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## Are U.K. Citizens Satisfied With E-Government Services? Identifying and Testing Antecedents of Satisfaction

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### ABSTRACT

Citizens' satisfaction is acknowledged as one of the most significant influences for e-government adoption and diffusion. This study examines the impact of *information quality*, *system quality*, *trust*, and *cost* on user satisfaction of e-government services. Using a survey, this study collected 1518 valid responses from e-government service adopters across the United Kingdom. Our empirical outcomes show the five factors identified in this study have a significant impact on U.K. citizens' satisfaction with e-government services.

### KEYWORDS

Citizens; e-government; IS success model; satisfaction; trust; United Kingdom

### Introduction

Governments across the world have implemented e-government (hereafter, eGov) systems with the aim of realizing a host of benefits for themselves as providers of public services as well as the citizens who are largely the users of these services (Jaeger, 2003; Teo, Srivastava, & Jiang, 2008). eGov systems can be as simple as providing information through a web site to as complex as enabling the filing of taxes (Hu, Brown, Thong, Chan, & Tam, 2009). In the case of Western and economically advanced economies such as those found in Europe and America, there is a general sense of government acting on behalf of its citizens by providing or supporting various services. Although each country has its own specific form of government, with different levels of government intervention, including healthcare provision and regulation of industry, there is a general focus on public service inherent in all government activities (Mosse & Whitley, 2009).

It has been argued that previous eGov literature has paid more attention exploring eGov services from the supplier side; however, the citizen's or stakeholder's perspective has been overlooked, resulting in limited published work in this realm (Lee, Kim, & Ahn, 2011; Moon & Welch, 2005; Thomas & Streib, 2003, 2005). It is acknowledged that the supply side driven development might not result in the widely proclaimed outcomes where users' expectations and satisfaction are much higher on the priority list in eGov (Kunstelj et al., 2009). A fair number of studies (e.g., Floropoulos,

Spathis, Halvatzis, & Tsipouridou, 2010; Rana, Dwivedi, & Williams, 2013a, 2013b; Rana, Dwivedi, Williams, & Lal, 2014; Rana, Dwivedi, Williams, & Weerakkody, 2014; Teo et al., 2008; Wang & Liao, 2008) on eGov research have focused on the aspects of measuring user's satisfaction. But, most of these studies focused on evaluating the different IS success models (DeLone & McLean, 1992, 2003; Rai, Lang, & Welker, 2002; Seddon, 1997) without any variations or with the inclusion of some of the external variables (such as perceived ease of use, risk, trust, etc.).

However, none of such empirical research has examined trust as a predictor for the quality constructs (i.e., system quality and information quality) and cost as an antecedent of user satisfaction. The motivation for this study is to address this research gap by examining the importance of trust in relation to system quality and information quality of eGov systems and to what level cost (in terms of time and money) influences user's satisfaction to use eGov services in the United Kingdom. Examining such relationships along the IS success model will not only strengthen the theoretical foundations of the proposed research model in measuring the demand side perspective of user satisfaction, but also allow policy makers to understand the extended facets of user's satisfaction based on the trust and cost of the eGov services being facilitated by the U.K. government.

In order to address the research gap and realize the aim of the article, the remaining sections are structured as follows. In the next section, a brief overview of

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related literature on user satisfaction studies in eGov is offered. This is followed by presenting the research model and hypotheses development for the study. A summary of the methodology used for the study is offered next, followed by the empirical results. Next, the article discusses the empirical results and outlines implications to theory and practice. Finally, the article concludes by acknowledging its limitations and identifying future research directions.

## Literature review

A number of studies (e.g., Chen, 2010; Cohen, 2006; Floropoulos et al., 2010; Gotoh, 2009; Hu et al., 2009; Rana et al., 2013a, Rana, Dwivedi, Williams, & Lal, 2014; Rana, Dwivedi, Williams, & Weerakkody, 2014; Teo et al., 2008; Zaidi, Siva, & Marir, 2014) on eGov services have used IS Success models to analyze user satisfaction. For example, Chen (2010) examined the quality antecedents (i.e., information quality, system quality, and service quality) on taxpayer satisfaction with online tax-filing systems. The results confirmed the quality antecedents strongly influenced taxpayer satisfaction with online tax-filing systems. Furthermore, the factors of information and system quality were found to be more important than the service quality in measuring taxpayer satisfaction. Similarly, Floropoulos et al. (2010) measured the success of the Greek taxation information system from the expert employees' perspective. They used the constructs including information quality, system quality, service quality, perceived usefulness, and user satisfaction—the results provided evidence that demonstrated strong connections between the five constructs. Interestingly, the impact of system quality on *perceived usefulness* was very low, and on user satisfaction was non-existent.

Cohen (2006) analyzed the survey of American citizens and suggested that only technology in itself was not accountable for the citizens' dissatisfaction; rather, prior beliefs, difficulty faced, and success using eGov services were also found to be significantly influencing satisfaction levels. Gotoh (2009) proposed a theoretical model for measuring the performance of eGov services in Japan and found that system quality had an indirect impact on user satisfaction. Further, P. J.-H. Hu et al. (2009) examined the determinants of service quality and continuance intention on the electronic taxation system in context of Hong Kong. The data analysis supported two service traits (i.e., security and convenience) and one technology trait (i.e., perceived ease of use) as the key determinants of the service quality. They also observed that perceived usefulness was not found as the strongest predictor of continuance intention, but service quality was.

Some recent publications (e.g. Rana et al., 2013a; Rana, Dwivedi, Williams, & Lal, 2014; Rana, Dwivedi, Williams, & Weerakkody, 2014; Zaidi et al., 2014) on eGov services satisfaction have explored the different variations of IS success models. Although some studies have considered trust as additional construct in their model development, none of them have attempted to explain quality constructs as the determining factors of trust and cost as the key factor of user satisfaction. For example, Teo et al. (2008) examined the research on role of trust over success of the eGov web site was almost untouched. Using DeLone and McLean's (2003) IS success model as a framework, the findings revealed trust in the government and not in technology was positively associated to trust in the eGov web site. Trust was further significantly associated to information quality, service quality, and system quality. Moreover, evaluating the validity of IS success models for an online public grievance system, Rana et al. (2013a) revealed information quality and system quality significantly influenced both behavioral intentions and user satisfaction. The study also proposed an integrated IS model and demonstrated the additional constructs such as perceived usefulness, complexity, facilitating conditions, and perceived trust worked well along the IS success model by DeLone and McLean (1992) and claimed to make the model more robust than merely with quality constructs. Further, Rana, Dwivedi, Williams, and Weerakkody (2014) used several external constructs including perceived usefulness, perceived ease of use, and perceived risk along with the updated DeLone and McLean (2003) IS success model. Hence, the current research would provide understanding of a system's success through risk associated with using and the overall quality of service provided by it.

Review of literature on eGov success analyzed across different services implies that no research has yet examined the impact of quality constructs on trust and also cost has not been considered along any models of IS success to understand its impact on user satisfaction. Realizing the lack of research in this direction, the current empirical research would be a timely and significant initiative to fill the existing research gap.

## Research model and hypotheses development

### *Theoretical background—IS success models*

There are primarily three theories offered in the area of IS success and these are all linked to DeLone and McLean's IS success model of 1992. The original IS success model was proposed by DeLone and McLean (1992) with six factors, namely system quality, information quality, use, user satisfaction, individual impact, and organizational

impact. In order to address criticism by several studies (such as Seddon & Kiew, 1996) relating to some of its constructs such as individual impact and organizational impact and use, Seddon (1997) introduced a re-specified model of DeLone and McLean (1992) where use of the system was considered to have results of various types; perceived usefulness was introduced in the model as an IS measure. Later DeLone and McLean discussed many of the significant IS research efforts that have applied, validated, challenged, and offered enrichments to their original model. This research resulted in an updated IS success model (DeLone & McLean, 2003) that incorporated a new construct service quality and substituted the variables, individual impact, and organizational impact, with net benefits which accounted for benefits at different levels of analysis.

### Overview of the proposed research model

The theoretical development in this study is based on the above described IS success models (DeLone & McLean, 1992, 2003; Seddon, 1997). Previous research on eGov, especially in the government-to-citizen (G2C) context has also emphasized the role of trust for user satisfaction under the IS success model (Balasubramanian, Konana, & Menon, 2003; Teo et al., 2008). In general, online trust has been found to be related to constructs such as information quality and system quality. Comparatively fewer studies have discussed the relationship between trust and satisfaction. Generally, satisfaction reflects the “affect status,” which is shaped by user’s previous experience with the web site, and trust shapes the user’s expectations toward the user’s behavior of the trustee (Kim, Xu, & Koh, 2004; Mayer, Davis, & Schoorman, 1995). Thus, satisfaction is sometimes regarded as an antecedent of trust. However, satisfaction has also been described as an outcome of trust (Teo et al., 2008). For example, Balasubramanian et al. (2003) found perceived trustworthiness of an online broker is directly related to the online investor’s satisfaction. Yoon (2002) also argued satisfaction could be an outcome of online trust and suggested a positive correlation between trust and satisfaction.

eGov is now a significantly prominent aspect of governance, and the extent of citizen expectations regarding services, information provision, interaction with government officials, and access can be expected to contribute to important outcomes such as trust (Welch, Hinnant, & Moon, 2004). This is the reason why trust has been considered a prominent variable in the proposed research model. The proposed model considers an external variable, cost, which is indicative of the monetary value in terms of money and time spent by the users on availing eGov facilities.

The concept of cost has been used in certain other services including mobile messaging (Deng, Lu, Wei, & Zhang, 2010), e-commerce (Sohrabi, Yee, & Nathan, 2013), etc. However, its significance in the eGov context cannot be ignored. Based on the discussion of the importance of the IS success models and relevance of additional constructs, such as trust and cost, this study will posit the proposed research model consists of system quality, information quality, trust, cost, and user satisfaction. The proposed research model (see Figure 1) postulates system quality and information quality will have a positive and significant impact on both trust and user satisfaction. Also, trust will have a positive and significant impact whereas cost will have negative and significant impact on user satisfaction.

### Hypotheses development

As illustrated in Figure 1, a total of six hypotheses are proposed based on the relationships between five constructs.

#### System quality

System quality is shaped through the interaction with the system when users complete a particular task. DeLone and McLean (1992, 2003) characterized system quality as the desired characteristics of the information system itself. More specifically, they incorporated five items into system quality: adaptability, availability, reliability, response time, and usability for measuring the e-commerce success. They hypothesize higher system quality is expected to lead to higher user satisfaction (DeLone & McLean, 2003). Seddon and Kiew (1996) surveyed users of the university accounting system and found significant relationship between system quality and user satisfaction. The prior empirical findings (Rai et al., 2002;

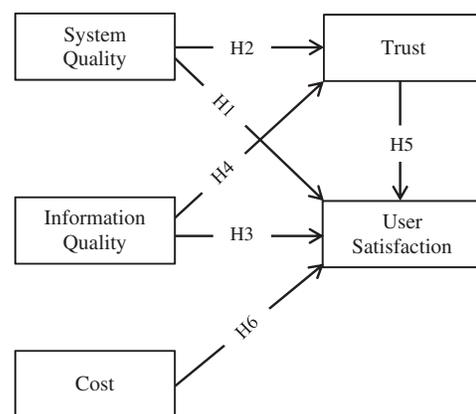


Figure 1. Proposed research model (DeLone & McLean, 1992, 2003).

Seddon, 1997; Seddon & Kiew, 1996; Wang & Liao, 2008) supported the impact of system quality on user satisfaction as discussed in DeLone and McLean's (2003) model. That indicates the higher levels of system quality are positively associated to higher levels of user satisfaction. For example, measuring the eGov system success using the validation of DeLone and McLean's (2003) model, Wang and Liao (2008) found a significant impact of system quality on user satisfaction. Therefore, we hypothesize:

*H1: System quality of eGov services in the United Kingdom has a positive and significant impact on user's satisfaction.*

Moreover, system quality attributes are relevant to the concept of trust because recent research suggests technical aspects of IT artefacts influence user willingness to trust (Gefen et al., 2006). For example, McKnight, Choudhury, and Kacmar (2002) found web site quality as the strong predictor of trusting beliefs. Similarly, examining trust in information technology artefacts, Vance, Elie-Dit-Cosaque, and Straub (2008) also found the system quality perceptions had a positive and significant impact on user's trusting beliefs. This research also believes higher system quality of eGov services used across the United Kingdom will improve user's trust. Therefore, we hypothesize:

*H2: Improved system quality of eGov services in the United Kingdom has a positive and significant impact on user's trust.*

### **Information quality**

A number of prior studies on IS success have established support for the argument that higher degree of information quality leads to enhanced user satisfaction (Floropoulos et al., 2010; Rai et al., 2002; Seddon, 1997; Seddon & Kiew, 1996; Wang & Liao, 2008). Petter and McLean's (2009) meta-analytic assessment of DeLone and McLean's (1992) model strongly supported the influence of information quality on user satisfaction. In context of eGov services, Wang and Liao (2008) presented and validated a model of eGov system success (using DeLone & McLean's [2003] IS success model), and found a significant influence of information quality on user satisfaction. Floropoulos et al. (2010) also obtained similar findings for a taxation system in Malaysian context. Therefore, we hypothesize:

*H3: Information quality of eGov services in the United Kingdom has a positive and significant impact on user's satisfaction.*

Moreover, improved information quality is expected to have positive influence on trust (Nicolaou, Ibrahim, & Van Heck, 2013). Attainment of accurate information indicates eGov service is able to provide accurate and up-to-date information and is a source of accurate information to achieve the desired outcomes. While examining the effect of information quality on trust in eGov systems transformation, A. Lee and Levy (2014) uncovered that citizens' perceived IQ factors determined trust in eGov systems. This research also believes higher accuracy, up-to-date timeliness, and exact relevance of information would lead to higher user trust in the eGov services. Therefore, we hypothesize:

*H4: Improved information quality of eGov services in the United Kingdom has a positive and significant impact on user's trust.*

### **Trust**

Trusting beliefs that an eGov service will act responsively when a citizen visits or transacts with it are central to the eGov services (Teo et al., 2008) being provided to the users. Sitkin and Roth (1993) defined trust as a set of expectations that tasks will be accomplished reliably. The government-citizen relationship plays a key role in the formation of trust in the government web services. Hence, citizen's trust in government should directly influence his or her trust in government web services. In other words, an eGov service is essentially a substitute for the government providing public services to citizens through traditional offline channels. Therefore, if a government demonstrates sincere care for the citizens and is able to effectually conduct its services, citizens are more likely to trust the eGov services established and are well-looked-after by the government to serve their needs. However, if the citizens' trust in the government and the eGov services provided by it is low, they will tend to distrust the policies made and actions taken by the government (Teo et al., 2008). Hence, we can argue higher trust in eGov services by U.K. citizens will lead to higher levels of satisfaction with it. Therefore, we hypothesize:

*H5: Improved levels of trust on eGov services experienced by the citizens of the United Kingdom will lead to higher degree of their satisfaction with such services.*

### **Cost**

Citizen-oriented eGov requires a number of planning and design processes to be successful; using such an

approach may, in fact, increase the costs of providing eGov services. The cost associated to an eGov service can well be associated with users as well. Users of eGov comprise of a number of groups—citizens employing government information and services, residents seeking various information related to all different government sectors and organizations, government employees using eGov in their job functions (Bertot, Jaeger, & McClure, 2008). Accessing the self-paid internet and eGov services could be little exasperating for citizens, particularly when it is not up to their expectations and consumes more time and expenses to get anything done online. Hence, this leads to a less satisfying experience for them. Considering the negative association of cost (in terms of time and money) with satisfaction, we hypothesize:

*H6: Higher degree of costs linked with using an eGov service has a negative, though significant, influence on user satisfaction.*

## Research methodology

This study adopted a survey-based approach (Choudrie & Dwivedi, 2005; Cornford & Smithson, 1996) to record the views of citizens across the United Kingdom. The survey instrument was influenced by literature from the domains of eGov and information system satisfaction. There are various ways to capture survey data, however, the present survey was completed online and participation was voluntary. We used a system similar to the survey monkey approach to gather data from different geographical locations in the country. The data were then transferred into a SPSS file for quantitative analysis, storage, and retrieval purposes. Descriptive statistics were used to present the quantitative results. The online questionnaire consisted of a total of 19 different questions on five different constructs and five questions related to demographic traits of the respondents. A total of 1518 people took part in the survey and completed all the questions during the period September to November 2014.

All the questions related to constructs were multiple-type, closed-ended, and 7-point Likert scale type questions. Likert scales (1–7) with anchors ranging from 1 (strongly disagree) to 7 (strongly agree) were used for all non-demographic items. The demographic questions asked to respondents were related to their age groups, gender, education, internet usage, and usage of the eGov services. We used a specialist company and its database to identify and contact users who were already using several specific eGov services. The company then distributed the survey online to those identified users. The users of the survey were ensured about the anonymity of their personal identification.

## Results

### Respondents' demographic profile

Table 1 presents the respondents' demographic profiles. Of the overall respondents, the number of males (i.e., 51.1%) and females (i.e. 48.9%) are approximately equitably distributed. The data collected across respondents of different age groups indicate more than half of the sample size (i.e., 60%) was relatively younger generations of less than 45 years of age; however, close to 40% of the overall respondents were in the 45 years or above age group. As far as the educational qualifications are concerned, 52% of the population obtained undergraduates to doctorate degrees whereas about 36% of the respondents were at high school or lesser level of education. Moreover, 12.5% of the overall population possessed other professional qualification. The internet usage frequency of the users were found quite high, as more than 98% of the internet users were found to have 3 years or higher experience in it. This high internet usage frequency reported by the users could well be due to the very nature of the data collection process which only targeted those users who have access to the internet and computing systems. Therefore, the respondents to the online surveys would possibly have moderate to high level of experience with the use of internet-based transactions. However, the percentage of respondents exploring the eGov services is not proportional to the internet usage frequency where close to 27% of the

**Table 1.** Demographic characteristics of respondents (N = 1518).

Characteristics	Frequency	%
Gender		
Male	776	51.1
Female	742	48.9
Age (in Years)		
Less than 24	146	9.6
25–34	452	29.8
35–44	325	21.4
45–54	319	21.0
55–64	275	18.1
65 and above	1	0.1
Education		
Secondary or less	136	9.0
High school	405	26.7
Undergraduate education	491	32.3
Postgraduate education	262	17.3
Doctorate	35	2.3
Other professional qualification	189	12.5
Internet Usage		
Beginner (<3 years)	28	1.8
Fair (3–6 years)	176	11.6
Good (6–10 years)	519	34.2
Excellent (Over 10 years)	795	52.4
eGov Service Usage		
Everyday	210	13.8
Several times weekly	213	14.0
Several times a month	158	10.4
Once a month	255	16.8
Several times a year	274	18.1
Once a year	408	26.9
Total (For each characteristic)	1518	100

overall respondents used the eGov services only once a year. As the data were gathered online from citizens across the different geographical locations in the United Kingdom on a random and voluntary basis, the sample can be considered as representative for the overall population.

### Descriptive statistics

Table 2 provides the mean, standard deviation (*SD*), and Cronbach's alpha ( $\alpha$ ) for all five constructs considered in the proposed research model. Reliability analysis was performed using Cronbach's alpha. It was used for determining the reliability of the scale, which provides an indication about the internal consistency of the items measuring the same construct (Hair, Anderson, Tatham, & Black, 1992; Zikmund, 1994). The reliability analysis for the eGov services indicates all the variables maintained either a high (with  $\alpha > 0.70$ ) or excellent (with  $\alpha > 0.90$ ) level of Cronbach's alpha (Gliem & Gliem, 2003). Cronbach's  $\alpha$  of greater than 0.70 is considered to be good (Hair et al., 1992; Nunnally, 1978). The possible reason for very high Cronbach's alpha for information quality and user satisfaction could be due to extremely strong internal consistency for the items specifically measuring these two constructs separately.

As far as means of the variables across positive constructs such as system quality, information quality, trust, and user satisfaction are concerned, they were found to be closed to the level of 5 or greater. This indicates the respondents responded favorably to the eGov services by and large. However, the overall lower mean of less than 4 for negative construct such as cost indicates respondents either felt negatively or remain neutral about the items related to this construct. *SDs* less than 1.5 for all positive constructs indicate respondents' responses did not fluctuate much across the mean values whereas a relatively large value of *SD* (i.e., close to 1.5) for cost indicates that users' responses were found to be a bit more fluctuating across mean values while responding to the items for this construct (see Table 2).

### Measurement model

The study tested the convergent and discriminant validity of the scales using confirmatory factor analysis.

**Table 2.** Mean and *SD* of items ( $N = 1518$ ).

Construct	Mean	<i>SD</i>	Cronbach's Alpha ( $\alpha$ ) <sup>a</sup>
System Quality (SYQ)	4.69	1.27	0.881 (H)
Information Quality (IQ)	5.36	1.29	0.942 (E)
Cost (CST)	3.83	1.46	0.854 (H)
Trust (TRST)	5.34	1.23	0.856 (H)
User Satisfaction (US)	5.38	1.33	0.939 (E)

<sup>a</sup>H: high, E: excellent.

Anderson and Gerbing (1988) recommended three ad hoc tests for convergent validity. Table 3 presents the standardized factor loadings (FLs), composite reliabilities (CRs), and average variance extracted (AVE) for this purpose. Standardized FLs are representative of the level of association between scale items and a single latent variable. The loadings are found highly significant in all cases. CRs, similar to Cronbach's alpha, were found well above the minimum limit of 0.70 (as recommended by Hair et al., 1992; Nunnally, 1978) for each construct.

The AVE estimates are measures of the variation explained by the latent variable to random measurement error (Netemeyer, Johnston, & Burton, 1990) and ranged from 0.755 to 0.935 for all the constructs. These estimates are found to be at much greater levels than the recommended lower limit of 0.50 (Fornell & Larcker, 1981). Hence, all three tests related to convergent validity of the scales were supported.

Discriminant validity was also examined using the test suggested by Anderson and Gerbing (1988). To pass this test, the factor correlation between a pair of latent variables should be less than the square root of AVE of each variable as shown in Table 4 through factor correlation matrix. The evaluation of this validity indicates the square root of AVE shown in bold fonts across the diagonal of Table 4 for each variable is always greater than the correlation value for any pair of variables. For example, correlation between trust and user satisfaction is 0.767, which is less than the square root of AVE shown along the diagonal of both these variables (i.e., 0.908 and 0.965, respectively). In other words, a variable is considered to be different from

**Table 3.** Results of confirmatory factor analysis.

Measure	FL	CR	AVE
<b>System Quality (SYQ)</b>			
SYQ1	0.81	0.873	0.813
SYQ2	0.80		
SYQ3	0.81		
SYQ4	0.76		
<b>Information Quality (IQ)</b>			
IQ1	0.92	0.946	0.935
IQ2	0.89		
IQ3	0.93		
IQ4	0.87		
<b>Cost (CST)</b>			
CST1	0.67	0.842	0.755
CST2	0.80		
CST3	0.82		
CST4	0.73		
<b>Trust (TRST)</b>			
TRST1	0.87	0.926	0.825
TRST2	0.87		
TRST3	0.73		
<b>User Satisfaction (US)</b>			
US1	0.78	0.943	0.930
US2	0.94		
US3	0.92		
US4	0.92		

**Table 4.** Factor correlation matrix.

Variable	SYQ	IQ	CST	TRST	US
SYQ	<b>0.902</b>				
IQ	0.422**	<b>0.967</b>			
CST	0.138**	-0.050ns	<b>0.869</b>		
TRST	0.558**	0.693**	-0.035ns	<b>0.908</b>	
US	0.530**	0.644**	-0.080**	0.767**	<b>0.965</b>

Notes: Square root of AVE on diagonals in bold; ns: non-significant.  
\*\* $p < 0.01$ .

other variables if the square root of the AVE for it is greater than its correlations with other latent variables (Barclay & Smith, 1997), which is satisfied for every variable of the proposed research model of the current study.

### Structural model testing

The overall model fit is reasonable as can be seen from Table 5. The test of the overall model fit resulted in a chi-squared ( $\chi^2$ ) value of 373.382 with a degree of freedom value of 136 and a probability value of less than 0.001. The significant  $p$ -value indicates the absolute fit of the model is less than desirable (Belanger & Carter, 2008). However, as the chi-squared ( $\chi^2$ ) test of the absolute model fit is receptive to sample size and non-normality, the better measure of fit is chi-squared ( $\chi^2$ ) divided by the degree of freedom. The intended ratio (i.e., 2.745) of these two values is less than 3 and conforms to the recommended value of less than or equal to 3 (Chin & Todd, 1995; Gefen, 2000).

This research also reports a number of fit statistics to examine the comparative fit of the data to the model. Descriptive fit indices compare the specified model to the baseline model, specifically the independence model, in an endeavor to exhibit the dominance of the proposed research model (Belanger & Carter, 2008). Jaccard and Wan (1996) suggested the use of at least three fit tests. Therefore, this research reports the goodness-of-fit index (GFI), adjusted GFI (AGFI), and comparative fit index (CFI). The GFI and CFI compare the absolute fit of an individual model to the absolute fit of the independence model. The higher the value of divergence between the overall fit of these two models, the larger the values of these explanatory statistics

**Table 5.** Model fit summary for the research model.

Fit statistics	Recommended value	Research model value
Chi-squared ( $\chi^2$ )/Degree of Freedom (DF)	$\leq 3.000$	373.382/136 = 2.745
Probability Value (p)	$> 0.05$	Non-significant
GFI	$\geq 0.900$	0.975
AGFI	$\geq 0.800$	0.965
CFI	$\geq 0.900$	0.990
TLI	$\geq 0.950$	0.987
RMSEA	$\leq 0.080$	0.034

(Belanger & Carter, 2008). Gerbing and Anderson (1992) determined the CFI as one of the most established and vigorous fit indices. This research also reports root mean square error of approximation (RMSEA) to examine the inconsistency per degree of freedom.

The GFI should be greater than or equal to 0.900 (Hoyle, 1995), while AGFI should be at or above the level of 0.800 (Chin & Todd, 1995). Similar to GFI, the CFI value of greater than or equal to 0.900 was considered representative of a well-fitting model (Bentler, 1992; Bentler & Bonett, 1980; Byrne, 2010; Hoyle, 1995). Finally, the RMSEA value should be below 0.10 (Browne & Cudeck, 1993); however, the threshold value of 0.08 or less has been recommended as an indicator for a very good fit (Belanger & Carter, 2008; Browne & Cudeck, 1993; Byrne, 2010). It is considered an indicative of good fit between the hypothesized model and the observed data if it is below the more restrictive threshold of 0.06 (L. T. Hu & Bentler, 1999).

As far as the fit statistics of the proposed model for this research is concerned, GFI (i.e., 0.975) and AGFI were found to be at the much higher level than their recommended values of 0.900 and 0.800 respectively. Moreover, CFI and Tucker-Lewis Index (TLI) were found at even better levels with their index values of 0.990 and 0.987, which are very close to absolute value of 1.0. As far as the RMSEA value of the model is concerned, it was found to be much below (i.e., 0.034) than the expected level of 0.08. The fit statistics of the proposed research model indicates that all the indices were found adequately fit for the data collected.

Having established the relatively reasonable model fit, it is quite appropriate to examine specific path coefficients corresponding to the proposed hypotheses of the research model. The results of the structural model testing are presented in Table 6. The proposed research model for this research is primarily based on the constructs of the IS success model (DeLone & McLean, 1992, 2003). All the hypotheses were supported by the data collected to validate this model from the eGov service users in the United Kingdom. The results indicate SYQ  $\rightarrow$  TRST ( $\gamma = 0.344$ ,  $p < 0.001$ ), SYQ  $\rightarrow$  US ( $\gamma = 0.119$ ,  $p < 0.001$ ), IQ  $\rightarrow$  TRST ( $\gamma = 0.600$ ,  $p < 0.001$ ), IQ  $\rightarrow$  US ( $\gamma = 0.080$ ,  $p < 0.01$ ), and TRST  $\rightarrow$  US ( $\gamma = 0.705$ ,  $p < 0.001$ ) exhibited positive and significant relationships whereas CST was found to have a negative, though significant, impact ( $\gamma = -0.077$ ,  $p < 0.001$ ) on US.

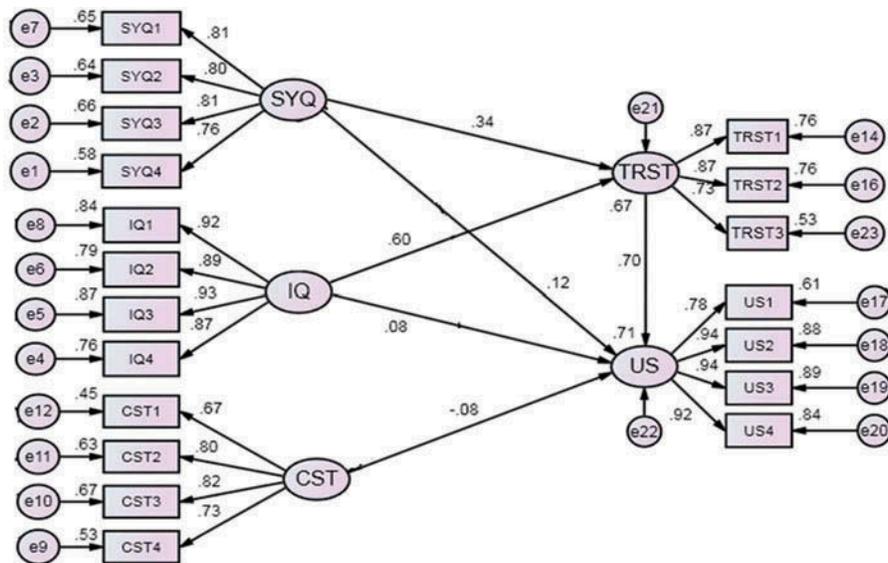
Figure 2 shows the validated research model with path coefficients and significance of each relationship. It also demonstrates the variance of the model shown

**Table 6.** Path coefficients and hypotheses testing.

Construct relationship	Path coefficient	Critical ratio (CR)	Significance ( $p$ )	Hypothesis-supported (YES NO)
SYQ → TRST	0.344***	14.074	$p < 0.001$	H1—YES
SYQ → US	0.119***	4.584	$p < 0.001$	H2—YES
IQ → TRST	0.600***	24.619	$p < 0.001$	H3—YES
IQ → US	0.080**	2.730	$p = 0.006$	H4—YES
TRST → US	0.705***	17.197	$p < 0.001$	H5—YES
CST → US	-0.077***	-4.264	$p < 0.001$	H6—YES
$R^2$ (TRST)	0.67			
$R^2$ (US)	0.71			

Note: CR: critical ratio.

Significance: \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .



**Figure 2.** Validated research model (CST: cost, IQ: information quality, SYQ: system quality, TRST: trust, US: user satisfaction).

on each of the two dependent variables (i.e., trust and user satisfaction). The variance of the research model shown on satisfaction (i.e., 71%) indicates variables such as system quality, information quality, cost, and trust are some of the most suitable constructs to analyze U.K. users' satisfaction.

## Discussion

The purpose of this study is to measure users' trust and satisfaction on eGov services in the United Kingdom. The proposed research model is primarily based on the IS success model (DeLone & McLean, 1992), along with some external constructs including trust and cost. The research model combined five constructs including information quality, system quality, cost, trust, and user satisfaction. The hypothesis testing results indicated there are significant links between the five constructs supporting six hypotheses. The results indicate both information quality and system quality have a positive and significant impact on trust and user satisfaction; trust has a positive and significant impact on

user satisfaction, whereas cost incurs a negative and significant influence on user satisfaction.

The positive and significant impact of information and system quality on user satisfaction indicates the better the quality of information provided through the eGov system and the overall enhanced quality of the web site results in higher user satisfaction with eGov services. A number of studies (e.g., Floropoulos et al., 2010; Teo et al., 2008; Wang & Liao, 2008) exploring the IS success models to measure satisfaction with eGov services have also shown support for these relationships. The findings clearly indicate the total effects of system quality on user satisfaction are marginally higher than the impact of information quality on user satisfaction. That is, in the context of eGov services, beliefs about system quality have a more dominant influence on user satisfaction than beliefs about information quality. This indicates eGov authorities should pay more attention toward promoting the information quality of eGov systems. Moreover, even though system quality exhibits higher impact on user satisfaction in comparison to information quality, it is not strong as

far as its path coefficient is concerned. In other words, the path coefficient of system quality on user satisfaction, although significant at  $p < 0.001$ , its empirical value was found only as 0.119. This also indicates quality of the eGov system should be given more importance so far as satisfying the users' needs are concerned.

Hence, those responsible for designing, implementing, and managing eGov systems should be responsible for considering the current status of system quality and work toward enhancing it. This could probably be achieved by focusing more on the degree of ease associated to use the appropriate web sites intended to provide specific service. This ease of use of the web sites could well be related to features such as, being able to easily find the relevant web site, easy access to current and previous transactions performed through the web site, or related to the ease of understanding its structure. Teo et al. (2008) also supported the significant relationship between system quality and user satisfaction and argued that the system quality of the web site is linked to the deeper and continued use of the online facility.

Although both information quality and system quality were found to be the significant predictors of trust in the present study, the results indicated information quality as the strong predictor of trust than system quality. The findings suggest that users of eGov services possess stronger trust in the quality of the information provided through the services than the system-web site itself. Such findings indicate that those responsible for implementing and maintaining eGov systems should be focusing more on accurate, updated, and easily accessible information to be embedded in the web site. As this whole process of crafting the relevant information is deeply linked to the quality of the web site itself, the designers of such eGov web sites should develop it in a simplistic manner. Trust is definitely very important for eGov web sites. The government needs to build trust in users by addressing their needs and by establishing a sound legal environment (Teo et al., 2008) to make sure that breach of trust is taken very seriously.

The strong and significant impact of trust on user satisfaction clearly indicates higher trust in eGov services would lead to better satisfaction with such services. The findings suggest building trust is necessary for keeping the users satisfied with the eGov services (Teo et al., 2008), and hence promoting such services for better serving the citizens in the country. The significance of this relationship also indicates users may be satisfied as long as they feel online services meet their needs well (Teo et al., 2008). For example, if the eGov users want to

pay the vehicle tax through the vehicle certification agency web site of the government, then they would feel satisfied when their trusting beliefs, among other important factors including information quality and system quality, affect their satisfaction. Moreover, the significant and negative impact of cost on user satisfaction indicates higher costs associated with accessing and using eGov services will reduce user satisfaction. The government should make sure eGov services are so efficiently designed that it loads as soon as the URL is written on the web browser. Also, the links in the web site should work properly and perfectly. The cost of internet subscription should also be kept reasonable so every citizen not only has the facilities to explore it through the system, but also through the mobile services. In sum, the overall costs associated to the use of eGov services should be kept in check to optimize the user satisfaction.

### Implications for theory

This study has contributed to theory by extending the IS success model to include constructs such as trust and cost and testing it in a new (eGov) context. First, this study reveals trust will be affected by system quality and information quality. As government is providing all different types of online services to its citizens, understanding trust serves a very important aspect of any eGov research. In other words, it is necessary to understand investment in building citizen trust is important for utilization of all eGov services. Second, the present study is among a very few, which has analyzed the concept of costs in terms of user's time and money along the IS success model. This would allow researchers to understand the significance of cost associated with using eGov services. Only reasonable costs involved in gaining access to any eGov service can keep the users satisfied and hence would maintain their continuing positive attitude and intention toward using it in the future.

### Implications for practice

The results also have implications for U.K. government agencies providing various eGov services. A relatively weak though significant relationship for both information quality and system quality with user satisfaction indicates the government should put in all its efforts to make the system easily accessible with up-to-date and accurate information. Similarly, the significant influence of information quality and system quality on trust also indicates initiatives taken to enhance the

information quality and system quality will also result in high trusting beliefs among citizens. Also, a negative, though significant, impact of cost on user satisfaction indicates the government should make all its efforts to optimize the expenses of accessing eGov services and time spent on it by the users. The high speed internet and relatively inexpensive subscription fee with efficient web sites provided by the government to its citizens will encourage them toward its continuous use.

## Conclusion

This study examined the effect of information quality and system quality of eGov services on trust and user satisfaction in the context of the United Kingdom. The study also examined whether the cost associated with using the service has any impact on user's satisfaction. In order to do that, we proposed a research model based on IS success model (DeLone & McLean, 1992) to understand user satisfaction toward eGov services. A total of 1518 valid responses were collected from the users of eGov services across the United Kingdom to validate the model. The results supported all six hypotheses formulated between five constructs. Our findings indicated both information quality and system quality had a positive and significant impact on trust and user satisfaction. Also, trust was found to be positively associated with user satisfaction whereas cost was found to exert a negative, though significant, influence on user satisfaction. The overall higher variance (i.e., 71%) explained by the model on user satisfaction indicates the importance of trust and costs associated with the quality constructs of the IS success model. The outcomes of this study will help researchers appreciate how the trust and cost based success model may relate to other developed and developing countries' contexts.

## Limitations and future research

First, this research has collected data largely from the existing users of eGov services in the United Kingdom. Such data are not able to capture the beliefs of those who are new to such systems and hence caution should be expressed while generalizing the outcomes of this research in the later perspective. Second, the outcome of this research is analyzed on the basis of the measures defined on the Likert scale of 1–7. Hence, the findings from such questions may not reveal the feelings of the users, which probably could have been better explained using a qualitative methodology such as interviews. Therefore, future research could focus on extending this study to a broader random sample of citizens to capture non-users and/or potential eGov users. Future research

should also employ qualitative approaches such as conducting interviews with few experienced users to explore why trust and cost are so very important toward user satisfaction. Finally, the data for this research were gathered from the citizens of the United Kingdom. Such data may not deliver the reflection of what professionals think about the quality of the online services provided by their government and whether their stand is different to the generic perception of citizens. In this respect, future research can validate the proposed research model by seeking the opinions of employees and analyzing this against citizens' perceptions. Another avenue that would be worth exploring is citizens' perception of trust and cost on satisfaction for the same public services offered using more traditional means (such as face to face and/or telephone) against their online or eGov versions. Such comparisons would offer more insights into the unique characteristics of certain public service processes that influence perception on trust, cost and satisfaction.

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