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Citizen Adoption of E-Government Services: Exploring Citizen Perceptions of Online Services in the US and UK

Authors:

Lemuria Carter (Corresponding Author)
Information Systems Department Chair
School of Business
Virginia Commonwealth University
Snead Hall, B4210A
301 West Main Street
P.O. Box 844000
Richmond, VA 23284-4000
Phone: 1-804-828-1732
Fax: 1-804-828-3199
Email: Ldcarter@vcu.edu

Dr. Lemuria Carter is an Associate Professor at Virginia Commonwealth University. Her research interests include technology adoption, e-government and cyber security. She has published in several top-tier journals, including the *Journal of the Association for Information Systems, Journal of Strategic Information Systems, Information Systems Journal,* and *The DATA BASE for Advances in Information Systems*. She has served as the e-government track and mini-track chair for the *Americas Conference on Information Systems* and the *Hawaii International Conference on System Sciences*. Her research has been funded by the Institute for Homeland Security Solutions and the Southeast Transportation Center.

Vishanth Weerakkody
Business School, Brunel University, UK
Phone: +44 (0) 1895 266020
Email: Vishanth.Weerakkody@brunel.ac.uk

Dr Vishanth Weerakkody is a member of faculty in the Business School at Brunel University, UK. VW was previously a faculty member in the department of IS and Computing at Brunel University and he has held various IT positions in multinational organisations, including IBM UK. VW is a Member of the British Computer Society, Chartered IT professional and a Fellow of the UK Higher Education Academy. He is the current editor-in-chief of the International Journal of Electronic Government Research.

Dr. Brandis Phillips
North Carolina A & T State University
School of Business and Economics
Department of Accounting and Finance
1601 East Market Street
Greensboro, North Carolina 27411
Phone: 336-285-3375
Fax: 336-256-2274
Email: bphillip@ncat.edu

Dr. Brandis Phillips is an associate professor of accounting at North Carolina A & T State University. His primary areas of research are user acceptance of social networking applications, digital literacy and accounting education. He has published his work in Information & Management, Journal of Organizational and End User Computing, Issues in Information Systems, Journal of Theoretical and Applied Electronic Commerce as well as the International Journal of Virtual Communities and Social Networking. He has also presented his work at the Academy of Management, Americas Conference on Information Systems and the Decision Sciences Institute.

Yogesh K. Dwivedi
School of Business & Economics, Swansea University, UK
Phone: +44 (0) 1792602340
Email: ykdwivedi@gmail.com

Yogesh K. Dwivedi is a Professor in the School of Management at Swansea University, UK. His research interests are in the area of Information Systems and Electronic Business including the adoption and diffusion of emerging ICTs (e.g. broadband, e-commerce, e-business, e-government, m-commerce). His work has been published in the European Journal of Information Systems, Government Information Quarterly, Information Systems Journal, Information Systems Frontiers, International Journal of Production Research, and Journal of Information Technology. He has edited/co-edited more than ten books on technology adoption, e-government and IS theory and had them published by international publishers such as Springer, Routledge, and Emerald.

Abstract

This study presents a cross-national examination of e-government adoption in the United Kingdom and the United States. The results of partial least squares analysis indicate that disposition to trust is positively related to internet trust and government trust. Perceived ease of use and perceived usefulness have a significant impact on intention to use. Internet trust has a positive effect on intention to use. We conclude by highlighting cultural differences in e-government adoption.

Keywords: E-government, IT diffusion and adoption, User Acceptance of IT, Comparative Research

1. Introduction

Government and industry e-commerce agendas have become more closely linked in recent times and more people are now less tolerant of poor, impersonal service in the public sector as they become aware of the power of the Internet and experience good service in the private sector (Bernardo, Marimon, & del Mar Alonso-Almeida, 2012). Therefore, it is in every government's interest to make their public services more efficient and available in order to gain citizens' trust, which has often eluded many governments and political leaders in modern society. In this context, e-government promises to deliver more transparent, efficient and effective public services to citizens (Affisco & Soliman, 2006; Reddick & Roy, 2013; Sipior, Ward, & Connolly, 2011; Weerakkody, Janssen, & Dwivedi, 2011). However, the user (citizen) adoption of e-government services has been slower than anticipated in some western nations, including the United States (US) and United Kingdom (UK) (Carter & Weerakkody, 2008; Cross, 2007; Gilbert, Balestrini, & Littleboy, 2004). While it is important to prevent a digital divide in terms of using e-government services (Carter & Bélanger, 2005; Carter & Weerakkody, 2008; Cruz-Jesus, Oliveira, & Bacao, 2012; Huang, 2007; N., 2002), it is also necessary that citizens from all facets of society be equipped with basic information communication technologies (ICT) skills as well as private and or public access to high-speed internet access to adopt these services. Likewise, the electronic services offered need to be secured and easy to use (Harris & Schwarz, 2000; Jarvenpaa, Tractinsky, & Saarinen, 1999; Warkentin, Gefen, Pavlou, & Rose, 2002; Welch, Hinnant, & Moon, 2005).

Yet, despite the availability of innovative technologies, government agencies are faced with many technical (Kamal, Weerakkody, & Jones, 2009; Weerakkody, Janssen, & Hjort-Madsen, 2007)), organizational (Irani, Elliman, & Jackson, 2007; Irani, Love, & Jones, 2008), socio-economic (Choudrie & Dwivedi, 2005; Dwivedi & Lal, 2007; Dwivedi, Papazafeiropoulou, Gharavi, & Khoumbati, 2006; Dwivedi & Williams, 2008; Palanisamy,

2004) and political (Beynon-Davies & Martin, 2004; Irani et al., 2007; Irani et al., 2008; Ramaswamy & Selian, 2007)challenges and barriers that need to be addressed when developing, adopting and diffusing e-government systems and services ((Helbig et al., 2009; Irani, Dwivedi, & Williams, 2009; Irani et al., 2007; Irani et al., 2008; Palanisamy, 2004). Although Internet usage has increased across the globe according to studies conducted by comScore (2011), (there are over 1420 million Internet users worldwide as of 2011), in light of the increased ubiquity of e-government, most countries, including the US and UK which boasts 74.2 and 84.7 Internet usage as percentage of population respectively (according to Google[1]), are eager to increase citizen acceptance of the online services provided by the government.

Various researchers and practitioners have attempted to offer insights into the implementation, acceptance and diffusion of e-government services (Al-Shafi & Weerakkody, 2008; Aladwani, 2013; Bélanger & Carter, 2012; Carter & Bélanger, 2005; Irani et al., 2009; Lai & Pires, 2009; Sabucedo & Rifon, 2010; Venkatesh, Thong, Chan, Hu, & Brown, 2011; Warkentin et al., 2002). However, all of these studies have focused on e-government adoption and diffusion at a national level. According to Ford *et al.*, (2003), even studies that examine the wider context of Information Systems and Technology (IS/IT) adoption across national contexts remain relatively unexplored. Researchers such as Gallupe and Tan (1999), Nelson and Clark (1994) and Watson *et al.*, (1994) have all highlighted the need for research that integrates IS/IT and national culture. This is particularly significant when viewed in the context of the effect that increased globalization has had on the private sector ((Ford et al., 2003; Friedman, 2005; Hayakawa, Machikita, & Kimura, 2012). Although the motivations may differ, in recent times public sector agencies have been forced to follow suit (Barbara, 2008; Dunleavy, Margetts, Bastow, & Tinkler, 2006; Ryan & Walsh,

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[1] http://www.google.co.uk/publicdata/

2004; Siddiquee, 2010) especially to comply with political, trade and legislative notions set out by organizations such as the EU and NATO. Therefore, the authors argue that understanding the factors which influence the adoption and diffusion of online public services in two economically developed as well as culturally and linguistically similar nations (such as the US and UK) is timely and appropriate.

1.1 Cross-Country Research on E-Government Adoption

On examining the official e-government strategies of the US and UK, there are hardly any differences to report. In the US the e-government strategy has been defined around four principles which include: a) information-centricity that is focused on managing and presenting information in the way that is most useful for the citizen, b) a shared platform that enables working together, both within and across agencies, to reduce costs, streamline development, apply consistent standards, and ensure consistency when creating and delivering information, c) customer-centricity that is focused on how to create, manage, and present data through websites, mobile applications and other modes of delivery that allows customers to shape, share and consume information, whenever and however they want it, and d) security and privacy to ensure safe and secure delivery and use of digital services to protect information and privacy (www.whitehouse.gov, 2013). The same principles are echoed in the UK e-government strategy which outlines the need for a) online transactional services to make life simpler and more convenient for citizens and businesses and channels to collaborate, and b) sharing information with citizens and business to enable the innovation of new online tools and services. Through reusing and sharing ICT assets and creating an environment for open and secure ICT solutions, the UK government hopes to improve productivity and efficiency, and reduce waste in government (www.gov.uk, 2013). In addition to this, the public administrative structure has many similarities when comparing the

US states with the municipalities in the UK in terms of how these national strategies are translated into local level e-government service delivery and engagement with citizens.

Moving beyond e-government to the broader socio-cultural contexts of the two countries, research shows that the UK and the US are very similar on several cultural dimensions (Ford et al., 2003). According to Ford et al., in order to conduct a comparative study of such culturally similar countries, Hofstede's (2001) five dimensions of national culture offer the most widely used and appropriate conceptual classification. These dimensions assess citizen views of individualism, masculinity, power, uncertainty and virtue. Using a 100 point scale, each country is assigned a score. The UK and the US were among the few countries (7 out of 70) to score highest on individualism. Similarly on average the scores for the other four cultural dimensions (masculinity, power, uncertainty and virtue), for the UK and the US differed only by 6 points (out of 100). This indicates that the two countries are culturally very similar. The aforesaid influenced the reasoning for selecting the UK and the US to explore the adoption of a key online public service from a cross-country perspective.

Along with cultural similarities, the US and UK also share many technological and public administration similarities. The United Nations and European Commission research has ranked the US and the UK in the top tier of its e-government readiness index for many years (Nations, 2008, 2010, 2012; Union, 2004). However, despite the UK e-enabling many of its public services, its government has encountered several barriers to e-government adoption (Irani et al., 2007; Irani et al., 2008; Sipior et al., 2011; Weerakkody et al., 2011). Studies have shown that despite numerous marketing efforts to increase awareness of online services, citizens' potential usage of e-government services in both the UK and US is sparse (Carter & Weerakkody, 2008; Gilbert et al., 2004; Paul, Juric, Kuljis, & Adeshara, 2004). Cross (2007) reports that a £5m campaign to persuade citizens to contact their local council

via the central e-government web portal[2] has had little effect in the UK. Website usage statistics published by the Society for IT management (SOCITM), a consultancy established by the association of local government IT managers, suggest that although the campaign raised awareness of local government websites, the increase in demand for services was too small to measure. Furthermore, recent findings from a survey of all 433 local authority websites in the UK concluded that most council websites remain insufficiently focused on the key services that are of greatest interest to their citizens SOCITM (2012).

While the above statistics offer a synopsis of e-government adoption and diffusion from a generic perspective, several academic studies have explored e-government acceptance in the United States (Carter & Weerakkody, 2008; Welch et al., 2005), the UK (Carter & Weerakkody, 2008; Dwivedi et al., 2006; Sipior et al., 2011) and at a cross-country level (see for instance (Gharawi, Pardo, & Guerrero, 2009; Luna-Reyes et al., 2010; Srivastava & Teo, 2007). However, our research found no scholarly studies that have examined the cross-national adoption of the same 'transformed' public (e-government) service. Indeed, Lee *et al.* (2005) state that cross-national research on e-government is sparse in the literature and Dwivedi et al. (2006) stress the need for more studies to address this research gap. In fact, the high level surveys such as those conducted by the UN and SOCITM lack the methodological rigor and theoretical underpinning required to dissect the most significant factors that influence adoption. Of the key factors that influence the adoption of Internet based online services, in particular, trust and risk have emerged as significant in many recent studies (see for e.g. (Khayun, Ractham, & Firpo, 2012; Morgeson, VanAmburg, & Mithas, 2010; Srivastava & Teo, 2009). Using such context as motivation and the similarities in cultural individualism, technological infrastructure, and e-government readiness in the UK

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[2] www.directgov.uk

and the US, this research aims to propose a cross-country model for analysing e-government adoption factors.

Our study addresses this aim by integrating constructs from the technology acceptance model (Davis, 1989) and Belanger and Carter (2008)'s e-government trust model to assess the predictors of e-government services in the UK and the US. Both models are based on established theories. By combining the fundamental elements of these studies we are able to present a comprehensive yet parsimonious model of e-government acceptance. To offer an international assessment of the proposed model, we test it in both the US and the UK. We present the findings of both the combined model and the cross-country comparison. By doing so, we answer the research question, *what is the influence of trust and risk on e-government adoption across two culturally and technologically similar nations*? It is anticipated that this research will stimulate discussion among the e-government research community, particularly in the UK and the US, and provide some pointers to practitioners and policy makers in the two countries for improving e-government adoption.

This paper is divided into several sections. First, the background literature and theoretical development are discussed. Then we describe the methodology. Next, we present the results and discuss the findings. Finally, the implications of this study are presented together with suggestions for future research.

2. Theoretical Development

Numerous studies of e-government adoption exist in the literature. However, few studies present a succinct yet inclusive model of e-government adoption in a cross-country context. Our proposed research model uses the theory of reasoned action (TRA) as the conceptual foundation (Ajzen & Fishbein, 1972). TRA, a prevalent behavioral model in psychology, is used in diverse disciplines to predict human behavior. The theory of reasoned action posits that beliefs influence intentions and intentions influence one's actions (Ajzen &

Fishbein, 1972). Numerous studies have examined the relationship between trust, technology adoption and user behavior using the TRA (Bélanger & Carter, 2008; Gefen, Karahanna, & Straub, 2003; Jarvenpaa et al., 1999; D. H. McKnight, Choudhury, & Kacmar, 2002; Pavlou, 2003). In this study, we measure intention-to-use an e-government service. Intention-to- use has been found to be a strong predictor of actual system usage in the IS literature (V. Venkatesh, M.G. Morris, G.B. Davis, & F.D. Davis, 2003a). As recommended in TRA, we explore several beliefs that may influence intentions to use an e-government service: trust of the Internet, trust of the government, and risk perceptions.

As aforementioned, we present a model of e-government adoption based on Belanger and Carter (2008)'s model of trust and risk in e-government adoption and Davis (1989)'s technology acceptance model. According to Belanger and Carter (2008) trust of the internet, trust of the government, disposition to trust and perceived risk have a significant impact on intention to use an e-government service. According to the technology acceptance literature perceived usefulness and perceived ease of use have a significant impact on adoption (Davis, 1989). We discuss each of these constructs below.

2.1 Trust and Risk

Numerous studies investigated trust and its influence on perception and use of technology (Connolly & Bannister, 2007; Li, Hess, & Valacich, 2008; Smith, 2011). Li *et al.* (2008) argue that understanding how initial trust is formed is vital for promoting the adoption of technology. Trust has proven to be an integral part of e-government adoption (Carter & Bélanger, 2005; Warkentin et al., 2002; Welch et al., 2005). Oxendine *et al.* (2003) compare citizen adoption of electronic networks in different geographic areas in the U.S. They found that system adoption was more prominent in localities where citizens are more trusting. Due to the distal nature of the Internet, citizens must believe the agency providing the service is

dependable. Wang and Emurian (2005) posit that lack of trust is one of the most challenging barriers to e-service adoption, especially when monetary or personal information is involved.

Numerous studies of online behavior emphasize the importance of including trust in adoption models to gain a more comprehensive understanding of user acceptance of electronic services (Benbasat & Barki, 2007; Holsapple & Sasidharan, 2005; Pavlou, 2003; Pavlou & Fygenson, 2006; Van Slyke, Bélanger, & Comunale, 2004). Rotter (1967) defines trust as an expectancy that the promise of an individual or group can be relied upon. This definition is based on social learning theory which suggests that experiences of promised negative or positive reinforcements vary for different individuals and, as a result, people develop different expectancies that such reinforcements would occur when promised by other people (J. B. Rotter, 1971) Over the years Rotter's research has been referenced in numerous studies of technology (Gefen et al., 2003; Mayer, Davis, & Schoorman, 1995; D. H. McKnight et al., 2002; D.H. McKnight, Cummings, & Chervany, 1998; J. B. Rotter, 1980; Zucker, 1986)

Research suggests that there are two fundamental targets of trust: the entity providing the service and the mechanism through which it is provided (Tan & Thoen, 2000). Hence, users should consider both the characteristics of the online service provider and characteristics of the supporting technology before using an electronic-service (Pavlou, 2003). Trust in e-government is therefore composed of the traditional view of trust in a specific entity (trust of the government) as well as trust in the reliability of the enabling technology (trust of the internet) (Bélanger & Carter, 2008; Pavlou, 2003).

As Internet based services grew in popularity, researchers began to explore the role of institution based trust on e-service adoption (D. H. McKnight et al., 2002). Institution-based trust is consistently identified as a key predictor of e-service adoption (Carter & Bélanger, 2005; Gefen et al., 2003; Warkentin et al., 2002; Welch et al., 2005). According to McKnight

et al. (2002), institution-based trust refers to one's perceptions of the policies, structures and regulations that make an atmosphere feel secure. For e-government services, the Internet constitutes that institutional atmosphere. Hence, citizen acceptance of these services hinges upon citizens' belief that the Internet is a reliable medium that can support error-free, secure transactions. These findings influence our first hypothesis.

> *H1: Trust of the Internet (TOI) will positively influence citizen intention to use (USE) an e-government service.*

In addition to trusting the means through which the service is provided, citizens must also believe in the integrity and ability of the entity providing the service (Becerra & Gupta, 2003; Ganesan & Hess, 1997; Jarvenpaa et al., 1999; M. Lee & Turban, 2001; Mayer et al., 1995; D. H. McKnight et al., 2002; D.H. McKnight et al., 1998). Citizens confidence in the ability of an agency to provide online services is imperative for the widespread adoption of e-government initiatives. Warkentin et al. (2002) posit that trust in the agency has a strong impact on the adoption of a technology. Before endorsing e-government initiatives, citizens must believe government agencies possess the astuteness and technical resources necessary to implement and secure these systems. Transparent, accurate interaction with e-government service providers will enhance citizen trust and acceptance of e-government initiatives. On the contrary, corruption, fraudulence and incompetence from government officials and employees will reduce trust and enhance opposition to these programs. Influenced by the above literature, we propose the second hypothesis of this study.

> *H2: Trust of the Government (TOG) will positively influence citizen intention to use (USE) an e-government service.*

Disposition to trust is defined as one's general propensity to trust others. It is composed of two concepts: faith in humanity and trusting stance. Faith in humanity assumes others are good-natured and dependable. Trusting stance assumes better outcomes result

from dealing with people as if they are well meaning and reliable (D. H. McKnight et al., 2002). Therefore, trust is the result of psychological dispositions that are beyond the immediate control of any government agency. These perennial propensities deal with the life-long socialized tendency to believe in social entities and to believe that better results will occur if one trusts others ((D.H. McKnight et al., 1998; J. B. Rotter, 1971; Warkentin et al., 2002). Characteristic-based trust and institution-based trust are influenced by one's disposition to trust. Drawing from these studies, we propose the following hypotheses:

> *H3: Disposition to trust (DT) will positively influence Trust of the Internet (TOI); and H4: Disposition to trust (DT) will positively influence Trust of the Government (TOG).*

According to Li et al. (2008), research suggests that trust plays a key role in helping users overcome perceptions of risk and uncertainty when it comes to the use and acceptance of new technology. Trust is necessary when risk is present (Pavlou, 2003). Risk is typically defined in terms of the trustor's belief about the likelihood of gains and losses (Mayer et al., 1995; Pavlou, 2003; Warkentin et al., 2002). According to Robert et al. (2009), perceived risk is a personal valuation of the probability of a significant disappointing outcome. Risk, by itself, is defined as a social construct that reflects how the society deals with uncertainty (Lim, Sia, & Yeow, 2011). Robert et al. (2009) argue that risk is an essential element of trust. When risk is present, trust is mandatory (Corritore, Kracher, & Wiedenbeck, 2003; Mayer et al., 1995; Pavlou, 2003). Pavlou (2003) found trust to be a significant antecedent of perceived risk. Perceived risk decreases when trust is present (Featherman & Pavlou, 2003; Ganesan, 1994; Grazioli & Jarvenpaa, 2000; Jarvenpaa et al., 1999). For e-services in both the public (Pavlou, 2003) and private sectors (Bélanger & Carter, 2008; Warkentin et al., 2002), perceived risk reduces intention to use the service. Using these arguments, we propose the fifth hypothesis of the study.

H5: Perceived Risk (PR) will negatively influence citizen intention to use (USE) an e-government service.

Mayer et al. (1995) define risk perception in terms of the trustor's belief about the likelihood of gains and losses. The literature states perceived risk decreases when trust is present (Featherman & Pavlou, 2003; Ganesan, 1994; Grazioli & Jarvenpaa, 2000; Jarvenpaa et al., 1999). Therefore, we hypothesize that:

H6: Higher levels of Trust of the Internet (TOI) will reduce the perceived risk (PR) of using an e-government service; and
H7: Higher levels of Trust of the Government (TOG) will reduce the perceived risk (PR) of using an e-government service.

2.3 Technology Acceptance

There are numerous studies of technology adoption in the literature (Khalifa, Cheng, & Shen, 2012). One of the most popular is Davis (1989)'s technology acceptance model (TAM). TAM is an influential theory in IS adoption literature (Hong, Thong, Chasalow, & Dhillon, 2011). It has been widely used to study user acceptance of technology (McCoy, Galletta, & King, 2007). The measures presented in Davis' study target employee acceptance of organizational software, but the model have been modified, extended, tested and validated for various users and types of systems (Carter & Bélanger, 2005; Chow, Herold, Choo, & Chan, 2012; Devaraj, Easley, & Crant, 2008; Dickinger, Arami, & Meyer, 2008; Gefen et al., 2003; Herath et al., 2014; Irani et al., 2009; Lu, Deng, & Wang, 2010; Pai & Huang, 2011; Polites & Karahanna, 2012; Shareef, Kumar, Kumar, & Dwivedi, 2011; Sila, 2010; Sipior et al., 2011; Strader, Ramaswami, & Houle, 2007; Sykes, Venkatesh, & Gosain, 2009; Venkatesh et al., 2003a; Y. Wang, 2008; Wu & Lederer, 2009)

TAM has two major constructs: perceived usefulness (PU) and perceived ease of use (PEOU) – which influences one's intention to use a system. Perceived usefulness was originally defined by Davis as the belief that using a particular system would enhance one's job performance. Perceived ease of use refers to one's perceptions of the amount of effort

required to use the system. The model predicts that higher perceptions of usefulness and ease of use will increase intention to use a system (Chow et al., 2012; Davis, 1989; Pai & Huang, 2011). All other things equal, perceived ease of use is predicted to influence perceived usefulness, since the easier a system is to use, the more useful it can be (Chow et al., 2012; Davis, 1989; Pai & Huang, 2011). However, Davis does caution that these constructs reflect users' subjective assessments of a system, which may or may not be representative of objective reality; system acceptance will suffer if users' do not perceive a system as useful and easy to use. Using TAM, we propose the following three hypotheses.

> *H8: Perceived Usefulness* (PU) *will positively influence citizen intention to use (USE) an e-government service;*
> *H9: Perceived Ease of Use* (PEOU) *will positively influence citizen intention to use (USE) an e-government service; and*
> *H10: Perceived Ease of Use* (PEOU) *will positively influence Perceived Usefulness* (PU)

3. Research Model

Based on the aforementioned literature, in figure 1, we propose a model for analyzing e-government adoption.
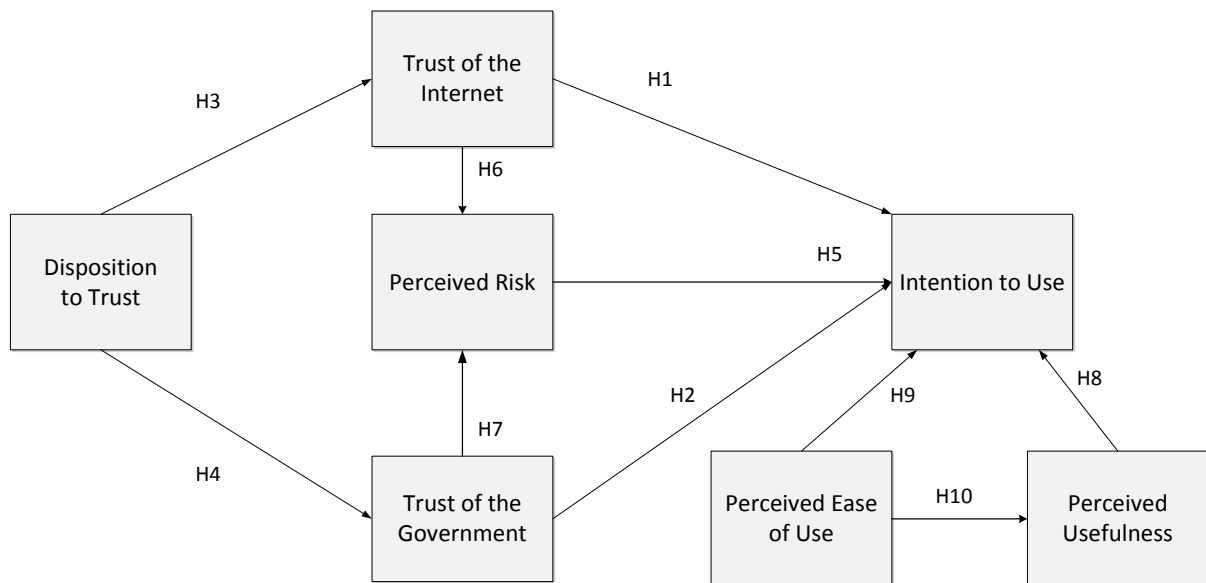

Figure 1. Model of Trust, Risk and Technology Acceptance in the Public Sector

4. Methodology

The research methodology employed in the study is described in this section. An evaluation of a variety of research approaches was conducted before selecting a cross-country survey to test the hypotheses and validate the proposed research model. A number of research methods such as interviews, focus group etc., are also appropriate for examining factors influencing technology adoption (Dwivedi & Kuljis, 2008; Irani et al., 2009; Saunders, Lewis, & Thornhill, 2000), but a survey was considered most appropriate for this study for the following two reasons.

- Firstly, it is a cross-country study which requires comparison of findings obtained from citizens of two different countries. While it is difficult to collect data from a large number of respondents in order to make some generalizations on the selected topic using interview, focus group or any other qualitative method, comparison of subjective responses obtained in such research is also too intricate to measure and compare precisely.
- Secondly, the theoretical approach adapted within this research requires quantitative data in order to accept or refute the proposed hypotheses.

Keeping these two points in mind, a survey based approach (Saunders *et al.,* 2002; Cresswell, 2003) was followed for this study. The following paragraphs briefly discuss the research instrument, data collection and data analysis techniques.

4.1 Data Collection

To obtain citizen perceptions of e-government, a paper based survey was administered randomly in wider London (south, west, north and east) in the UK and at a community event in the southeastern region of the United States. Citizens' adoption of the DVLA[3] (UK) and DMV[4] (US), two cases that illustrate good practices in service transformation in government, are used for the research. The DVLA and DMV services are unique as they demonstrate exemplary examples of 'joined-up and fully functional' e-government [see for instance Layne

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[3] The DVLA offers a range of services such as renewal of motor vehicle road tax, application of driving licences, booking of theory and practical driving tests, reporting of untaxed vehicles on public roads etc.
[4] The DMV offers a range of services which include processing of driver licences, registration of motor vehicles, renewal of road tax, checking of vehicle history, car insurance quotes, traffic alerts etc.

and Lee (2001); Alsebie and Irani (2005); and Weerakkody and Dhillon (2008)]. In this respect, the DVLA/DMV have implemented a host of services such as applying and renewing personal driving licenses, booking driving tests, taxing motor vehicles, reporting abandoned and unlicensed vehicles etc. These services require complex integration and harmonization of business processes and IT systems in and across the organisations with numerous other private and public organisations (as suggested by Layne and Lee, (2001)) that include Motor Vehicle Dealers, Insurance Companies, The Police and Motor Repair Services. As such, the DVLA/DMV e-government service epitomizes a truly 'transformed' public service that transcends beyond most other common transactional e-government services offered by the public sector such as paying council tax, parking fines, applying for housing benefits or social security. This justifies the reasons for selecting DVLA/DMV for investigation in this study.

The total sample consisted of 245 participants: 105 from the US and 140 from the UK. Since we did not distribute the survey to a fixed amount of people at this community event in the US, the response rate for the survey can only be calculated based on the capacity of the community theater, which is 222 people. Therefore, we can approximate a response rate of 47.3% (105/222) for the US. In the UK, we distributed the paper based survey randomly to 250 citizens in the suburbs of London and received 148 completed questionnaires (59% response rate) of which 140 questionnaires were usable. In both countries, citizens were asked about their perceptions of the online services provided by the Department of Vehicles and Licensing Agency (DVLA) in the UK and the Department of Motor Vehicles (DMV) in the US. In the United States, paper-based surveys were distributed to participants at a community event. The following table shows the demographics of the participants in the UK and the US (see table 1).

Table 1. Sample Demographics

Demographic	UK	US	Combined
N	140	105	245
Gender (% female)	50%	61%	55%
Age (% > 25)	62%	62%	62%
Income (25,000-86,999)	44% (pounds)	40% (dollars)	N/A
Ethnicity (% white)	29% (tied with Asian)	87%	49%
Use the Internet everyday	73%	82%	76%
Have made a purchase online	86%	96%	89%
Have retrieved government information online	83%	83%	83%
Have completed government transaction online	61%	67%	63%
Due to the personal nature of the demographic questions, completion of this section was optional. The above results reflect the information that was reported.			

4.2 Instrument Development

In the United States, two versions of the survey were created; we selected two widely used state systems in the Commonwealth of Virginia: the Department of Motor Vehicle, and the Department of Taxation's online system. Both the questions and the instructions were worded according to which version of the survey the respondent received. The selection of two agencies was deemed important to obtain increased generalisability of results, while allowing respondents to have reference points in answering the survey questions. Approximately half of the respondents answered one version and the other half the other. To control for bias towards a particular government agency, with respect to respondent demographics, we ran chi-square tests for demographics. All Chi-squares were non-significant, indicating that there were no statistical differences between respondents for the two versions of the survey. Hence, we combined two versions of the US survey. From this point, we will refer to the DMV version of the US survey. We also used the comparable agency, the DLVA, as a point of reference for citizens in the UK.

Survey items were adapted from prior research on e-service adoption (Carter & Bélanger, 2005; D. H. McKnight et al., 2002). Citizens' provided their perceptions by responding to a seven point Likert scale.

5. Data Analysis

5.1 Measurement Model

Due to the modest nature of the sample size for each country, partial least squares (PLS) is used to evaluate the model (Barclay, Higgins, & Thompson, 1995; Gefen, Straub, & Boudreau, 2000). PLS assesses reliability and validity by calculating the internal composite reliability (ICR) and the average variance extracted (AVE). The ICR is interpreted in the same manner as Cronbach's alpha. An ICR of 0.7 is an indicator of sufficient reliability (Fornell, 1981). The ICRs reported in Table 1 indicate sufficient reliability for all constructs (lowest = 0.84). The AVE measures variance explained relative to measurement error. A valid construct has an AVE greater than 0.50 (Chin, 1998), which indicates the construct items consistently measure what is intended. The results in Table 2 show that all of the constructs have AVEs greater than 0.50, evidence of convergent validity.

Table 2. Correlation Matrix (Combined Sample)

	Mean	SD	ICR	PU	DT	TOG	TOI	PR	USE	PEOU
PU	5.15	1.22	.93	**.87**						
DT	4.74	1.02	.84	.25	**.80**					
TOG	4.76	1.13	.89	.55	.40	**.85**				
TOI	4.22	1.24	.89	.49	.41	.62	**.86**			
PR	4.29	1.20	.87	.19	.25	.27	.36	**.88**		
USE	5.33	1.24	.89	.85	.24	.53	.52	.20	**.87**	
PEOU	5.07	1.29	.90	.78	.27	.50	.46	.21	.77	
AVE				**.76**	**.64**	**.73**	**.74**	**.78**	**.75**	**.74**

Note: Diagonal elements are the square root of the average variance extracted (AVE). Means and standard deviations are calculated based upon 7-point Likert scales

Discriminant validity requires that constructs be distinct from one another. The test

for discriminant reliability requires that the square root of the AVE for a latent variable must be greater than the correlations between the variable and any other variable (Fornell & Larcker, 1981). An examination of the correlations among constructs in Table 2 shows that the data pass this requirement, demonstrating adequate discriminant validity. Regarding individual construct items, table 3 below demonstrates that each construct contains items that load more on its construct than any other factor.

Table 3. Factor Loadings

	DT	PEOU	PU	PR	TOG	TOI	Use
DT1	**.82**	.25	.22	.21	.35	.31	.22
DT2	**.80**	.25	.25	.18	.34	.36	.21
DT3	**.78**	.15	.13	.21	.26	.31	.12
PEOU1	.21	**.88**	.67	.20	.38	.35	.69
PEOU2	.26	**.83**	.67	.18	.58	.43	.64
PEOU3	.24	**.87**	.69	.17	.33	.42	.67
PU1	.20	.60	**.84**	.24	.48	.45	.72
PU2	.22	.71	**.89**	.12	.49	.42	.77
PU3	.24	.65	**.85**	.19	.46	.38	.70
PU4	.23	.75	**.90**	.14	.49	.44	.78
PR1	.12	.14	.11	**.86**	.22	.29	.15
PR2	.30	.22	.22	**.91**	.26	.35	.20
TOG1	.31	.43	.47	.36	**.85**	.59	.52
TOG2	.39	.35	.39	.28	**.87**	.48	.39
TOG3	.36	.39	.39	.29	**.86**	.51	.41
TOI1	.39	.52	.59	.26	.61	**.91**	.56
TOI2	.31	.31	.34	.29	.44	**.83**	.32
TOI3	.30	.40	.44	.14	.50	**.82**	.44
USE1	.19	.69	.75	.17	.43	.46	**.90**
USE2	.17	.65	.77	.19	.48	.45	**.84**
USE3	.25	.67	.69	.16	.46	.43	**.84**

5.2 Structural Model

The PLS structural model is interpreted similarly to regression results. The path coefficients represent standard betas while the R^2 amount shown represents the variance explained. Given the research model, the following figure depicts the hypothesis testing results (see Figure 2).

Figure 2. Research model results
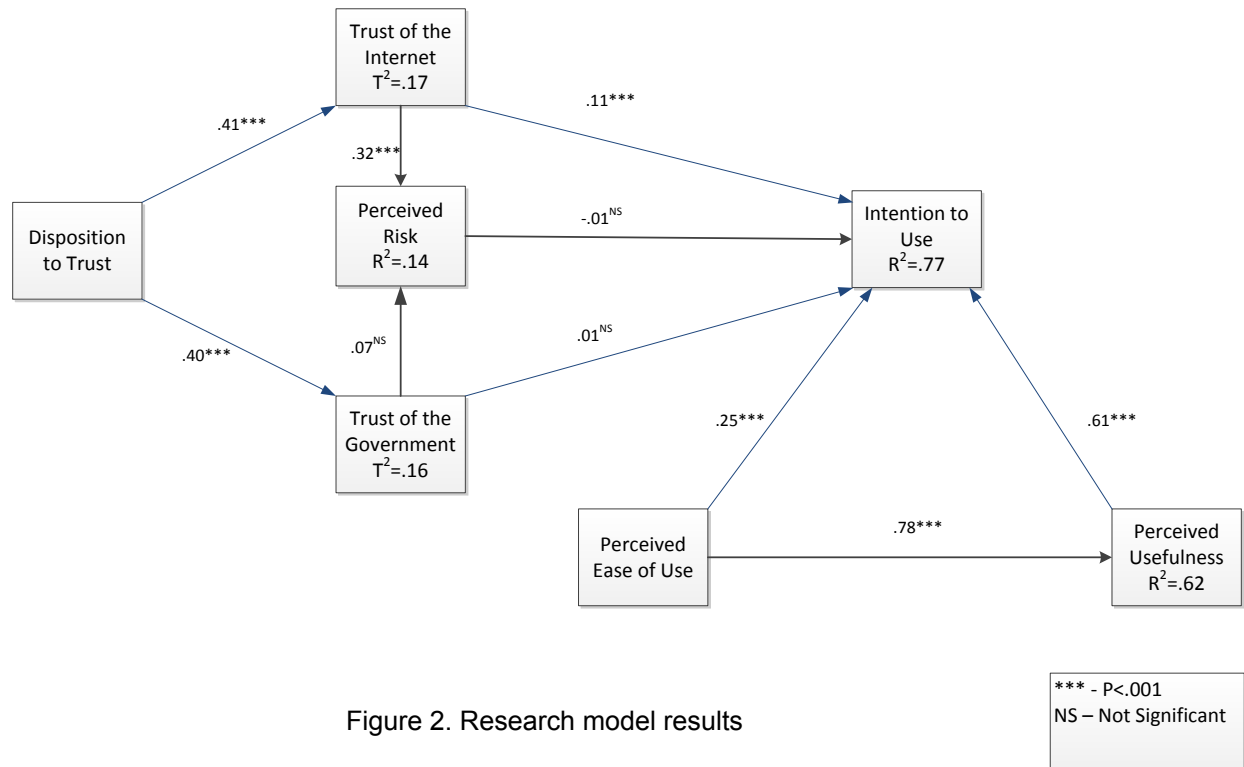
The following (table 4) summarizes the results of hypotheses testing.

Table 4. Hypotheses Testing (Combined Sample)

No.	Hypothesis	Supported (combined model)	UK Model	US Model
H1	**Trust of the Internet → Use**	**Yes**	**Yes**	**Yes**
H2	Trust of the Government → Use	No	No	**Yes**
H3	**Disposition to Trust → Trust of the Internet**	**Yes**	**Yes**	**Yes**
H4	**Disposition to Trust → Trust of the Government**	**Yes**	**Yes**	**Yes**
H5	Perceived Risk → Use	No	**Yes**	No
H6	**Trust of the Internet → Perceived Risk**	**Yes**	No	**Yes**
H7	Trust of the Government → Perceived Risk	No	No	No
H8	**Perceived Usefulness → Use**	**Yes**	**Yes**	**Yes**
H9	**Perceived Ease of Use → Use**	**Yes**	**Yes**	**Yes**
H10	**Perceived Ease of Use → Perceived Usefulness**	**Yes**	**Yes**	**Yes**

Hypothesis testing results are consistent with the literature and suggest the following. The disposition to trust which is an individual attitude is positively related to both types of trust, internet trust and government trust. Furthermore the impact of the technology acceptance variables, perceived ease of use and perceived usefulness have a significant impact upon intention to use. Finally internet trust has a significant and positive effect on intention to use.

Nevertheless the structural model using this sample puts forth insignificant and counterintuitive results worth noting. Perception of risk is hypothesized to have a negative impact upon intention to use. Although the hypothesis result is in the predicted direction, the impact is not significant. This suggests users do not necessarily feel uneasy when using the e-government service. Also of note is that trust in government does not necessarily facilitate an intention to use an e-government service due to the non-significant hypothesis result. Furthermore internet trust is positively and significantly related to perceptions of risk. This result is opposite of the predicted direction in that trust in the internet is presupposed to lower perceptions of risk. Similarly, trust in government does not have an inverse relationship to perceptions of risk as predicted a priori, nor is the hypothesis significant. In sum the model does predict variance in the dependent variable intention to use based upon trust related factors as well as those from the technology acceptance model. The results suggest technology acceptance model factors have a stronger impact than trust related factors.

5.3 Post Hoc Analysis

To determine if the samples collected from each country are similar or different a pooled test (Keil et al., 2000) is performed (see table 5 results below) to determine if the United Kingdom and United States are indeed different from one another. We separated the data by country (U.S. = 105, U.K. = 140) and ran the model again for each country. The results were then compared based upon the standard errors and path coefficients for each

hypothesis in both models (U.S. and U.K.). Differences in countries/models are identified by achieving significance (i.e. t-value) for each hypothesis which indicates that the samples do differ from one another.

Table 5. Pool Results

Model Relationships	Path Coefficients		Path Coefficient Differences
			(U.K.) vs. (U.S.) [t-values][1]
Path	**U.K.**	**U.S.**	
Disposition to Trust → Trust of Government	.50	.36	-26.10***
Disposition to Trust → Trust of Internet	.56	.26	-56.73***
Trust of Government → Perceived Risk	.12	-.11	-26.77***
Trust of Government→ Use	.06	-.09	-32.67***
Trust of Internet → Perceived Risk	.02	.71	86.48***
Trust of the Internet → Use	.05	.20	34.47***
Perceived Risk → Use	-.08	.04	32.20***
Perceived Usefulness → Use	.60	.60	-.07 ns
Perceived Ease of Use → Use	.23	.25	2.39*
PEOU → PU	.81	.77	-15.10***

***$p<.001$,*$p<.05$ ns=not significant
Model R^2
[1] $t = (PC_1-PC_2)/[S_{pooled} \times SQRT(1/N_1+1/ N_2)]$; $S_{pooled} = SQRT\{[(N_1-1)/(N_1+ N_2 -2)] \times SE_1^2 +[(N_2-1)/(N_1+ N_2 -2)] \times SE_2^2\}$; SE = Standard error of path in structural model; PC = Path coefficient in structural model; SQRT= square root

With the exception of the hypothesis (#8) linking perceived usefulness and the intent to use, all other hypotheses are significantly different from one another. The pooled test results suggest that the cultures differ with respect to the samples for the intention to use e-government services.

To further demonstrate differences between the two samples, structural models for the United Kingdom and United States were compared and indicate the following. Hypothesis #2, trust in government was found to be a significant predictor of intention to use in the U.S. sample but not in the U.K. sample. Hypothesis #6, Internet trust is a significant predictor of perceptions of risk in the U.S. sample but is not a significant predictor in the U.K. sample.

Finally, perceptions of risk is a significant predictor of intention to use in the U.K. sample but is not significant in the U.S. sample (see table 6 below for a summary of the differences in results for the hypotheses).

Table 6. Differences in Hypotheses of U.K. and U.S. Structural Models

Hypothesis #	Path	Supported in U.K.	Supported in U.S.
H2	Trust of the Government → Use	No	Yes
H5	Perceived Risk → Use	Yes	No
H6	Trust of the Internet → Perceived Risk	No	Yes

Note all other hypotheses in each model (U.S. and U.K.) are similarly significant with the exception of government trust on risk which is not significant in both models

We conducted an ANOVA to determine if differences in ethnicity impacted any of the variables in the model. F test results suggest only 2 of the 7 variables in the model, perceived ease of use and perceived usefulness, show any significant between group variance (i.e. impacts by ethnicity). Given this result and the homogeneous nature of the U.S. sample, this suggests that national attitudes play more of a factor in the resulting differences in the model as opposed to ethnic differences.

6. Discussion

Regarding trust, citizens' perceptions of the safety and security of the Internet are an integral part of e-government adoption. Agencies in both countries need to highlight the benefits of e-government services compared to face to face options for contacting the government. The government also needs to employ trust building strategies to increase citizen confidence in e-enabled services since trust of the Internet positively influences e-government adoption.

Trust of the government, however, was not a significant predictor of intention to use. Recent surveys of citizen satisfaction with e-government services indicate that although citizens are dissatisfied with government, they are pleased with government services provided

online (Cook, 2007). Based on the American Customer Satisfaction Index (ACSI), citizen satisfaction with e-Government for the year 2007 scores were 8% higher than the average score for all government services (Cook, 2007). Hence, citizen perceptions of e-government may be different from those of traditional government services. Perhaps, in the online environment citizens use Website-specific criteria, such as, ease of navigation, relevance of information, etc. instead of the agency's offline reputation to evaluate e-government services. An alternative dimension to understand the non-significance of this construct is to relate this with legal, economical, social, political environment. Both the UK and the US have strong democratic systems largely free from corruption in the public sector which may explain why this construct was found to be insignificant. If we believe this, then it is logical to argue that it is appropriate to include this construct when examining e-government adoption in developing the world where corruption is widespread in almost all parts of society.

6.1 Implications for Practice

Citizens who view e-government services as being useful are more likely to adopt this innovation. This finding suggests that if e-government provides extra benefits, such as convenient access and prompt service, when compared to traditional means, then this technological advancement will be diffused throughout society. Considering the significance of this concept, it is imperative that local government in the UK informs citizens (particularly citizens from lower socio-economic segments) of the advantages of such services. Citizens knowledge of e-government services and their benefits is a vital part of e-government adoption. Dwivedi *et al*. (2006) and Dwivedi and Williams (2008) surveyed 358 citizens across the UK to examine public awareness of the national e-government gateway (www.direct.gov.uk). The authors found that only 6% of respondents from the research sample had registered with the gateway portal and 78% were not even aware of the government gateway for e-government services (Dwivedi et al., 2006; Dwivedi & Williams,

2008). Before citizens are able to appreciate the relative advantages of e-government services, they must first be aware of this electronic option. The government should implement a national e-government awareness initiative that highlights the transformed services that are available and associated benefits.

In order to ensure that citizens understand the value and usefulness of e-services in the public sector, government should focus their efforts on projects and strategies, particularly at the local level, which offer services that are value added to citizens in comparison to what is offered in the context of traditional methods of service. In this respect factors such as speed, efficiency and effectiveness of the e-services offered are all important aspects from a process improvement and cost saving perspective for the government and from a convenience perspective for the citizen. In the context of *trust of the Internet*, proactive strategies and programs should be initiated to get the local communities involved in the decision making processes of e-government systems implementation. In this respect community forums and local council meetings (in the case of the UK) can be used to promote debate and better understanding of 'transformative' e-government services among citizens. In particular, the free ICT facilities offered in local libraries in the UK can also offer a useful platform for increasing e-government awareness among citizens. Furthermore, although local councils need to formulate their e-government plans in line with central government strategy, it is imperative that these plans are focused towards satisfying local citizens' needs and expectations rather than solely those of central government. Empirical research in the UK strongly suggests that succeeding at the *local level* is imperative for national level e-government success (Elliman, Sarikas, & Weerakkody, 2007; Hackney & Jones, 2002).

6.2 Implications for research and future research directions

The proposed model serves as an initial attempt to understand the cross-country predictors of e-government adoption based upon trust, risk and technology adoption. To date,

few studies have explored the aforementioned fundamental factors that impact the adoption of e-government services. This study proposes a parsimonious model of trust, risk and acceptance of e-government. Future research should try to identify unique characteristics of the UK and the UK citizens and culture that may have an impact on e-government adoption. For instance, in the US, identification of socio-economic factors that widen the digital divide has led to numerous initiatives to reduce this barrier (Thomas & Streib, 2003). In the UK, research has identified a divide between broadband adopters and non-adopters (Dwivedi & Lal, 2007) and there are perceptual differences between broadband adopters and non-adopters (Irani et al., 2009). Given this context, we suggest that future research should explore how broadband access impacts the use of e-government services.

Regarding general Internet access, connections are still not distributed evenly across racial, regional and socio-economic lines. According to (Wright, 2002) in 2001, 60 percent of white households in the US had Internet access, while only 34 percent of African American and 38 percent of Latino households did. Similarly, roughly 78 percent of households with income between $50,000 and $75,000 had Internet access compared to only 40 percent of those with household incomes between $20,000 and $25,000. Thomas and Streib (2003) suggest that among Internet users, ethnicity and education are important predictors for explaining the utilization of government Web sites. Higher usage rates tend to exist among white citizens and individuals with high education levels. Future studies could explore the impact of this divide on e-government adoption in the UK and the US. In particular, future studies could include control variables, such as socio-economic status, into an expounded model of e-government adoption. Future studies could also explore how differences in the system/technology (e.g. an e-government website) impact adoption.

In addition, future research should include antecedents of both perceived usefulness and trust to present a more comprehensive model of e-government adoption. Benbasat and

Barki (2007) suggest future adoption research should place more emphasis on the factors that impact relative advantage. The literature also suggests that other factors, such as social influence (V. Venkatesh, M. G. Morris, G.B. Davis, & F.D. Davis, 2003b). Future studies should expand the model to include additional indirect and direct predictors of e-government adoption.

Further, future studies could also expand the concept of trust. Burgoon *et al*. (2002) view trust as one of four dimensions of credibility. They claim that trust includes character-related facets such as being truthful, trustworthy, sincere, responsible, and reliable. In the current study, we rely on Rotter's (1967) parsimonious yet robust view that trust is an expectancy that the promise of an individual or group can be relied upon. However, future researchers could expand the model by exploring the diverse dimensions of trust. Also, regarding trust, researchers could investigate the association of social networking and trust. For instance, strength of ties is an aspect of a social network that correlates to the degree of trust. This construct is measured by various criteria such as the length of time two actors spend together and the frequency of interaction (Burgoon et al., 2002). In addition to the aforementioned avenues for research that focus on electronic service delivery, it would also be beneficial to explore the role of trust in e-participation in the public sector.

6.5 Limitations

There are a few limitations of this study outlined within this section. Findings of this study should be interpreted in light of these limitations and future research efforts should be directed as suggested here. First, the UK sample was selected from the region of London and the US sample was taken from one town that is not very diverse. Future research should attempt to obtain citizen responses from a wider population or even more countries. Also, in interest of parsimony and obtaining as many participants as possible, we administered a very concise survey to explore the adoption of a selected (exemplary) 'transformative' e-

government service. Future studies should include additional constructs and items to present an even more comprehensive view of wider e-government adoption. For instance, future research could incorporate additional technology adoption variables from extensions of TAM, diffusion of innovation theory, or the unified theory of acceptance and use of technology. Also, economic, legal, political and social environments in developing countries are entirely different from developed nations, so further investigations to examine cross-country factors salient in both developed and developing countries is timely and appropriate. Finally, future research should incorporate research hypothesis and constructs that capture cultural dimensions to evaluate their potential influence on e-government adoption as well as re additional countries with diverse cultural norms.

7. Conclusion

This paper has examined the salient constructs in a cross-country setting that affected citizen adoption of a major transformed electronic government service provided by Department of Vehicles and Licensing Agency (DVLA) in the UK and by the Department of Motor Vehicles (DMV) in the US. Electronic government services are deemed critical to the efficient and effective delivery of public services to citizens. Furthermore, such technologies and services are considered essential for reducing corruption in public sector by increasing the transparency of the government processes and interaction with citizens.

In line with the aim and objectives of this paper, the most important and interesting conclusions that have emerged from the analysis presented in this study are as follows:

- Although research exists that explores citizen adoption of e-government services, there is a lack of studies that examine the impacts of trust and risk on e-government acceptance.
- Due to increasing cooperation between government agencies of different countries and global presence of citizens in different countries, it is necessary to understand factors affecting adoption of electronic government services in a cross-country context.

- A full transformative potential of electronic government services is unlikely to be realized without substantial citizen adoption of such services and their participation in such initiatives. This point is clearly reflected in the UK government's recent efforts on transformational government development and diffusion within which one of the major objectives outlined is to promote design, development and diffusion of citizen centric online services for efficient delivery of public services.

- A number of factors (such as disposition to trust, trust of the Internet, perceived risk, perceived usefulness and perceived ease of use) were identified from the extant literature and considered important for understanding citizens decisions for adopting a 'transformative' electronic government service from cross-country perspective.

- Keeping the above conclusion and discussions in mind, further efforts are needed to investigate the cross-cultural nature of e-government adoption between developing and developed countries.

- In terms of the extent of the effect of perceived usefulness, countries that lead e-government success will be those who understand citizens' needs and then use this knowledge to develop citizen centric electronic services.

This research presents an initial effort towards understanding the adoption of a public service using e-government in a cross-country context. It therefore enables better decision-making ability to stakeholders such the policy makers and politicians in their efforts when encouraging citizens to adopt e-government services. Also this research is the first study that addresses the issue of citizens' adoption of the e-government service at a cross-country level by integrating constructs from two prominent theories (namely technology acceptance and trust). This study extends the body of knowledge in the area of citizen adoption of e-government applications and services, as it integrated and tested the above mentioned theories. Consequently, the paper brings about several theoretical contributions and implications to practice and policy as discussed in the previous section.

APPENDIX
Annotated Items

Trust of the Internet (TOI)

TOI1. The Internet has enough safeguards to make me feel comfortable using it to interact with the DVLA online.

TOI2. I feel assured that legal and technological structures adequately protect me from problems on the Internet.

TOI3. In general, the Internet is now a robust and safe environment in which to transact with the DVLA.

Trust of Government (TOG)

TOG1. The DVLA can be trusted to carry out online transactions faithfully.

TOG2. In my opinion, the DVLA is trustworthy.

TOG3. I trust the DVLA to keep my best interests in mind.

Disposition to trust

DT1. I generally do not trust other people

DT2. I generally have faith in humanity

DT3. I feel that people are generally reliable

Perceived risk

PR1. The decision of whether to use a state e-government service is risky

PR2. In general, I believe using state government services over the Internet is risky

Perceived Usefulness (PU)

PU1. The DVLA Website would enable me to complete transactions with the DVLA more quickly.

PU2. I think the DVLA Website would provide a valuable service for me.

PU3. I would find the DVLA Website useful.

Perceived Ease of Use (PEOU)

PEUO1. Learning to interact with the DVLA Website would be easy for me.

PEUO 2. I believe interacting with the DVLA Website would be a clear and understandable process.

PEUO 3. It would be easy for me to become skillful at using the DVLA Website.

Intention to Use (Use)

USE1. I would use the Web for gathering information from the DVLA.

USE2. I would use DVLA services provided over the Web.

USE3. I would use the Web to inquire about DVLA services.

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