

An Adoption Model of Electronic Government Services in Malaysia: Electronic Labor Exchange (ELX)

(Model Ambil Guna Perkhidmatan Kerajaan Elektronik di Malaysia:
Pasaran Buruh Elektronik (ELX))

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ABSTRACT

This paper examines factors influencing adoption of electronic government services among end-users of Electronic Labor Exchange (ELX) in Malaysia. The objective of the paper is to understand how end-users perceived e-Government as a primary government interaction channel and the factors that affect their level of usage. The proposed adoption model integrates a number of measurement criteria such as, system quality, information quality, security, efficiency, satisfaction, usage and system's benefits adapted from previous studies. To gauge the relationships between these constructs, several statistical analysis techniques such as factor analyses and Structural Equation Modeling (SEM) were conducted. The study finds that both information quality and efficiency positively affect satisfaction; security positively affects usage; and both usage and satisfaction positively affect benefits. However, the results of the study reject the hypotheses that the other two service quality components namely usability and functionality, and security positively affect satisfaction. The results also reject the hypotheses that service quality (efficiency, functionality, and usability), information quality and satisfaction influence usage. The results implied the urgent need to improve e-Government services in terms of functionality, usability, security in order to improve end-users' satisfaction, usage and long-term loyalty to the system.

ABSTRAK

Kertas ini menyelidik faktor yang memengaruhi ambil guna perkhidmatan kerajaan elektronik dalam kalangan pengguna Pasaran Buruh Elektronik (ELX) di Malaysia. Tujuan kertas ini adalah untuk memahami bagaimana tanggapan pengguna akhir terhadap e-Kerajaan sebagai saluran interaksi utama kerajaan dan faktor yang mempengaruhi tingkat penggunaannya. Model yang dicadangkan menyepadukan berbagai kriteria pengukuran seperti kualiti sistem, kualiti maklumat keselamatan, kecekapan, kepuasan, penggunaan dan faedah sistem yang diubahsuai daripada kajian lepas. Untuk menentukan hubungan antara berbagai konstruk tersebut beberapa teknik statistik seperti analisis faktor dan pemodelan persamaan struktur dilakukan. Kajian mendapati kedua-dua kualiti maklumat dan kecekapan mempengaruhi kepuasan pengguna secara positif. Walau bagaimanapun, keputusan kajian menolak hipotesis bahawa dua komponen kualiti perkhidmatan iaitu kebolehgunaan dan kefungsiiaan, dan keselamatan mempengaruhi kepuasan secara positif. Kajian juga menolak hipotesis bahawa kualiti perkhidmatan (kecekapan, kefungsiiaan, dan kebergunaan), kualiti maklumat dan kepuasan mempengaruhi penggunaan. Keputusan kajian menunjukkan keperluan segera untuk membaiki perkhidmatan-perkhidmatan e-Kerajaan umumnya dan ELX khususnya terutama dari segi kefungsiiaan, kebergunaan, dan keselamatan untuk membaiki kepuasan, penggunaan dan loyalti jangka panjang pengguna akhir kepada sistem e-Kerajaan.

INTRODUCTION

The basic purpose of e-Government is to improve relationships between government and citizen, government and business and other government agencies which we regard them as end-users. Improvement is mainly in terms of delivering services to these end-users. Measuring the end-

users perception on e-Government applications is one of the important element in assessing e-Government success. This paper discusses factors affecting citizen decision to adopt e-Government service delivery namely

Electronic Labor Exchange (ELX) by developing proposed adoption model of ELX. The model will assist governments in increasing citizens' adoption of their online services in general and ELX in particular.

e-Government defined as 'information system aided handling of public administration processes using information and communications technology' (Rotter 2003), is believed to lead to better delivery of government services, improved interaction with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits include increased accountability and

transparency, less corruption, greater convenience, increased citizen involvement, greater efficiency, and cost reductions for both the government itself and the adopter of e-Government services.

The advantages of e-government are unquestionable and online services are also cheaper, faster and more readily available. They reduce travel and waiting time (from in-line to on-line), introduce a more efficient payment method, improve transparency of government's operation, improve poor governance and reduce systemic corruption, and eventually lead to transformation of governance (Prattipati 2003; Reynolds & Regio 2001). However, the dark side of e-government is not cost overruns, turf battles or integration issues; it is low adoption rates (Ghaziri 2003). E-government is far from reaching its maximum potential and until the gap between what is offered and what is used is bridged, governments cannot justify large investments in e-government and will not get all of the value possible out of these investments. Therefore, it is important to understand the factors that might influence citizens' adoption behaviours. Aim of this paper is to explore the nature, drivers and consequences of citizen adoption of e-Government. This will provide the practitioners and researchers with a set of manageable, strategic levers to promote greater acceptance of e-Government. As a result of the above-mentioned motivations, the objective of this paper is to theoretically and empirically study factors leading to the adoption of e-Government services by end-users. This paper aims to find answers to the following questions:

1. How are intentions towards the use of e-government formed and to what extent are they related to the actual use of e-Government ELX?
2. What are the beliefs that influence citizens' propensity to use e-government? How do these beliefs affect their intentions towards the use of e-Government?

This paper contributes to research in a number of ways. First, it surfaces a research framework that will identify the factors important for encouraging adoption of e-Government service namely Electronic Labor Exchange (ELX) in Malaysia. It does so by viewing e-Government services as technical innovation and attempting to determine the factors that affect the adoption of this innovation. Second, our theoretical research framework integrates a number of different research streams: the literature on Reasoned Action, Technology Acceptance, innovation diffusion, satisfaction and security.

ELX is an application under the 7th Multimedia Super Corridor Flagship, Electronic Government Project. The system was launched by the Minister of Human Resources on 30th of May 2002. It comprises of 3 modules: Job Clearing System (JCS), Labor market Database (LMD), and Office Productivity Support System (OPSS). On 1st of August 2008 JCS was changed to JobsMalaysia which was officially launched on 22nd November 2008. JobsMalaysia provides (1) jobseekers registration, (2) employers registration, (3) job matching, and (4) job search.

THEORETICAL FRAMEWORK OF AN ELX ADOPTION MODEL

Theory-wise, we will use Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA) and Rogers' Diffusion of Innovation Theory to analyse technological adoption influences. In this section, we will review the literature on the above-mentioned related streams of research to look at the factors that we consider important for adoption of e-Government services. We will detail these factors and explain why we consider them as important in this study to explain the citizen adoption of e-Government ELX.

Drawing from previous studies on e-Government, this section discusses e-Government adoption influences from the technological and innovation perspectives. The technological perspective deals with perceived characteristics of a particular technology. There are several theories related to technological perspective of e-Government. Davis (1986) pioneered the TRA in social psychology, a widely studied theory to identify the determinants of consciously intended behaviours (Ajzen & Fishbein 1980; Fishbein & Ajzen 1975). TRA's most useful application is in Davis's TAM, used to hypothesise user acceptance of system and information technologies in the United States. Since then, numerous studies have demonstrated the academic vigor of TAM behavioural constructs: i.e., perceived usefulness (Igarria et al. 1996; Philips et al. 1997), perceived ease of use (Dabholkar et al. 2003) and predicted user acceptance (Gefen & Straub 2000; Adams et al. 2001; Al-Gahtani & King 1999). The TRA conceptual framework advocates for distinctions among beliefs, attitudes, intentions, and behaviours (Ajzen & Fishbein 1980; Fishbein & Ajzen 1975).

The TAM is a pre-eminent theory of technology acceptance in information system (IS) research. Numerous empirical tests have shown that TAM is a parsimonious and robust model of technology acceptance behaviours in a wide variety of IT across both the levels of expertise (Gefen 2002), and across countries (Taylor & Todd 1995). TAM hypothesises that a person's acceptance of an IT is determined by his/her voluntarily intentions to use that technology. The intention, in turn, is determined by two beliefs dealing with (1) the perceived usefulness (PU) of using the new IT and (2) the perceived ease of use (PEU) of the new IT. PU is the user's "subjective probability that using a specific application system will increase his or her job performance within an organisational context" and PEU is "the degree to which the user expects the target system to be free of efforts" (Davis, Bagozzi & Warshaw 1989). PU is influenced by PEU. We hypothesise that paths predicted by TAM apply also to e-Government. Thus, the more useful and easy to use is the e-Government website in enabling the citizens to accomplish their tasks, the more it will be used. Behavioural intention, a central concept in both the TRA (Carter & Belanger 2005) and the TAM, is defined as a 'person's subjective probability that she or he will perform some behaviours. Research following the

TRA and the TAM consistently showed a high correlation between intentions and actual use (Fishbein & Ajzen 1975).

The Diffusion of Innovation Theory (Rogers 1995) purports to describe the patterns of adoption, to explain the adoption mechanism, and to assist in predicting whether and how a new invention will be successful. A considerable body of work on IT acceptance and adoption has arisen as a consequence of Rogers' work. Perceived benefits from the adoption of e-Government services may serve as one of the main explanatory factors for the adoption. Receptivity towards e-Government services comes about when the new system is perceived as more beneficial than the paper-based system it supersedes, hence offering relative advantage to the end-users. One of the main purposes behind the introduction of e-Government services is to facilitate citizens to increase their Information Technology (IT) sophistication and to provide them with a higher level of convenience in their interaction with government.

THE CONCEPTUAL FRAMEWORK

This section discusses the ELX adoption conceptual model and the hypotheses of the study.

THE CONCEPTUAL MODEL: ELX ADOPTION MODEL

The objective of the study is to explore the relationships between eight constructs namely information quality, system quality (efficiency, usability, and functionality), security, satisfaction, usage and benefits within the context of end-users of e-Government service ELX. As citizens increasingly interact with online digital governmental services, there are widespread expectations for effective service delivery from such initiatives. At a general level, West (2004) has noted that for e-government to progress there needs to be a successful movement from citizens from viewing e-government as a set of websites (or "billboards") to viewing e-government as an effective suite of transactions. Carter & Belanger (2004) present results of their study on citizen adoption of e-government initiatives based on an approach supported by the Technology Acceptance Model (TAM) (Davis 1989). Reddick (2004) analyses the demand side of e-government, which relates to the citizen-centered aspect of interacting with e-government systems.

The ELX adoption model has been formulated with the aim of providing a scale by which government-to-citizen web-based service delivery can be evaluated – in terms of factors affecting adoption of e-Government services by end-users (Horan, Abhichandani & Rayalu 2006). Many previous studies have found that high confidence and trust regarding e-government security network are important factors in adopting e-government. In Malaysia, study by Mohd Yusof Hj. Abdullah & Mohd Azrul Mohamad Salleh (2008) found that public's level of confidence towards e-government was still moderate. Doll

and Torkzadeh (1988), in developing the End-User Computing Satisfaction (EUCS) instrument, identified content, format and timeliness of the information delivered and the ease of use facilitated by a system. Zeithaml, et al. (2000) identified the importance of responsiveness and ease of navigation in utilizing a service offered through websites. Loiacono et al. (2002) have included usability measures in devising a quality instrument for websites – Webqual. Similar aspects, or extensions thereof, have been used in other studies (Fayish, Gross & Jovanis 2005; Muylle, Moenaert & Despontin 2004; Zhang & Dran 2001). These contributions have been formulated as Usability construct in this study, which examines whether the ELX service is usable or not. In general, Usability covers aspects such as easy to learn, easy to use, user's friendly, easy to remember, and making minimal error (Fitzpatrick & Higgins 1998). While the importance of usable and reliable information is largely acknowledged, it is also pertinent that the information can be accessed efficiently with minimal effort by the end-user. The Efficiency construct examines the accessibility and organisation of the features and information available in the website (Fayish, Gross & Jovanis 2005; Huizingh 2000; Zhang & Dran 2000). Efficiency gains can also accrue to citizens in terms of reduced waiting time and less money spent on bribes.

The proposed model follows the TAM, TRA, and satisfaction and benefits literature and explains the intention towards the adoption of e-government ELX by postulating eight direct determinants: *information quality, system quality (efficiency, usability, and functionality), security, satisfaction, usage and benefits*. Based on these measures and overall constructs, 36 survey questions were identified. Of this total, 13 of them were based on 3 system quality constructs namely usability (5), functionality (5) and efficiency (3); information quality construct (6); and system security construct (3) were identified as constituents of the satisfaction and usage measures. Two constructs, usage (3) and satisfaction (6) were identified as determinants of benefits measure. These questions were presented as 5-point Likert scale questions, designed to collect responses with varying degrees of agreement or disagreement.

HYPOTHESES

The study proposes 13 hypotheses on the relationships between satisfaction, usage and benefits. First, 10 hypotheses associate with strong influences of security, system quality (efficiency, usability, and functionality) and information quality on e-Government ELX usage and satisfaction. Second, the study also hypothesises that satisfaction affects usage. Thirdly, the study also proposes that benefits are influenced by usage and satisfaction. A SEM model was employed to investigate simultaneous linkages that allow a researcher to determine the relative strength of relationships between these 8 constructs on end-user adoption. In this paper, firstly, the study aims to test the fitness of the overall SEM model based on the

main null hypothesis H_0 : The overall hypothesised model has a good fit. For structural equation modeling, accepting this hypothesis indicates that the model presented adequately reproduce the observed covariance matrix (Bollen 1989; Joreskog 1989; Mueller 1996) and suggests that the data fit the proposed SEM model. Therefore, in the test of goodness of fit for the SEM, the probability that is expected should not be significant (p -value > 0.05) to support the overall null hypothesis which suggests that the overall hypothesised model has a good fit. Then secondly, the study investigates the main research hypotheses of the study regarding the relationships between information quality, three components of system quality (efficiency, usability, and functionality), security, satisfaction, usage and benefit. Therefore, the following 13 main research hypotheses are investigated:

- H_{1A} : Information quality has a positive structural effect on satisfaction
- H_{1B} : Security has a positive structural effect on satisfaction
- H_{1C} : Usability has a positive structural effect on satisfaction
- H_{1D} : Functionality has a positive structural effect on satisfaction
- H_{1E} : Efficiency has a positive structural effect on satisfaction
- H_{1F} : Functionality has a positive structural effect on usage
- H_{1G} : Usability has a positive structural effect on usage
- H_{1H} : Efficiency has a positive structural effect on usage
- H_{1I} : Satisfaction has a positive structural effect on usage
- H_{1J} : Information quality has a positive structural effect on usage
- H_{1K} : Security has a positive structural effect on usage
- H_{1L} : Usage has a positive structural effect on benefits
- H_{1M} : Satisfaction has a positive structural effect on benefits

RESEARCH METHODOLOGY

The primary mode of data collection is through the use of surveys. Respondents were not cued as to what variables the items are measuring so as to improve response reliability. The study context and sample, operationalisation of research constructs, and statistical approach are described below.

RESEARCH DESIGN, STUDY CONTEXT AND SAMPLE

This paper forms part of a larger study on impact of e-government system application. Seven of the lead applications launched by government namely eService, eSyariah, eFilling, eSila, eProcurement, eKL and ELX were studied. This paper is only confined to ELX. A survey questionnaire designed comprised of questions related to (i) the adoption model, (ii) demographics, and (iii) past end-user experience with e-government service ELX. The

survey was designed to inquire about user experiences with the ELX based on information quality, system quality, security, satisfaction and benefits as well as to understand the characteristics of users utilizing this service. The instrument used in this study was a structured survey questionnaire, which was designed to assess the end-users of ELX in term of the described dimensions. To enable respondents to indicate their answers, five-point interval scales were used for the questionnaire. Thirty six items of 8 constructs, which have been widely referred in the previous studies, were extracted. The sample units of analysis in this study are end-users of e-government service delivery namely Electronic Labor Exchange (ELX). One hundred and ninety responses were received and analysed. The primary purpose of the research is to measure factors effecting adoption behaviours of end-users of ELX in Malaysia.

OPERATIONALISATION OF RESEARCH VARIABLES

The operationalisation of research variables can be obtained from Table 1. All items were measured on five-point Likert scales. Perceived benefits was measured by five items such as reducing/ saving cost and time, making task easier, and intention for future usage. Marketing scholars and practitioners have long recognised that customer satisfaction is an important and central concept, as well as an important goal of all business activity. Products and services that provide high customer satisfaction are less vulnerable to competition. Also, they have a higher proportion of repeat business, usage and higher gross margins (Fornell 1992). Customer satisfaction must be managed with extreme care because somewhat and completely dissatisfied customers are equally unlikely to repurchase or reuse a particular firm's product and services (Anderson & Mittal 2000; Mittal & Kamakura 2001).

Satisfaction factor in this study is adapted from DeLeon-McLean model (DeLeon & McLean 1992) with an addition to system security factor. Attributes that measure customer satisfaction are system security, system quality and information quality. Advance technology has increased network security, however, maintenance costs are also increased to maintain customer satisfaction (Laudon & Laudon 2006). Security and trust are central to mostly all daily interactions, transactions, and practices. The open nature of the Internet as a transaction infrastructure and its global constitution has made trust a crucial element of ecommerce. Study by DeLone and McLean (1992) found that system quality and information quality were significant determinants of consumer satisfaction. Information quality is related to the ability of the system to provide precise, up-to-date, sufficient and relevant information. This attribute can also evaluate the system in terms of providing feedback and presenting output in useful format. System quality attribute can be measured by three factors namely usability, functionality and efficiency. Usability is a factor that responsible toward

TABLE 1. Factor and indicator mean scores

Factor/indicator	Mean Score	Factor/indicator	Mean Score
INFORMATION QUALITY	3.74	Has the knowledge to answer questions (SQF5)	3.48
Provides precise information (IQ1)	3.75	Performs services right the first time (SQF6)	3.55
Provides sufficient information (IQ2)	3.63	SYSTEM QUALITY	
Provides up-to-date information (IQ3)	3.81	Efficiency	3.85
Provides relevant information (IQ4)	3.89	Increases productivity (SQE1)	3.97
Output presented in useful format (IQ5)	3.78	Get the information needed in time (SQE2)	3.87
Provides report exactly as required (IQ6)	3.61	Accomplishes task more quickly (SQE3)	3.71
SYSTEM SECURITY	3.79	SATISFACTION	3.66
Confidence in the system (SS1)	3.87	Delivers information as promised (S1)	3.67
System prevents modification and unauthorized usage (SS2)	3.76	Fast and accurate transactions (S2)	3.72
System is trustworthy (SS3)	3.74	Various services can be done concurrently (S3)	3.72
SYSTEM QUALITY		Gives prompt service (S4)	3.63
Usability	3.72	Meets my expectation (S5)	3.47
Easy to use (SQU1)	3.87	I am satisfied with the system (S6)	3.76
User friendly (SQU2)	3.72	BENEFITS	4.11
Easy to learn (SQU3)	3.87	I will use the system in the future (B1)	4.11
Reliable (SQU4)	3.71	The system makes task easier (B2)	4.08
Making mistake is slim (SQU5)	3.45	The system saves times (B3)	4.14
Functionality	3.68	The system saves cost (B4)	4.04
Provides an extensive explanation about its usage (SQF1)	3.56	The system is beneficial (B5)	4.19
Can precisely record user history (SQF3)	3.90	USAGE	3.28
Let users finish the transaction at their own times (SQF4)	3.91	I am dependent on the system (U1)	3.25
		I use the system frequently (U2)	3.31
		I prefer the system compared to counter services (U3)	3.80

Note: Field Work 2010.

the capability of the system to be easily understood, learned, used and convenient. Degree and problem with the usability depends on the customers’ perceptions on the usage of the system. Davis (1989) defined perceived ease of use or usability as “the degree to which a person believes that using a particular system would be free from effort” (p. 320). Gefen and Straub (2000) advocated that perceived ease of use measures user assessments of ease of learning which is characterized as ease of control, ease of selection and ease of obtaining information. It influences

an individual’s perceived behavioural ability to use information technology (Davis et al. 1989). Functionality is a factor that responsible for the existence of a set of functions needed for a particular e-Government system in this case ELX. Efficiency is a factor that responsible for the relationship between level of achievement of a particular service and amount of resources used in a particular situation. The above discussions have led to the formulation of our research model, which is summarised in Figure 1.

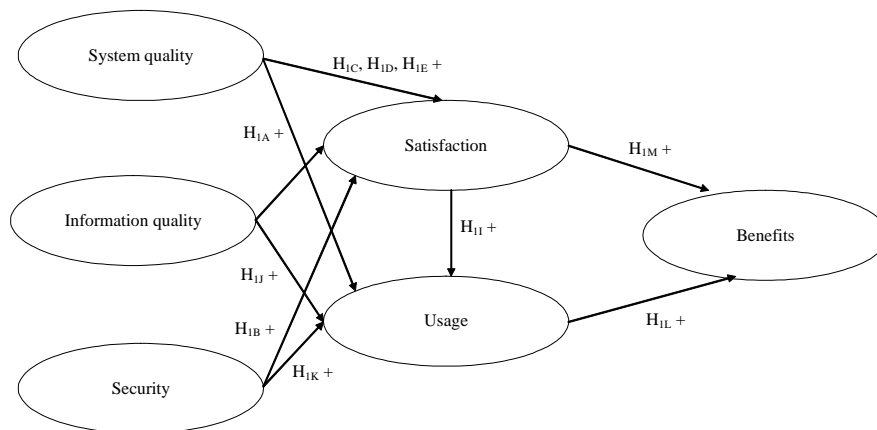


FIGURE 1. The proposed research ELX adoption model

INDEPENDENT AND DEPENDENT VARIABLES'
MEASUREMENTS: FACTOR ANALYSES,
VALIDITY AND RELIABILITY

As the initial data analysis, all 8 constructs were subjected to factor analyses, validity and reliability tests. Since data for this study was generated using multi-scaled responses, it was deemed necessary to test for reliability. The reliability analysis is concerned with the consistency of the research findings and most frequently associated with multi-item scales. The validity and reliability tests were computed to select and assess the final items of the constructs that would be utilized for statistical and hypotheses testing (Nunnally 1978; Ahire, Golhar & Walter 1996). The reliability analysis was conducted by computing the Cronbach's alpha for the main constructs. Exploratory factor analysis (EFA) was conducted to investigate whether the factors derived from the exploratory factor analysis fit the constructs described theoretically in the literature review. Three dimensions of service quality namely efficiency, usability, and functionality; security, usage, satisfaction and benefits adapted from several sources were included in the study.

RESULTS AND MODEL EVALUATION

Background data collected in the study can be divided into three different groups – demographics, ELX usage, and experience with ELX service. Demographic data included information such as Age, Gender, Level of Education, Employment Status, and Ethnicity. Further, data regarding experiences using ELX service was collected. About 58.9 percent of respondents were under or equal to 25 years of age. This was due to the nature and types of the services offered by ELX for people searching for jobs. Nearly 60 percent of respondents were females. Most of the respondents were Malays. More than 55 percent of respondents had a Bachelor's degree. Nearly 39 percent of respondents were students. The majority of respondents were employed. About 71 percent respondents were single. The percentages of respondents with either no working experience or 1 – 5 years working experience were 42.3 and 32.8, respectively. Most of the respondents were either from education (32.1%) or services (26.3%) sectors.

The model presented in Figure 1 was evaluated using exploratory confirmatory factor analysis (CFA) (Byrne 2001). SPSS v12.0 was used to calculate item reliability and Cronbach alpha (Nunnally 1978) for the 8 constructs. Table 2 illustrates the reliability estimates. Initially, to filter out the variables that failed to explain the cohesiveness of a construct, corrected item-to-total correlations and Cronbach alphas were examined per construct. Variables with low corrected item-to-total correlations (i.e. < 0.50) and pair-wise correlations (i.e. < 0.50) were removed. Constructs with Cronbach alpha less than 0.70 were removed from further analysis. The reliability result shows

TABLE 2. Factor reliability tests

Factor	Indicator	Cronbach Alpha
Information Quality (IQ)	6	0.868
System Security (SS)	3	0.793
System Quality		
Usability (SQU)	5	0.791
Functionality (SQF)	5	0.800
Efficiency (SQE)	5	0.805
Satisfaction (S)	6	0.897
Benefits (B)	5	0.877
Usage (U)	3	0.758
Total number of indicators	36	0.958

Note: Field work 2010

that the Cronbach's alpha measures for the main constructs exceed the threshold point of 0.70 suggested by Nunnally (1978). All alpha coefficients ranged between 0.791 and 0.958. The result from the exploratory factor analysis indicates that the KMO (Kaiser-Meyer-Olkin) measure is 0.885 with significant chi-square value (Barlett's Test of Sphericity = 750.01). The value of KMO in this analysis surpasses the threshold value of 0.50 as recommended by Hair et al. (1998). All constructs exhibit high factor loadings and fall into the 8 designated factors. This result provides evidence to support the theoretical conceptualization of the 8 constructs.

Given the confirmatory nature of this study, the statistical analysis technique called structural equation modeling (SEM) was utilised. A SEM model was employed to investigate simultaneous linkages that allow a researcher to determine the relative strength of relationships between service quality, information, security, usage, satisfaction and benefits. To support the assumption regarding the fitness of the SEM model with the empirical data, the acceptance of the null hypothesis of the overall model is expected. Hence, in this test of goodness of fit for the structural equation modeling, the resulting probability should be higher than 0.05 to support the overall null hypothesis of the model. The overall model was evaluated using SAS v9.2 statistical software using Maximum Likelihood Estimation (MLE) as the variables were found to be multivariate normal and the sample size was moderate (Hair et al. 1998) and reported in Figure 2 and Table 3.

Figure 2 depicts results of the final ELX adoption model based on SEM. The SEM result in Figure 2 indicates that the direct structural effect of 'information quality' on 'satisfaction' is the highest with structural effect value of 0.746 (Figure 2 and Table 3) suggesting that 'information quality' is an important determinant of satisfaction on e-government service ELX in Malaysia. The standardized structural coefficient of 'information quality' on 'satisfaction' is associated with low standard error (0.206) and non-zero critical ratio (3.621), which indicates that the structural effect between these two constructs, is positive and relationship is significant. The direct structural effect

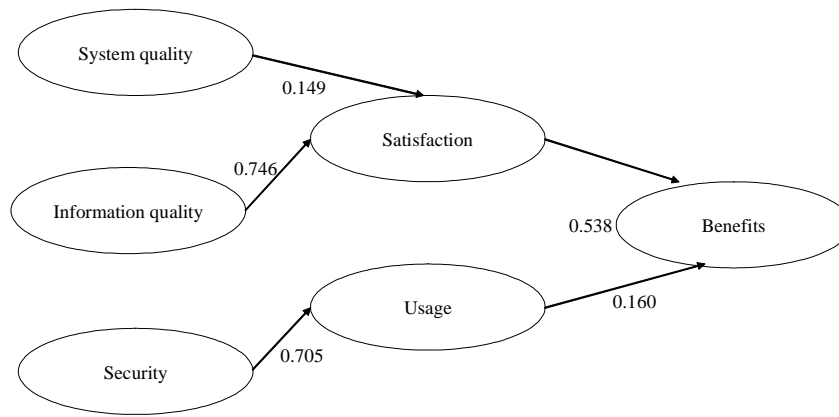


FIGURE 2. The final ELX adoption model

TABLE 3. Structural and measurement results of the SEM ELX adoption model

(i) Construct/ Indicator	Std. Loadings	Std. Errors	Critical Ratio	Prob.
INFORMATION QUALITY				
Provides precise information (IQ1)	0.769	0.120	6.408	0.000
Provides sufficient information (IQ2)	0.712	0.117	6.085	0.000
Provides up-to-date information (IQ3)	0.691	0.121	5.710	0.000
Provides relevant information (IQ4)	0.746	0.112	6.660	0.000
Output presented in useful format (IQ5)	0.705	0.109	6.467	0.000
Provides report exactly as needed (IQ6)	0.676	0.115	5.878	0.000
SYSTEM SECURITY				
Confidence in the system (SS1)	0.790	0.095	8.315	0.000
System prevents modification and unauthorized usage (SS2)	0.687	0.107	6.420	0.000
System is trustworthy (SS3)	0.739	0.120	6.158	0.000
SYSTEM QUALITY				
Usability				
Easy to use (SQU1)	0.744	0.098	7.591	0.000
User friendly (SQU2)	0.753	0.095	7.926	0.000
Easy to learn (SQU3)	0.731	0.089	8.213	0.000
Reliable (SQU4)	0.566	0.093	6.086	0.000
Making mistake is slim (SQU5)	0.503	0.086	5.848	0.000
Functionality				
Provides an extensive explanation about its usage (SQF1)	0.678	0.105	6.457	0.000
Can precisely record user history (SQF2)	0.649	0.100	6.490	0.000
Let users finish the transaction at their own times (SQF3)	0.585	0.102	5.735	0.000
Have the knowledge to answer questions (SQF4)	0.677	0.110	6.154	0.000
Performs services right the first time (SQF5)	0.716	0.103	6.951	0.000
Efficiency				
Increases productivity (SQE1)	0.736	0.087	8.459	0.000
Get the information needed in time (SQE2)	0.765	0.101	7.574	0.000
Accomplishes task more quickly (SQE3)	0.756	0.115	6.573	0.000
CUSTOMER SATISFACTION				
Delivers information as promised (S1)	0.781	0.087	8.977	0.000
Fast and accurate transactions (S2)	0.744	0.086	8.651	0.000
Various services can be done concurrently (S3)	0.725	0.091	7.967	0.000
Gives prompt service (S4)	0.743	0.089	8.348	0.000
Meets my expectation (S5)	0.783	0.086	9.104	0.000
I am satisfied with the system (S6)	0.753	0.076	9.907	0.000
BENEFITS				
I will use the system in the future (B1)	0.680	0.117	5.811	0.000
The system makes task easier (B2)	0.833	0.108	7.712	0.000

Continued

TABLE 3. *Continued*

(i) Construct/ Indicator	Std. Loadings	Std. Errors	Critical Ratio	Prob.
The system saves times (B3)	0.810	0.107	7.570	0.000
The system saves cost (B4)	0.706	0.114	6.129	0.000
The system is beneficial (B5)	0.718	0.119	6.033	0.000
USAGE				
I am dependent on the system (U1)	0.529	0.119	4.445	0.000
I use the system frequently (U2)	0.795	0.115	6.913	0.000
I prefer the system compared to counter services (U3)	0.860	0.205	4.195	0.000
(ii) Exogenous / Endogenous Path				
a. INFORMATION QUALITY → SATISFACTION	0.746	0.206	3.621	0.000
b. SECURITY → SATISFACTION	-0.129	0.093	-1.387	0.144
c. USABILITY → SATISFACTION	0.186	0.116	1.603	0.101
d. FUNCTIONALITY → SATISFACTION	0.025	0.128	0.195	0.842
e. EFFICIENCY → SATISFACTION	0.149	0.057	2.614	0.000
f. FUNCTIONALITY → USAGE	0.320	0.185	1.729	0.139
g. USABILITY → USAGE	-0.198	0.177	-1.118	0.340
h. EFFICIENCY → USAGE	-0.089	0.125	-0.712	0.555
i. SATISFACTION → USAGE	0.541	0.329	1.644	0.170
j. INFORMATION QUALITY → USAGE	-0.553	0.489	-1.130	0.196
k. SECURITY → USAGE	0.705	0.172	4.098	0.000
l. USAGE → BENEFITS	0.160	0.068	2.352	0.000
m. SATISFACTION → BENEFITS	0.538	0.064	8.406	0.000

Note: Field work 2010.

of 'efficiency' on 'satisfaction' is higher and significant (structural effect value of 0.149) with low standard error (0.057) and non-zero critical ratio (2.614). The direct structural effect of 'security' on 'usage' is also high and significant (structural effect value of 0.705) with low standard error (0.172) and non-zero critical ratio (4.098).

Table 3 also reports that the indirect structural effect of 'satisfaction' on 'benefits' is also substantial with structural effect value of 0.538 suggesting that 'satisfaction' is an important determinant of 'benefits'. This standardized coefficient is associated with low standard error (0.064) and non-zero critical ratio (8.406), which indicates that the structural effect between these two constructs, is positive and relationship is significant. Furthermore, the relationship between 'usage' and 'benefits' is also positive and significant with structural effect value of 0.160 and low standard error (0.068). Therefore, we have enough evidence to accept these 5 out of 13 main research hypotheses. Firstly, 'information quality' and 'efficiency' have positive significant structural effects on customer satisfaction (H_{IA} and H_{IE}). Secondly, 'security' has a positive structural effect on 'usage' (H_{IK}) and thirdly, both 'usage' and satisfaction have positive structural effects on 'benefits' (H_{IL} and H_{IM}). Thus, the evidence is clear to suggest that 'information quality' and 'efficiency' can improve end-user satisfaction, 'security' can enhance 'usage' and furthermore 'usage' and 'satisfaction' can indirectly generate 'benefits'. Looking at the structural loadings of 'information quality' and 'efficiency' determinants on 'satisfaction', these two constructs have positive impacts on 'satisfaction' but 'information quality' has the higher contribution toward

'satisfaction'. The results also show that 'usage' and 'satisfaction' constructs have positive and significant impacts on 'benefits' with the latter has the higher contribution.

On the other hand, the study rejects the hypotheses that other dimensions of system quality namely usability and functionality positively affect satisfaction. The study also does not find enough evidence to accept the hypotheses that all three dimensions of system quality positively affect usage. Many studies of perceived ease of use and usefulness on intention to use IT/ system generate contradictory results. Some studies suggest that perceived ease of use positively influences intention to use (Davies et al. 1989; Venkatesh and Davis 1996), while others propose a negative relationship between them (Davies 1989; Szajina 1994). A potential reason for these inconsistent results may be due to the use of different assumptions in users' motivations. Teo et al. (1999) and Venkatesh (2000) studies found that perceived ease of use actually reflect users' intrinsic motivations to use a particular system.

Various recommendations have been proposed for fit-indices depicted in Table 4. Although there is no clear-cut guideline about what value of CMIN/df is acceptable, a frequent suggestion is that this ratio should be less than 3 (Kline 1998). In this study, value of less than 3 was obtained. Other indices have been recommended, as they are less sensitive to sample sizes, such as GFI and AGFI. Both of the indexes range from 0 to 1 with values close to 1 being indicative of good fit. However, no absolute threshold levels for acceptability have been established (Hair et al. 1998). Based on the values obtained in this

study, it can be concluded that the model fits the sample data. PGFI is indicative of parsimony in the model with a value greater than 0.5 indicates better parsimony. NFI and CFI have been proposed to be the practical criterion of choice. CFI values of 0.953 and greater for a model have been generally considered as an indication of a well-fitting model (Bentler 1988). Similar values (≈ 0.95) have been obtained in these analyses. Values of 0.05 or less have been proposed for error approximation and residuals (Byrne 2001). Value of 0.045 has been obtained in this study. This analysis yielded the following results: GFI – 0.927, AGFI – 0.931, NFI – 0.914, CFI – 0.953, RMSEA – 0.064, RMR – 0.041.

TABLE 4. Results of the overall model fit

Statistics	Model Values	Recommended values for good fit
Probability Level	> 0.10	≥ 0.05
χ^2/df	1.904	≤ 3.00
Bollen (1989) Incremental Fit Index (IFI)	0.935	≥ 0.90
Parsimony Goodness of Fit (PGFI)	0.675	≥ 0.5
Adjusted Goodness of Fit Index (AGFI)	0.931	≥ 0.90
Bentler (1988) comparative fit model (CFI)	0.953	≥ 0.90
Normed fit index (NFI)	0.914	≥ 0.90
Goodness of fit index (GFI)	0.927	≥ 0.90
Root Mean Squared Error of Approximation (RMSEA)	0.064	
Root Mean Square Residual (RMR)	0.041	

Note: Field work 2010.

The results of the study suggest that ‘information quality’ and ‘efficiency’ are important factors that influence ‘satisfaction’ with the ‘information’ construct affects the most. Features related to efficient access were also found to be determinants of overall satisfaction in using ELX services. These features included better organisation and integration of content as well as visual presentation. The study also suggests that ‘security’ is an important factor in affecting ‘usage’. Furthermore, usage and satisfaction are important factors that influence ‘benefits’.

CONCLUSION AND IMPLICATION

The primary objective of this paper was to provide a conceptual model that determines the drivers of citizens’ intention towards e-government on one hand, and their relation to the use of e-government, on the other. The comprehensive, yet parsimonious model proposed in the present paper makes an important contribution to the emerging literature on e-government adoption by grounding new variables into well-accepted model (TAM) and applying them to a new context of e-government. This

paper provides several preliminary insights into the citizen’s’ adoption of e-government.

The model presented in this paper provides a coherent framework for further empirical research on the phenomenon of e-government adoption. With proper operationalisation and methodology, an empirical testing of the hypotheses generated from the model will lead to a better understanding of citizen’s adoption of e-government. The results will clarify and enrich the proposed model and will extend its boundaries. This will assist the e-government practitioners to determine which antecedent to focus on in order to increase the adoption rate of e-government. The antecedents of intentions can be influenced by appropriate advertising and marketing campaigns, visible privacy policies and the web site design. Finally, the proposed model describes a concrete set of factors that will help to transform a citizen from a curious observer to one who is willing to perform e-Government transactions. Such understanding will provide the practitioners with a set of manageable, strategic levers to promote greater acceptance of e-government.

The results show significant positive relationships between several factors and end-users’ decision to adopt e-Government service ELX. The information quality & efficiency constructs positively affect satisfaction, security positively affects usage; and usage & satisfaction positively affect benefits. Some possible implications of our study are that government needs to increase public awareness of direct and indirect benefits of their e-services, to improve and increase quality of services through citizen orientation by setting service standard and greater accessibility, to portray e-services as up-to-date, effective and secure, and to put in place various incentives to encourage their adoption. A performance culture must be established throughout the government organisation with an emphasis on continuous improvement, monitoring, assessing and measuring performance at the strategic, service and local levels. The approaches of using the experience of citizens and involving them in monitoring and evaluating services will help the government to identify problems and implement innovative solutions resulting in better public service performance.

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