Developing Citizens' Trust towards Successful Adoption of E-Government: an Empirical Study from Saudi Arabia

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Abstract
Despite the significant influence of citizens' trust towards successful adoption of e-government, the majority of research studies investigating trust in e-government focus only on technology and government agencies. This research provides a deep understanding of the concept of trust in e-government by investigating the influence of technology, government agencies, risk, citizens' characteristic. Structure Equation Modelling PLS-SEM is utilized to analyse the collected data and to test the proposed hypotheses. The findings of the study reveals the positive and significant impacts of both technical factors and citizens' characteristic while factors related to government agencies and risk provide negative impacts in trust in e-government. Also, this paper identifies effective strategies that government need to develop citizens' trust on their online services. Research contributions and limitations are also discussed in the end of the paper.
Keywords: E-government, Citizens' Trust, Risk, Individual Characteristic, Technology, Government Agencies.

Introduction

The main objective of e-government is to establish a digital state in which information, as well as public services, can efficiently be accessed and offered to citizens electronically (Albusaidy and Weerakkody, 2008; Dwivedi et al., 2011). Many scholars (e. g. Bannister and Connolly, 2011; Janssen and Shu, 2011, Weerakkody and Dhillon, 2008, Weerakkody et al., 2007) argue that the successful adoption and acceptance of e-government from citizens' perspective not only ensures the availability of technical infrastructures, but also other processes, including organizational and social readiness. Thus, the successful adoption of e-government requires in depth understanding and analysis of the multi-dimensional issues of e-government from citizens' perspective with the major consideration for both technical and non-technical challenges.

The importance and potential of e-government has motivated scholars to investigate the factors influencing e-government adoption and the processes leading to its successful adoption and implementation. Several studies that focus on citizens' adoption of e-government highlight the roles of trust, security and transparency as prominent factors influencing successful e-government adoption (Carter and Belanger, 2005; Layne and Lee, 2001, Moon, 2002). These studies are further supported by other research which claims that citizens' trust is one of the significant factors in e-government adoption (Warkentin et al., 2002; Welch et al., 2005; Morgeson et al., 2010; Ayyash et al., 2013; Mahmood et al., 2014). Also, Carter & Belanger (2005) demonstrate that the successful adoption of e-government is contingent upon citizens' trust and their willingness to use e-government services. However, in the context of trust in e-government, most studies focus on how the technical aspects of technology and government reputation influence citizens' trust at the adoption stage (Khasawneh et al., 2013; Rehman et al., 2012; Teo et al., 2008. Welech et al., 2005), which is believed to be the major barrier to e-government adoption. Consequently, a lack of clear understanding of the factors and issues that

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influence citizens' trust in the adoption of e-government is the motivation for this research.

The aim of this paper is to explore the factors influencing citizens' trust in e-government adoption in Saudi Arabia.

The paper is structured as follows: Section 2 provides a brief overview of the literature in the context of trust in e-government. Section 3 presents the conceptual model and research hypotheses based on the finding of the literature. Section 4, introduces the research methodology adopted to achieve the aim of this research followed by Section 5, which highlights the findings of the data analysis. This final section concludes, with a presentation of the limitations and contributions of the research.

Literature Review

In order to collect articles relevant to trust in e-government, a systematic review was presented to allow in-depth analysis of the factors influencing citizens' trust in the adoption of e-government services. The review was conducted in April 2014 for literature published between 2000 and 2014. Relevant keywords were chosen in respect of the critical factors influencing citizens' trust in e-government, which include: "trust", "e-government", "factors", "adoption", "citizens' perspective" and "antecedents of trust". Published studies were identified through six electronic databases: Scopus, Summon, Proquest, ACM, ScienceDirect and Google Scholar. This resulted in the initial identification of 237 articles.

The findings of the systematic literature review identified three significant points. First, there are inadequate research studies that identify the factors of trust in e-government from the multidimensional nature of trust. Most researchers (e.g. Khasawneh et al., 2013; Wang & Lo, 2012; Rehman et al., 2012; Bannister & Connolly, 2011) focus on two dimensions of trust in e-government, which are trust in technology and trust in government, with limit consideration of other factors such as the psychology of citizens and any risk factors. Second, the literature review revealed that the existing studies investigating the factors that influence citizens' trust are limited to the theory of the Technology Acceptance Model (TAM) or Diffusion of Innovation Theory (DOI), which both focus on the technology part. In addition, most of the conceptual frameworks used in these studies were conceptualized with a general approach and limited focus on the nature of trust. Third, in the existing studies of trust in e-government, there is a lack of research regarding the concept of trust, the multidimensional nature of trust, and the properties and types of trust. Thus, the majority of the extant researches focus on the technology or government factors, with limit consideration to the trust dimensions.

Conceptual Framework

In this paper, a conceptual framework was developed for the antecedents of trust in e-government based on the literature gap and the updated D&M IS Success Model. The proposed framework develops the updated D&M IS Success Model to include not only technological factors, but also the other factors that should be considered. Thus, in the proposed framework, four factors refer to the antecedents of trust in e-governmnet: technological factors, government agencies factors, risk, and characteristics of citizens. Citizens' Belief in this framework refers to trust in e-government while the outcome of trust include: intention to use/use, citizens' satisfaction, and the adoption of e-government services. Figure 1 presents the proposed reseach framework based on the government-to-citizen (G2C) interactions.

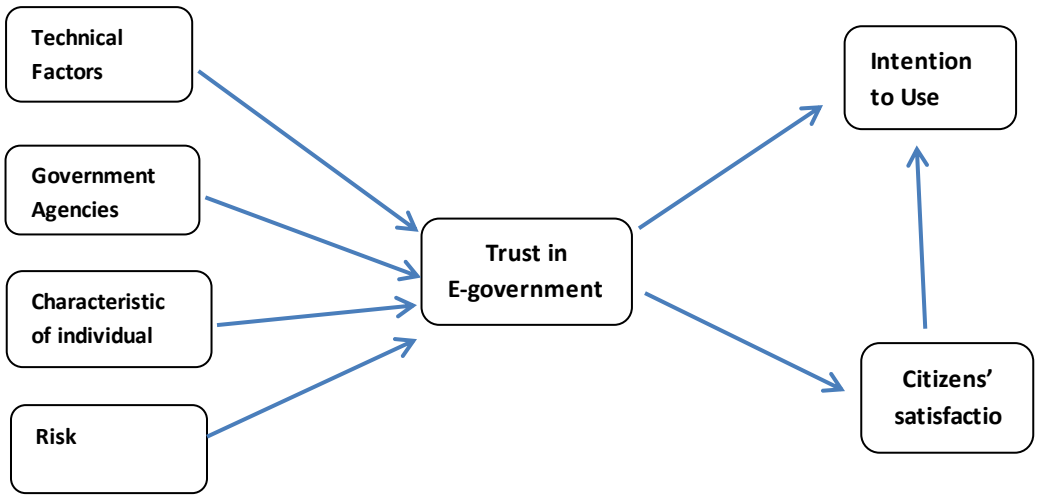

Figure 1: Conceptual Framework for Antecedents of Trust in E-government

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Research Methodology

A quantitative-based survey was conducted to assess and refine the structure and relationships in the conceptual framework. Five-point scales were adopted in this study to presents the items of constructs of the proposed framework. Survey method was adopted because it is supportive method to provide a quantitative description of specific aspects of a particular population that assess relationship among variables. Surveys also yield subjective data as it is gathered from people. Consequently, the quantitative study is adopted to examine the relationships between factors in the development framework. This procedure required applying a quantitative analysis of the collected data to determine how the conceptual framework described in trust in e-government. Thus, this study utilizes the structural equation modelling SEM to identify the critical factors influencing trust in e-government and to examine the influence of citizens' trust in adoption of e-government services. There is an increased use of structural equation model methods in the business research problems whereas in other areas there has been considerable method expressed about these methods with concerns being expressed about the extent to which structural equation models adequately test causal assumptions.

As the issues of trust in e-government is rising in the developing countries, the researcher conducted the study in Saudi Arabia which is a developing country and e-government in Saudi Arabia is still facing many challenging that influencing their citizens to trust e-government. Questionnaires were distributed by both online link and hard copies to Saudi citizens and residents. Online link send to the research canters of some ministries in Saudi Arabia while the hard copies of the questionnaire were distributed in the most populous cities in Saudi Arabia.

Research Findings

In this study, the proposed model is evaluated using Partial Least Squares Structure Equation Modelling PLS-SEM which is a powerful multivariate technique for the analysis of causal models with concurrent estimation of structural and measurement models (Hair et al (2014)). Table 1 presents the demographic information of the participants for the survey. The total population in this study is 912 participants. This reveals that most respondents for this survey belong to the 18–30 years age group (44.5%), followed by the 31–40 years age group (33.2%). Overall, the highest percentage of respondents was between 18 and 40 years of age, representing a higher involvement of a relatively younger population for this survey. As seen from Table 1, the male population (52.0%) was slightly higher than the female population (48.0%). As far as the educational levels are concerned, an education level of Bachelor formed the biggest cohort (48.6%), followed by high school or less with 25.3% of respondents. Regarding the occupation, public sector employees presented the highest percentage (41.4%), followed by unemployed with 22.1% of respondents and then student (18.6%). Finally, with regard to internet experience, the most responses were received from those participants with 6–10 years' experience (49'8%), followed by 11–20 years (15.9%) and 21-–30 years (15.8%).

Table 1: Frequency test

Variable	Group	Frequency	Percentage
Age	18-30 years	406	44.5
	31-40 years	303	33.2
	41-50 years	137	15.0
	51-60 years	58	6.4
	Over 60	8	.9
	Total	**912**	**100.0**
Gender	Male	474	52.0
	Female	438	48.0
	Total	**912**	**100.0**
Occupation	Public sector employee	378	41.4
	Private sector employee	102	11.2
	Student	170	18.6
	unemployed	202	22.1
	Retiree	60	6.6
	Total	**912**	**100.0**
Education Level	High school or less	231	25.3
	Diploma	135	14.8
	Bachelor	443	48.6
	Master	85	9.3
	Doctor	18	2.0
	Total	**912**	**100.0**
Internet Experience	1-5 years	125	13.7
	6-10 years	454	49.8
	11-20 years	145	15.9
	21-30 years	144	15.8
	None	44	4.8
	Total	**912**	**100.0**

Measurement Model Evaluation

Two assessments are adopted in this study to evaluate the measurement model: reliability and validity. Measurement model reliability is measured by utilizing both Cronbach's alpha (CA) and composite reliability (CR). Starting with Cronbach's Alpha (CA), it provides an estimate of the indicator inter-correlations. An acceptable measure for Cronbach's Alpha is 0.7 or higher. Table 2 shows that all latent variables studied are above 0.7. The highest value of Cronbach's Alpha is provided by adoption of e-government variable, followed by intention to continue use and citizens' satisfaction. In contrast, trust in e-government present the low value. In addition to using Cronbach's alpha (CA), reliability is measured using the Composite Reliability (CR). In order to display good reliability, a latent variable's CR should generally be 0.70 or higher (Hair et al., 1992; Nunnally and Bernstein, 1994). The CR estimate, unlike CA, takes into consideration the indicators' different loadings. As shown in Table 2, the composite reliability values for all latent variables have exceeded the threshold mentioned.

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Table 2: Cronbach's Alpha CA and Composite Reliability

	Cronbach's Alpha	Composite Reliability
Citizens' Characteristic	0.832	0.881
Citizens' Satisfaction	0.938	0.960
Government Agency	0.918	0.935
Intention To Continue Use	0.947	0.966
Risk Factors	0.883	0.904
Technical Factors	0.896	0.918
Trust in e-government	0.750	0.859

The evaluation of measurement model validity is measured by assessment convergent validity and discriminant validity. Convergent validity refers to the degree to which two measures of constructs that theoretically should be related, are in fact related (Hair et al., 2014). Convergent validity can also be defined as the extent to which the scores on one measure are related to scores collected from a similar or different measure. To evaluate the model validity, the average variance extracted (AVE) were examined for each variable to be 0.50 or higher. According to Jonnaa et al., (2014), an AVE value of 0.50 demonstrates that the construct explains more than half of the variance of its indicators. Table 3 highlights the average variance extracted (AVE) for the eight constructs that are acceptable, as all the values are above 0.5. Intention to continue use has the highest value (0.905) while risk factor has the lowest value (0.512).

Table 3: Average Variance Extracted (AVE)

	Average Variance Extracted (AVE)
Citizens' Characteristic	0.713
Citizens' Satisfaction	0.889
Government Agency	0.707
Intention To Continue Use	0.905
Risk Factors	0.512
Technical Factors	0.618
Trust in e-government	0.679

The second measurement of measurement model validity is evaluation of discriminant validity. The purpose of discriminant validity is to test whether the latent variables differ from each other. Discriminant validity was tested by comparing the inter-construct correlations with the square roots of their respective average variances extracted. The square roots of average variances extracted (AVEs) for each latent variable are shown in Table 4 with a yellow highlight. When comparing the square roots of the AVEs with the other values on each column, the square roots of the AVEs for each latent variable are greater than any correlation relating to each latent variable. The results indicate that the discriminant validity of the latent variables is satisfactory (Fornell and Larcker, 1981).

Table 4: Discriminant Validity

	CH	GA	IN	RF	SAT	TF	TR
CH	0.844						
GA	0.314	0.841					
IN	0.455	0.143	0.951				
RF	0.066	0.433	0.138	0.715			
SAT	0.479	0.138	0.828	0.076	0.943		
TF	0.385	0.409	0.650	0.209	0.636	0.788	
TR	0.444	0.206	0.844	0.235	0.792	0.662	0.824

Legend: CH-Citizens' Characteristic; GA- Government Agency; IN- Intention to Continue Use; RF- Risk Factor; SAT-Citizens' Satisfaction; TF- Technical Factors; TR-Trust in e-government

Structure Model Evaluation

The next step after establishing the reliability and validity of the measurement model is to evaluate the structure model. To assess the structure model, the coefficient of determination and effective size are evaluated. In addition, the path coefficient is adopted to test the proposed hypothesis and identify the significant support relations. The following sections provide further detail about the structure model evaluation

Coefficient of determination (R Square) is a statistical measure of how close the data are to the fitted regression line. It is also known as the coefficient of determination, or the coefficient of multiple determinations for multiple regressions. R-square can take on any value between 0 and 1, with a value closer to 1 indicating that a greater proportion of variance is accounted for by the model. In Table 5, an R-square value of 0.628 means that the fit explains 62.8% of the total variation in the data about the average of citizens' satisfaction.

Table 5: Coefficient of determination

	R Square
Citizens' Satisfaction	0.628
Intention To Continue Use	0.780
Trust in E-government	0.515

Table 6 presents the path coefficient and p-values for the proposed hypothesis. The path coefficient provides the significant of the hypothesized relations connecting the constructs. Table 6 reveals that all the hypotheses are significantly supported as the p-Value is less than 0.05. While the influence of the government agencies factors in e-government was proposed to be positive, this study presents a negative influence of government agencies in trust in e-government.

Table 6: Hypotheses' Path Coefficient and p-Vale

Hypotheses	Path coefficient	P – Value	Supported
Technical Factors -> Trust	0.602	0.000	Yes
Government Agency -> Trust	-0.199	0.000	Yes
Risk Factor -> Trust	-0.179	0.000	Yes
Citizens' Characteristic -> Trust	0.263	0.000	Yes
Trust -> Intention to continue use	0.504	0.000	Yes
Trust -> Citizens' Satisfaction	0.792	0.000	Yes
Citizens' Satisfaction -> Intention to continue use	0.429	0.000	Yes

Effect size (f2) is also used to determine the actual strength of the effect of one factor on the other factor. According to Hair et al (2014), if the value of effect size is greater than or equal to 0.02, then the effect is small. If it is greater than or equal to 0.15, then effect is medium. If effect size is greater than or equal to 0.35, then the effect is large. Table 7 demonstrates that the factors of citizens' characteristic, government agency and risk have small effects in trust in e-government, while technical factors have a large effect in trust in e-government.

Table 7: Effective Size

	SAT	CH	GA	IN	RF	TF	TR
SAT				0.311			
CH							0.117
GA							0.056
IN							
RF							0.053
TF							0.568
TR	1.686			0.430			

Legend: CH-Citizens' Characteristic; GA- Government Agency; IN- Intention to Continue Use; RF- Risk Factor; SAT-Citizens' Satisfaction; TF- Technical Factors; TR-Trust in e-government

Strategies for Developing Trust in E-Government

This study also provides three effective strategies for government agencies which related to citizens' empowerment, roles of government agencies and technology. First strategy discusses the important of citizens' empowerment. Government agencies need is to empower their citizens by increasing their awareness of e-government systems. Khanh (2014) mentions that awareness increases the understanding of the activities that government agencies have. Thus, government agencies are required to use the mass media for educative purposes and introducing the concepts of e-government. In addition, the government agencies could carry out seminars and training of their public service and encourage citizens to use the online applications and dissemination of web-based documents to ensure that this technological use is embraced. It could also carry out individual meetings and show support for the program through monitoring and evaluating sectors that have adopted e-government use (Basu 2004). In effect, publishing such information in newsletters, magazines, and holding presentations are some of the ways that government organizations attain knowledge of technological use. Further, El-sofany, Al-tourki, Al-howimel, and Al-sadoon (2012) agree that creating awareness is one way through which the government can enforce public enforcement of e-government. Essentially, individuals are willing and ready to take up change if they are aware of the benefits the systems they are adopting. Thus, awareness creates positive sentiments to enforce e-government.

Also, it is important to involve citizens in the development processes of e-government by soliciting their feedback. When users are involved in the development process and constantly asked how to improve the system and process, their level of satisfaction will be increased (Srivastava and Teo 2009). Having the users participate in the process, as well as consulting them for their views is an imperative approach to creating trust in e-government usage. According to Chun et al., 2010, citizens are not only recipients of e-government services, but they are also the key chain that guides policy formulation through their opinion and views. In addition, Carter and Bélanger (2005) demonstrate that 74.2% of government agencies in UK have a web site. However, 90.5% have not conducted a survey to see what online services citizens and businesses actually want. Thus, the citizens' level of trust in the institution increases when they are informed about the actions and the processes of the government.

Second direction involves the role of government agencies. According to Ebrahim et al (2004), improving the role of government agency in the context of e-government leads self-service operations that develop efficiently managed internal business process. Governmental issues in Saudi' agencies influence the reputation of the agencies leading to decrease of trust in their online services. According to Colesca (2009), citizens need to be confident about the abilities to their government agencies to perform effective processes to provide their online services.

The government needs to ensure that its managers are aware and in support of the system to develop trust of its subordinates. Alshehri and Drew (2011) agree that it is imperative that top leaders and managers are on board for successful management and implementation of e-government. Top-level support and adoption of these systems refer to the ability and the promise to integrate, take up the processes, and support the functions of the systems. Thus, leadership is a significant factor in ensuring that any project adoption and initiative is successful. Such support implies that the government can rely on the leadership to enforce integration, avail the required resources, and train their staff, as well as ensure that there are user collaboration and coordination. Further, the managers ensure that various stakeholders, players, and partners are involved in the adoption process of making e-government implementation successful. Similarly, Khanh (2014) concurs that attaining organisational support, especially from the top leadership, is a critical way of ensuring successful

business and technological adoption. Khanh (2014) further espouses that top managers are not only the President and CEO of the organisation, but also everyone in the line of management with the capability and authority to enforce both guidelines and policies. Notably, top management support implies the enthusiasm, commitment, and support of the senior managers in undertaking the project.

In addition, partners and stakeholders of the organization ought to cooperate and collaborate on the usage of e-government functions and systems, as well as in the implementation process to ensure that it is successful.

Drew (2011) explains that for a new technological function to be accepted, it is imperative that all the parties concerned collaborate. Saudi's government should encourage every other sector to participate in the development process of e-government. Khanh (2014) further reinforces that every stakeholder has a role in participating in the collaborative social process of implanting IT functions. While most departments in the public sector in Saudi Arabia carry out individual functions and are independent of decision-making, it is imperative that these departments maintain communication amongst them. In effect, it is a social responsibility in Saudi Arabia to ensure that IT functions are shared, transferred, and shared equitably. Thus, it is imperative that government sites take up information sharing so that there would be no barriers between the government and the citizens and foster information synchronisation between the parties. Notably, the integration of technology is a crucial function for senior managers in the public sector, as the process allows successful collaboration that foster the success of IT projects (Mahmood, 2014).

The third direction discusses the technical aspects. As presenting in the finding of this study, technology is an important factor influencing trust in e-government which is supported by the existing literature in the field of trust in e-government. One of the important strategies that the governments require is to provide effective quality of services. High-quality services are characterised by high-quality in information delivery, exemplary services, and excellent speed with consideration of availability and reliability of the services (Alateeyah, Crowder and Wills 2014). In addition, it is important that a government website takes into consideration the needs of the citizens because the sites lack a face to face interaction. Alateeyah et al., (2014) also demonstrate that providing online services require high reliability. For instance, fast error recovery when the system is down. Quality wise, the system should be able to offer the function expected of it as promised by the provider. Finally is the quality of information. A key area of assessing the government's website is information ality. Thus, a website can be of quality if it can provide useful content, offer timelines, and accurate (Alateeyah, et al., 2014).

Government agencies also are required to provide effective e-government services to secure and private use of information and services for citizens and businesses. As presented in the finding of this study, privacy and security risk of online services are one of the critical concerns of Saudi' citizens leading to negative impact on trust in e-government. Srivastava and Teo (2009) demonstrate that the need for development of citizen trust in e-government processes by utilize stringent cyber laws to encourage the implementation and usage of such technologies. A particular law that deals with cyber security in Singapore which is the Singapore Electronic Transactions Act enacted in 1998 as an example for the legal requirement. Thus, citizens require utilizing these online services with clear understanding the major strategies adopted from government agencies that they are secure, and they are not a risky venture.

Conclusion

This study explored the critical factors influencing citizens' trust in e-government from multi-dimensions of trust. While the majority of research studies on trust in e-government focuses in technology and government agencies, this research provides a deep understanding of the concept of trust in e-government by investigating the influence of four major factors: technology, government agencies, risk, citizens' characteristic. The findings of the study highlights the positive and significant impacts of both technical factors and citizens' characteristic while factors related to government agencies and risk provide negative impacts in trust in e-government. This is due to the technical and organizational issues in the public organizations in Saudi Arabia.

Research Contributions

Three primary contributions are the result of this research. First, this study reviews literature that informs on trust in e-government by integrating the literature on the concepts of trust and e-government and providing a comprehensive understanding of trust in e-government. Second, a conceptual framework was proposed based on the D&M IS Success Model, which explores the technical factors for IS Success and explains how these factors influence citizens' beliefs. This study developed this conceptual framework by integrating other factors (such as organizational factors, risk, and citizen's characteristic) that influence trust in e-government and the subsequent adoption of e-government services. Finally, the findings of this study highlight four types of antecedents influencing citizens' trust to adopt e-government: technology, governmental agencies, risk, and citizen's characteristics.

Limitations

This study has three limitations. Firstly, this study investigates the influence of trust from citizens' aspects such as gender, age, and internet experience and education level. However, studying the social influence on citizens' trust (such as culture and digital divide) would provide significant further insights. Citizens' trust is influenced by many dimensions required to investigate. Social factors may play a significant role on trust e-government. This issue can be examined in future research. Second, the study is based on Saudi citizens who have a different culture. The findings of this research are adopted based on Saudi which reflects their culture and the development stage of e-government in Saudi Arabia. Further research can be explored in other countries to study the citizens' aspects on trust in e-government. Third, this study uses a sample from participants who have an experience on Saudi' e-government servicers. Citizens who do not use online services of Saudi' government are not participant in this study. Further research can collect data from all citizens in Saudi Arabia

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