



Trust and System Quality on the Actual Usage of E-Government in Kuwait Using TAM

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Abstract

Objectives: The aim of this study is to determine the impact of trust in e-government and system quality on the actual usage of e-government in an Arab country. **Method:** A modified TAM model was developed and tested over a sample of 465 actual users. Validity and reliability were used alongside latent construction and discriminant validity. Furthermore, structured equation modeling (LISREL 8.4) was used to validate the research model. **Results:** Results show that trust in e-government increased perceived usefulness (PU) and decreased actual usage. System quality increase perceived usefulness, perceived ease of use (PEOU), and actual usage. PEOU increases PU and actual usage. Finally, PU decreases actual usage. **Conclusion:** Results successfully show that trust in e-government and system quality do have an indirect effect on the actual use through the mediation of PEOU and PU. And for the first time we found that both PU and trust decrease actual usage.

Keywords: Trust in e-government, System quality, Perceived usefulness, Perceived ease of use, TAM, Actual usage, Arab country, Kuwait, Middle East.

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Introduction

The decline of individual trust in government services has inspired the switch to e-government to improve its efficiency, effectiveness, and increasing their participation in the political process (Tolbert et al., 2006). E-government is perceived as communication channel to radically improve perceptions of government services' quality and delivery and possibly improve citizen trust in government.

The trend is to move toward adoption of e-government services. This is mainly due to benefits gained using the combination of Internet and new ICTs. Those gains are: time reduction, less effort, ubiquitous service delivery, democratic responsiveness, public outreach, and so forth. However, e-government entail risks related to potential service disruptive and downtimes (Akram et al., 2019; Alharbi et al., 2017; Bélanger et al., 2008; Veeramootoo et al., 2018).

Accordingly, potential users show distrust in using e-government websites which forms the critical obstacle against their adoption and usage of e-government services (Alharbi et al., 2017; Bélanger et al., 2008; Teo et al., 2008).

Prior studies in the field have examined and used different behavioral theories, including Technology Acceptance Model (TAM) (Ahmad & Campbell, 2015; Al-Zahrani, 2020) and proposed different variations (Ahmad & Campbell, 2015; Al-Hujran et al., 2015) using different sample perspectives (students, employees, and citizens). They have studied many issues surrounding e-government adoption, current and continuous use including perceived usefulness (PU), perceived ease of use (PEOU), risk, privacy, security, quality (information, system, and service), trust, and satisfaction (e.g. Alzahrani, et al., 2017; Rana & Dwivedi, 2015; Zhang, et al., 2014).

This research aims to study the influence of trust and system quality on actual use behavior via the mediation of PU and PEOU. We focus on these issues for three reasons: First, prior studies provided mixed results related to the effect of trust on e-government intention to use (ITU). Indeed many studies found that trust is positively related to ITU (e.g.: Bélanger &

Carter, 2008; Teo et al., 2008) while others failed to find such effect (e.g.: Horsburgh, et al., 2011), and other found that trust exerted the least effect on ITU compare to other factors. In addition, the systematic literature review carried by (Rana & Dwivedi, 2015) that included 63 quantitative studies on e-government adoption, revealed that 19 were found to exhibit significant effect of trust on ITU (while 3 failed to find significant path). Second, while PU and system quality were extensively studied, their impact on adoption behavior provides mixed results. According to Rana and Dwivedi (2015), 21 studies found significant path between PU and ITU (while 3 studies failed to find significant path). Furthermore only 3 studies exhibited significant relationship between system quality and ITU (while 2 studies failed find significant path). Third, while e-government received extensive focus in the western culture, the literature review of Rana and Dwivedi (2015) found only three high quality studies were carried in Arab world before 2015. These studies were conducted in Saudi Arabia (Al-Sobhi, et al., 2011; Dwivedi & Weerakkody, 2007) and Qatar (Al-Shafi & Weerakkody, 2009). Fourth, most past studies focused on ITU (Alzahrani et al., 2017; Rana, et al., 2015; Zhang et al., 2014) and thus living the floor for more investigation for factors that impact the actual use (AU).

Since we excluded the social influence factor and facilitating conditions, this study aims to develop a modified TAM model through the following research question: Does trust in e-government and system quality impact AU of e-government through the mediation of TAM beliefs in Kuwait?

We focused on trust on e-government and system quality because these are important factors that may increase e-government adoption for the following three main reasons. First, it is noticeable that online transactions differ massively between e-government and e-commerce services. For commercial transactions, when customers feel unsafe and do not trust online transactions, they may switch to other websites to another that provide safer environment and attractive products (Nadeem et al., 2020). However, there is only one e-government website that provides online services, and people have the freedom to use or not by visiting physical agencies and switching to other providers is not an option.

In addition, Arab countries, according to Rouibah et al. (2016), belong to a collectivism culture where people prefer face to face transactions, and have tendency to avoid high level of risks, as the case of online transactions. Second, the qualitative study about e-government by Rouibah, et al., (2018) revealed system quality and PU are among obstacles toward e-government ITU in Kuwait, which is similar findings of Alenezi et al., (2017). Other studies in Kuwait also found similar results (Alenezi et al., 2015). Third, despite considerable investments in e-government projects, these initiatives fail to achieve expected return on investment (Al-Zahrani, 2020; Samuel, et al., 2020; United Nations, 2020b). Indeed despite that individuals participate heavily in social networking activities, use e-commerce websites and online banking, they are still hesitant to use online government services and communicate online with public authorities (Al-Zahrani, 2020; Harfouche & Robbin, 2012).

Recognizing the differences between services provided by e-government and e-commerce and the little focus on e-government adoption in the Arab world (Al-Zahrani, 2020), this study is an attempt to fill these gaps by developing a modified TAM model and validate it in Kuwait.

In order to fulfil this objective and shed light on the research question, this paper is organized to discuss the literature review; introduce the proposed research model; describe the used research methodology; report results and discussion; conclude and present future research directions and points to managerial implications.

Literature Review

1. IT acceptance models for e-government adoption

Prior studies have used different theories to study e-government adoption, including theory of reasoned action-TRA (Alryalat et al., 2020), theory of planed behavior-TPB (Samuel et al., 2020), TAM (Mensah, 2019; Al-Hujran et al., 2015; Alomari et al., 2012; Alomary et al., 2017), the unified theory of acceptance and use of technology-UTAUT (Jacob et al., 2019; Ahmad et al., 2015; AlAwadhi et al., 2009; Mansoori et al., 2018; Weerakkody et al., 2013), innovation diffusion

theory-IDT (Alomari et al., 2012), the unified model of electronic government adoption- UMEGA (Verkijika & De Wet, 2018), expectation confirmation theory-ECT (Veeramootoo et al., 2018), public value theory (Scott et al., 2016), and information system success-ISS (Rana & Dwivedi, 2015; Rouibah et al., 2018; Veeramootoo et al., 2018). Using these theories, prior studies have used different samples (composed of citizens, students, and employees) to investigate different personal, environmental, technological, and organization factors.

Among these models, TAM is the most used and stable one (Rana and Dwivedi 2015). Information systems scholars originally build TAM to predict how end users adopt information systems and ICT devices (Davis, 1989). TAM researchers assume that cognitive complexity (PEOU) and instrumental (PU) are the two major drivers toward adoption.

2. A subset of Arab studies on e-government adoption: effect of system quality and trust

Many studies investigated different factors that impact e-government adoption in different Arab countries including Jordan (Al-Hujran et al., 2015; Almaiah & Nasereddin, 2020), Saudi Arabia (Al-Zahrani, 2020; Weerakkody et al., 2013), Qatar (Al-Sobhi et al., 2011), UAE (Mansoori et al., 2018; Yousif et al., 2020), Egypt (Elgohary et al., 2020), Lebanon (Chebaro et al., 2020); Iraq (Ahmad & Campbell, 2015; Khanapi et al., 2020), and Oman (Martins & Al-Shekaili, 2019). Despite this increase, less studies with theory based models were done in Kuwait (Abbas et al., 2019; Abbas & Hamdy, 2015; Aladwani, 2016; AlAwadhi & Morris, 2009; Rouibah et al., 2018).

Table 1 shows a subset of these studies that included system quality, trust in e-government web site, PU and PEOU. It revealed that: (1) all these studies focused on ITU, not on AU taking into account that intention behavior does not necessarily lead to current behavior; (2) they focused more on PU and PEOU compare to system characteristics (system quality and system design); (3) these studies offer contradictory findings related to the effect of trust in e-government, system quality, PU, and PEOU on intention to adopt,

(4) the path from system quality to PU and PEOU did not receive the due attention, and (5) the same remark also applies to the path from trust in e-government to PU and PEOU.

Aladwani (2011) identified many factors that motivate Kuwaiti people to use e-government services including:

citizens' awareness, Internet experience, attitudes toward e-government, usability (technical, content, appearance, etc.), broadness of services offered, existence of suitable national Internet infrastructure, continuous financial support, adequate human resources, governmental incentives, lack of collaboration among public offices involved, existence of security and privacy issues, perceived value, adequate legislations, and several other critical e-government issues.

In the same path, Alkraiiji (2020) developed a model that tests the impacts of system and information quality on citizen satisfaction in Saudi Arabia. His findings show that PU and trust in e-government mediated association between quality and satisfaction. He concluded that system quality exhibited the strongest effect on citizen satisfaction.

Similarly AlAwadhi and Morris (2009); found that PU, PEOU, getting rid of bureaucracy, reduce cultural and social influences (Wasta), are among important factors toward e-government ITU. In general, the literature in e-government acceptance in the Gulf region did not receive the due attention compared to Western countries, and the trust in e-government is still behind western societies (Alsaghier & Hussain, 2012). This is why our study aims to fill in these gaps.

Table 1
S subset of Arab studies on e- government adoption

Authors	Theory	Type of behavior	Type study	System quality [SQ]→ AB	Trust in e-gov-ernment [TiE] →AB	PU →AB	PEOU →AB	PEO-U→P-U	Trust →PU	Trust →PE-OU	Other factors
(Rouibah et al., 2018)	Various referen-ces	Inten-tion and actual beha-rior	Quali-tative (81 parti-cipants in Ku-wait)	X [s]	X [s]	X [s]	X [s]		NT	NT	IQ, SVQ, TIG, TII, SAT, PR, AA, DW, DE
(Al-harbi et al., 2017)	Modi-fied TAM/UTA-UT	Inten-tion	Quanti-tative (625 Saudi citi-zens)	User Inter-face quality [UIQ, s]	X [s]	X [s]	X[ns]	NA	NT	NA	SE, P&S FC, SI
(Ah-mad et al., 2017)	Modi-fied TAM	Inten-tion	Quanti-tative (120 stu-dents in UAE)	NA	X [s]	X [ns]	X [ns]	NT	NT	NT	CO, SI, VOSe
(Ah-mad et al., 2015)	Modi-fied TAM	Inten-tion	Quanti-tative (548 online users in Iraq)	NA	X [s]	X [s]	X [ns]	X[s]	NT	NT	FC, SI, PV, PR, IQ
(Al-Hujran et al., 2015)	Modi-fied TA-M	In-ten-tion	Quanti-tative (413 Jor-danian users)	NA	X [s]	X [ns]	NT	X [s]	X [s]	X [s]	ATT, NC

Cont. Table 1

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Authors	Theory	Type of behavior	Type study	System quality [SQ]→ AB	Trust in e-gov-ernment [TiE] →AB	PU →AB	PEOU →AB	PEO-U→P-U	Trust →PU	Trust →PE-OU	Other factors
(Abu-Shanab, 2014)	Modified TAM	Intention	Quantitative (759 in Jordan)	NA	X [s]	X [s]	X [s]	NT	NT	NT	SI, IQ, FWI, TII, TIG, P&S
(Ayyash et al., 2013)	TAM and ISS model	Intention	Quantitative (364 employees in Palestine)	NT	X [s]	NT	NT	NT	X [s]	X [s]	IQ, SVQ, privacy & Security
(Zhao & Khan, 2013)	TAM	Intention	Quantitative (465 students' users in UAE)	NA	X [s]; UAE; ns; USA]	X [s]	X [ns; UAE; s:USA]	NT	NT	NT	TIT, CSE,
(Alomari et al., 2012)	TA-M+D-OI	Intention	Quantitative (400 in Jordan)	X: Website design [x]	X[s]	X[s]	X[ns]	NT	NT	NT	TII, CSE, RD, COMPP

Note. [AB: Actual Behavior; NA: Not Available; NS: Not Significant; S: Significant; NT: Not tested] IQ: Information Quality; SVQ: Service Quality; SQ: System Quality; TIG: Trust In Government; TII: Trust In Internet; SAT: Satisfaction; PR: Perceived Risk; AA: Attractiveness of the Alternatives; AW: Awareness; DE: Design Esthetic; SE: Security; P&S: Privacy and Security; FC: Facilitating Conditions; SI: Social Influence; CO: Cost; VOS: Variety Of Services; CSE: Computer Self-Efficacy; PI: Personal Innovativeness; PV: Prior Visits; ATT: Attitude; NC: National Culture; RA: Relative Advantage; FWI: Familiarity With Internet; COMP: Compatibility].

3. A subset of non-Arab studies on e-government adoption: effect of system quality and trust

We can identify three different streams of research that approached the e-government adoption. The first one focused on conducting literature reviews (Alzahrani et al., 2017; Khan et al., 2020; Rana et al., 2015; Zhang et al., 2014). The second developed conceptual models without validations (Alzahrani et al., 2017). Third one focused on identifying adoption factors by applying different theories (Li & Shang, 2020). In addition, review of prior studies reveals the following observations: (1) few studies were conducted in less developed countries compared to well-developed countries; (2) the literature presents reciprocal and contradictory findings. For example, Wu et al., (2011) found trust has significant impact on PEOU. However, Nangin et al., (2020) found that the opposite is true where PEOU impact significantly trust. Thus, the link between PEOU and trust is not yet been established and needs further studies. This also true for the path trust and PU. Some scholars showed significant impact of trust on PU (Boon-itt, 2019; Wu et al., 2011) and yet another group of studies showed the opposite is also true (Singh et al., 2020). Other studies focused on the impact of external factors on trust and perceived usefulness (Lee et al., 2020). Table 2 shows key literature review on e-governemnt adoption outside the Arab world.

Table 2

A subset of non-Arab studies related to e-government adoption

Authors	Theory	Type of behavior	Type study	System quality [SQ]→ AB	Trust in e-gov-ernment [TiE] →AB	PU →AB	PEOU →AB	PEO-U→P-U	Trust →PU	Trust →PE-OU	Other factors
(Khan, et al. 2020)	TAM	Intention	Quantitative (615 Pakistani users)	NA	NA	NA	NA	Sig	Sig	NA	IQ-> Trust, Security-> Trust, Privacy-> Trust

Cont. Table 2

A subset of non-Arab studies related to e-government adoption

Au- thors	Theory	Type of be- havior	Type study	System quality [SQ]→ AB	Trust in e-gov- ernment [TiE] →AB	PU →AB	PEOU →AB	PEO- U→P- U	Trust →PU	Trust →PE- OU	Other factors
(Chang, 2005 #299)	Mod- ified TA- M	In- ten- tion	Quantitative (141 users in in Tai- wan)	X [NT]	NA	X [NT]	X [NT]	X [s]	NA	NA	IQ, PC, ATT
(Rana, 2015b #215)	Mod- ified ISS and TAM	In- ten- tion	Quantitative (419 Indian users)	X [NT]	NA	X [s]	X [s]	NA	NA	NA	IQ, SVQ, PR, SAT
(Ak- ram, 2019 #44)	Mod- ified ISS	In- ten- tion	Quantitative (409 Users in Pa- kistan)	X [NT]	NA	X [s]	NA	NA	NA	NA	IQ, SVQ, CON- F, PR, SAT
(Veera- moo- too, 2018 #191)	Mod- ified ISS	In- ten- tion	Quantitative (645 Users from Mauri- tius)	X [s]	NA	NA	NA	NA	NA	NA	IQ, SVQ, PR, SAT, CONF, HAB

Note. [COMX: Complexity; PC: Perceived Credibility; SN: Subjective Norms; EI: External Influence; IPI: Inter-Personal Influence, CONF: Confirmation; HAB: Habit].

4 IT, ICT and E-government in Kuwait

Kuwait has recorded the highest penetration rates in ICTs among other countries. It is one of the earliest countries' adopters of the public internet service in the Arab world (Kemp, 2020).

Kuwait has heavily invested in ICT and its expenditure is expected to grow at a rate of 10.2% between 2019 and 2024, to reach \$10.1bn by 2024. This growth will be led by spending in artificial intelligence, big data, cloud computing, and Internet of Things (GlobalData, 2020). Recently Kuwait has spent billions of dollars on ICT projects to achieve the New Kuwait vision of 2035. This positive look at the future ICT sector is also strengthened by Kemp (2020).

Kuwait has conducted and succeeds to implement several projects related to e-government (Rouibah et al., 2018). First, it succeeded to design and implement its online portal (e.gov.kw and EGOVKW). This gateway provided 1993 services until June 2020 (998 information electronic services and 995 electronic payment services). Kuwait also succeeded to design and implement the Kuwait Information Network that connected the major public agencies (n=62 public and non-public institutions) that allowed the sharing of secured information and with high-speed data transmission over the e-government portal. Second, Kuwait also designed and implemented its E-Government Payment System (Tasdeed) in 2008 with the collaboration of the Kuwait Ministry of Finance and the online payment gateway K-Net. This system links all governmental agencies with the banking sector to enable citizens and companies to pay online by electronic means. Third, Kuwait has also designed and implemented the Exchange of Documents and Correspondence electronically between government agencies (G2G) with high confidentiality and privacy levels. The system facilitates governmental communication procedures. Finally, Kuwait has designed and implemented the National Center for Computer Emergency. This system allows the provisioning of IT infrastructure to deal with the risks related to information security, intrusion and cybercrime. Table 3 provides several key performance indicators related to the success of e-government portal.

Although Kuwait ICT market is flourishing, its e-government adoption is low. According to United Nations (2020a), Kuwait is scoring low position on e-readiness criteria, and also losing its competitive positions in favor of other similar countries (e.g. Bahrain and Cyprus). Our study aims to increase the level of end-user adoption of the e-government.

Table 3
Key Performance Indicators of the e.gov.kw

PKI	2019	2018	2017	2016	2015	2014
Number of visitors.	13,319,674	4,252,075	9,349,218	6,220,380	8,369,892	7,912,396
Number of viewed pages.	34,370,466	11,680,975	26,913,331	16,869,645	19,527,558	17,869,116
Average pages views per visitor.	2.58	2.74	2.87	2.76	2.655	2.25
Average time stay per visitor.	2:29	2:38	2:30	2:25	2:29	2:24
Number of unique visitors.	3,782,789	1,339,359	2,829,587	2,241,479	2,630,787	2,902,523
Total amount paid online.	471,617,462	49,272,343	94,849,129	51,688,710	40,092,673	30,204,024
Total number of on-line operations.	4,706,481	1,185,006	186,971.9167	76,4970	651,417	503,262

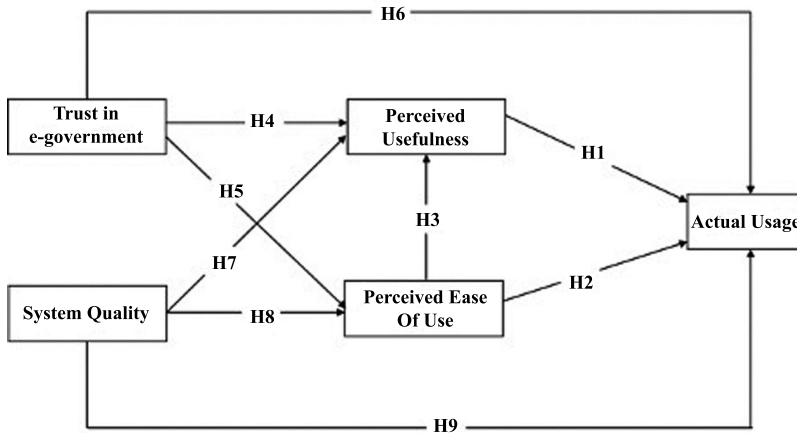
Source. (Rouibah et al., 2019).

Conceptual Framework and Research Hypotheses

Figure 1 provides the research model. Selection of the included factors was guided by the findings of the prior research due to shortage in testing the impacts and effects of factors on e-government ITU (Alenezi et al., 2015; Alkrajji, 2020). This model depicts two independent factors (quality and trust), two mediating factors (PU and PEOU) and one dependent (AU of the e-government).

TAM assumed that the decision to use an information system is based on external stimulus (trust in e-government and system quality) that drive a cognitive process, a cognitive response and beliefs (PU and PEOU) to use that system, which affects the Intention to Reuse (IR), and IR also affect behavioral response, i.e. to the actual use of the system (AU).

Figure 1

Research Model**1. Effect of perceived usefulness (PU) and perceived ease of use (PEOU)**

TAM always assumed that PU and PEOU are the primary determinants of the behavior (ITU or AU) of information technology (Davis, 1989). PU refers “to the extent to which a person believes that using an information system”, i.e. having a value for end-users. PEOU, on the other hand, refers to the “extent to which a person believes that using the system will be free from any mental effort” (Davis, 1989). Many studies applied TAM to a variety of technologies, including e-government (Akram & Sulaiman, 2019; Alomari et al., 2012; Rana et al., 2015). These studies found positive association between PU and ITU (Akram & Sulaiman, 2019; Rana & Dwivedi, 2015; Rana et al., 2015; Abu-Shanab, 2014; Ahmad & Campbell, 2015; Alharbi et al., 2017; Alomari et al., 2012; Zhao & Khan, 2013), PEOU and ITU (Ahmad & Campbell, 2015; Ayyash et al., 2013; Rana et al., 2014; Zhao & Khan, 2013), PEOU and PU (Al-Hujran et al., 2015; Rana et al., 2015). On the other hand, other studies failed to find significant association between PU and ITU (Ahmad & Khalid, 2017; Al-Hujran et al., 2015; Alomari et al., 2012). Also, with the exception of Alomari et al. (2012), others found mixed results between PEOU to ITU

(Ahmad & Khalid, 2017; Alharbi et al., 2017; Alomari et al., 2012). Alomari et al. (2012) found such association (PEOU & ITU) in USA but failed to find it valid in UAE. Yet another difficulty in understanding these relationships, other group of studies test the path between PEOU and perceived trust (Akbari et al., 2020). Thus, and in absence of studies that focused on current use, we replicate these findings and we posit the following:

H₁: Increased PU is associated with increased AU.

H₂: Increased PEOU is associated with increased AU.

H₃: Increased PEOU is associated with increased PU.

2. Role of trust in e-government actual usage (AU)

According to the literature, there is no clear definition of trust (Bhattacharya et al., 1998) and researchers have difficulty reaching a unified interpretation of this concept (Colesca, 2009b). Oxford English Dictionary defines trust as “confidence in or reliance on some quality or attribute of a person or thing, or the truth of a statement”. Trust can be studied in terms of individual characteristics, as an interpersonal characteristic, and as an institutional phenomenon. This means the term trust is discussed through different levels; personality psychologists, social psychologists, and economists and sociologists. Colesca (2009) discussed different definitions. However, the main idea behind all these definitions are the degree of dealing with vulnerability and expectations of another’s future behavior.

Empirical studies show that trust is built in a cumulative process where the level in early stages impacts the levels of late stages and the development of established relationships (Berg et al., 1995; Colesca, 2009). “For adopting e-Government services, citizens must have intention to engage in e-Government which encompasses the intentions to receive and provide information through on-line channels” (Colesca, 2009, p.9).

Prior studies have conceptualized trust either from the service provider perspective (interpersonal trust); or system trust; or dispositional trust (McKnight and Chervany, 2001; McKnight et al., 2002; Rouibah et al, 2016). In this study, we define trust from the system trust.

People have the option either to use online services of the e-government website or complete their governmental procedures through walking-in into official physical locations. Thus, we hypothesize Kuwaiti people trust what their government is offering them electronically, and at the same time they also appreciate high quality of their government online technical systems. Prior literature found that user's trust influences PEOU (Detlor et al., 2013; Dirsehan & Can, 2020; Pai & Huang, 2011), user's trust influences PU (Detlor et al., 2013; Dirsehan & Can, 2020; Pai & Huang, 2011), and user's trust influence ITU (Bélanger & Carter, 2008; Dirsehan & Can, 2020).

Also Arab studies have found that trust in e-government is positively related to PEOU, PU, and ITU (Santa et al., 2019; Sharma et al., 2019), while no previous study focused on the relationship between trust and AU.

Unlike Wu et al., (2011) who found that PEOU positively influence user's trust, we follow Dirsehan & Can, (2020) and test user's trust influences PEOU. And we found seldom studies that examined the impact of user's trust over AU compare to the majority that focused on ITU. Accordingly, we replicate H4 and H5 and infer for the first time H6:

H₄: Increased user' trust is associated with increased PU.

H₅: Increased user' trust is associated with increased PEOU.

H₆: Increased user' trust is associated with increased AU.

3. Role of system quality on e-government adoption

According to information system success model (DeLone & Mclean, 2003), system quality is key dimension of the success of information systems. System quality in the form of web design refers to the performance of the system in terms of usability, availability, reliability, adaptability and response time (DeLone & Mclean, 2003). Prior studies found system quality influences: PEOU (Detlor et al., 2013; Pai & Huang, 2011), PU (Detlor et al., 2013; Pai & Huang, 2011), ITU (Lee et al., 2020; Masri et al., 2020). System quality was also found to influence user satisfaction (AIMulhem, 2020; Koh & Kan,

2020; Wang & Teo, 2020), but none was found to influence AU of e-government. Based on the previous discussion we replicate H7 and H8, and we infer H9 for the first time:

H₇: Increased system quality is associated with increased PU.

H₈: Increased system quality is associated with increased PEOU.

H₉: Increased system quality is associated with increased AU.

Methodology

Subjects and Procedure of Data Collection

The study utilized a questionnaire to test the research model. This study targeted all Kuwaiti people as a potential population. Students in an introductory course of MIS course were trained and assigned the task of instrument distribution. They were asked to distribute a paper form to their relatives and friends whom use e-gov.kw website. They also randomly distributed at different geographical locations with different timings to represent all sectors of the Kuwaiti society. To guarantee the fulfillment of this task, students received incentives in terms of an extra bonus to participate in the study. Participants were asked to assess their perceptions towards AU of government website services.

Pre-tests of the Questionnaire

We pretested the research instrument by two professors at the college of business administration school at Kuwait University. They first translated items originally in English into Arabic language and back translated them into English according to established procedures. Later, the instrument was pretested with 30 of students which led to instrument improvements clarity and vagueness removal.

A random sample of 451 users of the “e.gov.kw” was collected to represent all groups of Kuwaiti population. Among these responses, 36 were excluded because of missing data, leading to a sample of 415 valid answers used in the model validation. The respondents were informed of the purpose of the survey and provided with an explanation of the concept of e-government before they completed the questionnaire.

Construct Validity

Most of the research model constructs were taken from past and well-known studies (see Table 5). System quality was measured using 4 items from (DeLone & Mclean, 2003); PU by 3 items from (Davis, 1989; Venkatesh & Davis, 2000), PEOU by 6 items from (Davis, 1989; Venkatesh & Davis, 2000); trust in e-government by 4 items from (Beldad et al., 2012) and AU by 3 items from (Hamner & Qazi, 2009).

Results

The Sample

The majority of participants, see Table 4, are female (51.3%), Kuwaiti (91.6%) while expatriates are very few (8.4%), and 46.3% in the range of 20's (20-30), and 44.1% are holders of bachelor's degree.

Table 4
Demographics

Variable	Groups	Frequency	Percentage calculated
Nationality	Kuwait	414	99.76%
	Arab	32	7.71%
	Non-Arab	5	1.20%
Gender	Male	219	52.77%
	Female	232	55.90%
Academic Background	Less than high school	9	2.17%
	High school	128	30.84%
	Two years college	77	18.55%
	Bachelor's degree	199	47.95%
	Master's degree	25	6.02%
	PhD	13	3.13%
Age	Less than 15	11	2.65%
	15 to less than 20	86	20.72%
	20 to less than 25	153	36.87%

Cont. Table 4

Demographics

Variable	Groups	Frequency	Percentage calculated
Age	25 to less than 30	56	13.49%
	30 to less than 35	30	7.23%
	35 to less than 40	29	6.99%
	40 to less than 45	38	9.16%
	45 to less than 50	33	7.95%
	50 to less than 55	12	2.89%
	More than 55	14	3.37%
Income	None	20	4.82%
	Less than 500 KD	181	43.61%
	500 to less than 1000 KD	101	24.34%
	1000 to less than 1500 KD	70	16.87%
	1500 to less than 2000 KD	36	8.67%
	2000 to less than 2500 KD	16	3.86%
	2500 to less than 3000 KD	13	3.13%
	3000 to less than 3500 KD	7	1.69%
	3500 to less than 4000	5	1.20%
Working sector	More than 4000	2	0.48%
	Not Specified	190	45.78%
	Public	167	40.24%
	Private	61	14.70%
	Business owner	8	1.93%
	Retired	25	6.02%

Reliability and Validity of the Instrument

Before testing the research model, we first tested its reliability and validity. The overall Cronbach's reliability coefficient Alpha, see Table

5, vary from 80.20% to 92%, which suggest it is consistent and reliable as required by behavioral sciences (Hair et al., 1998).

Table 5

Construct validity

Con-struct	Item No	Items description	Factor loadings	Reliability (Cronbach Alpha)	Ex-plained Variance
System Quality (SQ)	SQ1	E-government employees give prompt service to users.	0.822	83.0%	66.237%
	SQ2	E-government employees have the knowledge and do their job well.	0.816		
	SQ3	E-government provides me with complete and extra information.	0.644		
	SQ4	E-government pages give useful information from other external sources.	0.610		
Per-ceived Usefulness (PU)	PU1	Using Kuwait e-government website enhances my effectiveness on the job.	0.676	80.2%	71.8%
	PU2	Using Kuwait e-government website increases my productivity.	0.798		
	PU3	Using e-government website improves my job performance.	0.815		
Per-ceived Ease of Use (PEOU)	PEOU1	Using e-government website is easy to use.	0.742	92.0%	71.675%
	PEOU2	E-government website screens are clear and understandable.	0.692		
	PEOU3	It is easy for me to be familiar with e-government website	0.732		

Cont. Table 5

Construct validity

Construct	Item No	Items description	Factor loadings	Reliability (Cronbach Alpha)	Explained Variance
Perceived Ease of Use (PEOU)	PEOU4	Using e-government website is flexible to interact with.	0.750	92.0%	71.675%
	PEOU5	Using e-government website is easy for me to understand	0.797		
	PEOU6	In general, e-government website is easy to use.	0.805		
Trust in e-government (TiE)	TiE1	I think electronic processes on Kuwait e-government website are trustworthy.	0.813	89.5%	76.175%
	TiE2	Most of e-government website pages that I use in my processes are trustworthy.	0.814		
	TiE3	E-government website will treat my personal data because it has a privacy statement	0.731		
	TiE4	I trust in e-government website in terms of their processing and usage of citizens' personal data	0.735		
Actual Usage (AU)	AU1	During working days, how many hours are spent on browsing the Kuwaiti e-government website?	0.739	80.9%	72.7%
	AU2	In average, how many times do you use Kuwait e-government website?	0.871		
	AU3	In average, how many times do you use Kuwait e-government website for processing official transaction offered in e-gov.gov.kw site?	0.874		

In order to test the instrument validity, we first used data reduction technique. The Principal Component Analysis with Varimax rotation was used for this purpose with eigenvalue greater than one and factor loadings greater than 0.5 (Kaiser, 1958).

The constructs in Table 5 were used for further analysis. Note that all variances of study measurements are above 60%, and all reliabilities are above 70%, which are above threshold (0.60) required in social science studies (Hair et al. 1998).

Evaluation of Conceptual Model

After carefully ensuring that all items are loaded on their appropriate factors, we used the LISREL software, a Structural Equation Modeling (SEM) tool, to test the significance paths among the research model.

The results showed good fit indices, in particular. Results revealed the following goodness of fit indicators (Hair et al., 1998; Sharma, 1996): Root Mean Square Residual (RMR)=0.05 (recommended ≤ 0.05 ; Hair et al., 1998), Goodness of Fit Index (GFI)=0.85 (recommended ≥ 0.80), and Adjusted Goodness of Fit Index (AGFI)=0.81 (recommended ≥ 0.80). All these measures reflected satisfactory and acceptable model and ensure best fit data to the research model: Normed Fit Index (NFI)=0.96; Incremental Fit Index (IFI)=0.97; Relative Fit Index (RFI)=0.95.

Latent Construct Validity, Reliability, and Discriminant Validity (DV) tests

Before testing the significance paths among the research model, additional analysis was conducted to examine the constructs validity and reliability tests of the latent constructs in term of composite reliability⁽¹⁾ average variance extracted (AVE)⁽²⁾, and discriminant validity (DV) tests. CR is needed because the Cronbach's Alpha reliability measurement does not ensure unidimensionality of the construct, but instead, it pre-assumes that it does exist. CR is needed to ensure that there is an existence of internal consistency in measurements per each construct (Hair et al., 1998). The AVE is used to evaluate the overall amount of explained variations accounted for by

(1) The composite reliability can be calculated as follows:

$$\text{Composite Reliability} = \frac{(\sum \text{Standardized loadings})^2}{(\sum \text{Standardized loading})^2 + \sum |\text{error}|}$$

(2) Variance extracted is computed as follows:

$$\text{Average Variance Extracted (AVE)} = \frac{\sum (\text{Standardized loadings})^2}{\sum (\text{Standardized loading})^2 + \sum |\text{error}|}$$

the construct. Table 6 shows three columns; CR, AVE, and R² and their minimum value requirements.

Table 6
CR, AVE, and coefficient of determination (R²) test

Construct	CR (Requirement > = 70%)	AVE (Requirement > = 50%)	R ²
Trust in e-government (TiE)	92.3%	75.09%	NA
System quality (SQ)	85.88%	60.38%	NA
Perceived usefulness (PU)	84.8%	65.46%	46%
Perceived ease of use (PEOU)	93.5%	70.699%	60%
Actual use (AU)	85.86%	67.33%	20%

Note. NA: Not Applicable.

Discriminant validity test is to ensure there is no overlapping in the measurements (items) of factors in the research model. In other terms, the questions that are used in the survey should not be overlapped and where one measurement question cannot measure two factors at the same time. The DV test is acceptable as long as the DV⁽³⁾ is less than or equal 0.85. Table 7 clearly ensures there are no overlapping between study measurements.

Table 7
The results of the DV test

	TiE	SQ	PU	PEOU	AU
Trust in e-government (TiE)	0.751				
System quality (SQ)	0.786 ^b	0.604 ^a			
PU	0.633 ^b	0.6682 ^b	0.655 ^a		
PEOU	0.807 ^b	0.748 ^b	0.730 ^b	0.707 ^a	
AU	0.326 ^b	0.431 ^b	0.305 ^b	0.469 ^b	0.673 ^a

Note. x^a: The average variance extracted AVE, x^b: the square coefficient of correlation.

(3) The discriminant validity test can be computed as follows $DV_{XY} = \frac{Corr(x,y)}{\sqrt{rel_x * rel_y}}$

It is obvious according to Table 7 that all constructs measurements satisfied the DV threshold. And therefore, the collected data and the instrument are both valid.

Path Analysis and Validation of the Research Model

We applied the SEM technique based LISREL tool which estimate, the direct, indirect, and total effects of all possible paths between external variables (i.e. trust in e-government and system quality), the mediating variables, on the dependent variable (AU) (see Table 8).

Table 8

Path analysis of study research model

Path	Hypotheses	Path Coefficient (β)	SD	t-value	Significant [s] or not significant [ns]	Supported hypothesis
H1: PU \rightarrow Actual usage	H9	-0.06	0.07	5.472*	S	No
H2: PEOU \rightarrow Actual usage	H8	0.41	0.09	9.405*	S	Yes
H3: PEOU \rightarrow PU	H7	0.45	0.08	17.382*	S	Yes
H4: Trust in e-government \rightarrow PU	H1	0.07	0.08	13.736*	S	Yes
H5: Trust in e-government \rightarrow PEOU	H2	0.55	0.06	23.043*	S	Yes
H6: Trust in e-government \rightarrow Actual usage	H3	-0.15	0.09	6.158*	S	No
H7: System Quality \rightarrow PU	H4	0.22	0.07	14.098*	S	Yes
H8: System Quality \rightarrow PEOU	H5	0.29	0.06	18.341*	S	Yes
H9: System Quality \rightarrow Actual usage	H6	0.23	0.09	8.094*	S	Yes

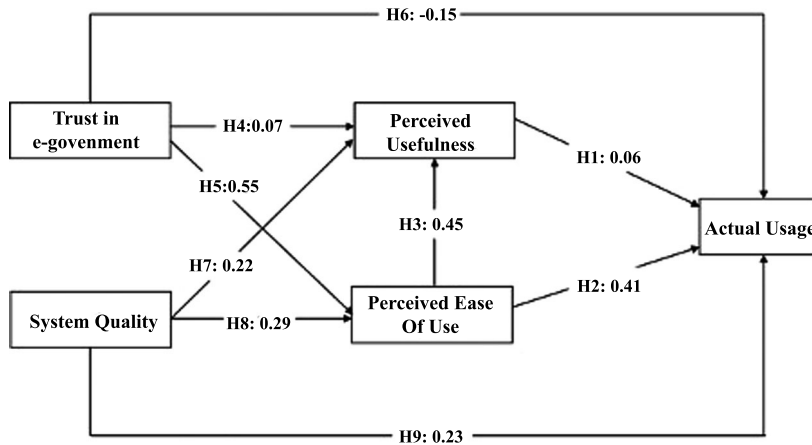
Note. (*p < 0.001).

The above Table 8 and Figure 2 shows that trust in e-government increased PU ($\beta=0.07$, $t=13.736$), PEOU ($\beta=0.55$, $t=23.043$), but contrary to our expectation decreases AU ($\beta = -0.15$, $t=6.158$). System quality also increases PU ($\beta=0.22$, $t=14.098$) and PEOU ($\beta=0.29$, $t=18.341$) and, AU ($\beta=0.23$, $t=8.094$). PEOU increases PU ($\beta=0.45$, $t=17.382$) and AU ($\beta=0.41$, $t=9.405$). Contrary to our expectations, PU decreases AU ($\beta=-0.06$, $t=5.472$). These results revealed that,

except H1 and H6, the other seven hypotheses are supported (H2, H3, H4, H5, H7, H8 and H9).

Figure 2

Research model with path coefficients



Discussion

Unlike previous studies that focused on factors that affect intention to use e-government (Al-Somali et al., 2009; Saparudin et al., 2020; Suleman et al., 2019), our study focused on the role of trust in e-government (TiE) and system quality (SQ) on actual use via the mediation of TAM constructs (PEOU and PU). And System quality has stronger effect on actual usage than does trust in e-government.

Both TiE and SQ influence PEOU. This is corroborate with previous studies that studied Trust and PEOU (Detlor et al., 2013; Dirsehan & Can, 2020; Pai & Huang, 2011), and SQ and PEOU (Detlor et al., 2013; Pai & Huang, 2011; Kang & Namkung, 2019). But the relative impact of TiE is stronger than does SQ. And this is a similar finding as (Wu et al., 2011). Contrary to our findings, Nangin et al., (2020) did study the impact of PEOU on trust and found that PEOU is significant predictor of trust in e-government. Thus, we believe that there is a reciprocal association between PEOU and trust

in e-government, which requires additional investigation to ascertain this new result.

Also, TiE and SQ both influence PU but the later has more effect. This is in line with findings of previous studies that studied SQ and PU (Detlor et al., 2013; Pai & Huang, 2011; Kang & Namkung, 2019), and TiE and PU (Detlor et al., 2013; Dirsehan & Can, 2020; Pai & Huang, 2011). And the finding related to the relationship between trust in e-government and PU is controversial since some studies investigated the impact of PU on trust in e-government (Aw et al., 2019; Singh & Sinha, 2020), and yet others stated the opposite is true (Boon-itt, 2019; Wu et al., 2011). In our study we tested the impact of trust in e-government on PU and find significant association between the two, similar to findings of Wu et al., (2011). Also, our study found significant association between trust in e-government and AU. This is understandable according to literature (Park et al., 2012).

This result is unique since it is seldom to find Arabic studies that examine associations between system quality and trust in e-government on one side, and AU of e-government on the second. This fact signifies the importance and criticality of system quality toward usage of e-government services.

As previous studies did, we found that TAM constructs mediate the relationship between independent variables (trust and system quality) on AU, which was supported by previous studies on technology adoption in Kuwait and Arab region (Abbas, 2014; Rouibah & Abbas, 2010).

SQ, TiE, PU and PEOU have influence on actual usage of e-government. Among these four factors, PEOU followed by PEOU exert the strongest effect. And unlike prior studies that studied the effect of these factors on intention to use, our study took a different perspective and focused on actual usage behavior. Also contrary to previous studies (Bélanger & Carter, 2008; Dirsehan & Can, 2020), we found for the first time in Kuwait that PU decreases current usage of e-government, which signify that people are unhappy, and therefore needs more studies to investigate the reason for that.

Last, prior studies found that trust in e-government and system quality constructs are associated with each other. And contrary to our study, Teo et al., (2008) used two multidimensional constructs of trust and quality to study their impact on intention to continue using e-government website, besides user satisfaction in Singapore. They found that trust significantly influence directly quality and indirectly both intention to use and user satisfaction. This is different from our approach, since we studied the impact of both factors (trust and quality) on actual usage via the mediation of TAM model.

Conclusion

Research Contributions

Our study validated a new research model that integrated system quality and trust in e-government into TAM and by focusing on actual usage instead of intention to use as the case of prior studies. For the first time, our findings revealed trust in e-government and PU have both negative influences on e-government actual usage while PEOU and quality increased it.

Research Limitations

This study suffers from three limitations. *First*, as most and previous studies did, our model is developed based on participants' perceptions, and therefore, bias may be introduced since we cannot ensure their trust when completing the research instrument, and whether they have enough information on the e.gov.kw and whether they have used it one time of many times.

Second, our study did not account for other factors that may affect actual usage such as the influence of family members and friends, privacy protection and security of the e-government website that were found in prior studies to play significant impact on e-government adoption (Wadie & Abbas, 2015). Also, the ultimate objective of any e-government website is to ensure continuous use since huge investments were spent to make these projects successful. However, our research model did not include continuance intention, where a better model can

be reached if such inclusion took place. Another limitation is related to the usage of TAM theory, and we did not account for its recent constructs such as habit and risks.

Finally, we considered both trust and quality as two single constructs, while prior studies considered both of them as two multi-dimension constructs (Teo et al., 2008).

Managerial and Research Perspectives

The results have several theoretical and practical implications. Improving the website is crucial from the viewpoint of citizen, as the PU and trust in e-government were found to be negative, meaning end-users neither trust the e-government portal nor do they perceive its value.

The only way to measure the success of any e-government project is by whether end-users trust it, perceive its benefits and value, use it, being satisfied about its use, and continue to use it on a daily basis. It is obvious that e-government of Kuwait, from the perspective of the participants in this study, failed to achieve this objective in terms of trust of the e-government and its perceived usefulness (PU). Thus, our study points to the need to market the e-government by the Central Agency for Information Technology (CAIT), in charge of the e-government, among citizens and residents to increase the level of these two factors (trust and PU), so that the actual use will also increase.

Moreover, governmental agencies are encouraged to move quickly towards fully e-government services especially after Covid-19 pandemic that heavily hit the world. Because the real challenge faced by CAIT is to enough convince citizens and residents to adopt the e.gov.kw and continue using its services with high frequencies. Thus, building trust is crucial for users to use these services. Additionally, quality perceptions of the users towards e-government services largely depend on the trusting belief.

In line with the limitations of this study, we proposed to continue studying factors that affect, not only actual usage, but to extend it to continue using the e-government. In doing so, we also suggest to adopt

the information success model of Delone and McLean (2003) as it different quality attributes (information quality, system quality, and service quality) (Gefen & Straub, 2003; Teo et al., 2008) and also to include trust as multi-dimension construct as shown by a previous quality study in Kuwait (Rouibah et al., 2019) and other studies outside Kuwait (Gefen et al., 2003; Teo et al., 2008). In doing so, we also suggest investigating the two types of paths that links PU and trust (PU → trust and Trust → PU).

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أثر متغيري الثقة والكفاءة على الاستخدام الفعلي لنظام الحكومة الإلكترونية في دولة الكويت باستخدام TAM

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ملخص

الأهداف: هدفت الدراسة لتحديد أهمية وقيمة أثر الثقة بنظام الحكومة الإلكترونية وجودة نظام الحكومة الإلكترونية على الاستخدام الفعلي في الكويت. **المنهج:** استخدمت الدراسة نموذجاً معدلاً من نظرية تام، وتم اختبار النموذج على 465 مستخدماً فعلياً لموقع الحكومة الإلكترونية بالكويت. وقد تم التحقق من الموثوقية وصلاحيّة نموذج الدراسة إلى جانب الاستفادة من نموذج SEM للتحقق من لياقة نموذج البحث. **النتائج:** أظهرت النتائج المتحققة من الدراسة أن الثقة في نظام الحكومة الإلكترونية بالكويت يؤثر على متغير الشعور بفوائد الاستخدام، الذي بدوره أثر عكسياً على الاستخدام الفعلي. أما جودة نظام الحكومة الإلكترونية؛ فقد أثرت إيجاباً على متغير الشعور بفوائد الاستخدام وعلى الاستخدام الفعلي لموقع الحكومة الإلكترونية. أما بالنسبة لمتغير سهولة الاستخدام؛ فقد أثر إيجاباً وبقوة على الشعور بفوائد الاستخدام وعلى الاستخدام الفعلي. كما أن الشعور بفوائد الاستخدام أثر إيجاباً على الاستخدام الفعلي. **الخاتمة:** توصلت النتائج إلى إثبات صحة فروض الدراسة وأظهرت أن متغيري الشعور بالثقة وجودة موقع الحكومة الإلكترونية يؤثران بصورة غير مباشرة في الاستخدام الفعلي لموقع الحكومة الإلكترونية بالكويت من خلال المتغيرين الوسيطين: سهولة الاستخدام والشعور بفوائد الاستخدام.

الكلمات المفتاحية: الثقة في الحكومة الإلكترونية، جودة النظام، فوائد الاستخدام، سهولة الاستخدام، تام، الاستخدام الفعلي، الدول العربية، الكويت، الشرق الأوسط.

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