects of information quality, service quality, system quality, and user satisfaction but do not consider e-government trust. This study incorporates e-government trust into the IS success model and empirically tests the model on empirical findings reported in 67 prior studies using meta-analysis methods and structural equation modeling. Our analysis shows that: a) information quality, service quality, system quality, and user satisfaction influence e-government trust, and b) system use mediates the effect of e-government trust on intention to use e-government systems in the future.

Keywords: Information system success, E-Government trust, Meta-analysis, SEM, Meta-analytic structural equation modeling, MASEM.

1 Introduction

Advances in information and communication technology (ICT) and the global penetration of the internet have significantly contributed to the proliferation of e-government systems in recent decades. The success of e-government systems is estimated to be around 15% in developing countries (Anthopoulos et al., 2016) despite the recognition that they may provide transparency, accountability, participation, and collaboration in public services (MacLean & Titah, 2022). E-government success refers to the satisfactory e-government system adoption and use by its beneficiaries (Teo et al., 2008).

Prior research has proposed various models and factors that impact system use (SU) or behavioral intention (BI) to use e-government systems. For instance, the Technology Acceptance Model (TAM) proposed two technology attributes—perceived usefulness and perceived ease of use—to impact SU and BI (Davis, 1989) whereas the Unified Theory of Acceptance and Use of Technology (UTAUT) posited performance expectancy, effort expectancy, social influence, and facilitating conditions to impact SU or BI (Venkatesh et al., 2003). While these models offer useful insights, they do not address specific challenges in e-government settings such as the quality of service or users' satisfaction with systems. The

Information Systems Success (ISS) model proposed service quality, information quality, system quality, and user satisfaction as influential factors in SU or BI (DeLone & McLean, 2003). However, the risks and uncertainties experienced by e-government users are not theorized in the ISS model.

Since e-government systems involve online transactions and access to personal information, users face risks and uncertainties in adopting and using such systems. The quality attributes of the technology (DeLone & McLean, 2003) or users' perceptions of technology usefulness (Venkatesh et al., 2003) are not sufficient to deal with risks and uncertainties. Rather, psychological factors such as trust are crucial to foster the initial adoption and subsequent long-term use of e-government systems (Alkraiji, 2020). E-government maturity models have identified various stages in deploying e-government systems (Layne & Lee, 2001) and trust plays a significant role at every stage (Bannister & Connolly 2011). Trust has received research attention in e-government settings, but has not been explicitly included in ISS models (Rana et al., 2013; Teo et al., 2008) although prior studies have considered trust and quality together.

This study has two related objectives. First, we develop an integrated research model incorporating e-government trust into the ISS model and theorize paths involving trust and ISS constructs such as service quality, system quality, information quality, and user satisfaction on SU and BI. The integrated model offers a richer perspective since it simultaneously considers quality and trust factors in e-government SU. Second, we use meta-analytic structural equation modeling (MASEM) methods to empirically test the integrated research model (Jeyaraj & Dwivedi, 2020). MASEM methods enable the synthesis of effect sizes for bivariate relationships reported in prior studies, obtain the matrix of correlations among variables, and apply SEM methods to examine the interrelationships among constructs. In doing so, this study reconciles inconsistent findings in prior studies for the relationships examined in our model. For instance, trust had mixed effects on BI (Al-Omairi et al., 2020; Al-Sulami & Hashim, 2018); information quality had mixed effects on BI (Mellouli et al., 2020; Stefanovic et al., 2016); and system quality had mixed effects on BI (Sharma & Mishra, 2017; Mensah, 2019). Thus, our study offers both theoretical and empirical contributions in examining e-government systems.

2 Theoretical Background

2.1 E-Government Systems

An e-government system is an ICT-based solution used by governments to deliver public services to its beneficiaries. It may manifest as different types of digital technologies including web sites and e-service portals that enable users to interact with governments (UNDESA, 2004). Public services include information provision in response to citizens' questions (e.g., age of retirement) or transaction processing to cater to specific needs (e.g., an application for building permit) through e-government systems (Nielsen, 2021). Both types of services may require users to provide personal or sensitive data through the e-government system, which is a significant reason for consideration of e-government trust.

2.2 Technology Adoption and Use

Prior research on the adoption and use of e-government systems has yielded useful insights. Models of IS acceptance (Davis, 1989; Venkatesh et al., 2003) have been used in examining e-government adoption and use. These models found performance expectancy, effort expectancy, social influence, and facilitating conditions to impact e-government SU (Alryalat et al., 2015). Models based on expectation confirmation theory (ECT) and social cognitive theory (SCT) found satisfaction, outcome expectations, prior experience, and social influence to impact users' BI to use e-government (Alruwaie et al., 2020). Such models typically do not consider quality or trust as influential in technology adoption and use.

2.3 IS Success and Trust

The ISS model emphasizes different dimensions of quality in technology use. Three dimensions—service quality, information quality, and system quality—have been proposed to influence user satisfaction and SU (DeLone & McLean, 2003). The model has been empirically tested in various studies in the e-government domain (Wang & Liao, 2008).

Service quality represents the superiority of service provided by a system; information quality refers to the correctness, usefulness, and completeness of the system output; and system quality represents the technical quality of the system such as availability, reliability, and access (Wang & Liao, 2008; Wang et al., 2010), all of which exert an influence on user satisfaction. Further, the effects of the three quality factors and user satisfaction on e-government SU have received considerable empirical support (Wang & Liao, 2008). The ISS models thus underline the importance of the various quality attributes unlike the technology adoption and use models.

Similar to technology adoption and use models, the ISS models do not portray the role of trust in SU. However, trust can be a significant consideration in e-government settings due to the impersonal nature of electronic interactions with governmental systems and the need to divulge private and sensitive data (Carter & Bélanger, 2005; UNDESA, 2018; Santa et al., 2019; J. Zhang et al., 2021). When a system is perceived to be safe and secure, which may be considered as quality attributes, trust may be enhanced, which may result in SU (Teo et al., 2008; Singh et al., 2020). Thus, trust may be closely linked with the ISS models than technology adoption models since the TAM constructs may not necessarily increase trust since they do not provide ways for individuals to overcome negative thoughts about safety and security. Since trust needs to be addressed to enhance e-government maturity (Nielsen, 2016) and trust needs to be developed rather than be automatically transferred from other settings (Luhmann, 1988), e-government systems could be designed to increase users' trust by improving the three quality dimensions and adhering to security and privacy expectations (Teo et al., 2008).

3 Research Model

Figure 1 shows the integrated research model with e-government trust and the ISS model examined in this study. Table 1 shows the definitions of the model constructs.

Construct	Definition	Reference
System quality	E-government systems' efficiency, availability, and reliability	Teo et al. (2008)
Information quality	Completeness, usefulness, and correctness of information provided by the e-government system	Wang et al. (2010)
Service quality	E-government systems' quality of services and support in answering queries, entertaining requests, and offering solutions	Kumar et al. (2007); Stefanovic et al. (2016)
User satisfaction	Users' feelings about the e-government system after using it	Konradt et al. (2016); Sachan et al. (2018)

E-government trust	Users' confidence in the e-government system to provide reliable and efficient service without technical errors and opportunistic behaviors of service providers	Almaiah & Nasereddin (2020); Warketin et al. (2002)
System use	Users' actual utilization of the e-government system to avail public services and complete transactions	Singh et al. (2020); Nurdin et al. (2010)
Behavioral intention	Users' willingness to utilize e-government systems in the future	Fishbein & Ajzen (1980); Zhao & Khan (2013)

Table 1. Construct Definitions

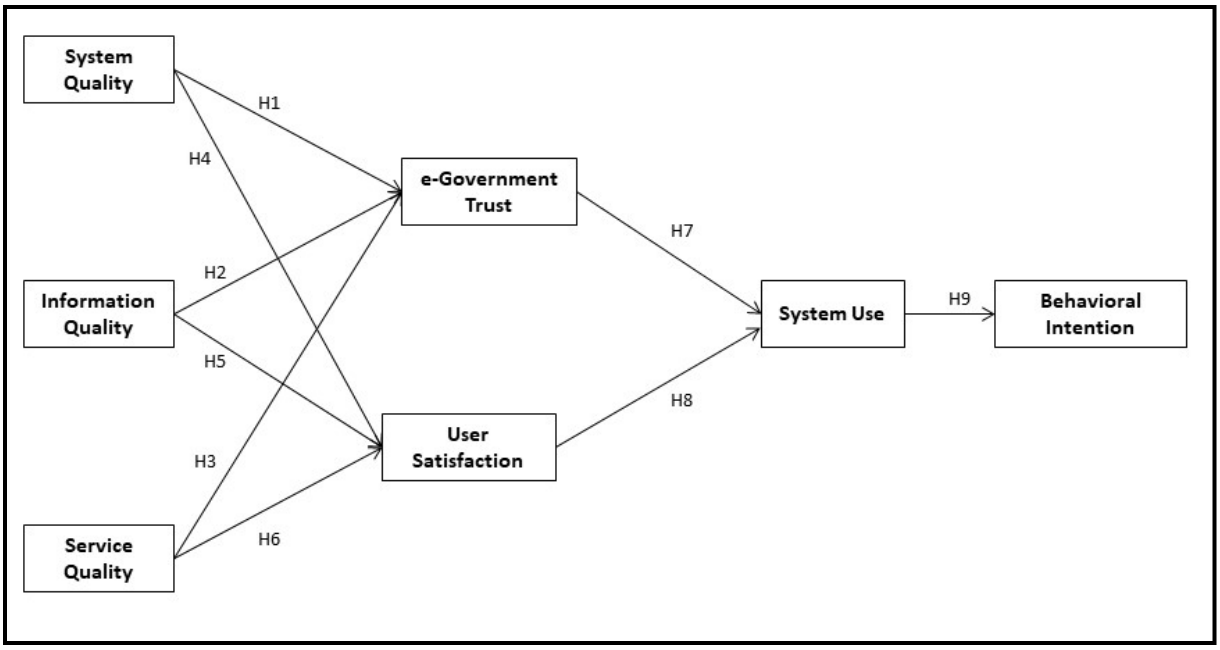


Figure 1. Initial Research Model

3.1 E-Government Trust

E-government trust represents the users' expectations that e-government systems provide authentic, correct, and timely information in a secured online environment without technical errors and opportunistic behaviors of service providers (Papadopoulou et al., 2010; Warkentin et al., 2002). It includes beliefs that governments are equipped with the necessary technical and managerial resources to provide services in a secure online environment (Warkentin et al., 2002). Actions involving investment of trust are based on trustors' (e-government users) estimate of trustees' (e-government) credibility (Sztompka, 1998). It encompasses beliefs about the government's goodwill, information privacy, data authenticity, service quality, and transaction security (Papadopoulou et al.,2010; Piehler et al., 2016). E-government trust may be impacted by the systems' quality attributes.

System quality represents users' perceptions regarding the efficiency, availability, and reliability of the e-government system and the accuracy of the communication (Teo et al., 2008). The technical capability of e-government systems depicted by speed and reliability plays a crucial role in winning users' confidence by improving their trust with e-government systems. For instance, users are likely to have greater levels of trust in e-government systems if they can rely on the availability of the system whenever they need to use them to obtain information or complete transactions and they know that the systems will not fail them. Thus, system quality is of considerable importance to e-government trust.

H1: *System quality is positively related to trust in e-government systems.*

When users perceive that e-government systems provide information that can suitably and appropriately meet their requirements, they are likely to demonstrate higher level of trust towards both the medium of service (internet) and the provider (government) (Mun et al., 2013). However, poor information quality may obstruct e-government success since inaccurate, incomplete, and ambiguous information provided by e-government systems may shake users' trust adversely affecting e-government initiatives (Lee & Levy, 2014). Information quality thus remains crucial to e-government success as it is a strong determinant of user's trust.

H2: *Information quality is positively related to trust in e-government systems.*

Service quality is the users' evaluation of received services towards their service expectations from the system (Wang et al., 2010). Service quality is assessed as the system's capability to provide desired services that help users in efficiently completing the governmental transactions. This quality dimension covers the speed at which users' queries receive responses from the e-government system (Kumar et al., 2007). By appropriately meeting their expectations, the quality of e-government systems' service can strengthen users' beliefs about the service provider (government) competence and the medium (internet). Since face-to-face interaction with public service providers are not always possible in e-government contexts, service quality plays a crucial role in shaping users' trust.

H3: *Service quality is positively related to trust in e-government systems.*

3.2 User Satisfaction

Anwer et al. (2016) contend that user-centric service options, process performance, and security features of e-government systems significantly influence users' satisfaction and overall success of e-government systems. Users have reported dissatisfaction despite the benefits offered by e-government systems (Kumar et al., 2018; United Nations, 2016) and only small proportions of users in countries such as Brazil, Mexico, and Uruguay use e-government systems (Fairas et al., 2017; Roseth et al., 2017; Nielsen, 2019). Poorly designed interfaces, inconvenient access, inappropriate information, slow responsiveness, untrustworthiness of technology, system malfunction (United Nations, 2016; Gupta & Suri, 2017) and usability issues such as sub-optimal presentation structure (Nielsen, 1999) are cited as reasons for the low levels of adoption and satisfaction among users.

Poor system quality of e-government systems reflected in incompatible technical standards, poor system design, inflexibility and poor integration of e-government systems and databases generate user dissatisfaction (Angelopoulos et al., 2010; Savoldelli et al., 2014). When systems are deemed to be convenient, reliable, and user-friendly, users may become more satisfied with the general efficiency and effectiveness of e-government systems (Sachan et al., 2018). Prior studies provide empirical support for the effect of system quality on user satisfaction (Weerakkody et al., 2016; Veeramootoo et al., 2018).

H4: *System quality is positively related to user satisfaction.*

Information quality, perceived in terms of accessibility, usability, accuracy, and understandability, is a significant contributing factor of users' satisfaction (Al-rawahna et al., 2018). These features determine the extent to which users find the system helpful. Hence, if e-government systems fail to provide the desired information quality, users experience dissatisfaction and frustration (Al-rawahna et al., 2018). Prior e-government studies contributed empirical evidence to support a positive significant impact of information quality on user satisfaction (Weerakkody et al., 2016; Wang & Liao, 2008).

H5: *Information quality is positively related to user satisfaction.*

Service quality of e-government systems represented by reliable, responsive, and empathetic service, increases user satisfaction levels (Al-rawahna et al., 2018). E-government systems which are responsive to users' needs by providing the necessary help for them to use systems elevate user satisfaction. Prior e-government studies provide empirical support for the effect of service quality on user satisfaction (Wang & Liao, 2008; Stefanovic et al., 2016).

H6: *Service quality is positively related to user satisfaction.*

3.3 E-Government System Use

Trust in e-government reduces the perceived risk and uncertainty associated with online interactions and transactions, which encourages users to use e-government systems. Trust is crucial in assuring users that the government will not engage in opportunistic behaviors by using its venerable position in governmental transactions to disadvantage the users (Fukuyama, 1995; Lewis & Weigert, 1985). Thus, trust can minimize the negative impacts of perceived risks and uncertainties, which can impact the use of e-government systems to a greater extent.

H7: *Trust in e-government systems is positively related to system use.*

User satisfaction is a strong indicator of how well e-government systems have performed in accordance with users' expectations and needs. A significant obstacle to e-government success is user dissatisfaction with e-government systems (Nawafleh, 2018; Sachan et al., 2018). This implies that the challenge of guaranteeing repeated use and consequent success of e-government systems may depend on satisfied users (Lai & Pires, 2010). A satisfied user may choose e-government systems over traditional methods of interacting with governments. Prior studies have reported significant effects for user satisfaction on e-government SU (Rana et al., 2015).

H8: *User satisfaction is positively related to system use.*

3.4 Behavioral Intention

BI explains the degree to which users formulate conscious plans to demonstrate specified behaviors to engage in or not engage in a particular activity (Fishbein & Ajzen, 1980; Warshaw & Davis, 1985). BI is viewed as the probability that users will choose to utilize e-government systems for their future needs. BI is largely driven by an individual's internal evaluation results based on prior SU (Ajzen & Fishbein, 1980) and has considerable empirical support in prior IS literature (Law et al., 2016; van Slyke et al., 2007).

H9: *System use is positively related to behavioral intention.*

4 Research Methods

4.1 Sample

To empirically test our research model, we gathered studies published between 2000 and 2021 using multiple online databases including Scopus, Google Scholar, and Digital Government Reference Library (DGRL). Keywords for the search included "electronic government," "e-government," "digital government," "internet government," "mobile government," and "online government" along with phrases such as "success," "adoption," "usage," "satisfaction," "trust," "quality," and "intention" (and its variants such as "behavioral intention" and "use"). The search resulted in more than 500 articles. Duplicate articles and others such as teaching notes, editorials, qualitative studies, and reviews were excluded first, followed by articles that did not examine e-government success, adoption, usage, or intention (Kumar et al., 2018; Rana et al., 2015; Valle-Cruz, 2019). Finally, studies that did not examine a relationship in our integrated research model or report correlations required for meta-analysis were excluded. Our final meta-analysis sample included 67 studies[1].

4.2 Coding

Data were uniformly coded from the identified studies. For each study, we coded author names, journal name, and year of publication. To facilitate meta-analysis, we also coded data for the constructs and relationships in our model. The mean, standard deviation (SD), reliability, and Likert scale anchors were coded for the constructs while the Pearson correlation and sample size were coded for the relationships.

The coded data was screened to assess consistency with analysis requirements. First, differently worded constructs across studies were combined as a single construct. For instance, delivery system quality, perceived service quality, online service quality, and quality of service were coded as service quality (Idoughi & Abdelhakim, 2018; Mensah, 2019; Wang et al., 2020; Santa et al., 2019) while perceived system quality, web site quality, and quality of system were coded as system quality (Ibrahim & Zakaria, 2016; Santa et al., 2019; Stefanovic et al., 2016). This categorization was based on the definitions and/or measurement scales used in prior studies. For instance, delivery system quality was defined as the users' perception of technical performance of the system (Idoughi & Abdelhakim, 2018) while initial trust (Azam et al., 2013) was measured using the same scale as e-government trust. Table 2 shows details of the categorization effort. Second, the coded data was assessed to determine if the observations were independent, i.e., only one finding was allowed from the same study for a bivariate relationship. If multiple findings could be coded for any relationship from the same study, we computed the mean of the correlations (Azam et al., 2013; Mensah, 2019; Teo et al., 2008). The exception was when the same study reported results of multiple samples (e.g. Gonzalez et al., 2010) . Finally, reliabilities of constructs were not reported in all studies and hence the average reliability was substituted for missing values (Gilbert et al., 2004). Overall, we coded 226 findings from the studies.

[1] The studies were published in: 2004 (1), 2007 (2), 2008 (2), 2009 (1), 2010 (1), 2011 (2), 2012 (2), 2013 (2), 2015 (2), 2016 (5), 2017 (9), 2018 (3), 2019 (13), 2020 (19), and 2021 (3). Four studies each were published in *Government Information Quarterly* and *International Journal of Electronic Government Research*, three studies each in *Journal of Theoretical and Applied Information Technology* and *International Journal of Information Management*, and, two studies each in *Information & Management*, *Transforming Government: People, Process and Policy*, *Electronic Government*, *International Journal of Business Information Systems*, *International Journal of Interactive Mobile Technologies*, *Computers in Human Behavior*, and *SAGE Open*, and one each in 37 other journals. Complete citations for the studies available from the authors upon request.

Research model construct	Construct in prior study	Reference
System quality	Perceived system quality	(Ibrahim & Zakaria, 2016)
	Website quality	(Santa et al., 2019)
	Quality of system	(Mensah, 2019; Mensah & Mi, 2017)
Information quality	Information quality	(Alruwaie et al., 2020)
	Perceived information quality	(Alkraiji, 2021)
Service quality	Online service quality	(Wang & Teo, 2020)
	Quality of service	(Santa et al., 2019; Alqaralleh et al., 2020)
	Delivery system quality	(Idoughi & Abdelhakim, 2018)
	Perceived service quality	(Mensah & Mi, 2017)
User satisfaction	Citizen satisfaction	(Obaid & Ahmad, 2021)
	User satisfaction	(Mellouli et al., 2020; Al-Zahrani, 2020)
	Satisfaction	(Piehler et al., 2016)
	Public satisfaction	(Hariguna, Lai, Hung, Chen, et al., 2017)
E-government trust	Perceived trust	(Eid et al., 2020)
	Trust	(Kamarudin et al., 2021)
	Initial trust	(Azam et al., 2013)
	E-Governance trust	(Mansoori et al., 2018)
System use	Actual use	(AlBar & Hddas, 2018)
	eService utilization	(Hossan & Ryan, 2016)
	Usability	(Noor et al., 2011)
	Usage behavior	(Weerakkody et al., 2013)
	Use behavior of e-government services	(Ibrahim & Zakaria, 2016)
	E-government system usage	(Alshaher, 2021)
Behavioral intention	Adoption	(Shuib et al., 2019)
	Behavioral intention	(Rana & Dwivedi, 2015)
	Intention to adopt	(Alharbi et al., 2017)
	Intention to use	(Shahzad et al., 2020)
	Use of e-government	(Qasim Nidawy et al., 2020)
	Public intention use	(Hariguna, Lai, Hung, & Chen, 2017)
	Willingness to use	(Mensah & Mi, 2018)

Table 2. Coding and classifying constructs in prior studies

Table 2 shows details of the categorization effort. Second, the coded data was assessed to determine if the observations were independent, i.e., only one finding was allowed from the same study for a bivariate relationship. If multiple findings could be coded for any relationship from the same study, we computed the mean of the correlations (Azam et al., 2013; Mensah, 2019; Teo et al., 2008). The exception was when the same study reported results of multiple samples (e.g. Gonzalez et al., 2010) . Finally, reliabilities of constructs were not reported in all studies and hence the average reliability was substituted for missing values (Gilbert et al., 2004). Overall, we coded 226 findings from the studies.

4.3 Analysis

We employed Hunter & Schmidt (2004) meta-analysis methods to compute the corrected correlation for each relationship in our model. Measurement errors were corrected by factoring in the reliabilities of the constructs. Specifically, the observed correlation was divided by the square root of the product of the reliabilities of the two constructs in the relationship. Sampling errors were corrected by computing the sum of the product of the sample size and observed correlation and dividing by the sum of the sample sizes across studies. Table 3 shows the corrected correlations, the cumulative sample size, and the number of observations for each relationship. Further, the table shows the mean, standard deviation, and reliability for each construct. We used the linear transformation X7 = (X5 -1)*(6/4) + 1, where X7 and X5 represent the 7-point and 5-point Likert scale values respectively. Further, the failsafe-N and credibility interval for each relationship are also shown on Table 3. Since the credibility intervals do not include 0, the effects in our model are positive (Whitener 1990). Failsafe-N, i.e., the number of non-significant findings needed to invalidate the results (Sabherwal et al., 2006), ranges from 25 (i.e., information quality to SU relationship) to 336 (i.e., e-government trust to BI relationship) with the average of 111 across the 21 relationships. We conclude that publication bias is not a major problem. The MASEM analysis was done in AMOS 21 using the corrected correlations and the minimum sample size (435).

Construct	Mean (SD)	CR	BI	IQ	RQ	SQ	TR	US	SU
Behavioral intention (BI)	5.361 (1.26)	0.85		[0.309, 0.583] 3200	[0.033, 0.895] 11464	[0.395, 0.756] 7213	[0.269, 0.879] 23145	[0.157, 1.04] 9980	[0.496, 0.812] 8456
Information quality (IQ)	5.33 (1.62)	0.85	0.440 (9, 2960)		[0.040, 1.11] 8607	[0.297, 0.929] 21328	[0.343, 0.866] 9975	[0.279, 0.846] 17148	[0.249, 0.682] 1461
Service quality (RQ)	5.70 (1.90)	0.82	0.473 (15, 6361)	0.534 (12, 3360)		[0.238, 0.745] 4449	[0.286, 0.874] 5827	[0.141, 1.09] 8610	[0.093, 0.766] 4234
System quality (SQ)	5.40 (1.63)	0.85	0.595 (8, 2609)	0.597 (20, 9268)	0.503 (9, 2404)		[0.296, 0.869] 7178	[0.218, 0.913] 15750	[0.044, 0.805] 1480
E-government trust (TR)	5.11 (1.54)	0.88	0.569 (29, 10435)	0.625 (10, 5239)	0.600 (8, 2879)	0.593 (9, 4432)		[0.211, 0.998] 8594	[0.528, 0.763] 4228
User satisfaction (US)	5.289 (1.63)	0.87	0.623 (10, 3851)	0.547 (18, 8816)	0.615 (12, 3486)	0.557 (17, 7910)	0.622 (10, 4590)		[0.282, 0.888] 2835
System use (SU)	5.29 (1.13)	0.89	0.675 (6, 3546)	0.471 (3, 485)	0.428 (4, 2597)	0.510 (3, 485)	0.672 (3, 1734)	0.616 (3, 485)	

Note. CR: Construct reliability; SD: Standard deviation
Correlation, number of observations, and sample size in the lower triangle
Failsafe-N and low and high thresholds of 90% credibility interval in the upper triangle

Table 3. Results of Meta-Analysis

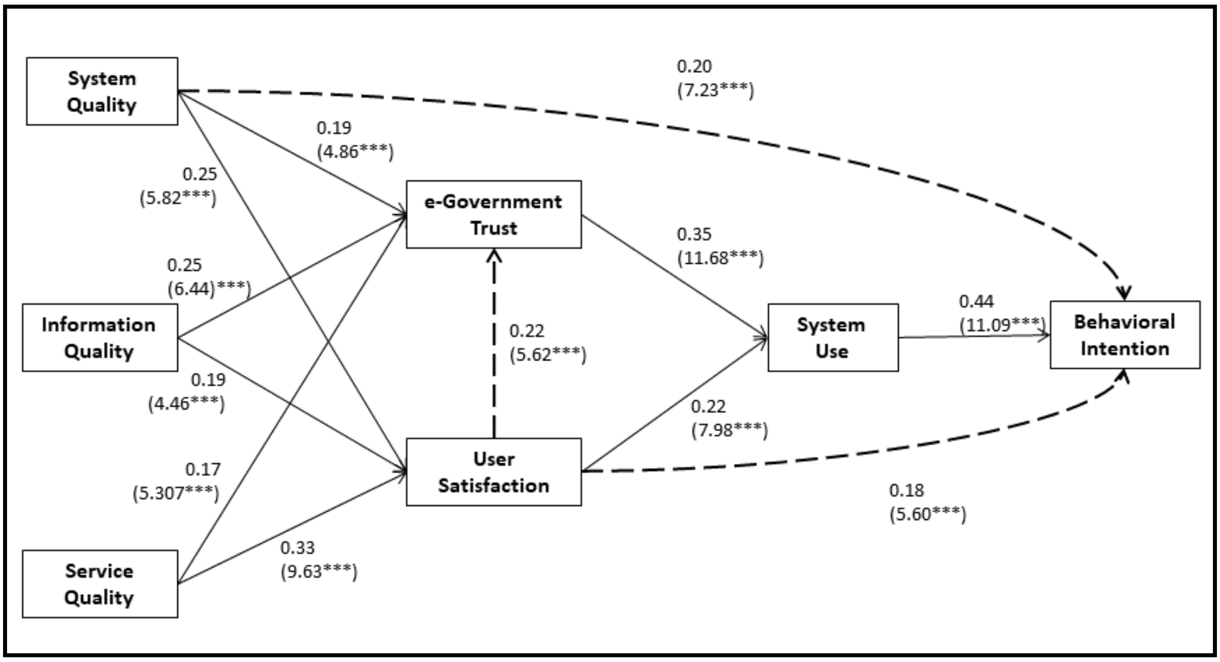
5 Results

The research model showed reasonable fit: $\chi2$ (df) = 159.27 (9), $p < 0.01$, TLI = 0.808, CFI = 0.918, RMSEA = 0.094, and SRMR = 0.186. All paths hypothesized in the research model were supported. The $\chi2$ / df ratio for the model was above 3 and not acceptable (Sabherwal et al., 2006). While CFI was acceptable (> 0.90), TLI was lower than the recommended 0.90 level (Bentler & Bonett, 1980). RMSEA and SRMR were above the recommended 0.08 (Sabherwal et al., 2006; Browne & Cudeck, 1993). The results showed modification indices (MI > 10) for inclusion of other paths that may yield better fit.

We first added the path from system quality to BI (MI = 56.12). The resultant model showed better fit than the research model: $\chi2$ (df) = 77.277 (8), p < 0.01, TLI = 0.961, CFI = 0.963, RMSEA = 0.134, and SRMR = 0.049. The $\chi2$/df ratio did not meet the recommended threshold. Both CFI and TLI were acceptable. SRMR was acceptable but RMSEA did not meet the recommended threshold. Results showed adding other paths could improve fit.

The path from user satisfaction to BI (MI = 16.35) was included next. The resulting model showed better fit: $\chi2$ (df) = 46.085 (7), p > 0.05, TLI = 0.938, CFI = 0.979, RMSEA = 0.107, and SRMR = 0.036. The $\chi2$/df ratio did not meet recommended thresholds although CFI and TLI were acceptable. RMSEA was above recommended while SRMR was acceptable. Results showed other paths could improve model fit.

We added the path between user satisfaction and e-government trust (MI = 15.38). The resultant model was a better fit with the data: $\chi2$ (df) = 15.489 (6), p < 0.01, TLI = 0.982, CFI = 0.995, RMSEA = 0.057; SRMR = 0.018. The $\chi2$/df ratio and the other fit indices were acceptable. The emergent model is shown in Figure 2.



Notes. → Hypothesized path; - - → Emergent path

χ^2 = 15.538, df = 6, p < 0.01
CFI = 0.995, TLI = 0.982
RMSEA = 0.057, SRMR = 0.018

R^2 for Trust = 0.557
R^2 for Satisfaction = 0.481
R^2 for Use = 0.516
R^2 for Intention = 0.565

Figure 2. Final Emergent Model

6 Discussion

6.1 Findings

An integrated model of ISS success and e-government trust along with SU and BI was empirically examined in this research. The MASEM analysis showed significant results for all the hypothesized paths, indicating strong support for the integrated model. In addition, a few paths emerged in the analysis, providing new insights into the ISS relationships.

All three technology quality attributes had significant effects on e-government trust as hypothesized. System quality (H1, β = 0.26***), information quality (H2, β = 0.21***), and service quality (H3, β = 0.16***) had positive impact on e-government trust. In addition, user satisfaction (emergent, β = 0.21***) influenced e-government trust. Collectively, the three quality attributes and user satisfaction explained 55.7% of variance in e-government trust. These results are consistent with prior findings (e.g., Santa et al., 2019) that found the accuracy of communication facilitated by high quality design of e-government system to be instrumental in winning users' e-government trust. Users place greater trust in systems that are efficient and effective in providing the desired information in a timely manner and enable users to easily handle their needs. This emphasizes a customer-oriented approach with a focus on customizing the e-government systems' attributes for users' needs and priorities (Kelly & Vidgen, 2005).

The three technology quality attributes also had significant effects on user satisfaction as hypothesized. System quality (H4, β = 0.20***), information quality (H5, β = 0.17***), and service quality (H6, β = 0.32***) had positive impact and explained 48.1% of the variance in user satisfaction. Our study finds that superior system quality yields higher user satisfaction (e.g. Sachan et al., 2018). System quality reflects the operational efficiency of e-government system in terms of smooth and error-free governmental transactions facilitated by the system. Such pleasant experiences improve user satisfaction (Sachan et al., 2018; Anwer et al., 2016). This study also finds support for information quality, which stresses the importance of information appropriateness, accuracy, and comprehensiveness (Salaun & Flores, 2001), which increases user satisfaction. Similarly, the reliability, accuracy, and usefulness of information provided by e-government systems will satisfy user needs and be instrumental in elevating user satisfaction with e-government systems (Gotoh, 2009). This study also found service quality to influence user satisfaction, emphasizing the impact of promptness and accuracy of e-government service on user satisfaction. The user-centric capabilities of e-government systems and a great service experience will improve user satisfaction.

Both e-government trust (H7, β = 0.33***) and user satisfaction (H8, β = 0.21***) had significant effects on SU as hypothesized and explained 51.6% of the variance in SU. The results suggest that when they trust e-government systems for authenticity of information, privacy of personal data, security of online transaction, and quality of service (Papadopoulou et al., 2010), users may be more inclined to utilize e-government systems for future transactions. Users' e-government trust is thus reflected in their repeated SU (Sternstein, 2010). Further, satisfied users possess a positive overall perception of e-government which will translate into future use (Sachan et al., 2018).

SU had a significant effect on BI (H9, β = 0.46***) as hypothesized. BI was influenced by system quality (emergent, β = 0.22***) and user satisfaction (emergent, β = 0.15***). These three constructs explained 56.5% of the variance in BI. These results confirm that prior e-government SU explains BI. If users found the e-government system technically efficient, reliable, and fast during their previous engagements, they are likely to use it (Wang & Liao, 2008). Users satisfied with and confident about the -government systems' capabilities may be more inclined to hold stronger intentions for future use (West, 2004).

6.2 Limitations

The study limitations may be considered in interpreting the study findings. First, the study did not use primary data but relied on statistics reported in prior studies. This study cannot verify the accuracy of the statistics reported and assumes that prior studies were of high quality. Second, the study aggregated prior findings despite their theoretical and empirical differences. Third, the meta-analysis included prior studies published in journals but not in conferences proceedings or other sources such as book chapters. The average failsafe-N across all relationships in the model is high, which can mitigate this limitation. Fourth, only those studies that reported zero-order Pearson correlations were included in the sample while other studies were excluded. Finally, the coding process included assumptions when necessary statistics could not be coded.

6.3 Implications for Research

First, our research contributes to the literature on information system success by extending it with e-government trust. The original ISS model was situated in a work environment involving employees (DeLone & McLean, 1992) while the revised ISS model was contextualized in an e-commerce setting relating to customers (DeLone & McLean, 2003)—in both cases, the ISS model included quality dimensions and satisfaction but not trust. Since the ISS model has been used to investigate SU in different contexts, the inclusion of trust makes it more applicable in contexts that involve service-based activities such as e-government. All three dimensions of quality depicted in the ISS model were helpful in establishing e-government trust.

Second, our research clarifies the potential roles of SU and BI at least in the context of ISS models. While prior literature on technology acceptance has theoretically argued for SU→BI (Law et al., 2016) and BI→SU (Venkatesh et al., 2003), the revised ISS model had not specified a relationship between SU and BI although both constructs were included in the model (DeLone & McLean, 2003). This study theorized SU→BI rather than BI→SU since users may determine their future BI to use e-government based on their past use of the system. The empirical support for the SU→BI relationship has implications for modeling SU and BI in future studies of technology acceptance.

Third, our research also highlights new paths between the constructs in ISS models. Two such new paths involve BI—where system quality and user satisfaction influenced BI. Since ISS models typically model system quality and user satisfaction to impact SU (DeLone & McLean, 1992), the empirical tests demonstrating the impacts on BI provides new insights. In doing so, this study also showed that e-government trust and user satisfaction mediate the effect of system quality on SU, thus emphasizing the role of e-government trust in ISS models. In addition, trust was influenced by user satisfaction, showing that trust was influenced by several ISS constructs. Further, SU mediated the effect of user satisfaction on BI.

Finally, our research does not handle the reciprocal relationships that may be possible between different constructs in our model. For instance, H7 argued that e-government trust influenced SU. However, it is possible that continued SU over time may influence trust either positively or negatively. Similarly, H8 examined the effect of user satisfaction on SU. But SU can also influence user satisfaction with continue use. Further, H9 proposed that SU had an effect on BI, but a reciprocal effect is possible since BI has the potential to influence SU over time. Future research may consider these avenues to examine the reciprocal relationships.

6.4 Implications for Practice

This study provides many useful takeaways for public service providers. First, our investigation suggests service quality, information quality, and system quality of e-government are not only important, but play a vital role in improving users' overall perception of trust and satisfaction towards e-government system. While designing e-government systems, government agencies must ensure that the system is capable of generating accurate, complete and timely information in a safe and convenient online environment without any technical glitch. E-government managers may analyze clickstream data of first-time users to understand their peculiar requirements and challenges of using e-government system (Park et al., 2013). For example, to warrant accuracy and completeness, e-government system designers may deploy auto-test procedures, hyperlinks and guidelines to help users efficiently complete desired tasks. An interactive user-friendly user interface, round-the-clock availability, and a fast query resolution system may foster ease of using e-government (Meuter et al., 2000). The importance of service quality is also evident; users exhibit higher levels of satisfaction and trust with high-quality e-government systems. While system quality and information quality may improve functional efficiency, service quality that establishes a partnership between government agencies, technology suppliers, and consultants is necessary to achieve overall operational efficiency (Kafaji, 2013). The technology suppliers and consultants must be encouraged to deliver beyond functional features and focus on personalization features. This will enable government agencies to accomplish its goals and increase users' trust and satisfaction with e-government systems.

Second, our study validates the significant direct impact of satisfaction and trust on e-government SU. These are two effective means of reducing uncertainty associated with e-government systems. While efficient and fully secured systems are prerequisites for gaining trust and satisfaction, user skills to optimally and cautiously use the system are equally important. The overall value of e-government systems is co-created by the e-government service provider and the users. Awareness and training programs should be conducted to educate users on how to successfully use e-government systems and provide useful feedback for further improvement. Such initiatives portray that government agencies care about users' requirements and are capable of delivering high-quality services. This can positively alter users' perceptions towards and engagements with e-government systems.

Third, our study suggests that SU is a key determinant of users' BI to use e-government systems in the future. For the success of e-government initiatives, users should be encouraged to plan their upcoming transactions on e-government systems. Users can experience and recognize the benefits of e-government SU only when they actually use it (Norris & Moon, 2005). Government agencies should motivate users to use e-government platforms to influence their future use behaviors. Incentive schemes and promotion campaigns may be announced to attract users to try e-government platforms, which may facilitate future use of e-government systems.

Fourth, our analysis showed the direct impact of system quality on BI. This implies that e-government system designers should prioritize the technical efficacy of the system to serve user needs in terms of efficiency, accuracy, and ease of using the system. E-government system managers should consider the evolving nature of user expectations and requirements and communicate them to the system designers. This calls for update and upgrade of e-government systems at regular intervals so that users do not feel neglected. By doing so, e-government agencies can involve users in improving system quality. High-quality systems will attract users to try e-government systems and result in future intentions to use the system should they find the systems technically superior.

Finally, our results revealed the direct impact of user satisfaction on e-government trust and BI. Efforts should be made to elevate user satisfaction levels since a satisfied user is likely to trust the efficiency and capability of e-government systems meeting their requirements (Sachan et al., 2018). E-government system managers should convince the system designers to not only focus on the functional aspects but also consider the personalization and safety features of the system. Since face-to-face interaction with service providers and front-office help may not be possible in e-government settings, such features will be helpful to users and increase their satisfaction. A satisfied user may not be concerned about the inherent uncertainty and risks involved in online interactions and may be more willing to use e-government service platforms (Teo et al., 2008).

7 Conclusion

This study extended the ISS model to include e-government trust as an antecedent of SU leading to BI. Based on a meta-analysis and structural equation modeling approach, the prominent role of e-government trust in information system success was uncovered in this study. Specifically, e-government trust influences SU, which in turn, impacts BI; e-government trust is influenced by service quality, information quality, system quality, and user satisfaction; and e-government trust mediates the effects of service quality, information quality, system quality, and user satisfaction on SU. These findings offer new theoretical insights and practical implications in dealing with e-government systems.

References

Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived usefulness, ease of use, and usage of information technology: A replication. *MIS Quarterly, 16(2)*, 227-247.

Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. *MIS Quarterly, 24(4)*, 665-694.

Agarwal, R., & Prasad, J. (1997). The role of Innovation Characteristics and Perceived Voluntariness in the Acceptance of Information Technologies. *Decision Sciences, 28(3)*, 557-582.

AlBar, A. M., & Hddas, M. A. (2018). Exploring Saudi citizens' acceptance of Mobile government service. *International Journal of Advanced Computer Science and Applications, 9(11)*, 397–400. https://doi.org/10.14569/ijacsa.2018.091156

Alharbi, N., Papadaki, M., & Dowland, P. (2017). The impact of security and its antecedents in behaviour intention of using e-government services. *Behaviour & Information Technology, 36(6)*, 620–636.

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.

Alkraiji, A. I. (2020). Citizen Satisfaction with Mandatory E-Government Services: A Conceptual Framework and an Empirical Validation. *IEEE Access, 8*, 117253–117265.

Alkraiji, A. I. (2021). An examination of citizen satisfaction with mandatory e-government services: comparison of two information systems success models. *Transforming Government: People, Process and Policy, 15(1)*, 36–58. https://doi.org/10.1108/TG-01-2020-0015

Almarabeh, T., & AbuAli, A. (2010). A general framework for E-government: Definition maturity challenges, opportunities, and success. *European Journal of Scientific Research, 39(1)*, 29–42.

Al-Omairi, L., Al-Samarraie, H., Alzahrani, A. I., & Alalwan, N. (2020). Students' intention to adopt e-government learning services: a developing country perspective. *Library Hi Tech, 39(1)*, 308–334.

Alqaralleh, B. A. Y., Al-Omari, A. H., & Alksasbeh, M. Z. (2020). An integrated conceptual model for m-government acceptance in developing countries: The case study of Jordan. *International Journal of Interactive Mobile Technologies, 14(6)*, 115–136. https://doi.org/10.3991/IJIM.V14I06.11449

Al-Rawahna, A. S. M., Chen, S.-C., & Hung, C.-W. (2018). The barriers of e-government success: An empirical study from Jordan. *International Journal of Managing Public Sector Information and Communication Technologies, 9(2)*, 1–18.

Alruwaie, M., El-Haddadeh, R., & Weerakkody, V. (2020). Citizens' continuous use of eGovernment services: The role of self-efficacy, outcome expectations and satisfaction. *Government Information Quarterly, 37(3)*, 101485.

Alryalat, M. A. A., Rana, N. P., & Dwivedi, Y. K. (2015). Citizen's adoption of an e-government system: Validating the extended theory of reasoned action (TRA*). International Journal of Electronic Government Research, 11(4)*, 1–23.

Alshaher, A. (2021). IT capabilities as a fundamental of electronic government system success in developing countries from users perspectives. *Transforming Government: People, Process and Policy, 15(1)*, 129–149. https://doi.org/10.1108/TG-05-2020-0080

Al-Sulami, Z. A., & Hashim, H. S. (2018). Measuring the success of e-government systems: Applying the success model of the DeLone and McLean information system*. Journal of Theoretical and Applied Information Technology, 96(22)*, 7654–7670.

Al-Zahrani, M. S. (2020). Integrating IS success model with cybersecurity factors for e-government implementation in the Kingdom of Saudi Arabia. *International Journal of Electrical and Computer Engineering, 10(5)*, 4937–4955. https://doi.org/10.11591/ijece.v10i5.pp4937-4955

Angelopoulos, S., Kitsios, F., & Papadopoulos, T. (2010). New service development in e-government: identifying critical success factors. *Transforming Government: People, Process and Policy, 4(1)*, 95-118.

Anthopoulos, L., Reddick, C. G., Giannakidou, I., & Mavridis, N. (2016). Why e-government projects fail ? An analysis of the Healthcare.gov website. *Government Information Quarterly, 33(1)*, 161–173. https://doi.org/10.1016/j.giq.2015.07.003

Anwer, M. A., Esichaikul, V., Rehman, M., & Anjum, M. (2016). E-government services evaluation from citizen satisfaction perspective: A case of Afghanistan. *Transforming Government: People, Process and Policy, 10(1)*, 139–167.

Azam, A., Qiang, F., & Abdullah, M. I. (2013). Determinants of e-government services adoption in Pakistan: an integrated model. *Electronic Government, an International Journal, 10(2)*, 105–124.

Bannister, F., & Connolly, R. (2011). Trust and transformational government: A proposed framework for research. *Government Information Quarterly, 28(2)*, 137–147.

Bentler, P.M. & Bonett, D.G. (1980). Significance Tests and Goodness of Fit in the Analysis of Covariance Structures. *Psychological Bulletin, 88(3)*, 588-606.

Bhattacherjee, A., & Sanford, C. (2009). The Intention-Behavior gap in Technology Usage: The moderating role of attitude strength. *Behaviour & Information Technology, 28(4)*, 389-401.

Browne, M.W. & Cudeck, R. (1993). Single Sample Cross-Validation Indices for Covariance Structures. *Multivariate Behavioral Research, 24(4)*, 445-455.

Carter, L., & Bélanger, F. (2005). The utilization of e-government services: Citizen trust, innovation and acceptance factors. *Information Systems Journal, 15(1*), 5–25.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13(3)*, 319–340.

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.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research*, 3(1), 60–95.

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

Eid, R., Selim, H., & El-Kassrawy, Y. (2020). Understanding citizen intention to use m-government services: an empirical study in the UAE. *Transforming Government: People, Process and Policy, 15(4)*, 463-482.

Farias, P., Goldsmith, S., Flumian, M., Mendoza, G., Wiseman, J. & Zanabria, G. (2017). *Governments that Serve: Innovations that Improve Service Delivery to Citizens*. Inter-American Development Bank, Washington D.C, USA. https://publications.iadb.org/en/publication/17464/governments-serve-innovations-improve-service-delivery-citizens

Fishbein, M., & Ajzen, A. (1980). *Understanding Attitudes and Predicting Social Behaviour*. Prentice-Hall. Inc., Englewood Cliffs, NJ, USA.

Fukuyama F. (1995). *The Social Virtues and the Creation of Prosperity*. Free Press, London, UK.

Gilbert, D., Balestrini, P., & Littleboy, D. (2004). Barriers and benefits in the adoption of e-government. *The International Journal of Public Sector Management, 17(4/5)*, 286–301.

Gonzalez, P., Adenso-Diaz, B., & Gemoets, L. A. (2010). A Cross-National Comparison E-government Success Measures: A Theory-Based Empirical Research. In Proceedings of the *16th Americas Conference on Information Systems (AMCIS 2010)*, pp. 1–10. Lima, Peru. https://aisel.aisnet.org/amcis2010/354

Gotoh, R. (2009). Critical factors increasing user satisfaction with e-government services. *Electronic Government, an International Journal, 6(3)*, 252-264.

Gupta, P. J., & Suri, P. (2017). Measuring public value of e-governance projects in India: citizens' perspective. *Transforming Government: People, Process and Policy, 11(2)*, 236-261.

Hariguna, T., Lai, M.-T., Hung, C.-W., & Chen, S.-C. (2017). Understanding information system quality on public e-government service intention: An empirical study. International *Journal of Advanced Manufacturing Technology and Maintenance and Reliability. Human Behavior, 11(3)*, 271–290.

Hossan, C., & Ryan, J. (2016). Factors Affecting e-Government Technology Adoption Behaviour in a Voluntary Environment. *International Journal of Electronic Government Research, 12(1)*, 24–49. https://doi.org/10.4018/Ijegr.2016010102

Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis: Correcting error and bias in research findings*. Sage Publishing, Thousand Oaks, CA, USA.

Ibrahim, O. A., & Zakaria, N. H. (2016). E-government services in developing countries: A success adoption model from employees perspective. *Journal of Theoretical and Applied Information Technology, 94(2)*, 383–396.

Idoughi, D., & 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), 14(1)*, 63–85.

Jackson, C. M. (1997). Toward an understanding of the Behavioral Intention to use an Information System. *Decision Sciences, 28(2)*, 357-389.

Jeyaraj, A., & Dwivedi, Y. K. (2020). Meta-analysis in information systems research: Review and recommendations. International Journal of Information Management, 55(December), 102226.

Kafaji, M. A. (2013). Evaluating the roll of service quality as a mediator on user satisfaction in e-government applications. Problems of Management in the 21st Century, 8, 55. http://oaji.net/articles/2014/450-1397905708.pdf

Kamarudin, S., Omar, S. Z., Zaremohzzabieh, Z., Bolong, J., & Osman, M. N. (2021). Factors predicting the adoption of e-government services in telecenters in rural areas: The mediating role of trust. *Asia-Pacific Social Science Review, 21(1)*, 20–38.

Karavasilis, I., Vrana, V., & Zafiropoulos, K. (2016). An Extended Model of E-Government Adoption by Civil Servants in Greece. *International Journal of Electronic Government Research, 12(1)*, 1–23.

Kelly, B., & Vidgen, R. (2005). A quality framework for web site quality: user satisfaction and quality assurance. Paper presented at the 14th international conference on World Wide Web 2005, May 10-14, Chiba, Japan, pp. 930–93. https://doi.org/10.1145/1062745.1062803

Konradt, U., Nerdinger, F. W., & Ellwart, T. (2016). A Model for Usability in E-Commerce Services: Theoretical Concept and Empirical Evidence. In *Encyclopedia of E-Commerce Development, Implementation, and Management*, pp. 2332-2343, IGI Global, Hershey, PE, USA.

Kumar, V., Mukerji, B., & Butt, I. (2007). Factors for Successful E Government Adoption: A Conceptual Framework. *Electronic Journal of E-government, 5(1)*, 63-76.

Kumar, R., Sachan, A., Mukherjee, A., & Kumar, R. (2018). Factors influencing e-government adoption in India: a qualitative approach. *Digital Policy, Regulation and Governance, 20(5)*, 413–433.

Lai, C. S. K., & Pires, G. (2010). Testing of a Model Evaluating e-Government Portal Acceptance and Satisfaction. *Electronic Journal of Information Systems Evaluation, 13(1)*, 35-46.

Law, M., Kwok, R. C., & Ng, M. (2016). An extended online purchase intention model for middle-aged online users. *Electronic Commerce Research and Applications, 20*, 132-146.

Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government Information Quarterly, 18(2)*, 122–136.

Lee, A., & Levy, Y. (2014). The effect of information quality on trust in e-government systems' transformation. *Transforming Government: People, Process and Policy, 8(1)*, 76-100.

Lewis, J. D., & Weigert, A. (1985). Trust as a social reality. *Social Forces, 63(4)*, 967-985.

Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How Habit limits the predictive power of Intention: The case of Information Systems Continuance. *MIS Quarterly, 31(4)*, 705-737.

Luhmann, N. (1988). Trust: Making and Breaking Cooperative Relations in Gambetta, D. (ed.) Familiarity, Confidence, Trust: Problems and Alternatives, pp. 94–107, Blackwell, New York, USA.

MacLean, D., & Titah, R. (2022). A Systematic Literature Review of Empirical Research on the Impacts of e-Government: A Public Value Perspective. *Public Administration Review, 82(1)*, 23-28. https://doi.org/10.1111/puar.13413

Mansoori, K. A. A., Sarabdeen, J., & Tchantchane, A. L. (2018). Investigating Emirati citizens' adoption of e-government services in Abu Dhabi using modified UTAUT model. *Information Technology & People, 31(2)*, 455–481. https://doi.org/10.1108/ITP-12-2016-0290

Mellouli, M., Bouaziz, F., & Bentahar, O. (2020). E-government success assessment from a public value perspective. *International Review of Public Administration, 25(3)*, 153–174. https://doi.org/10.1080/12294659.2020.1799517

Mensah, I. K. (2019). Predictors of Electronic Government Services Adoption: The African Students' Perspective in China. *International Journal of Public Administration, 42(12)*, 997–1009.

Mensah, I. K., & Mi, J. (2017). Electronic government services adoption: The moderating impact of perceived service quality. *International Journal of Electronic Government Research, 13(3)*, 38–54. https://doi.org/10.4018/IJEGR.2017070103

Mensah, I. K., & Mi, J. (2018). An empirical investigation of the impact of demographic factors on E-government services adoption. *International Journal of E-Services and Mobile Applications, 10(2)*, 17–35. https://doi.org/10.4018/IJESMA.2018040102

Meuter, M. L., A. L. Ostrom, R. I. Roundtree, & M. J. Bitner (2000). Self-service technologies: understanding customer satisfaction with technology-based service encounters. *Journal of Marketing, 64(3)*, 50-64.

Morgeson, F. v., Vanamburg, D., & Mithas, S. (2011). Misplaced trust? Exploring the structure of the e-government-citizen trust relationship. *Journal of Public Administration Research and Theory, 21(2)*, 257–283.

Mun, Y. Y., Yoon, J. J., Davis, J. M., & Lee, T. (2013). Untangling the antecedents of initial trust in Web-based health information: The roles of argument quality, source expertise, and user perceptions of information quality and risk. *Decision Support Systems, 55(1)*, 284-295.

Nawafleh, S. (2018). Factors affecting the continued use of e-government websites by citizens: An exploratory study in the Jordanian public sector. *Transforming Government: People, Process and Policy,17 (1)*, 1-17.

Nielsen, J. (1999). *Designing Web Usability: The Practice of Simplicity.* New Riders Publishing, Thousand Oaks, CA, USA.

Nielsen, M. M. (2016). E-governance and stage models: analysis of identified models and selected Eurasian experiences in digitising citizen service delivery. *Electronic Government, an International Journal, 12(2)*, 107–141. https://doi.org/10.1504/EG.2016.076132

Nielsen, M.M. (2019).Tutorial: How to Create an Ecosystem and Framework for Digital Public Sector Service Delivery. *Sixth International Conference on eDemocracy & eGovernment (ICEDEG),* Quito, Ecuador, pp. 6-9, doi: 10.1109/ICEDEG.2019.8734336.

Nielsen, M.M. (2021). The Untapped Potential: The Inclusive, Personal and Co-created Public Service Experience in Europe. In Musiał-Karg, M., Luengo, Ó.G. (eds). Digitalization of Democratic Processes in Europe. Studies in Digital Politics and Governance. Springer Publishing Company, Cham, Switzerland. https://doi.org/10.1007/978-3-030-71815-2_13

Noor, Z. M., Kasimin, H., Aman, A., & Sahari, N. (2011). An adoption model of electronic government services in Malaysia: Electronic labor exchange (ELX). *Jurnal Pengurusan, 33*, 87–97. https://doi.org/10.17576/pengurusan-2011-33-07

Norris, D. F., & Moon, M. J. (2005). Advancing e-government at the grassroots: tortoise or hare?. *Public Administration Review, 65(1)*, 64-75.

Obaid, Q. M. S., & Ahmad, M. F. (2021). The linkage between e government and citizens' satisfaction in UAE. *Annals of the Romanian Society for Cell Biology, 25(1)*, 3118–3130.

Papadopoulou P., Nikolaidou M. & Martakos D. (2010).What Is Trust in E-Government? A Proposed Typology. *Proceedings of 43rd Hawaii International Conference on System Sciences*, Honolulu, HI, USA, 2010, pp. 1-10, doi: 10.1109/HICSS.2010.491.

Park, S., Choi, Y. T., & Bok, H. S. (2013). Does better e-readiness induce more use of e-government? Evidence from the Korean central e-government. *International Review of Administrative Sciences, 79(4)*, 767-789.

Piehler, R., Wirtz, B., & Daiser, P. (2016). An Analysis of Continuity Intentions of eGovernment Portal Users. *Public Management Review, 18(2)*, 163–198. https://doi.org/10.1080/14719037.2014.965270

Qasim Nidawy, B. al, Sidek, S., Ali Al-shami, S., & Elzamly, A. (2020). E-government trust model (EGOV-TRUST) that enhances the usage of e-government services among users in Iraq. *Journal of Theoretical and Applied Information Technology, 15(3)*, 402-418.

Rana, N. P., Dwivedi, Y.K. , & Williams, M. D. (2013). Evaluating the Validity of IS Success Models for the Electronic Government Research: An Empirical Test and Integrated

Model. *International Journal of Electronic Government Research, 9 (3)*, 1–22. https://doi.org/10.4018/jegr.2013070101.

Rana, N. P., & Dwivedi, Y. K. (2015). Citizen's adoption of an e-government system: Validating extended social cognitive theory (SCT). *Government Information Quarterly, 32(2)*, 172–181. https://doi.org/10.1016/j.giq.2015.02.002

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.

Roseth, B., & Reyes, A.(2017). *Wait No More: Citizens, Red Tape, and Digital Government: Caribbean Edition*. Inter-American Development Bank, Washington D.C., USA. http://dx.doi.org/10.18235/0002080

Sabherwal, R., Jeyaraj, A., & Chowa, C. (2006). Information System Success: Individual and Organizational Determinants. *Management Science, 52(12)*, 1849-1864.

Sachan, A., Kumar, R., & Kumar, R. (2018). Examining the impact of e-government service process on user satisfaction. *Journal of Global Operations and Strategic Sourcing, 11(3)*, 321-336.

Salaun, Y., & Flores, K. (2001). Information quality: meeting the needs of the consumer. *International Journal of Information Management, 21(1)*, 21-38.

Santa, R., MacDonald, J. B., & Ferrer, M. (2019). The role of trust in e-Government effectiveness, operational effectiveness and user satisfaction: Lessons from Saudi Arabia in e-G2B. *Government Information Quarterly, 36(1)*, 39–50. https://doi.org/10.1016/j.giq.2018.10.007

Savoldelli, A., Codagnone, C., & Misuraca, G. (2014). Understanding the e-government paradox: Learning from literature and practice on barriers to adoption. *Government Information Quarterly, 31*, S63-S71.

Shahzad, F., Xiu, G., Shafique Khan, M. A., & Shahbaz, M. (2020). Predicting the adoption of a mobile government security response system from the user's perspective: An application of the artificial neural network approach. *Technology in Society, 62(June 2019)*. https://doi.org/10.1016/j.techsoc.2020.101278

Sharma, R., & Mishra, R. (2017). Investigating the role of intermediaries in adoption of public access outlets for delivery of e-Government services in developing countries: An empirical study. *Government Information Quarterly, 34(4)*, 658-679.

Shuib, L., Yadegaridehkordi, E., & Ainin, S. (2019). Malaysian urban poor adoption of e-government applications and their satisfaction. *Cogent Social Sciences, 5(1)*, 1–18. https://doi.org/10.1080/23311886.2019.1565293

Singh, H., Grover, P., Kar, A. K., & Ilavarasan, P. V. (2020). Review of performance assessment frameworks of e-government projects. *Transforming Government: People, Process and Policy, 14(1)*, 31-64. https://doi.org/10.1108/TG-02-2019-0011

Stefanovic, D., Marjanovic, U., Delić, M., Culibrk, D., & Lalic, B. (2016). Assessing the success of e-government systems: An employee perspective. *Information & Management, 53(6)*, 717–726.

Sternstein, A. (2010). Study links online transparency efforts, trust in government. *NextGov*, February 16, 2010. https://www.nextgov.com/cxo-briefing/2010/02/study-links-online-transparency-efforts-trust-in-government/45965/

Sztompka, P. (1998). Trust, distrust and two paradoxes of democracy. European Journal of *Social Theory, 1(1)*, 19-32.

Taylor, S., & Todd, P. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research, 6(2)*, 144-176.

Teo, T. S. H., Srivastava, S. C., & Jiang, L. (2008). Trust and electronic government success: An empirical study. *Journal of Management Information Systems, 25(3)*, 99–132.

UNDESA (2004). G*lobal E-government Readiness Report 2004 Towards Access for Opportunity*. https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2004 (Accessed: 1 January 2022).

UNDESA (2016) *E-Government in Support of Sustainable Development*. UNITED NATIONS. Available at: https://publicadministration.un.org/egovkb/en-us/reports/un-e-government-survey-2016 (Accessed: 3 January 2022).

UNDESA (2018). *Gearing E-Government to Support Transformation Towards Sustainable and Resilient Societies*. Available at: https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2018 (Accessed: 1 January 2022).

Valle-Cruz, D. (2019). Public value of e-government services through emerging technologies. *International Journal of Public Sector Management, 32(5)*, 473–488.

Van Slyke, C., Ilie, V., Lou, H., & Stafford, T. (2007). Perceived critical mass and the adoption of a communication technology. *European Journal of Information Systems, 16*, 270-283.

Veeramootoo, N., Nunkoo, R., & 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, 35(2)*, 161–174.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of information technology: Toward A Unified View. *MIS Quarterly, 27(3)*, 425–478.

Venkatesh, V., Thong, J. Y. L., Chan, F. K. Y., Hu, P. J. H., & Brown, S. A. (2011). Extending the two-stage information systems continuance model: Incorporating UTAUT predictors and the role of context. *Information Systems Journal, 21(6)*, 527–555.

Wang, C., & Teo, T. S. H. (2020). Online service quality and perceived value in mobile government success: An empirical study of mobile police in China. *International Journal of Information Management, 52(January)*, 102076. https://doi.org/10.1016/j.ijinfomgt.2020.102076

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.

Wang, Y. J., Hernandez, M. D., & Minor, M. S. (2010). Web aesthetics effects on perceived online service quality and satisfaction in an e-tail environment: The moderating role of purchase task. *Journal of Business Research, 63(9-10)*, 935-942.

Warkentin, M., Gefen, D., Pavlou, P. A., & Rose, G. M. (2002). Encouraging citizen adoption of e-government by building trust. *Electronic Markets, 12(3)*, 157-162.

Warshaw, P. R., & Davis, F. D. (1985). Disentangling behavioral intention and behavioral expectation. *Journal of Experimental Social Psychology, 21(3)*, 213-228.

Weerakkody, V., El-Haddadeh, R., Al-Sobhi, F., Shareef, M. A., & Dwivedi, Y. K. (2013). Examining the influence of intermediaries in facilitating e-government adoption: An empirical investigation. *International Journal of Information Management, 33(5)*, 716–725.

Weerakkody, V., Irani, Z., Lee, H., Hindi, N., & Osman, I. (2014). A Review of the Factors Affecting User Satisfaction in Electronic Government Services. International Journal of *Electronic Government Research, 10(4)*, 21–56.

Weerakkody, V., Irani, Z., Lee, H., Hindi, N., & Osman, I. (2016). Are U.K. Citizens Satisfied With E-Government Services? Identifying and Testing Antecedents of Satisfaction. *Information Systems Management, 33(4)*, 331–343.

West, D. M. (2004). E-government and the transformation of service delivery and citizen attitudes. *Public Administration Review, 64(1)*, 15-27.

Whitener, E.M. (1990). Confusion of Confidence Intervals and Credibility Intervals in Meta-Analysis. *Journal of Applied Psychology, 75(3)*, 315-321.

Wu, J., & Lederer, A. (2009). A Meta-Analysis of the role of Environment-based Voluntariness in Information Technology Acceptance. *MIS Quarterly, 33(2)*, 419-432.

Wu, J., & Du, H. (2012). Toward a better understanding of Behavioral Intention and System Usage constructs. *European Journal of Information Systems, 21(6)*, 680-698.

doi: https://doi.org/10.3127/ajis.v27i0.4079