Predictors for e-government adoption in Jordan
Deployment of an empirical evaluation based on a citizen-centric approach

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Abstract
Purpose – This paper aims to engage with the growing debate on the factors that affect e-government adoption in the developing country of Jordan. The change from traditional interactions between government and citizens in Jordan to interaction via the web needs further exploration in order to understand the factors that might affect e-government adoption by citizens. This paper therefore aims to report on a study to identify the main factors that influence citizens’ intention to adopt e-government websites in Jordan, using a theoretical framework consisting of diffusion of innovation theory (DOI) and the technology acceptance model (TAM).

Design/methodology/approach – A survey study of 400 Jordanian citizens who were internet users investigated the influence of the aforementioned factors on the adoption and use of e-government websites. Multiple regression analysis was used to test the hypotheses.

Findings – Contrary to previous research, trust in the internet, relative advantage, compatibility and perceived ease of use were not found to be significant predictors of intention to use e-government websites. Trust in government, website design, beliefs, complexity and perceived usefulness were significant factors in Jordanian citizens’ intention to use e-government websites.

Originality/value – This study is one of the few to examine what influences adoption and use of e-government websites by citizens in the Middle East. The study clearly identifies the relationship between the constructs of “beliefs” (religious views) and website design and e-government adoption, and explores the influence of attitudes towards e-government adoption in Jordan. Although previous studies show similarities between the constructs related to DOI (relative advantage and complexity) and those related to TAM (perceived usefulness (PU) and perceived ease of use (PEoU)), this research shows the importance of including these constructs when considering the topic of e-government adoption in a Middle Eastern country.

Keywords E-government, Adoption, Intention to use, Factors, Jordan, Developing countries, Middle East, Information society

Paper type Research paper

Introduction

It would be reasonable to expect that the successful introduction of information and communication technologies (ICTs) such as e-government would depend on many factors, including social and attitudinal factors. But are these factors the same for all countries? Could, say, e-government adoption factors developed in the United States be the same factors that lead to successful e-government adoption in the developing Middle Eastern country of Jordan? This paper reports on research exploring this topic and argues that new factors must be identified and understood in order for e-government adoption to be successful in different national contexts.

The government in Jordan has acknowledged the importance of e-government as an initiative to develop the social life in Jordan and to create a knowledge-based society (MoICT, 2006a), however it tends to follow Western models and strategies of implementation. Because these strategies have been developed and designed to suit the social life of Western countries, they may not be applicable to the Jordanian context, since the social and cultural systems in Jordan are different from those of the West (Hill et al., 1998; Hofstede, 2009). Therefore, Jordan (and other developing countries) will encounter social impediments when implementing e-government. Ciborra and Navarra (2005) mention that an e-government initiative will stand a better chance “if it acquires the scope of a truly ‘regional’ learning experiment aimed at evolving and integrating closely with the local economic, social, cultural, and political contexts” (p. 156). This study therefore offers greater understanding of the factors that may influence citizens to utilize e-government websites in their daily life to interact with the government in Jordan.

This paper uses a citizen-centric approach to determine the factors that influence e-government adoption by citizens in Jordan. Lack of citizen-centricity in the implementation of e-government is one of the main challenges of e-government implementation in Jordan (MoICT, 2006b). In light of this challenge, a lack of participation by citizens in e-government is expected. The e-government strategy in Jordan states that a successful implementation of e-government in Jordan needs effective participation by different stakeholders, including citizens, who “share ownership of e-government” (MoICT, 2006a). Gunter (2006) demonstrates that e-government “does not just depend on computer power, but also on the willingness of people to adopt it as a normal form of interface in respect of public services” (p. 365). Thus, this study had two main objectives: identifying the initial group of factors that might be related to e-government adoption and confirming the relationship between these factors and e-government adoption.

The E-government Strategy in Jordan demonstrates the main vision of e-government in Jordan (MoICT, 2006a):

E-Government in Jordan is dedicated to delivering services to people across society, irrespective of location, economic status, education or ICT ability. With its commitment to a customer-centric approach, e-Government will transform the government processes and contribute to the Kingdom’s economic and social development (MoICT, 2006a, p.10).

As can be seen in this vision of e-government in Jordan, citizens represent the core concern of the e-government project. This research paper focuses on citizens as the main users of e-government to examine the factors that would deter their intention to use e-government websites. On the other hand, the e-government vision also indicates the government intention to change their processes. This change might include a change in the way the government governs the people, such as increasing citizens’
engagement in political and public decision making (E-democracy). Yet, e-democracy is beyond the main core purpose of this research although it has been listed as one of the e-government initiatives (functions), in addition to e-services, e-administration, and e-society (Al-Omari, 2006; Heeks, 2002). E-democracy focuses mainly on how to utilise ICTs in political and governance processes (Mahrer and Krimmer, 2005). E-voting is one of the e-democracy’s mechanisms that present the internet as a tool to enable people to vote.

This research paper focuses mainly on the G2C e-service function. Services have been described as the heart of e-government (MOICT, 2006a). Internet websites were chosen as the main channel used to deliver e-government services to customers (MoICT, 2006b). This research identifies government websites as the main gateway to deliver government services and therefore it focuses on testing the factors that might influence their adoption by citizens in Jordan.

This study proposes an exploratory model of 11 fundamental constructs that affect intention to use e-government services:

1. trust in the internet;
2. trust in government;
3. attitudes;
4. beliefs;
5. internet and computer skill confidence;
6. website design;
7. perceived usefulness;
8. perceived ease of use;
9. relative advantage;
10. compatibility; and
11. complexity.

The model uses the Diffusion of Innovation Theory (DOI) (Rogers, 1983) and Technology Acceptance Model (TAM) (Davis, 1989) as a steering theoretical framework. This study measured intention to use an e-government website, which has been found to be a strong predictor of actual systems usage in the information systems (IS) literature (Chau and Hu, 2001; Gefen and Straub, 2000; Venkatesh et al., 2003). In general, previous research examining the technology adoption model used terminology relating to the intention or willingness to use (Carter and Bélanger, 2005; Bélanger and Carter, 2008; Chang et al., 2005; Gefen and Straub, 2000; Gilbert and Balestrini, 2004; McKnight et al., 2002; Pavlou, 2003; Van Slyke et al., 2004).

This paper offers a brief discussion of previous research work that has addressed factors relevant to e-government adoption. After outlining the research theoretical framework, the research model and the proposed hypotheses are presented. Data for this study was collected using a questionnaire and was analyzed using factor analysis and multiple regression. The significant findings, including the research implications and the limitations of the study, are then discussed before the conclusion of the study.
Review of the literature

Previous research has identified different e-government models which have focused on different areas such as e-government development (Layne and Lee, 2001; Reddick, 2004) and the adoption of e-government ((Bélanger and Carter, 2008; Carter and Bélanger, 2005). Layne and Lee (2001) introduced a development model of e-government that includes four stages of development. These are Catalogue, Transaction, Vertical Integration, and Horizontal Integration. These stages consider the citizens as the main users of e-government. Reddick (2004) presented another development model as a two-stage model of e-government focusing on Cataloguing and Transactions. Reddick’s (2004) focuses mainly on the Government to Citizens (G2C) relationship. This paper focuses on this type of relationship (G2C) to test the factors that would influence citizens to adopt e-government websites. Therefore, more attention is given in this research paper to the area of e-government adoption. Thus, this article focuses on a different relationship presented in the adoption models that are published in previous studies (Bélanger and Carter, 2008; Carter and Bélanger, 2005). The following is the representation for main factors and their related literature.

Trust in the internet

Trust is an important element of e-government (Warkentin et al., 2002). This paper examines the impact of trust issues on e-government adoption by citizens. Trust issues are categorized as trust in the internet in terms of security and privacy, and trust in government. Carter and Bélanger (2005) emphasise that “citizens must have confidence in both the government and the enabling technologies” (p. 9).

Trust in the internet is often identified as institution-based trust (Carter and Bélanger, 2005; Bélanger and Carter, 2008), which is “the belief that needed structural conditions are present (e.g. in the internet) to enhance the probability of achieving a successful outcome in an endeavour like e-commerce” (McKnight et al., 2002, p. 339). Jordan is a developing country that faces the challenge of establishing a legal framework to govern the utilization of information communication technologies (ICT), regarding issues such as consumer protection, cyber crimes and privacy (MOICT, 2006a). Thus, Jordanian citizens may be concerned about the privacy and security of their information, even when dealing with government agencies via the internet. Prior research has extensively recognized trust in the internet as a significant predictor of e-government services adoption (Carter and Bélanger, 2005; Chang et al., 2005) and this research recognizes its importance.

In the developed countries, Carter and Bélanger (2005) examined the significant role of trust in citizens’ intention to use e-government websites by designing a model for e-government adoption that examined the factors that influence citizens’ adoption of e-government initiatives. The model integrates the constructs from the Technology Acceptance Model, Diffusion of Innovation Theory, and Web Trust Model. By collecting 105 questionnaires from citizens at a community concert who had different levels of computer and internet expertise, Carter and Bélanger (2005) argued that trust in the internet and trust in government are significant factors that affect citizens’ intention to use e-government services.

With regard to developing countries, Chang et al. (2005) and Phang et al. (2005) have provided two empirical studies based on the Technology Acceptance Model (TAM) in Taiwan and Singapore, respectively. The two authors found that trust in the internet
(security and privacy) influence intention to use e-government services. Yet, these two indicate the indirect and intermediate influence of trust in the internet (security and privacy) over citizens’ intention to use e-government services in two developing countries. Also, the two studies included trust in one of the broader adoption models, the Technology Acceptance Model (TAM). The current study explored the role of trust in the internet (security and privacy) in e-government adoption by testing the direct relationship between the two constructs. It also focused on the adoption of e-government websites in general without focusing on a specific service. These arguments informed the first hypothesis:

H1. Higher levels of trust in the internet will be positively related to higher levels of user intention to use e-government websites in Jordan.

Trust in government
“Trust in government” can be defined as the public’s assessment of government based on their perceptions of political authorities’, agencies’ and institutions’ integrity and capability to provide services according to the expectations held by the citizens (Belanger and Carter, 2008; Levi and Stoker, 2000; Mayer et al., 1995). The government in Jordan displays a lack of collaboration between its entities in drafting laws and regulations related to ICT usage, standardisation of the system’s use, and sharing of information (MOICT, 2006a). These issues may cause the government in Jordan to deliver its services and information inefficiently. Thus, Jordanian citizens may be suspicious of the government’s capability to implement e-government systems with the full features that would meet their expectations, such as an efficient and secure transaction processes. This study therefore explored the influence of citizens’ trust in government over their intention to utilise e-government services.

Previous research indicates the importance of addressing the role of trust in government in influencing e-government adoption (Belanger and Carter, 2008; Carter and Belanger, 2005; Welch et al., 2005). Belanger and Carter (2008) provided empirical evidence by examining the influence of trust in government over e-government adoption in the USA. They found that trust in government is a significant factor influencing citizens’ intention to use e-government.

Trust in government is therefore recognized as a major concern for the adoption of e-government. However, there is a lack of research examining the influence of trust in government on e-government adoption in countries ruled by a monarchy, such as Jordan. The above discussion therefore suggested the second hypothesis:

H2. Higher levels of trust in government will be positively related to higher levels of user adoption of e-government websites in Jordan.

Attitudes and beliefs
It is idealistic to believe that the people in any community view the Web as a powerful tool for advancing the efficiency of their interactions with the government. In reality, some people might be more enthusiastic about interacting with the government traditionally, via face-to-face interaction, due to negative attitudes or beliefs about the usage of online services (Vassilakis et al., 2005). Taylor and Todd (1995) define “attitude” as a positive or negative feeling that individuals might have towards performing a behavior; and the individual’s beliefs about consequences of that
behavior and evaluation of the desirability of those consequences represent a
determinant for that behavior (Fishbein and Ajzen, 1975). This research uses the
following definition of “attitudes” in relation to e-government:

A positive or negative feeling that individuals might have towards interaction with the
government online through its websites.

On the other hand, “beliefs” can be described as the individual’s subjective perception
of the probability that performance of a given behavior will result in a given
consequence (Fishbein and Ajzen, 1975; Taylor and Todd, 1995). This study takes into
account the different kinds of beliefs, such as religious beliefs, about the internet. As an
example, some people in Jordan will not connect to the internet from home, as they may
believe that their family members would have access to the internet and would thus be
able to view various immoral themes that appear on websites. Therefore, this study
uses the following definition of “belief”:

An individual’s subjective perception of the probability that performance of a given behavior
will result in a given consequence.

“Attitudes and beliefs” are proposed in this research to be significant factors
influencing e-government adoption by citizens in Jordan. As mentioned above, the
method of implementing e-government is usually consistent with the norms, traditions,
beliefs and attitudes of people in Western communities, that are different from those of
Middle Eastern societies. Thus, this research highlights the importance of
investigating the effect that the attitudes and beliefs of people in Jordan may have
on their intention to use e-government services. Many researchers articulate the
significant influence of attitudes and beliefs over the usage of information technology,
including the internet and government e-services (Charbaji and Mikdashi, 2003; Davis,
1989; Evans and Yen, 2005; Leonard et al., 2004; Norton, 2002; Persaud and Sehgal,
2005; Pons, 2004; Vassilakis et al., 2005).

Persaud and Sehgal (2005) conducted a study to gain a deeper understanding of how
and why Canadians use e-government. The researchers designed a model that is an
extension of both the Technology Acceptance Model (TAM) and the Diffusion of
Innovation Theory (DOI). The researchers found that attitude is a significant predictor
of citizens’ intention to use e-government. Persaud and Sehgal’s (2005) conclusion is in
line with the findings of Chu and Wu (2005) and Hung et al. (2006), who conducted
studies in a newly developing country, Taiwan. Based on intention-based theoretical
models (TAM, Theory of Planned Behavior [TPB], and Decomposed Theory of
Planned Behavior [DTPB]), the authors found attitude is one of the factors that
influence e-government services’ acceptance in Taiwan. The studies explored the
influence of attitudes based on the utilization of broad theories and model. This study
investigated the direct influence of citizens’ attitudes over their intention to use
e-government websites in the developing Arabic country of Jordan. Therefore, the third
hypothesis states that:

\[ H3. \quad \text{A higher level of positive attitudes regarding the internet will be positively}
\text{related to higher levels of user adoption of e-government websites in Jordan.} \]

This study also took into account the influence of beliefs over citizens’ intention to use
e-government. The introduction of the internet and online communities has prompted
researchers to focus attention on investigating their impact on social life, especially in Arabic communities where religion and tradition play a significant role in individuals’ lives (Al-Saggaf, 2004; Hill et al., 1998; Hofheinz, 2005). Hofheinz (2005) found that although internet use in the Arab nations is similar to worldwide patterns in terms of the expansion and facilitation of social networks, information and entertainment, internet use in the Arabic region has two unique features: religion and Arab users’ willingness to engage in discussions on topics related to politics, religion and sex. Norton (2002) states that Arabic religious beliefs can discourage internet usage due to a number of moral issues, such as access to adult-oriented websites. Similarly, in researching the countries of Eastern Europe, the former Soviet Union and Mongolia, Dimitrova and Beilock (2005) found that religion plays a critical role in determining the adoption of the internet.

This study presents Jordan as another example of an Arabic community in which religion plays a significant role in defining the culture and acts as a major force in determining the social norms, patterns, traditions, obligations, privileges and practices of society. Thus, this study sought a depth evaluation of the impact of Jordanians’ religious beliefs on their intention to use e-government, as there is a lack of research examining the relationship between measurements of religious belief and e-government adoption.

Negative attitudes towards e-government adoption are also related to fear of job loss due to the elimination of paper-based work (Vassilakis et al., 2005). In collecting 346 online questionnaires from the UK, Spain and Greece, Vassilakis and colleagues (2005) found that a general attitude against electronic services was one of the main barriers to electronic service development, acceptance and use. They found that specific citizens in the communities had a negative stance against electronic services and preferred the traditional paper-based channels of interaction. This study therefore includes fear of job loss as another measurement of beliefs, reflected in the fourth hypothesis:

**H4.** A higher level of positive beliefs regarding the internet will be positively related to higher levels of user adoption of e-government websites in Jordan.

*Internet and computer skill confidence*

Having the skills to use the internet and to use computers to interact with e-government is a core predictor of e-government adoption (Bélanger and Carter, 2008; Pons, 2004; Wangpipatwong et al., 2008; Welch et al., 2005). Dugdale and colleagues (2005) argue that: “Once people have the infrastructure to go online, they need the awareness, skills and online content to motivate their access” (p. 111). According to Pons (2004), awareness of the internet, understanding of the internet, and workers with information technology skills are the three key elements to ensure the successful adoption of any technology. This study examined the influence of technical competence (internet and computer skill confidence) on e-government adoption in Jordan.

In the USA, Bélanger and Carter (2008) used data from a previous study (Carter and Bélanger, 2005) to explore the influence of the digital divide on e-government usage. The authors designed a model for internet usage in the USA with the two categories of “access” and “skill”. The “skill” category consists of four different constructs, including “computer experience” and “general internet use”. The researchers created the survey items, excluding the items of the “use of e-government” (USE) constructs that were
taken from a previously validated instrument. Bélanger and Carter (2008) found that computer experience does not influence e-government usage, while internet use has a direct influence on e-government usage.

Aladwani (2003) explored the characteristics of e-commerce in relation to the challenges facing the diffusion of the internet in Arabic countries. The review revealed that “most Arab countries still have a long way to cover before being able to fully realize the benefits of the internet” (p. 9). Pons (2004) emphasized the significant role of the high level of illiteracy, including IT illiteracy, in information technology adoption in Arabic countries. Aladwani’s (2003) research led the current research to propose that in relation to Jordan, higher levels of ability to use the internet and computers would be positively related to higher levels of user adoption of e-government websites:

H5. Higher levels of ability to use the internet and computers will statistically predict higher levels of user adoption of e-government websites.

Website design
As e-government websites have become the main channel for online interaction between the government and citizens, designing user-centered websites has become a concern of governments (Becker, 2004). Bertot and Jaeger (2006) argue that accessibility is one of the most important considerations in building useful user-centered e-government services. Studies demonstrate the importance of well-presented content on government websites in ensuring citizens’ satisfaction with the services provided (Smith, 2001; Wang et al., 2005; Zhang and von Dran, 2000).

Wang and colleagues (2005) state that without appropriate evaluation of web-based e-government services, some of the e-government benefits, such as fast access to government services and cost reduction, cannot be assured. In an empirical evaluation of the influence of website design on e-government adoption, Gilbert and Balestrini (2004) conducted a study in the UK to examine the main predictors of individuals’ willingness to use government e-services. Visual appeal emerged as a significant factor that influenced citizens’ willingness to use government e-services.

Abanumy and colleagues (2005) explored the importance of web usability and accessibility with respect to e-government websites in two Arabic countries, Saudi Arabia and Oman. They used an email survey to explore the reasons behind the lack of accessibility/usability of e-government websites. The authors found that lack of awareness of the importance of websites’ accessibility and unavailability of the accessibility policy was the mean reasons behind the inaccessible websites. In general, they found that the government websites still needed considerable work in order to become accessible websites to the public.

This research embraced the idea that it is necessary to investigate the influence of government website design on citizens’ intention to adopt e-government websites in order to ensure successful employment of e-government. As evidenced above, there is a clear lack of studies that empirically examine the direct relationship between website design and technology usage and, in particular, e-government. Therefore, this study designs the sixth hypothesis to determine whether website design influences e-government adoption in Jordan:

H6. Higher standards of e-government website design will be positively related to higher levels of user adoption of e-government websites.
Theoretical perspectives

Diffusion of Innovation Theory (DOI)

Diffusion of Innovation Theory (DOI) was used in this research to study the main factors that may influence e-government adoption in Jordan. “Innovation” is an “idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 1983, p. 11). Researchers in information technology-related adoption studies have used this theory to discuss the information technology innovation based on the characteristics of innovation. According to DOI, there are five characteristics of successful adoption (Rogers, 1983):

1. relative advantage;
2. complexity;
3. compatibility;
4. triability; and
5. observability.

Relative advantage, complexity and compatibility have been found to be consistently significant in technology adoption (Tornatzky and Klein, 1982). These three characteristics were utilized previously in research to test the factors related to the adoption of e-government in Jordan (Alomari et al., 2010) and are used in this research for the same purpose.

“Relative advantage” is defined as “the degree to which an innovation is perceived as better than the idea it supersedes” (Rogers, 1983, p. 213). In this study, relative advantage is the level to which citizens perceive interaction with the government through e-government websites as superior to traditional methods of interaction, such as paper-based work. A previous empirical study conducted by Ojha and colleagues (2009) found the significant impact of relative advantage on citizens’ intention to use an income tax e-filling service. However, Schaupp and Carter (2005) found that relative advantage did not emerge as a significant predictor of citizens’ intention to use e-voting.

Venkatesh and colleagues (2003) claim that relative advantage is similar to perceived usefulness (PU) from TAM (the other theoretical framework of this study). Carter and Bélanger (2005) included both constructs in their model of e-government adoption, stating that the conceptual overlap between these two constructs is not clear. This research included relative advantage as one of the constructs of the e-government adoption model. Therefore, the seventh hypothesis is:

\[ H7. \] Higher levels of relative advantage will be positively related to higher levels of user intention to use e-government websites.

“Compatibility” is defined as “the degree to which an innovation is perceived as being consistent with the existing values, past experience, and needs of potential adopters” (Rogers, 1983, p. 223). In this study, compatibility is defined as the way in which citizens conceive e-government to be consistent with their work and lifestyle. Carter and Bélanger (2005) found that compatibility has a significant impact on citizens’ intention to use e-government services. Van Slyke and colleagues (2004) confirmed compatibility as a predictor of intention to shop on the web. This study proposes
compatibility as an independent variable in the research model for e-government adoption. The eighth hypothesis is:

\[ H8. \] Higher levels of compatibility will be positively related to higher levels of user intention to use e-government websites.

“Complexity” is defined as “the degree to which an innovation is perceived as difficult to understand and use” (Rogers, 1983, p. 230). Van Slyke and colleagues (2004) report complexity as a significant predictor of citizens’ intention to purchase goods or services over the web. Carter and Bélanger (2005) found a similarity between complexity from DOI and perceived ease of use (PEoU) from TAM.

However, this was based on non-empirical evidence or small sample studies conducted in developed countries in the context of e-commerce. Thus, this study employs complexity in the model of e-government adoption in Jordan. The ninth hypothesis suggests that:

\[ H9. \] Lower levels of complexity will be positively related to higher levels of user adoption of e-government websites.

Technology Acceptance Model

The Technology Acceptance Model (TAM) is an adaptation of the Theory of Reasoned Action, which states that actual behavior is influenced by the person’s intention to perform such behavior, and this intention is influenced by one’s attitudes and subjective norms (Ajzen and Fishbein, 1972). TAM states that there are two determinants for the consumer’s attitudes towards usage intention: “perceived usefulness” and “perceived ease of use”. Perceived usefulness (PU) is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989). Moreover, perceived ease of use (PEOEU) is defined as “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989). If technology is relatively easy to use and helpful, this will have a positive influence on the person’s attitudes and intention towards using that technology (Davis, 1989). The two main constructs of TAM, perceived ease of use and perceived usefulness, are proposed to influence e-government adoption in Jordan.

Davis’s (1989) model, TAM, is used to evaluate user acceptance of a technology. Previous research demonstrates the convenience of using the two main constructs of TAM to investigate the intention to use e-government (Carter and Bélanger, 2005; Carter and Bélanger, 2005; Chang et al., 2005; Hung et al., 2006; Phang et al., 2005). Most of the research conducted in the developing countries examines an intermediate relationship between PU and PEOEU and intention to use (Chang et al., 2005; Hung et al., 2006; Phang et al., 2005). This lack of investigation of the direct association between these two constructs of TAM led to the last set of hypotheses:

\[ H10. \] Higher levels of perceived usefulness will be positively related to higher levels of user adoption of e-government websites.

\[ H11. \] Higher levels of perceived ease of use will be positively related to higher levels of user adoption of e-government websites.
Research hypotheses and model
This research developed a model incorporating ten independent variables derived from the literature review of social factors, Diffusion of Innovation Theory (DOI) and Technology Acceptance Model (TAM):

1. trust in the internet;
2. trust in government;
3. attitudes and beliefs;
4. internet and computer skill confidence;
5. website design;
6. relative advantage;
7. compatibility;
8. complexity;
9. perceived ease of use; and
10. perceived usefulness.

This paper proposes a direct relationship between independent variables and the dependent variable, e-government adoption. Based on the direct association between the ten independent variables and the dependent variable, this paper presents ten hypotheses, one for each independent variable in the model. Figure 1 represents the research model and the main relationships.

Methods
Sample
This research used questionnaires to collect information on attitudes to e-government adoption from 400 Jordanian citizens who had regular access to the internet. Most respondents (61.6 percent) were female. The highest percentage (49.4 percent) was in the range of 20-29 years old. University students represented the majority of respondents (70.6 percent) and 40.9 percent of respondents used the internet at university. The amount of internet access time the respondents had each week was spread fairly evenly from less than one hour to more than eight hours per week. Most of the respondents (60.1 percent) held a bachelor’s degree level of education.

The survey
This study used a survey to examine the different factors in the most practical way possible. Most of the survey items were adapted from previous studies (Davis, 1989; Moore and Benbasat, 1991; Gefen and Straub, 2000; Jarvenpaa et al., 2000; Pavlou, 2003; Van Slyke et al., 2004; Carter and Bélanger, 2005; Vassilakis et al., 2005). The five-point Likert Scale (interval scale) was used to measure responses to the statements in the research questionnaire on a scale of 1 (strongly agree) to 5 (strongly disagree). Because English is not the first language of Jordan and most Jordanians are not fluent in English, the questionnaire was translated into Arabic. Back translation was used, with the questionnaire translated from English to Arabic first and then from Arabic to English.
Figure 1.
Research model
Results

Factor analysis
To first analyze the results of the survey, exploratory factor analysis was conducted. The 65 items of the Likert Scale were subjected to axial components analysis using SPSS version 16.0. Prior to performing axial component analysis, the data’s suitability for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser-Meyer-Olkin value was 0.869, and the Bartlett’s Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix. Axial components analysis with Varimax rotation was used. The axial factor analysis revealed the presence of 14 components with eigenvalues exceeding 1, making them suitable for analysis (Hair et al., 1998). An inspection of the screenplot revealed a clear break after the sixth component. It was decided to retain the six components that showed a number of strong loadings:

1. website design;
2. perceived usefulness (PU);
3. complexity;
4. trust in the internet;
5. trust in government; and
6. beliefs.

Moreover, a strong loading of items was recorded for the dependent variable, e-government adoption. Five factors were dropped from any further analyses:

1. internet and computer skill confidence;
2. perceived ease of use;
3. relative advantage;
4. compatibility; and
5. attitudes.

Table I shows the factor analysis that explains that all the items loaded properly in their expected factors. Headings of columns report the name of factors showing strong loading and headings of rows indicate the main items that are related to each factor.

A previous study conducted by Carter and Bélanger (2005) in the USA highlights the recorded strong loadings for items of the trust in the internet and trust in government constructs. Carter and Bélanger (2005) decided to combine the two constructs into one (trustworthiness). However, in this research, the items of the two constructs recorded strong loadings in different components; therefore, this research examined the relationship of these two factors to the dependent variable separately. Relative advantage and compatibility were loaded together in previous studies (Carter and Bélanger, 2005; Moore and Benbasat, 1991) but this research dropped both constructs from any further analysis, because they did not show strong loadings.

The items of perceived usefulness recorded a strong loading with each other in one component. In the study by Carter and Bélanger (2005), the authors found that PU loaded with relative advantage and compatibility, although they decided to drop PU from further analysis, as they argued that RA and PU were similar and could be treated together. In this research, the items of complexity and PEOU did not load
together in one component and only the items related to complexity showed a strong loading with each other, so PEOU was dropped from further analysis. In the study conducted by Carter and Bélanger (2005), the authors did not include complexity in their model, as they argued that it was similar to perceived ease of use. However, this research shows that respondents view the items of complexity to be different from the ones related to PEOU. Hence, this research could be a valuable resource, proving the importance of including these two constructs when researching the adoption of a technological innovation such as e-government in a developing country like Jordan.

This study also found that despite expectations, the items of attitudes and beliefs did not load together – they loaded as different components. Thus, this research shows that respondents viewed attitudes as different from beliefs. Moreover, the items of

<table>
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<tr>
<th>Item</th>
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<th>Trust_G</th>
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Table 1. Factor analysis

Notes: WEB = Website design; PU = Perceived usefulness; CX = Complexity; Trust_I = Trust in the internet; Trust_G = Trust in government; ATTIT_B = Attitudes and beliefs; ADOP = Adoption
belief showed a strong loading together, while the items of attitudes did not record a strong loading. Table II shows reliability analysis for trust in the internet, trust in government, beliefs, website design, perceived usefulness, complexity, and adoption.

Results of multiple regressions (hypothesis testing)
As the main purpose of this research was to determine the relationship between e-government adoption (dependent variable) and the factors (independent variables), multiple regression was deemed the most suitable analytical technique. Table III illustrates the main factors used for multiple regressions. There were no violations of assumptions of multivariate normal distribution, independence of errors and equality of variance. Multicollinearity was not a concern, with variance inflation factors ranging from 1.082 to 1.422 for the main effect regression model. Outlier influential observations were identified with leverage, standardized residuals and Cook’s D-statistic. This analysis indicated that there were no problems with respect to influential outliers.

The regression resulted in a model with adjusted $R^2$ of 34.5 percent. This indicates that independent variables account for 35 percent of the variance in citizens’ intention to use e-government. Because the overall model was significant ($F = 36.000, p = 0.000$), the significance of each variable was tested. As can be seen from Table IV, all of the hypotheses were supported, with the exception of those relating to trust in the internet; internet and computer skill confidence; relative advantage; compatibility; and perceived ease of use, which were dropped from further analysis because they did not load with their proper items. Thus, the hypotheses related to trust in government, beliefs, website design, complexity, and perceived usefulness were significant. Table IV demonstrates the supported hypotheses.

Complexity has the strongest impact on use intention, followed by website design, perceived usefulness and beliefs. Beliefs has a negative impact on the dependent

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<tr>
<th>Constructs</th>
<th>No. of items</th>
<th>Alpha</th>
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<td>Trust in government</td>
<td>4</td>
<td>0.752</td>
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<tr>
<td>Belief</td>
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</tr>
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<td>Website design</td>
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<td>0.888</td>
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<tr>
<td>Perceived usefulness</td>
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<tr>
<td>Complexity</td>
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<td>Adoption</td>
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Table II. Reliability analysis

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<th>Standard deviation</th>
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<td>0.557</td>
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<tr>
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<td>0.734</td>
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<td>0.860</td>
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<td>Trust in government</td>
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<tr>
<td>Belief</td>
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</tr>
<tr>
<td>Adoption</td>
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</table>

Table III. Final regression variables
variable, intention to use, thus a lower level of negative beliefs regarding the internet is related to a higher level of user’s intention to use e-government websites. Figure 2 presents the modified research model of e-government adoption in Jordan, using only the significant path (the supported hypotheses).

**Discussion**

This section discusses the significant results of multiple regression, which relate to trust in government ($H2$), beliefs ($H3$), website design ($H5$), complexity ($H8$), and perceived usefulness ($H9$). The results highlight the significance of two different categories of factors: the two factors reviewed in the literature – beliefs and website design – and the two factors derived from the theoretical framework of this research – complexity from Diffusion of Innovation Theory (DOI) and perceived usefulness from the Technology Acceptance Model (TAM).

$H2$ is supported. Higher levels of trust in government will directly predict higher levels of user adoption of e-government websites in Jordan. The ability of the Jordanian

<table>
<thead>
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<th>Hypotheses</th>
<th>Variable</th>
<th>Coefficient</th>
<th>$t$-value</th>
<th>Significance</th>
<th>Support</th>
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</thead>
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</table>

Table IV. Hypothesis testing

**Figure 2.** Modified research model
government to carry out different transactions, process different forms, and provide citizens with up-to-date information are the main measurements of trust in government. The finding of this study is consistent with the significant results of the research conducted by Bélanger and Carter (2008) in the USA. In their research, they collected data from people with varying internet and computer expertise, who interacted with government websites in order to gather information and/or complete transactions. The current research collected data from people who were internet literate, yet most of them did not use government websites. Although there is a difference in the samples used by the two studies, there is consistency in the findings. This might indicate that trust in government is a concern both for people who have experienced e-government services and for those who have not.

E-government in Jordan appears to lack a citizen-centric view in its implementation (MOICT, 2006b). In fact, Jordan is still in the early stage of implementing e-government. The main focus at this stage of development is on improving the internal and external IT infrastructure. Also, most of the government websites are informational websites, which Jordanian citizens do not see as a real test of the government, because they do not offer any transactional processes. On the other hand, the government in Jordan lacks collaboration between its entities to draft laws and regulations related to ICT Usage, standardizing system use, and sharing information. These issues should be considered by government in Jordan especially when they integrate different services provided by different government agencies and ministries together in order to increase the efficiency and effectiveness of their online services provided to citizens. Layne and Lee (2001) indicate that integration (vertically and horizontally) are one of the important stages of e-government development that “…represent an ideal situation for citizens, in which citizens have on-line access to ubiquitous government services with levels of government and the functional walls inside government transparent to them” (p. 126). Solving these issues by the government in Jordan could be considered as a starting point to increase citizens’ trust in government and having them more willing to use government websites. For example, the Jordanian government should convey to citizens that are capable to provide them with services and information that meet their needs by promoting about the real interaction between different government entities in order to provide citizen-centric services.

The findings support the above hypothesis \( (H4) \). The less that negative beliefs are held by citizens, the more they intend to adopt e-government. The literature indicates the significant role of beliefs (religious beliefs, fear of job loss, and bad impressions) on information technology usage, including internet and e-government usage (Norton, 2002; Dimitrova and Beilock, 2005; Evans and Yen, 2005; Hill et al., 1998; Hofheinz, 2005; Vassilakis et al., 2005).

This research finds that religious belief is a significant predictor of e-government adoption in Jordan, a finding in line with the literature. Jordan is one of the Islamic, Arabic countries in which religion significantly determines social norms and practices (Elsheikh and Cullen, 2008; Hill et al., 1998; Hofheinz, 2005). The current research demonstrates that the government in Jordan needs to understand the extent to which religious beliefs influence citizens to adopt e-government. This research provides the required answer by empirically testing the impact of religious beliefs on citizens’ intention to use government websites.

Further, this research examined beliefs in terms of fear of job loss, finding that the less that people believe that e-government will lead them to lose their job, the more they
intend to adopt e-government. Fear of job loss was a significant factor found in a study by Vassilikis et al. to challenge the adoption of government e-services (Vassilikis et al., 2005). The finding of the current research is consistent with their findings, although the two studies were conducted in different contexts. The consistency might refer to the nature of e-government as a new technological innovation, which requires changes regardless of the context in which it is implemented. This research therefore highlights beliefs as a significant predictor of e-government adoption by citizens in Jordan.

Website design emerged in this research as a significant predictor of e-government adoption in Jordan. Citizens’ intention to adopt e-government increases if e-government websites are available with adequate, attractive and well-organized design and content. Any government tends to have an online presence on the web such as having an online presentation of government information to meet the citizens demands. Layne and Lee (2001) and Reddick (2004) mentioned that this government tendency explain one of the important stages of e-government development model that is cataloguing. The government in Jordan is one of the governments that have started to have an online presence by using websites as the main medium through which to launch its services and information. Therefore, government agencies in Jordan should ensure that their websites are accessible to different users. Improving citizens’ accessibility to government services and information to increase government transparency is one of the main e-government objectives (MOICT, 2006a). The government in Jordan therefore should ensure that their websites are available with consistent and attractive screen layout. Also, the links on the websites should be updated as they should not lead to deleted or re-directed pages. Ensuring that people are comfortable in interacting with the government by the web-based channel could enable the government to move and think about the other electronic based channels such SMS. Consequently, having a variety of electronic channels for launching government services to the citizens will assist the government to increase people accessibility to the government information and services provided through the website and therefore having them more informational and technological knowledgeable.

The literature shows a lack of studies that empirically examine the influence of website design on e-government adoption. However, a study conducted by Gilbert and Balestrini (2004) found that visual appeal emerged as a significant predictor of citizens’ willingness to use e-government services. The current study’s finding is in line with what was discovered by Gilbert and Balestrini (2004), although the two research studies utilized different measurements for examining the impact of website design on e-government adoption. This is to be expected, as the government website is the main gateway by which governments launch their services. Overall, the result of the current study is consistent with the literature in confirming the direct association between website design and e-government adoption in Jordan. In the context of Arabic countries similar to Jordan, Abanumy and colleagues (2005) found that government websites in Saudi Arabia and Oman needed to be made more accessible. The current study posits that website design is a significant predictor of e-government adoption and designing a customer-centric website is part of implementing citizen-centric e-government. Moreover, the non-standardized designs of e-government websites might hinder their navigation. No less important, the lack of a standard design of websites for either the ministries or other entities of government (MOICT, 2006a) may be a consequence of the lack of citizen centricity in implementing e-government. Therefore, having a non-standard design for the government entities’ online services will lead people to
view the websites in different ways. Consequently, the different designs might be undesirable for most people when they need to navigate the different websites to conduct different transactions. This study therefore confirms website design as one of the factors that affect e-government adoption by Jordanian users.

H8 is supported. The more the users perceive e-government websites as being easy to understand and use, the more they will intend to use these websites. The government in Jordan through e-government tends to improve citizens interaction with government and increased efficiency in delivering services to them (MOICT, 2006a). One of the strategies to do that, the government in Jordan should launch its services and information in an easy and understandable way by ensuring simplicity when completing different transactions and navigating its websites. As an example, the government users should be able to locate information on the websites with less effort.

Complexity has often had a significant relationship with user intentions in other contexts, such as e-commerce (Van Slyke et al., 2004). The current research also found that complexity is a significant factor that may influence intention to adopt e-government – in this case, by Jordanian citizens. In this research paper, complexity is significant because the survey was administered to people who were internet literate and capable of assessing to what extent the website was easy to use and understand. Finally, this paper found complexity as a significant factor related to the adoption within the e-government context.

H9 is supported. Higher levels of perceived usefulness are associated with increased intention to adopt e-government. This finding indicates that citizens will be more willing to adopt e-government if the services that are launched on the websites increase the effectiveness and efficiency of conducting different transactions. Increasing efficiency in delivering government services to the citizens is one of the main objectives of e-government that lead to better governance (MOICT, 2006a). Therefore, the government in Jordan should ensure that the websites are free of technical problems in order to ensure the usefulness of the services and information provided online.

A reason for this result may be that the sample was familiar with the internet. Internet-literate people are more able to assess to what extent Web-based services help them to conduct their transactions efficiently compared to those who are not internet literate. This research finding is inconsistent with some previous work in which perceived usefulness was not a significant predictor of e-government adoption (Carter and Belanger, 2005); however, it is in line with prior research results that confirm the effect of PU on citizens’ intention to use particular e-government services (Chang et al., 2005; Phang et al., 2005). Although the other studies conceive of PU as a predictor of e-government adoption by focusing on particular e-services, this research captures the same relationship by focusing generally on e-government websites.

Research implications
This study finds that trust in government, beliefs, website design, complexity, and perceived usefulness are the main predictors of e-government adoption by citizens in Jordan. The government in Jordan can sustain the people’s trust in different ways – one is through its websites, by providing them with up-to-date information, such as information about services and about new laws or regulations. Also, the government should increase its promotions about e-government and improve the adequacy of the strategies followed in launching a successful e-government service.
The government in Jordan can ensure a citizen-centric design for its websites by standardizing website design, including updated links that do not lead to deleted pages or re-directs, and consistent and attractive screen layouts. The government in Jordan should also increase promotional campaigns about the importance of utilizing the internet in daily life and introduce the internet as a medium which can strongly identify with Jordanian cultural and social life, including Islamic values and traditions.

Complexity and perceived usefulness are the other predictors of e-government adoption in Jordan. The government should provide people with services requiring little effort to use, by providing a clear direction of how to navigate the website and clearly listing the steps involved in conducting a particular transaction. Also, the government should ensure that the website is free of any technical problems to ensure the usefulness of the service provided online, such as speeding up processing procedures.

This research could be significant in bridging the gap between the theoretical design of e-government and the actual deployment of e-government services in the real social world through interaction with citizens as end users. This research provides an insight into the issues that could influence e-government’s effective functioning in the social community. The research model for e-government adoption includes the joint use of the components derived from DOI and TAM that represent a practical starting point from which to examine what factors influence citizens’ intention to use e-government. The measurements of these components were used to investigate the citizen’s perspectives towards e-government adoption. This research could be a useful resource for researchers and practitioners concerned with the implementation and adoption of information technology projects in general and e-government in particular. The research offers a model for e-government adoption in a Middle Eastern country, which may be used in further studies of e-government adoption in other Arabic countries.

**Limitations**

This research surveyed people who had regular access to the internet. This highlights the necessity to conduct a study with citizens who do not have regular access to the internet. A qualitative method of data collection, such as interviews or focus groups, may be more suitable for people who struggle with the literacy required to complete written surveys. This would help to include all Jordanian citizens in the study of e-government adoption and increase the generalisability of the results. Furthermore, this may be helpful in generating useful comparisons between the different perceptions of e-government adoption of internet-literate and – illiterate people. Finally, this research focused mainly on obtaining respondents’ perceptions of government websites in general, instead of focusing on a specific website; thus, further studies should be conducted to examine e-government adoption by focusing on a specific online service launched by a particular government department in Jordan.

**Conclusion**

Jordan serves as an interesting case by which to examine e-government adoption in a community where religion and tradition are present in all aspects of life. This study has proposed a model of e-government adoption in Jordan by identifying the main factors that may impact on e-government adoption, using constructs from the literature on Diffusion of Innovation Theory (DOI) and the Technology Acceptance Model (TAM). A survey of 400 Jordanian citizens facilitated an empirical examination of the
main factors influencing e-government adoption. The study performed multiple regressions on the different factors resulting from the factor analysis. According to the findings, trust in government, website design, beliefs, perceived usefulness, and complexity are significant factors in adoption of e-government by Jordanian citizens. The model designed in this research could be used with further studies to examine e-government adoption in other Arabic countries. It will be important in further studies to collect qualitative data involving internet-illiterate people to sustain the required generalizability of findings.

References


**Further reading**


Appendix. Survey items

Trust in the internet (TRUST_I)

TRUST_I1. The internet has enough safeguards to make me feel comfortable using it to interact with government online.

TRUST_I2. In general, the internet is now a robust and safe environment in which to transact with government.

TRUST_I3. I am confident that the data I submit through government websites will not be misused and will be treated confidentially.

TRUST_I4. I am confident that no fraud will be committed.

Trust in government (TRUST_G)

TRUST_G1. Government can be trusted to carry out online transactions faithfully.

TRUST_G2. I trust government because they keep my best interests in mind.

TRUST_G3. I am confident that the forms I submit through government websites will be processed.

TRUST_G4. I am confident that the government will provide me with reliable and up to date information through its websites.

Attitudes and beliefs (ATTIT_B)

ATTIT_B1. I would prefer paper-based work because of negative impressions I have about electronic transactions.

ATTIT_B2. I would prefer not to use the internet because of immorality which is against the rules of my religion.

ATTIT_B3. I am not concerned about the “de-personalisation” of government e-services.

ATTIT_B4. I would have negative attitudes toward internet because paper-based work will be eliminated since most of the work will be done online and I might lose my job.

ATTIT_B5. I would easily adapt to any changes that e-government may cause.

ATTIT_B6. The idea of using E-government website to interact with government is appealing.
ATTIT_B7. Using the E-government website is a good idea.

ATTIT_B8. I like the idea of using the E-government website.

Internet and computer skill confidence (ICSC)

ICSC1. I would find it easy for me to navigate within public websites without having internet or computer skills.

ICSC2. It is not easy for me to understand and be aware of internet benefits without having the required skills to use it.

ICSC3. I have the internet and computer skills which enable me to navigate within websites to use different e-services.

ICSC4. Having the internet and computer skills improves my interaction with government online through using different e-government websites.

ICSC5. Having the internet and computer skills enables me to assess the e-services provided through e-government websites.

Website design (WEB)

WEB1. I would be confident in using websites, which are adequately designed to serve my needs.

WEB2. E-government websites should be available with well organised contents.

WEB3. E-government websites should present attractive screens (colours and backgrounds).

WEB4. E-government websites should be opened with different internet browsers.

WEB5. E-government websites should be free of technical problems such as “syntax error”.

WEB6. E-government websites should provide clear directions for navigating the site.

WEB7. E-government websites should present information in a simple and understandable manner.

WEB8. E-government websites should have consistent screen layouts.

WEB9. E-government websites should provide up to date information.

Perceived usefulness (PU)

PU1. E-government websites enable me to accomplish tasks more quickly.

PU2. Using e-government websites save me time.

PU3. Using e-government websites make it easier to do my job.

PU4. E-government websites would enable me to complete different transactions more quickly.
PU5. I think e-government websites would provide a valuable service for me.

PU6. The content of e-government websites would be useless to me.

PU7. The e-government websites would enhance my effectiveness in searching for and using different services that has been launched.

PU8. I would find e-government websites useful.

**Perceived ease of use (PEOU)**

PEOU1. I often become confused when I use the e-government websites.

PEOU2. Interacting with e-government websites requires a lot of my mental effort.

PEOU3. My interaction with e-government websites is easy for me to understand.

PEOU4. I do not find that e-government websites need high skills.

PEOU5. Learning to interact with the e-government websites would be easy for me.

PEOU6. I believe interacting with the e-government websites would be a clear and understandable process.

PEOU7. I would find the e-government websites to be flexible to interact with.

PEOU8. It would be easy for me to become skilful at using the e-government websites.

PEOU9. I would find e-government websites difficult to use

PEOU10. I find the e-government websites easy to use.

**Relative advantage (RA)**

RA1. Using the web would enhance my efficiency in gathering information from the e-government.

RA2. Using the web would enhance my efficiency in interacting with the e-government.

RA3. Using the web would not make it easier to explore and gather information from e-government websites.

RA4. Using E-government website would make it easier to interact with government.

RA5. Using E-government website would give me greater control over my interaction with government.

RA6. The disadvantages of my using the E-government website far outweigh the advantages.
Compatibility (CT)

CT1. I think using the web would fit well with the way that I like to gather information from e-government.

CT2. I think using the web would fit well with the way that I like to interact with the government.

CT3. Using the web to interact with government would fit into my lifestyle.

CT4. Using the web to interact with the government would incompatible with how I like to do things.

CT5. Using E-government website fits into my work style.

Complexity (CX)

CX1. It is easy for me to navigate within e-government websites.

CX2. Learning to use the E-government website for exploring information and do different transaction is easy for me.

CX3. I believe that it is easy to get the E-government website to do what I want it to do.

CX4. Interacting with E-government website to explore information and do different transaction is clear and understandable.

CX5. Overall, I believe that using the E-government website to explore information or do different transactions is easy.

Adoption (ADOP)

ADOP1. Interacting with the government over the web is something that I would do.

ADOP2. I would not hesitate to provide personal information to the e-government websites.

ADOP3. I would use the web to retrieve information from the government.

ADOP4. I would use the web to inquire about government services.

ADOP5. It is likely that I will use the web for financial transactions with the government in the near future.

ADOP6. Given the chance, I predict that I will use government websites.

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