

Prioritization of citizens' preferences for using mobile government services

The analytic hierarchy process (AHP) approach

Meiaad Rashed Saadi, Syed Zamberi Ahmad and Matloub Hussain

*Department of Management, College of Business Administration,
Abu Dhabi University, Abu Dhabi, United Arab Emirates*

Abstract

Purpose – The identification of key criteria that influence citizens' preferences for using m-government services, prioritization of these criteria and making them consistent with the development of m-government services can improve the relationship of the government with citizens and vice versa. The purpose of this study is to investigate and prioritize the criteria that influence the usage of m-government services in the United Arab Emirates (UAE), using the technology acceptance model (TAM) and diffusion of innovation (DOI) theory, along with external variables of perceived security and perceived privacy.

Design/methodology/approach – A quantitative approach has been applied using a questionnaire with a nine-point scale for collecting data. The analytic hierarchy process (AHP) approach has been deployed to structure and prioritize citizens' preferences and select users of the Ministry of Interior (MOI) application.

Findings – The results of the data analysis showed that the first criteria, which refer to the intention to use m-government services, were ease of use and perceived security and were given the highest priority, and the criterion of observability was given the lowest priority.

Originality/value – This study integrates the DOI and TAM theories with other external variables such as perceived security and perceived privacy to develop a conceptual framework. AHP has been used to structure and prioritize the main criteria and sub-criteria of m-government services. The results can assist the m-government decision-makers and software developers in focusing on the criteria that should be considered for the development of m-government services.

Keywords United Arab Emirates (UAE), Analytic hierarchy process (AHP), Technology acceptance model (TAM), Diffusion of innovation (DOI), Mobile government

Paper type Research paper

Introduction

Information and communication technology (ICT) improves collaboration between citizens, the government and service providers through the expansion of technology in providing services and expediting the communication (Alotaibi and Roussinov, 2015; Mengistu *et al.*, 2009; Sharma, 2015). One of the emergent technologies is electronic government (e-government), which is a technological innovation developed by governmental initiatives that improves and provides equitable access to government services for citizens through wired connection (Alomari *et al.*, 2014). Despite the significant number of e-government initiatives, e-government failed to consider the high penetration of mobile users through wireless technology when providing its public services to the citizens through mobile devices (Abu-Shanab and Haider, 2015). To overcome the limitations of e-government, mobile government (m-government) can be considered the next inevitable direction of the evolution of e-government initiatives (Amaief and Lu, 2011).



m-Government enables the government to provide public services through mobile devices depending on the availability of wireless technology, to improve the level of interaction with its citizens and to provide high-quality services (Abaza and Saif, 2015; Abdelghaffar and Magdy, 2012). One of the greatest advantages of m-government services is the opportunity to provide public services for citizens from any place and at any time (Abu-Shanab and Haider, 2015), along with other advantages, such as accessibility, user proximity, real-time information exchange, and immediacy of messages (Vincent and Harris, 2008).

As a completely alternative way of providing public services through mobile devices, m-government has been accepted in several countries around the world to deliver services to the citizenry with impressive efficiency and effectiveness (Shareef *et al.*, 2014). As an area of particular focus in the Gulf Cooperation Council (GCC) countries, the UAE was ranked number one by the United Nation's (UN's) e-smart services index in 2016—the index used to evaluate the performance of e-government and m-government services around the world—amongst all the GCC states, for providing the most e-government and m-government services to citizens (Innovation and Tech, 2016). The UAE offered 89.13 per cent of its government services through electronic and mobile portals, followed by Bahrain with 82.61 per cent, Kingdom of Saudi Arabia (KSA) and Qatar with 67.39 per cent, Kuwait with 65.22 per cent and Oman with 59.42 per cent. Even with the success of implementing m-government services on mobile platforms, m-government will not achieve long-term success and constancy of use until it meets citizens' requirements (Carroll, 2005). Alssbaiheen and Love (2015) and Ishmatova (2007) argued that citizens' potential preferences depend on the critical factors for the success of m-government.

The current understanding of what preferable factors drive citizens to use m-government services is limited (Abaza and Saif, 2015). To develop citizen-centered m-government services that provide citizens with immediate accessibility, relevant information and high-quality services, m-government developers should understand the citizens' preference factors for using m-government services (Shareef, Archer and Dwivedi, 2012). Therefore, it is important to investigate the key factors that influence the use of m-government services. Thus, this study is designed to measure the key factors that influence the use of m-government by answering the following questions:

- Q1. What are the key factors that influence citizens' use of m-government services in the UAE?
- Q2. Which of these factors that influence the use of m-government services in the UAE are most or least preferred by citizens?

This study seeks to prioritize the factors that affect the use of m-government services. These factors were derived using the diffusion of innovation (DOI) theory, which is one of the earliest theories used to test the adoption of information systems (Rogers, 2003), as well as the technology acceptance model (TAM), which was used to determine the acceptance of innovative technology use (Rehman and Esichaikul, 2011). Both focus on individual perceptions in the adoption and use of innovative technology (Kamal *et al.*, 2015) along with external variables of perceived security and perceived privacy. To prioritize the factors, the analytic hierarchy process (AHP) approach was adopted. AHP is a useful tool designed to solve complex multi-criteria decision-making problems (Ahmad and Hussain, 2016; Saaty, 2008). AHP provides a means of prioritizing the various elements in the hierarchy, thereby assisting the government and software developers in focusing on the most important issues (Zhao and Khan, 2013).

The study makes its major contributions by satisfying the two research questions. First, the integration of the DOI and TAM theories along with external variables, i.e. perceived security and perceived privacy, helps to build a conceptual framework for citizens' preferences for m-government services. Second, unlike previous studies, this study tests a comprehensive hierarchical model that examines the criteria underlying citizens' preferences and analyses the relationships that exist among several important higher preference factors of m-government services using the AHP approach. Third, the study provides empirical support for the integration of the DOI, TAM and external variables with the use of a hierarchical model to conceptualize, measure and prioritize the citizens' preference of m-government services. Finally, the results of the study will benefit the decision-makers and software developers of m-government services to consider the citizens' preferences in developing m-government services, to promote wider use of m-government services.

Following the introduction, this study offers a brief critical review of m-government from other literature reviews in the context of the UAE. Also, it presents the theoretical framework of the DOI and TAM theories—the two theories used in the study. This is followed by a research method section that presents an overview of AHP and its structure. Furthermore, it presents the results and analysis of the collected data using AHP. Finally, the study closes with a discussion of the results, implications, limitations of the study, and the conclusion.

Literature review

Emergence of mobile government (m-government) services

Many governments around the world are introducing e-government by exploiting the existence of ICT to develop and improve the delivery of services to citizens (Abaza and Saif, 2015). E-government entails the use of ICT to deliver government services through an application of internet-based technologies in an interactive manner that attracts citizens using internet-wired technology (Sharma, 2015). It can be considered a way to connect the citizens using an effective and efficient approach through the e-government service initiatives by accessing the government's portal (Zhao *et al.*, 2012). Although e-government improves the interaction between the government and the citizens, developers failed to consider the high level of mobile user penetration through wireless technology when providing public services to the citizens through mobile devices (Abu-Shanab and Haider, 2015). To recover from the limitations of e-government initiatives, m-government initiatives can be considered a solution for addressing the e-government gap (Amailef and Lu, 2011).

m-Government is an extension of or a complementary technology to e-government services, with features that enable access to these services through mobile devices (Abu-Shanab and Haider, 2015; Kushchu and Kuscu, 2003; Litan, 2015; Shareef *et al.*, 2012). The main purpose of m-government services is to provide citizens with accessibility anytime and anywhere, user proximity, real-time information exchange, immediacy of messages, and high-quality services (Abu-Shanab and Haider, 2015). Although m-government is considered an extension of e-government, it is challenging for the developers of m-government services to encapsulate and capture citizens' preference factors to improve m-government services (Shareef *et al.*, 2012) due to lack of interaction between the government and the citizens in investigating citizens' preferences (Amailef and Lu, 2011). However, there are important issues that must be considered and that have gained great attention, which include the increased usage of m-government services by citizens (Abaza and Saif, 2015). To increase citizens' usage, m-government developers should focus on the

factors that influence their usage and identify the services that are most useful for them, and then focus on providing these services in the way they require (Abaza and Saif, 2015).

m-Government services in the United Arab Emirates

m-Government initiatives were launched by His Highness Sheikh Mohammad Bin Rashid Al Maktoum on May 22, 2013. He advised providing services for citizens around-the-clock via a single login that can be used wherever they are (Cherrayil, 2014). The Telecommunication Regulatory Authority (TRA) – which is responsible for the telecommunication and technology industries in the UAE – was established to provide the guidelines and the roadmap for the delivery of m-government services through smart devices. This was successfully accomplished by the end of June 2015. One of the most important objectives of the UAE's m-government is to provide citizens with the best services at a lower cost and to increase overall efficiency and accessibility (Cherrayil, 2014). However, the major track of the UAE roadmap is to meet the desires of citizens by verifying their preferential criteria for using m-government services (TRA, 2014a).

The UAE has achieved remarkable success with m-government by achieving objectives such as improving readiness, making environmental improvements, and achieving user happiness in delivering m-government services (Emirates247, 2015). According to the evaluation by the UN's e-smart services index in 2016, UAE is ranked eighth globally, third in Asia, and first in Gulf Arab countries and Western Asia, in implementing its government services in the form of electronic services (e-services) and mobile services (m-services) successfully (Innovation and Tech, 2016), which puts the UAE in a competitive position to develop its services around the globe.

In total, 337 services considered paramount by the UAE Government were implemented during a smart transition to m-services as m-government services (Emirates247, 2015). The online booking service "The Record" is one such service launched by the Ministry of Health (Gulf News, 2016), which provides easy access to health data for patients who want to check their health status, book appointments and check medical records such as medical reports, prescription drugs and laboratory tests. The Ministry of Education (MOE) launched a mobile application called "Abnaai" (My Children) that provides an interactive environment for parents, their children and schools (Krol, 2014). The Ministry of the Interior (MOI) launched an application called "MOI UAE" that integrates multiple services such as traffic services, civil defense services and more (AD Police, 2016). The UAE Ministry of Environment and Water (MOEAW) implemented a mobile application called "M-Environment Self Service" (MOCCAE, 2014), which uses a smart service through Twitter, enabling customers to receive automated responses within 15 s – the first time such a system has been used in the Middle East and Arab region. The application also provides other services such as guidance initiation, request status, service inquiries and more.

Following the m-government initiative, the UAE Government implemented an application that enables citizens to access services offered by governments across the seven emirates (Abu Dhabi, Dubai, Sharjah, Ajman, Fujairah, Ras al-Khaimah and Umm al-Quwain) through a single portal to citizens. The Abu Dhabi government has 26, Dubai has 56, Sharjah has 12, Ajman has 5, Fujairah has 5, Ras al-Khaimah has 6 and Umm al-Quwain has 1 application. In addition, there are three learning institute applications and nine media institute applications (UAE m-government, 2016). In 2015, the UAE m-government launched an m-government magazine that raises awareness among citizens about m-government initiatives, informs citizens about the most important applications, and provides other services related to coverage quality (Zawya, 2015). Although the UAE Government entities mandated improvement of the services to increase the usage of m-

government services (TRA, 2016), the indicator of the proportion of use of electronic/mobile government services is less than the target that has been set by the government. According to the detailed report of smart enabler's government indicators that has been issued by TRA, the usage number of m-government services in 2014 was 21 per cent where the target was 60 per cent and was 41.6 per cent as against 65 per cent in 2015 (TRA, 2014b; TRA, 2015). Thus, m-government service developers should interact with citizens in parallel to measuring the citizens' preference factors to increase the usage of m-government services (Abaza and Saif, 2015).

Theoretical background: citizens' preferences for using m-government services

Various models have been developed to investigate and predict users' use of and response to innovation technology. The most widely used theories are the theory of reasoned action (TRA), the diffusion of innovations (DOI) theory, the theory of planned behavior (TPB), the technology acceptance model (TAM), the technology acceptance model 2 (TAM2) and the unified theory of acceptance and use of technology (UTAUT).

The TRA, which was developed by Ajzen and Fishbein (1980), states that the beliefs in one's mind impact on one's intentions and that intentions influence one's actions (Abaza and Saif, 2015). The TRA measures the impact of cognitive components, such as intentions, social norms and attitude on the user's behaviors (Guo *et al.*, 2007). In addition, a user's performance of a specified behavior is determined by their attitude toward the behavior and the social pressure put on them to perform (Malhotra and Galletta, 1999). In general, TRA is designed to explain virtually, the relationship between attitude and behavior within a user's action (Ajzen and Fishbein, 1980). Thus, many researchers have suggested and used TRA as a foundation for investigating a user's technology behavior (Hsu and Lin, 2008; Chang, 2013; Rehman *et al.*, 2007).

The TPB was developed by Ajzen (1985) and defined as a dominate model used for predicting and understanding users' behavioral intention (Ajzen, 1985, 1991). Research has indicated that TPB is a well-defined model for exploring a user's acceptance behavior to an information system (IS) (Bhattacharjee, 2000; Hung *et al.*, 2009; Taylor and Todd, 1995). TPB stated that acceptance behavior of IS can be measure by behavioral intention, whereas the behavioral intentions are antecedents, including perceived behavioral, attitude and subjective norms (Rana *et al.*, 2013). Riffai *et al.* (2012) found that TPB provides deep and specific information about a group of users who resist the use of the system, although it is slower, complex and its implementation is more expensive. Hung *et al.* (2013) have shown that TPB, in the context of the m-government, can work effectively along with other external factors.

The TAM 2 was developed by Venkatesh and Davis (2000) (Venkatesh and Davis, 2000). Two processes within the TAM 2 model are considered to be crucial to the study of users' acceptance of technology. These are:

- the *social influence process*, including the following variables: image, subjective norm and voluntariness; and
- the *cognitive instrumental process*, including the following variables: perceived usefulness, output quality, result demonstrability and job relevance (Wu *et al.*, 2008).

Venkatesh and Davis (2000) identified that TAM has some limitations in explaining the reasons behind the way of measuring how users would perceive a given technology's usefulness. To adjust for this, they added the two processes for the TAM variable (perceived usefulness). Wu *et al.* (2008) have argued that by using TAM 2, the researcher would be able

to provide a detailed explanation for the reasons users considered a given technology to be useful.

UTAUT has been developed by Venkatesh *et al.* (2003) to overcome the limitation of the TAM model (Riffai *et al.*, 2012; Abdelghaffar and Magdy, 2012; Abaza and Saif, 2015; Abu-Shanab and Haider, 2015). However, UTAUT is a theory that explains users' intention to use technology and their subsequent behaviors which fulfill the gap in TAM (Venkatesh *et al.*, 2003). UTAUT is based on different theoretical models, including TRA, TAM, TPB; a model combining the TAM and TPB; model of personal computer utilization (MPCU) – developed by Thompson *et al.* (1991) – dealing with workers who use personal computers (PC) by their own choice in an organization which does not mandate the use of PCs; and the social cognitive theory – developed by Bandura and Cervone (1986). Moreover, it focuses on the concept of self-efficiency, which is a motivational model developed by Davis *et al.* (1992) for the study of information technology adoption and use, and DOI (Abaza and Saif, 2015). UTAUT has been implemented in a wide range of IS adoption processes, and most of IS adoption studies use this theory because it maps all the theories of IS adoption (Rana *et al.*, 2013). UTAUT consists of several factors, namely, performance expectancy, effort expectancy, social influence and facilitating conditions (Abdelghaffar and Magdy, 2012).

Table I provides brief comparative information concerning the above theories by presenting the theory developer, the use of that theory, origin of the applied area and remarks about each theory. However, in recent years, despite the increased number of studies that have used these theories, little remains known about users' preferential criteria for using mobile communication technologies and the criteria that influence decisions to use mobile technologies (Al-Hadidi, 2010; Kushchu, 2007). Thus, Al-Hadidi (2010) argued that the combination of both TAM and DOI is the most effective method to test users' preferences for using m-government services. In addition, many studies have suggested the integration of TAM with other theories, such as DOI, to overcome rapid changes in technology and improve specificity and explanatory power (Al-Hadidi, 2010; Carter and Bélanger, 2005; Legris *et al.*, 2003).

TAM is considered one of the most widely used theories in information technology for measuring the influence and predicting the response to use of innovative technologies (Abaza and Saif, 2015; Abdelghaffar and Magdy, 2012; Conrad *et al.*, 2012; Liu *et al.*, 2014; Rana *et al.*, 2013). TAM is an extension of Ajzen and Fishbein's (1980) TRA, which states that once someone has a belief in mind, it will influence his or her intention, and his or her intention will influence his or her action (Abdelghaffar and Magdy, 2012). However, Conrad (2009) argued that TAM is a replacement model of TRA attitudes that measure the acceptance to use of the technology because TRA measures the user's behavior in connection with the use of the technology. This model consists of two factors that determine people's acceptance to technology based on their intention of usage: perceived usefulness (PU) and perceived ease of use (PEOU) (Abaza and Saif, 2015).

PU is defined as the degree to which the individual is able to use a particular system and whether this system can enhance his or her job performance (Liu *et al.*, 2014), which can be achieved by providing certain m-government services (Abdelghaffar and Magdy, 2012). PEOU, on the other hand, is defined as the degree to which a user of a particular system believes that using it will be free of effort (Abaza and Saif, 2015). Shareef *et al.* (2012) mentioned that "ease of use" refers to the nearest of the mobile devices that citizens can use to apply for government services. "Ease of use" can be more rigidly defined as how clear the application is, whether it is user friendly, whether it is easy to learn how to use it, and whether it is free of effort compared with the previous method used. Liu *et al.* (2014)

Table 1.
Technology/
innovation theories

Theory	Use/stages	Originating area	Remarks
Theory of Reasoned Action (TRA; Ajzen and Fishbein, 1980)	TRA is used to determine user attitude and behavior. Two main intention factor determinants: Attitude toward behavior (ATB) Subjective norm (SN; social pressure or decision making to perform behavior)	Social psychology	TRA is designed to explain virtually the relationship between attitude and behavior within a user's action (Ajzen and Fishbein, 1980). TRA focuses on users' behavior related to technology. Thus, TAM is the replacement of TRA's attitude as TAM is considered the most influential extension of TRA (Conrad, 2009; Shareef et al., 2012)
Diffusion of Innovation (DOI; Rogers, 1962, 1983, 1995, 2003)	DOI is used to investigate how, why and at what rate an innovation spreads through cultures. Innovation-decision process can be defined in five stages: Knowledge of an innovation Persuasion toward the innovation Decision to adopt or reject an innovation Implementation of the new idea Confirmation of this decision	Education/Economics/Anthropology/Marketing and Management/Sociology/ Communication/ Geography/Technology adoption	Rogers is considered the only innovation scholar focusing on diffusion theories, both at the individual and organizational level (Conrad, 2009)
Theory of Planned Behavior (TPB; Ajzen, 1985)	TPB was proposed as an extension of the TRA applied to behaviors that are under a lack of control. There are three kinds of belief: Behavioral beliefs Normative beliefs Control beliefs TAM influences the extension of the TRA, which determines how users come to accept new innovations. The attitude is determined by: Perceived ease of use (PEOU) Perceived usefulness (PU)	Social psychology	Riffai et al (2012) found that TPB provides deep and specific information about a group of users who resist the use of the system, although it is slower, more complex, and its implementation is more expensive
Technology Acceptance Model (TAM; Davis, 1989)		Information systems/Technology adoption	TAM has been found to have a significant impact on technology/innovation usage behavior. It is considered the strongest theory in terms of acting freely in using technology/innovation without limitation (Barclay, Higgins and Thompson, 1995; Moore and Benbasat, 1991)

(continued)

Theory	Use/stages	Originating area	Remarks
Technology Acceptance Model 2 (TAM 2; Venkatesh and Davis, 2000)	TAM 2 is a new version of TAM in which subjective norms are added to measure the intention to use. The attitude is determined by: Perceived ease of use (PEOU) Perceived usefulness (PU) Subjective norms	Information systems/ Technology adoption	TAM 2 focuses on a detailed explanation for the reasons users find a given technology to be more useful (Wu <i>et al.</i> , 2008) than the users' preferences
Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh <i>et al.</i> , 2003)	UTAUT is used to determine the intention and behavior of the users over time. The construct of usage behavior and usage intention: Performance expectancy Effort expectancy Social influence Facilitating conditions	Information systems/ Technology adoption	Rana, Dwivedi and Williams (2013) found that the UTAUT is not a sufficient theory that can be used to test the users' preferences for e-government services, which means it cannot be applied to m-government services
Note: Technology acceptance model (TAM)			

Table I.

supposed that the criterion for using m-government services was a product of these two factors.

Abu-Shanab and Haider (2015) explored the factors influencing the adoption of m-government services in Jordan. The study used TAM theory and discovered that both PEOU and PU were major motivating factors for the use of m-government services. Moreover, Liu *et al.* (2014) investigated the factors driving the adoption of the use of m-government services in rural China. The study used TAM theory and found that PEOU and PU were important attributes of technology. Furthermore, Zhao and Khan (2013) used TAM theory to investigate the factors influencing e-government adoption in the UAE and found PU to be a significant factor for the adoption of e-government services. Despite the fact that the TAM theory was developed to study users' acceptance of innovative technology and to predict the factors influencing the use of the innovative technology (Kushchu, 2007), Al-Hadidi (2010) argued that the TAM theory does not fully cover specific influence and usage context factors regarding the use of m-government services. Therefore, this study utilized DOI theory to investigate the criteria and citizens' preferences for the use of m-government services.

Diffusion of Innovation

Diffusion of innovation (DOI) is another theory purporting to explain users' preferential criteria for using new technology (Abdelghaffar and Magdy, 2012; Conrad *et al.*, 2012; Rana *et al.*, 2013; Sharma, 2015). This theory is seen to be a good fit for measuring users' usage and can be considered the only proven theory that scholars use to measure the diffusion between the government and the citizens' level (Abaza and Saif, 2015; Abdelghaffar and Magdy, 2012; Conrad, 2009). The theory was developed by Rogers in 1995. The theory model consists of five factors that influence users' decision to use a new technology on organizational levels, which are relative advantage, compatibility, complexity, trialability and observability (Conrad *et al.*, 2012; Rogers, 2003; Sharma, 2015). Relative advantage refers to the degree to which individuals can receive the idea in a better way than is expected (Rogers, 1995). Robinson (2009) found that the greater the perceived relative advantage of innovation, the more rapid its usage rate is likely to be because social prestige will be created to match the users' requirements, increasing productivity and efficiency, as well as saving users' time. Compatibility is the degree to which innovation can be compatible with the existing users' needs and values, as well as the users' past experiences (Abaza and Saif, 2015; Abdelghaffar and Magdy, 2012). Carter and Bélanger (2005) and Conrad *et al.* (2012) found that compatibility is a significant indicator for predicting citizens' criteria for using e-government services. Seen from this perspective, compatibility must fit citizens' style and needs and not conflict with previously implemented ideas (Rogers, 2003).

Complexity is defined as the degree to which innovation or technology is relatively difficult to use or understand by the user (Rogers, 2003). Moore and Benbasat (1991) assert that the more complex the technology is, the more maintenance it needs, the less user-friendly it is, the more complex it is to operate the service, the more effort required on the user's part, and therefore, the less likely it is to be used. Trialability is the degree to which innovation is tested or experimented with by the user, which means that if the citizens get the chance to use the trial version within a certain period of time, then the citizens will easily accept the use of the e-government service (Conrad *et al.*, 2012). Moore and Benbasat (1991) mentioned that the user must have access to the technology and service before applying for them. Observability is the degree of the innovation's visibility to users and how easily the benefit can be shared with others (Rogers, 1995). Observability is a significant variable that

can be used to measure a user's criteria for using the innovative technology by determining how accessible it is to the user and how frequently it is used by others (Carter and Bélanger, 2005). Conrad *et al.* (2012) mentioned that there is a similarity between the factors in DOI and TAM that have been proven by other studies. These factors comprise a relative advantage that is similar to PU and complexity, which are the opposite of ease of use (Conrad *et al.*, 2012).

Briefly, the study used both TAM and DOI theories because both are important in testing the understanding of acceptance, rejection and usage criteria for new technology (Al-Hadidi, 2010; Davis, 1989; Davis *et al.*, 1992; Venkatesh *et al.*, 2003; Ziamou, 2002). In addition, both theories were used to research the usage, acceptance and innovation process of both the individual and the organization (Gallivan, 2001). Furthermore, these theories have strong methodological support, which makes them popular and widely accepted by scholars (Venkatesh *et al.*, 2003). Thus, this study investigates citizens' preferences and prioritizes them using the combination of TAM and DOI criteria, along with the external variables of perceived security and perceived privacy, ensuring that the results obtained herein are methodologically sound.

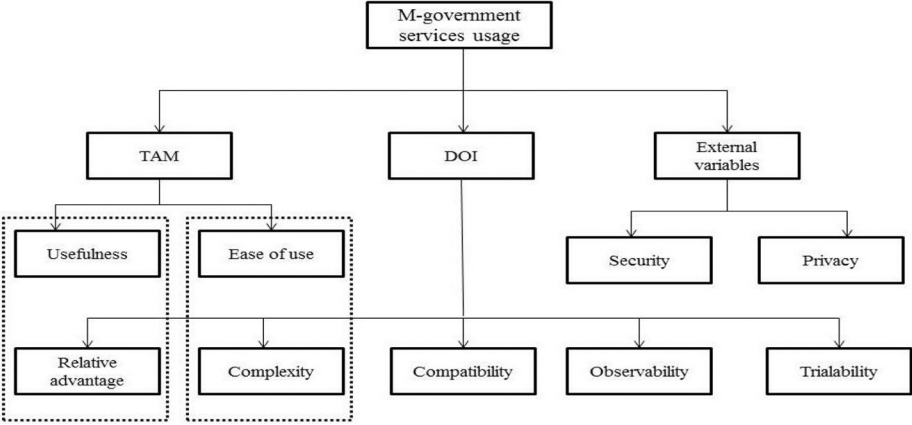
Perceived security and perceived privacy

Many other studies have considered different variables that affect the use of a new technology (Abdelghaffar and Magdy, 2012; Carter and Bélanger, 2005; Zhao *et al.*, 2012). Most of the factors are related to subjective norms and perceived behavior controls that influence use of new technology (Hung *et al.*, 2013). By considering other studies, Carter and Bélanger (2005) integrated constructs from TAM and DOI models, along with the web trust (privacy and security) model, to create a model of factors that impact citizens' adoption of e-government initiatives. The findings indicate that trustworthiness, compatibility and PEOU are significant predictors of citizens' criteria for using an e-government service. Kumar and Sinha (2007), Chang and Kannan (2002), and Al-Hujran and Migdadi (2013) mentioned that perceived security and perceived privacy play a vital role in the usage of an innovative technology. Security and privacy have been established as the primary issues with mobile technology, given that users will not use the technology without trusting it (Suo *et al.*, 2013). Kumar and Sinha (2007) considered the perceived security of innovative technology as the hallmark of a successful technology because it provides comfort in use, provides more financial security, and increases the safeguard level and trustworthiness. Perceived privacy can be accomplished when the citizens accept that the government uses their personal information, trust that their information is fully protected and know their rights (Suo *et al.*, 2013). Shareef *et al.* (2012) examined the behavior regarding adoption of m-government services and found that perceived security is a significant factor that affects the adoption of the use of the services. Furthermore, Sharma (2015) explored the adoption of e-government services in Oman and found that perceived security is one of the most important predictors of the willingness to use e-government services. To sum up, this study extends the TAM and DOI theories, including the external variables of perceived privacy and perceived security, to investigate users' preferences for using m-government services in the UAE. Figure 1 presents the conceptual framework of the variables affecting the use of m-government services.

Methodology

An AHP approach is used in this study to prioritize the factors affecting the use of m-government services, which will outline the strategic plan for the decision-maker and software developer to develop mobile services according to citizens' preferences. AHP was

Figure 1.
Conceptual
framework



developed by Saaty (1970) and used for understanding complex system issues in structuring managerial decision-making in a hierarchical way (Saaty, 2008). In other words, AHP is a theory used to measure a pairwise comparison that relies on expert judgment and provides a priority scale among a set of alternatives (Sipahi and Timor, 2010). AHP consists of two fundamental approaches to solving problems: the deductive approach that focuses on the parts, and the system approach that focuses on the entire system.

Recent studies that have recorded impressive success in using AHP, have validated the theory as an emerging solution for decision-making, especially when one is faced with a mix of quantitative, qualitative, and sometimes, conflicting factors (Ahmad and Hussain, 2016; Forman and Gass, 2001; Ishizaka *et al.*, 2012; Kumar and Vaidya, 2006; Liberatore and Nydick, 2008; Sipahi and Timor, 2010; Vargas, 1990). For example, Ahmad and Hussain (2016) applied the AHP method in the international education sector; Kurttila *et al.* (2000) and Masozera *et al.* (2006) in environmental management; Lee and Kwak (1999) and Kwak and Lee (2002) in health care management; Ngai and Chan (2005) and Grimaldi and Rippa (2011) in knowledge management; Seffah *et al.* (2005) and Seffah and Metzker (2008) in software engineering; Radasch and Kwak (1998) and Kwak, Lee and Kim (2005) in the marketing discipline; and Chen and Zuo (2006) in mobile access services.

AHP is very effective for making complex, often irreversible decisions. The initial stage before the implementation of the mobile service system is to perform a detailed analysis of the system, often referred to as an IT system selection. It is essential to analyze the domain of interest to be able to establish all the procedures that the new system will support. This analysis should cover the entire spectrum of user categories. This step is followed by a description of the requirements of the system to be implemented (Lai *et al.*, 2002). This should cover both the functional tasks that provide a description of the specific tasks to be performed by the system and the non-functional requirements that generate the criteria and goals of the system, other than the specific attributes.

The last two steps are performed correspondingly. The first one regards the selection of alternatives, while the last one is the determination of comparison criteria. In the development of a new system, there are more sub-categorized alternatives when compared to an existing system. The various criteria used for comparison of the alternatives should also be included in every aspect of the system's implementation, usage and functionality (Millet and Schoner, 2005; Wei *et al.*, 2005). The criteria include:

- *Managerial*: Mostly related to the cost and required time of implementing the new IT system.
- *User-related*: Refer to the capabilities of the system with regard to satisfaction of the requirements (functional and non-functional), ease of use and success of the system regarding the former.
- *Technology-related*: Refer to the expertise or skills necessary to use the system (in terms of both hardware and software).
- *Vendor-related*: Refer to the vendor's expertise, stability and reputation.

Why analytic hierarchy process?

The study illustrates citizens' preference factors to successfully increase the usage of m-government services based on DOI and TAM theories with other additional constructs. To structure and prioritize citizens' preference factors (main criteria) and the sub-factors (sub-criteria), the AHP method is used in this study. AHP has proven to be a very useful technique when the decision-maker of any organization must deal with complex, unstructured and multi-criteria problems to make the overall best decision (Ahmad and Hussain, 2016). The strength of AHP lies in its ability to recognize users' judgments about the importance they attach to different influential factors and to structure a complex and multi-criteria system matrix (Ahmad and Hussain, 2016). By applying AHP, the decision-maker can identify several criteria, and measure their relative importance, to determine priorities among them (Saaty, 1994). Therefore, this study uses AHP to measure the conceptual model by assessing relative importance and to determine the priority weights of the criteria and sub-criteria according to citizens' preferences and judgments, that would lead to an increase in the use of m-government services.

Abaza and Saif (2015) assert that to predict citizens' preferences for using m-government services, the government should focus on and prioritize the factors affecting the use of m-government services through highlighting and prioritizing the criteria affecting m-government. The criteria are ranked depending on how they meet the requirements. The organization can decompose a decision by generating priorities for making the decision by following the AHP analytic hierarchy phases (Saaty, 2008), as shown in Figure 2.

Analytical hierarchy framework

This study can be considered pioneering in that it uses AHP to refine the current theories with the attributes of using a new technology to define the key factors that compel a user to use m-government services and to prioritize these factors. Thus, the study has composed a multi-criteria decision-making hierarchy of this prioritization process. To deal with the complexity of the multi-criteria decision-making process, AHP has been applied using the four phases mentioned above.

Applying analytic hierarchy process

To answer the central questions of this study, a quantitative approach has been used via AHP. The first phase is to formulate an AHP hierarchy of the citizens' preferences for using m-government services in the UAE, which could be easily applied by m-government developers. This research is aimed at establishing the key factors that increase the usage of m-government services in the UAE. Therefore, this research is segmented into a hierarchal process, and the AHP has been applied to investigate this complex hierarchal system. This hierarchy is classified into several levels. In the highest level, the goal of this paper has been

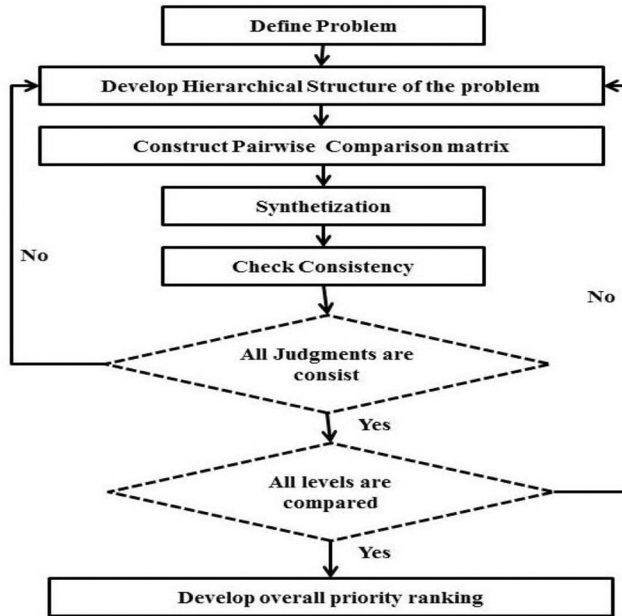


Figure 2.
The AHP process

Source: Saaty (2008)

specified as the citizens' preferences for using m-government services in the UAE. That is followed by an intermediate level that mentions the main criteria of this research, which were derived from extensive literature reviews. The main criteria of this study include relative advantage, compatibility, trialability, ease of use, observability, privacy and security. Following the main criteria, there are sub-criteria for each separate criterion. At the lowest level, the alternative decision has been measured, which is the Ministry of Interior (MOI) application's user. [Figure 3](#) presents the hierarchy of the AHP for measuring the citizens' preferences for using m-government services. [Table II](#) shows the main criteria and sub-criteria that have been adopted from other research studies and modified to fit the concept of m-government.

After building the AHP model hierarchy, the next phase is measurement and data collection. Particularly regarding the preferences for using the MOI application's services in the UAE, data were collected from the users of this application. A questionnaire was designed based on a nine-point scale, as suggested by [Saaty \(2008\)](#), which covers the seven main criteria (relative advantage, compatibility, trialability, ease of use, observability, privacy and security) and subsequent sub-criteria of the attributes. The questionnaire was pilot tested with the expert opinion – one with special skills or knowledge of subject ([Walton, 2010](#)) – of the MOI application collected from MOI users' contacts, and some of the items had to be rephrased to make them more representative of the intended constructs. An evaluation was made by 20 senior users of the MOI application who have been selected from the MOI mobile application database, according to years of experience, using the application. The users had applied for more than 30 mobile service per year, without any failure or mistakes and had a clear understanding about the study. In addition, they

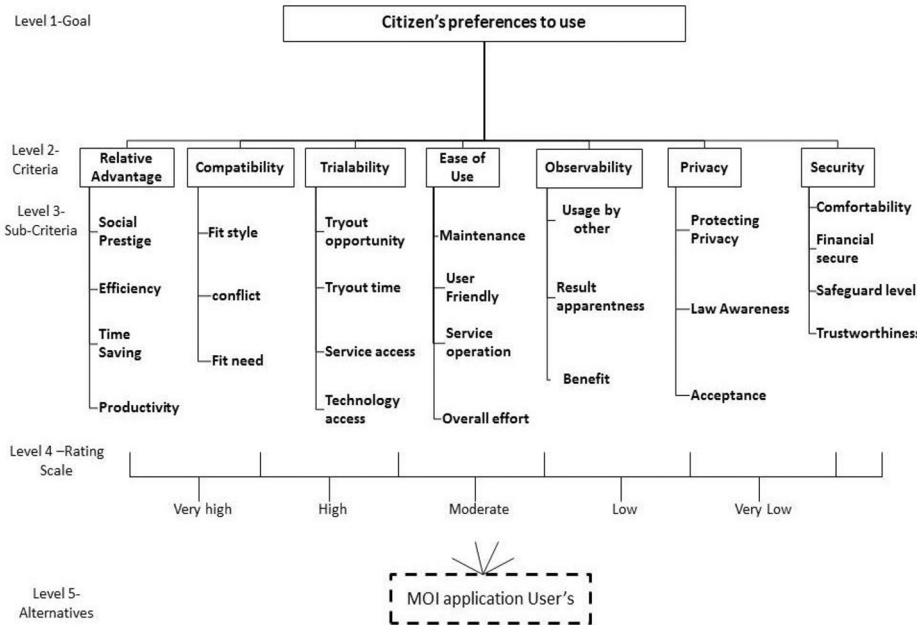


Figure 3.
The hierarchy
structure for citizens'
preferences for using
m-government
services

provided feedback and filled out a user satisfaction survey. The users were contacted through their mobile instruments. This study used the geometric mean approach instead of the arithmetic approach to combine the individual pairwise comparison judgment metrics, as suggested by Saaty, to apply the consensus pairwise comparison judgment metrics for all users.

The next stage in the AHP is to determine the pairwise comparison among the criteria. As suggested by Saaty (2008), a nine-point scale was used to determine the pairwise comparison, as shown in Table III. For example, if the user identified that relative advantage is more important than ease of use, then the relative advantage was rated "5" and the ease of use was rated "1/5" in this comparison, and so on.

After determining the pairwise comparison, a check for consistency is required. To check the consistency index (CI), the formula below was used, as suggested by Thomas and Saaty (1980):

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

Where λ_{max} is the maximum eigenvalue of the matrix of the importance ratios and n is the number of elements. Later on, the consistency ratio (CR) was used to assess whether a matrix was sufficiently consistent or not. The CR was calculated using the ratio of the CI to the random index (RI), which is the CI of a matrix of comparisons generated randomly. Table IV present the RI according to the n (size of matrix or number of criteria). For example, if number of main criteria $n = 7$, $RI = 1.35$:

$$CR = \frac{CI}{RI}$$

Criteria	Sub-criteria	Definition	Source
Relative advantage (usefulness)	Social prestige	Utilization of m-government services enhances citizens' prestige	Moore and Benbasat (1991)
	Efficiency	Using m-government services increases efficiency compared with the traditional way	
	Time saving	Using m-government services will save citizens' time compared with the time consumed using a traditional method	
Compatibility	Productivity	Using m-government services does not affect work progress	Moore and Benbasat (1991)
	Fit style	m-Government services fit well with the current technology style	
	Conflict	m-Government services do not conflict with the traditional system	
Trialability	Fit needs	m-Government services fit the citizens' needs	Moore and Benbasat (1991)
	Tryout opportunity	Citizens have the chance to try out the system before it is launched	
	Tryout time	Citizens have the chance within a period of time to test m-government services before they are launched	
Ease of use (Complexity)	Technology access	Citizens have proper access to the technology (using smart mobile devices) before the implementation	Davis (1989), Moore and Benbasat (1991)
	Service access	Citizens have proper access to m-government services	
	Maintenance	It is easy to maintain the issues related to applying the services through m-government services	
	User friendly	Using m-government services is easier compared with the traditional method	
	Service operation	It is easy to operate the service compared with a traditional service	
Observability	Overall effort	It takes less effort compared with the traditional way	Moore and Benbasat (1991)
	Usage by others	Lots of people are using m-government services	
	Result apparentness	Results of using m-government services are apparent to citizens	
Privacy	Benefits	There is proper information on the benefits of using m-government services	Suo <i>et al.</i> (2013)
	Protecting privacy	Citizens feel safe using their personal information	
	Law awareness	Citizens are aware of their rights	
Security	Acceptance	Citizens accept logging-in to find their personal information	Bélanger and Carter (2008), Fang <i>et al.</i> (2005)
	Comfort	Citizens feel comfortable when using a secure process	
	Financially secure	Citizens believe that the services are financially secure	
	Safeguard level	Citizens feel that enough safeguards are provided to protect them	
	Trustworthiness	Citizens believe they are adequately protected by government law	

Table II.
The main criteria and sub-criteria

Table III.
The fundamental 9-point scale for pairwise comparisons

Intensity of importance	Definition	Explanation
1	Equal importance	Two criteria contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favor one over another
5	Strong importance	Judgment and experience strongly favor one over another
7	Very strong importance	A criterion is favored very strongly over the other and its dominance is demonstrated in practice
9	Extreme importance	Important of one over another affirmed on the highest possible order
2,4,6,8	For comparison between the above values	Used to represent compromise judgment between the priorities listed above

Table IV.
Random index

Size of matrix (n)	1	2	3	4	5	6	7	9	9	10
Random consistency	0.00	0.00	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49

Random pairwise comparisons were simulated to produce average random indices for different sized matrices. Saaty (1983) stated that the inconsistency is acceptable if the CR is smaller or equal to 0.10.

Analysis

As suggested by Saaty (1990), this study used the geometric mean approach instead of the arithmetic approach to combine the individual pairwise comparison judgment metrics to apply the consensus pairwise comparison judgment metrics for all the users. Table V presents the geometric means of pairwise comparisons for the users of the MOI mobile application for the main criteria. For example, by creating the comparison matrix for the main criteria, one of the respondent rated the relative advantage-compatibility as 1/8, which means that the respondent found that both factors are rated between very strong and extreme importance from the perspective of MOI mobile application's compatibility. Whereas other respondents rated the same relation as 5, which mean that both factors are rated between very strong and extreme importance from the perspective of MOI mobile application's relative advantage. After that, the average of all respondents is measured for each relationship in the matrix (the average of the relative advantage-compatibility = 4.05). Afterwards, the relative priority was defined for each main criterion by calculating the priority vector, as shown in the last column of Table V. Saaty (1990) introduced a "consistency principle" for calculating priority vectors. The consistency principle that says $a_{ik} = a_{ij} - a_{jk}$ and the subsequent argument for using the special case of the consistency matrix were formed by elements $a_{ik} = \frac{W_i}{W_j}$, where W_i and W_j are the elements of the priority weight vector corresponding to criteria i and j .

It is evident that ease of use and the perceived security have the highest priority and are jointly preferred over all the criteria, which are weighted at 0.22, and the perceived privacy is the next competitive priority at 0.18, followed by relative advantage, which has a priority of 0.17, while the least important is the observability, at 0.05. The CR for the main criteria and

Table V.
Geometric means of
pairwise
comparisons for the
main criteria

	Relative advantage	Compatibility	Triability	Ease of use	Observability	Privacy	Security	Priority vector
Relative advantage	1	4.05	5.63	0.35	3.03	1.30	0.31	0.17
Compatibility	0.25	1	5.60	0.30	2.90	0.70	0.31	0.10
Triability	0.18	0.18	1	1.10	1.53	0.37	0.15	0.06
Ease of use	2.90	3.32	0.91	1	6.60	1.57	0.57	0.22
Observability	0.33	0.35	0.66	0.15	1	0.65	1	0.05
Privacy	0.77	1.43	2.68	0.64	1.54	1	3.69	0.18
Security	3.19	3.26	6.54	1.76	2.09	0.27	1	0.22

CR = 0.00 < 0.10 (Acceptable)

sub-criteria is acceptable because it is below the upper limit, which is 0.01, as shown in Table V.

Table VI shows that social prestige is mostly preferred by the user, which is weighted at 0.39. The second preferred sub-criterion of relative advantage is time saving, the weight of which is 0.25. The least preferred sub-criterion is efficiency, which was weighted at 0.17. The CR value shows that the result is consistent.

As shown in Table VII, the highest preferred sub-criterion of compatibility is conflict, which is weighted at 0.42, followed by the compatibility's fit style of citizens to use these m-government services, which is weighted at 0.38. The least preferred sub-criterion is the fit need, in which the users think that it does not meet their needs, so it is weighted at 0.20. The CR value shows that the result is highly consistent.

As mentioned above, trialability is the degree of interfering with the users to use the trial version of these application services in an interval of time before the launch of these services. The tryout apparentness of the trial version is highly preferred by the users, which was weighted at 0.32, followed by the technology access before the trial version is implemented, which was weighted at 0.31, as shown in Table VIII. The least preferred sub-criterion is the service access to this trial version, the weight of which is 0.15. The CR value shows that the result is highly consistent.

Table IX shows how much easier the application of m-government services is. The results show that the user friendliness of the application is the most important for the users,

	Social prestige	Efficiency	Time saving	Productivity	Priority vector
Social prestige	1.00	5.84	2.08	3.64	0.39
Efficiency	0.17	1.00	3.31	0.15	0.17
Time saving	0.48	0.30	1.00	6.60	0.25
Productivity	0.27	6.89	0.15	1.00	0.19
CR = 0.01 < 0.10 (Acceptable)					

Table VI.
Geometric means of
pairwise
comparisons for the
sub-criterion: relative
advantage

	Fit style	Conflict	Fit need	Priority vector
Fit style	1.00	1.22	1.43	0.38
Conflict	0.82	1.00	2.87	0.42
Fit need	0.70	0.35	1.00	0.20
CR = 0.00 < 0.10 (Acceptable)				

Table VII.
Geometric means of
pairwise
comparisons for the
sub-criterion:
compatibility

	Tryout apparentness	Tryout time	Service access	Technology access	Priority vector
Tryout apparentness	1	4.20	2.11	0.32	0.32
Tryout time	0.24	1	2.04	1.23	0.22
Service access	0.47	0.49	1	0.91	0.15
Technology access	3.13	0.82	1.09	1	0.31
CR = 0.00 < 0.10 (Acceptable)					

Table VIII.
Geometric means of
pairwise
comparisons for the
sub-criterion:
trialability

the weight of which is 0.55, and the least important is the overall effort required to use this application, so its weight is 0.05.

The degree to which the application is visible to the individual and he or she can tell others about it is called observability, which is shown in Table X. The usage by others' sub-criterion means that many people use the services and the user is following them. It is highly rated by the individual, and its weight is 0.61. The lowest rated is the benefit of this application, the weight of which is 0.16. The CR result shows the consistency of the data given.

Table XI shows the perceived privacy for the individual regarding his or her personal information. The highly prioritized sub-criterion is the protection privacy, which is weighted at 0.55, and the lowest sub-criterion is law awareness, which is weighted at 0.13. The CR result shows the consistency of the data.

The perceived security sub-criteria are shown in Table XII, which shows that the comfort of the individual is highly rated at a weight of 0.42, and the least preferred sub-criterion is the safeguarded level, which is weighted at 0.08. The CR result shows the consistency of the data.

Table IX.

Geometric means of pairwise comparisons for the sub-criterion: ease of use

	Maintenance	User friendly	Service operation	Overall effort	Priority vector
Maintenance	1	0.31	2.87	4.80	0.25
User friendly	3.27	1	4.25	7.80	0.55
Service operation	0.35	0.24	1	5.80	0.16
Overall effort	0.21	0.13	0.17	1	0.05
CR = 0.00 < 0.10 (Acceptable)					

Table X.

Geometric means of pairwise comparisons for the sub-criterion: Observability

	Usage by others	Result apparentness	Benefit	Priority vector
Usage by others	1	4.07	2.86	0.61
Result apparentness	0.25	1	2.08	0.23
Benefit	0.35	0.48	1	0.16
CR = 0.00 < 0.10 (Acceptable)				

Table XI.

Geometric means of pairwise comparisons for the sub-criterion: perceived privacy

	Protecting privacy	Law awareness	Acceptance	Priority vector
Protecting privacy	1	3.80	1.94	0.55
Law awareness	0.26	1	0.36	0.13
Acceptance	0.52	2.81	1	0.32
CR = 0.00 < 0.10 (Acceptable)				

Table XII.

Geometric means of pairwise comparisons for the sub-criterion: perceived security

	Comfort	Financially secure	Safeguard level	Trustworthiness	Priority vector
Comfort	1	2.11	5.00	2.10	0.45
Financial secure	0.47	1	5.27	1.53	0.29
Safeguard level	0.2	0.19	1	0.49	0.08
Trustworthiness	0.48	0.65	2.04	1	0.18
CR = 0.00 < 0.10 (Acceptable)					

The last step is calculating the global priority weights for the alternative of using pairwise comparison. Global priority was derived by multiplying each main criterion by its sub-criteria (Saaty, 2008). In this research, we used seven criteria (relative advantage, compatibility, trialability, ease of use, observability, perceived privacy and perceived security) and one alternative, which is the MOI application's user. Figure 4 shows the derived priority for all the sub-criteria, along with their global priority level. The ease of use sub-criterion (user friendly) has the highest priority, the weight of which is 0.12, followed by protecting privacy and comfort, which are the sub-criteria of perceived security and have the same priority weight, which is 0.10. The least important sub-criteria are the benefit, overall effort, service access, result apparentness and tryout time, whose weights are 0.01.

Discussion

The UAE Government strives to provide services to citizens in an easy way to gain their trust. That is why governments take advantage of the availability of the internet and smart devices to provide services through mobile applications. After considering the main criteria affecting the citizens' preferences for using m-government services, the AHP was used to filter out the most important criteria that affect the use of m-government services. The result shows that ease of use and perceived security have the highest priority weight (0.22), which means that the citizens found the MOI application easy to use and that the platform of the application was highly clear and could be used by different individuals with no concern for their demographic characteristics. Abdelghaffar and Magdy (2012) found in their study that ease of use is insignificant in predicting the response to use of m-government services, which is contrary to the results found in this study. In addition, from the security side, the citizens found that this application is highly secure and that the users can trust it when using their visa or credit cards as a payment method. Furthermore, the study shows how much more important ease of use is to the citizens, which is contrary to other studies that found that ease of use is less important to predict the usage (Abdelghaffar and Magdy, 2012; Rokhman, 2011). On the other hand, the result also shows that relative advantage (0.17) and perceived privacy (0.18) have a moderate priority, which means that (in terms of relative advantage) individuals perceived the application in a way that is different than they expected and that this application saved them time and increased their productivity because

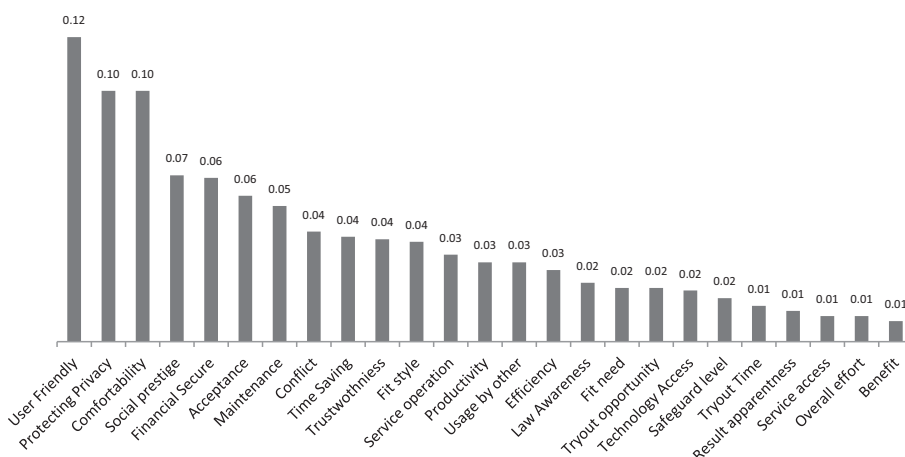


Figure 4. Global priority for the MOI application's user

they could use it anytime and anywhere due to the availability of the internet. Also, regarding perceived privacy, the application uses the individual's personal information, and the individual accepts use of his or her personal information with little worry about privacy because all of the information is securely protected and the individual is aware of his or her rights. Abdelghaffar and Magdy (2012) found that the user's trust (trust is the degree of a user's belief and faith in the government services to ensure security and privacy) is less important and does not affect the use of the government services, which is contrary to the result found in this study, which shows how important it is to provide security and privacy to the user. This result shows how much the government needs to care about security and privacy to gain the trust of the individual. Once the individual has lost the trust, he or she will not be able to use the government services via the smart devices. Conversely, observability (0.05) and trialability (0.06) had the least priority, which shows that these services are not visible to the individual, that fewer users use it, and that the overall effort is more comparable to the traditional method. In addition, the individual did not get the chance to try out these services within a certain period of time before the launch of the service, to be able to provide comments and resolve the application bugs. This means that the MOI did not care much about sharing the trial version of the application with users before launching.

The result of ranking the sub-criteria in Figure 4 was that the sub-criterion was user-friendly, the weight of which is 0.12, is highly preferred by the MOI application users, which means that the users found the application to be easy to use. The next important sub-criteria are protecting privacy and comfort, which are weighted at 0.10 and show that the MOI application highly protects the individual's personal information and that the individual feels confident using the service. Also, the users appreciate that the application matches their prestige because it matches recent technology, and they are confident when applying for online payment and accepting it confidentially, which is shown in the sub-criteria social prestige, financially secure and acceptance, with weights of 0.07, 0.06 and 0.06, respectively. On the other hand, the study found that the least important sub-criteria are tryout time, result apparentness, service access and benefit, which are weighted at 0.01. These results show that the users did not get the chance to test the trial version of the MOI application before the service was launched, and they did not get the chance to access the service to provide their feedback. Also, they did not observe the advantage of using the application over the traditional method. In addition, the overall benefit of this application is not clear to them.

Theoretical contribution

From a theoretical perspective, this study makes several contributions. First, it fills an important gap in the literature because it helps to highlight the importance of interaction between the government and the citizens by understanding citizens' needs, such as by investigating the preferential criteria and challenges that influence the success of m-government services that are required by citizens to access government services through mobile devices. Second, it adds value by incorporating both the TAM and DOI theories, including perceived privacy and perceived security, into a single hierarchy structuring model as a pioneering method in the context of m-government services.

Third, the study examines the main criteria and sub-criteria using the AHP method by investigating the key factors (main criteria and sub-criteria) that influence the usage of m-government services. This provides more insight to researchers in the same field using the same method to prioritize the key factors needed for decision-making. Fourth, this research contributes to knowledge by providing a new understanding of the sub-criteria that either highly influenced or had less of influence on the users of m-government services,

which have been ranked to depict the criteria's degree of significance in influencing the usage of m-government services.

Practical contribution

In practical terms, this research will enable decision-makers (or software developers), who are responsible for designing m-government initiatives, to better understand the criteria preferred by the users of m-government services they develop. As shown in the findings, understanding the m-government environment is crucial for implementing successful initiatives in the future. The knowledge provided by the study can assist decision-makers in gaining an in-depth understanding of TAM and DOI factors that can be used to successfully implement m-government services, as required by the citizens. In addition, this study can assist the stakeholder (outsourcing who is interested in implementing services for the government) in understanding the citizens' preference criteria to increase the usage of m-government services or to consult with the government to implement them in successful ways that fulfill citizens' needs.

This study also offers the decision-makers who are responsible for m-government initiatives a richer understanding of the high-priority criteria or low-priority criteria that should be implemented in a time-table according to the citizens' demands. Finally, the AHP structure model provides the decision-makers with a framework or a roadmap for m-government services, by which future initiatives can be evaluated and prioritized.

Limitations of the study and future direction

Despite the theoretical and practical contributions, as is the case with any research study, the current research also has some limitations. First, the results are based on the judgments of individuals in terms of their situation rather than technology adopted by the actual organization. This is because individual judgments will change when they gain more experience (Venkatesh *et al.*, 2003). Second, this study did not consider the effects of demographic variables on each criterion in using m-government services. Therefore, further studies can test the effects of demographic variables on the citizens' preferences for using m-government services. For example, gender, age and level of education can be used. Third, the study tested the factors of one alternative application, the MOI application. Other studies can test them for more alternative applications. Fourth, the study only investigates the main construct from DOI and TAM with two additional variables such as perceived security and perceived privacy. Future studies should consider other external variables that can fit the nature of future study. Fifth, the variables in the study belong to the literature reviews, without taking into consideration users' preferences. Therefore, future studies can explore other suitable variables according to the user requirements through focus group discussions. Finally, this study was applied to government applications without considering mobile applications of the private sector and semi-governments, as the governments are focused on individuals rather than businesses.

Conclusion

The expansion of internet sources has made the use of mobile phones more prevalent. At the government level, technology has a significant influence on the informational network, which is integrated centrally for people living in the country. m-Government, through which information and knowledge are transmitted to people in society who own mobile phones and have access to internet technology, is complementary to e-government. This paper was focused on finding out the key critical factors that influence citizens' preferences for using m-government services in the UAE, using DOI and TAM theories with the external

variables of perceived privacy and perceived security. AHP was used to validate and prioritize the key criteria that affect the use of m-government services. Users of MOI mobile applications were selected to judge their preferences according to the main and sub-criteria founded from the literature review.

The study found that the criterion ease of use is highly preferred which goes with the finding of [Abu-Shanab and Haider \(2015\)](#), who found that ease of use is one of the most important factors the user's preferences and ease of use is less important. Furthermore, the main criterion perceived security and perceived privacy is also highly preferred by the citizens who are using MOI applications. This finding matches the results of the other literature ([Al-Hujran and Migdadi, 2013](#); [Chang and Kannan, 2002](#); [Kumar and Sinha, 2007](#); [Suo et al., 2013](#)) which found that both criteria are highly important in investigating mobile technology. On the other hand, the criteria, observability and trialability, are both least preferred when using m-government services, which contradict the finding of [Al-Busaidi, \(2012\)](#) who mentions that observability is significant to the use of m-government services. In addition, [Al-Busaidi, \(2012\)](#) found that trialability is less significant to the use of m-government services and [Conrad et al. \(2012\)](#) discussed that if the complexity is high (less ease of use) then trialability should be high.

Briefly, the findings imply that decision-makers and software developers should take different initiatives to develop m-government services according to the citizens' preferences. Theoretically, the integration of both DOI and TAM theories with perceived security and perceived privacy provides a new conceptual framework to investigate the users' preferences while using m-government services. Furthermore, the AHP method arrives at a theoretical understanding by structuring the criteria or the factors of m-government services and prioritizing them to provide a decision-making outcome. Practically, the findings assist the decision-maker and software developer to start a new initiative strategy in developing m-government services according to the users' preferences and judgment.

References

- Abaza, M. and Saif, F. (2015), "The adoption of mobile government services in developing countries", *International Journal of Computer Science Issues (IJCSI)*, Vol. 12 No. 1, p. 137.
- Abdelghaffar, H. and Magdy, Y. (2012), "The adoption of mobile government services in developing countries: the case of Egypt", *International Journal of Information*, Vol. 2 No. 4, pp. 333-341.
- Abu-Shanab, E. and Haider, S. (2015), "Major factors influencing the adoption of m-government in Jordan", *Electronic Government, an International Journal*, Vol. 11 No. 4, pp. 223-240.
- AD Police (2016), "MoI launches MOI UAE app new design on Apple store", available at: www.adpolice.gov.ae/en/media.centre/news/9800355.aspx (accessed 21 February 2017).
- Ahmad, S.Z. and Hussain, M. (2016), "The analytic hierarchy process of the decision-making factors of African students in obtaining higher education in the United Arab Emirates", *Compare: A Journal of Comparative and International Education*, pp. 1-14, available at: <http://dx.doi.org/10.1080/03057925.2016.1171703>
- Ajzen, I. (1985), "From intentions to actions: a theory of planned behavior", in Kuhl, T. and Beckmann, J. (Eds), *Action Control*, Springer, Berlin, Heidelberg, pp. 11-39.
- Ajzen, I. (1991), *The Theory of Planned Behavior, Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211.
- Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behaviour*, Prentice-Hall, Englewood Cliffs, NJ.
- Al-Hadidi, A. (2010), "An exploratory study on adoption and diffusion of m-government services in the Sultanate of Oman", Doctoral dissertation, Cardiff University, Wales.

- Al-Busaidi, H.A.S. (2012), "A model of intention to use mobile government services", Doctoral dissertation, Victoria University.
- Al-Hujran, O. and Migdadi, M. (2013), *Public Acceptance of M-Government Services by the Public in Developing Countries: The Case of Jordan*, Princess Sumaya University for Technology, Jordan, pp. 242-263.
- Alomari, M.K., Sandhu, K. and Woods, P. (2014), "Exploring citizen perceptions of barriers to e-government adoption in a developing country", *Transforming Government: People, Process and Policy*, Vol. 8 No. 1, pp. 131-150.
- Alotaibi, S. and Roussinov, D. (2015), "A conceptual model for examining mobile government adoption in Saudi Arabia", in Adams, C. (Ed.), *Proceedings of the 15th European Conference on eGovernment ECEG 2015*, University of Portsmouth, p. 369.
- Alssbaiheen, A. and Love, S. (2015), "Exploring the challenges of m-government adoption in Saudi Arabia", *Electronic Journal of e-Government*, Vol. 13 No. 1, pp. 18-27.
- Amailef, K. and Lu, J. (2011), "A mobile-based emergency response system for intelligent m-government services", *Journal of Enterprise Information Management*, Vol. 24 No. 4, pp. 338-359.
- Bandura, A. and Cervone, D. (1986), "Differential engagement of self-reactive influences in cognitive motivation", *Organizational Behavior and Human Decision Processes*, Vol. 38 No. 1, pp. 92-113.
- Barclay, D., Higgins, C. and Thompson, R. (1995), "The partial least squares (PLS) approach to causal modeling: personal computer adoption and use as an illustration", *Technology Studies*, Vol. 2 No. 2, pp. 285-309.
- Bélanger, F. and Carter, L. (2008), "Trust and risk in e-government adoption", *The Journal of Strategic Information Systems*, Vol. 17 No. 2, pp. 165-176.
- Bhattacharjee, A. (2000), "Acceptance of e-commerce services: the case of electronic brokerages", *IEEE Transactions on Systems, Man, and Cybernetics – Part A: Systems and Humans*, Vol. 30 No. 4, pp. 411-420.
- Carroll, J. (2005), "Risky business: will citizens accept m-government in the long term", *Euro mGov 2005 Proceedings: From e-government to m-government, 10-12 July, University of Sussex, Brighton*, pp. 77-87.
- Carter, L. and Bélanger, F. (2005), "The utilization of e-government services: citizen trust, innovation and acceptance factors", *Information Systems Journal*, Vol. 15 No. 1, pp. 5-25.
- Chang, M.K. (2013), "Predicting unethical behavior: a comparison of the theory of reasoned action and the theory of planned behavior", *Journal of Business Ethics*, Vol. 17 No. 16, pp. 433-445.
- Chang, A.M. and Kannan, P.K. (2002), "Preparing for wireless and mobile technologies in government", *E-government Series*, pp. 345-393, available at: <http://knet.ca/documents/Wireless-and-Mobile-Technologies-in-Government-IBM-report.pdf> (accessed 20 September 2017).
- Chen, W.T. and Zuo, S.C. (2006), "Key factors for successful rollout of mobile access services", *Asia Pacific Management Review*, Vol. 11 No. 4, pp. 213-221.
- Cherrayil, N.K. (2014), "UAE's m-government initiative 'progressing well and on track'", *Gulf News*, available at: <http://gulfnews.com/news/uae/general/uae-s-m-government-initiative-progressing-well-and-on-track-1.1342890>
- Conrad, E.D. (2009), "Willingness to use IT innovations: a hybrid approach employing diffusion of innovations and technology acceptance models", Doctoral dissertation, Southern Illinois University, Carbondale, Illinois.
- Conrad, E.D., Michalisin, M.D. and Karau, S.J. (2012), "Measuring pre-adoptive behaviors toward individual willingness to use IT innovations", *Journal of Strategic Innovation and Sustainability*, Vol. 8 No. 1, p. 81.
- Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *Management Information Systems Research Center, University of Minnesota, MIS Quarterly*, Vol. 13 No. 3, pp. 319-340.

- Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1992), "Extrinsic and intrinsic motivation to use computers in the workplace", *Journal of Applied Social Psychology*, Vol. 22 No. 14, pp. 1111-1132.
- Emirates247 (2015), "UAE achieves 96.3% success rate in m-government: Mohammed: Day-to-day services have made smart transition to m-government and m-services", available at: www.emirates247.com/news/government/uae-achieves-96-3-success-rate-in-m-government-mohammed-2015-05-24-1.591686 (accessed 21 February 2017).
- Fang, X., Chan, S., Brzezinski, J. and Xu, S. (2005), "Moderating effects of task type on wireless technology acceptance", *Journal of Management Information Systems*, Vol. 22 No. 3, pp. 123-157.
- Forman, E. and Gass, S. (2001), "The analytic hierarchy process – an exposition", *Operations Research*, Vol. 49 No. 4, pp. 469-486.
- Gallivan, M.J. (2001), "Organizational adoption and assimilation of complex technological innovations: development and application of a new framework", *ACM Sigmis Database*, Vol. 32 No. 3, pp. 51-85.
- Grimaldi, M. and Ripa, P. (2011), "An AHP-based framework for selecting knowledge management tools to sustain innovation process", *Knowledge and Process Management*, Vol. 18 No. 1, pp. 45-55.
- Gulf News (2016), "Ministry of health launches online booking service", *Gulf News*, available at: <http://gulfnews.com/news/uae/health/ministry-of-health-launches-online-booking-service-1.1707019>
- Guo, Q., Johnson, C.A., Unger, J.B., Lee, L., Xie, B., Chou, C.P., Palmer, P.H., Sun, P., Gallaher, P. and Pentz, M. (2007), "Utility of the theory of reasoned action and theory of planned behavior for predicting Chinese adolescent smoking", *Addictive Behaviors*, Vol. 32 No. 5, pp. 1066-1081.
- Hsu, C.L. and Lin, J.C.C. (2008), "Acceptance of blog usage: the roles of technology acceptance, social influence and knowledge sharing motivation", *Information & Management*, Vol. 45 No. 1, pp. 65-74.
- Hung, S.Y., Chang, C.M. and Kuo, S.R. (2013), "User acceptance of mobile e-government services: an empirical study", *Government Information Quarterly*, Vol. 30 No. 1, pp. 33-44.
- Hung, S.Y., Tang, K.Z., Chang, C.M. and Ke, C.D. (2009), "User acceptance of intergovernmental services: an example of electronic document management system", *Government Information Quarterly*, Vol. 26 No. 2, pp. 387-397.
- Innovation and tech (2016), "Digital ecosystem & smart city", available at: www.innovationandtech.ae/uae-ranks-8th-globally-1st-regionally-uns-2016-e-smart-services-index/ (accessed 5 February 2017).
- Ishizaka, A., Nemery, P. and Pearman, C. (2012), "AHP sort: AHP based method for sorting problems", *International Journal of Production Research*, Vol. 50 No. 17, pp. 4767-4784.
- Ishmatova, D. (2007), "Assessing user needs for m-government services: a case study of information mobile campus services", *Proceedings of the 1st International Conference on Theory and Practice of Electronic Governance*, pp. 445-446.
- Kamal, M.M., Bigdeli, A.Z., Themistocleous, M. and Morabito, V. (2015), "Investigating factors influencing local government decision makers while adopting integration technologies (IntTech)", *Information & Management*, Vol. 52 No. 2, pp. 135-150.
- Krol, P. (2014), "Ministry of Education wins 'best m-government service' award", available at: www.schoolsindubai.com/2014/02/ministry-of-education-wins-best-m.html (accessed 21 February 2017).
- Kumar, S. and Vaidya, O. (2006), "Analytic hierarchy process: overview of applications", *Journal of Operational Research*, Vol. 169 No. 1, pp. 1-29.
- Kumar, M. and Sinha, O.P. (2007), "M-government–mobile technology for e-government", *International Conference on e-Government*, pp. 294-301.
- Kurttila, M., Pesonen, M., Kangas, J. and Kajanus, M. (2000), "Utilizing the analytic hierarchy process (AHP) in SWOT analysis—a hybrid method and its application to a forest-certification case", *Forest Policy and Economics*, Vol. 1 No. 1, pp. 41-52.
- Kushchu, I. (2007), *Mobile Government: An Emerging Direction in E-Government*, IGI, Hershey, PA.

-
- Kushchu, I. and Kuscü, H. (2003), "From e-government to m-government: facing the inevitable" The 3rd European Conference on e-Government, *MCIL Trinity College, Dublin*, pp. 253-260.
- Kwak, N.K. and Lee, C.W. (2002), "Business process reengineering for health-care system using multicriteria mathematical programming", *European Journal of Operational Research*, Vol. 140 No. 2, pp. 447-458.
- Kwak, N.K., Lee, C.W. and Kim, J.H. (2005), "An MCDM model for media selection in the dual consumer/ industrial market", *European Journal of Operational Research*, Vol. 166 No. 1, pp. 255-265.
- Lai, V.S., Wong, B.K. and Cheung, W. (2002), "Group decision making in a multiple criteria environment: a case using the AHP in software selection", *European Journal of Operational Research*, Vol. 137 No. 1, pp. 134-144.
- Lee, C.W. and Kwak, N.K. (1999), "Information resource planning for a health-care system using an AHP-based goal programming method", *Journal of the Operational Research Society*, Vol. 50 No. 12, pp. 1191-1198.
- Legris, P., Ingham, J. and Colletette, P. (2003), "Why do people use information technology? A critical review of the technology acceptance model", *Information & Management*, Vol. 40 No. 3, pp. 191-204.
- Liberatore, M. and Nydick, R. (2008), "The analytic hierarchy process in health and medical care decision making: a literature review", *European Journal of Operational Research*, Vol. 189 No. 1, pp. 194-207.
- Litan, D. (2015), "M-government, a technical, social and economic challenge", *Cogito: Multidisciplinary Research Journal*, Vol. 7, p. 85.
- Liu, Y., Li, H., Kostakos, V., Goncalves, J., Hosio, S. and Hu, F. (2014), "An empirical investigation of mobile government adoption in rural China: a case study in Zhejiang province", *Government Information Quarterly*, Vol. 31 No. 3, pp. 432-442.
- Malhotra, Y. and Galletta, D.F. (1999), "Extending the technology acceptance model to account for social influence: theoretical bases and empirical validation", *Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences*, HICSS-32, IEEE, p. 14.
- Masozera, M.K., Alavalapati, J.R., Jacobson, S.K. and Shrestha, R.K. (2006), "Assessing the suitability of community-based management for the Nyungwe Forest Reserve, Rwanda", *Forest Policy and Economics*, Vol. 8 No. 2, pp. 206-216.
- Mengistu, D., Zo, H. and Rho, J.J. (2009), "M-government: opportunities and challenges to deliver mobile government services in developing countries", Fourth International Conference IEEE Computer Sciences and Convergence Information Technology, ICCIT'09, pp. 1445-1450.
- Millet, I. and Schoner, B. (2005), "Incorporating negative values into the analytic hierarchy process", *Computers & Operations Research*, Vol. 32 No. 12, pp. 3163-3173.
- MOCCA (2014), *UAE Ministry of Environment & Water Launches Its 'm-Government Self Service' via Twitter Conjunction with the Government Summit*, MOCCA.
- Moore, G.C. and Benbasat, I. (1991), "Development of an instrument to measure the perceptions of adopting an information technology innovation", *Information Systems Research*, Vol. 2 No. 3, pp. 192-222.
- Ngai, E.W. and Chan, E.W.C. (2005), "Evaluation of knowledge management tools using AHP", *Expert Systems with Applications*, Vol. 29 No. 4, pp. 889-899.
- Radasch, D.K. and Kwak, N.K. (1998), "An integrated mathematical programming model for offset planning", *Computers & Operations Research*, Vol. 25 No. 12, pp. 1069-1083.
- Rana, N.P., Dwivedi, Y.K. and Williams, M.D. (2013), "Evaluating alternative theoretical models for examining citizen centric adoption of e-government", *Transforming Government: People, Process and Policy*, Vol. 7 No. 1, pp. 27-49.
- Rehman, M. and Esichaikul, V. (2011), "Factors influencing the adoption of e-government in Pakistan," in e-business and e-government (ICEE)", International Conference E-Business and E-Government (ICEE), pp. 1-4.

- Rehman, T., McKemey, K., Yates, C.M., Cooke, R.J., Garforth, C.J., Tranter, R.B., Park, J.R. and Dorward, P.T. (2007), "Identifying and understanding factors influencing the uptake of new technologies on dairy farms in SW England using the theory of reasoned action", *Agricultural Systems*, Vol. 94 No. 2, pp. 281-293.
- Riffai, M.M.M.A., Grant, K. and Edgar, D. (2012), "Big TAM in Oman: exploring the promise of on-line banking, its adoption by customers and the challenges of banking in Oman", *International Journal of Information Management*, Vol. 32 No. 3, pp. 239-250.
- Robinson, L. (2009), *A Summary of Diffusion and Innovations*, How to enable communities, groups and societies to do things they've never done before, Changeology.
- Rogers, E.M. (1962), *Diffusion of Innovations*, 1st ed., The Free Press, New York, NY.
- Rogers, E.M. (1983), *Diffusion of Innovations*, The Free Press, New York, NY.
- Rogers, E.M. (1995), *Diffusion of Innovations*, 4th ed., The Free Press, New York, NY.
- Rogers, E.M. (2003), *Diffusion of Innovations*, The Free Press, New York, NY.
- Rokhman, A. (2011), "e-Government adoption in developing countries; the case of Indonesia", *Journal of Emerging Trends in Computing and Information Sciences*, Vol. 2 No. 5, pp. 228-236.
- Saaty, T.L. (1970), *Optimization in Integers and Related Extremal Problems*, McGraw-Hill, New York.
- Saaty, T.L. (1983), "Priority setting in complex problems", *IEEE Transactions on Engineering Management*, Vol. 30 No. 3, pp. 140-155.
- Saaty, T.L. (1990), *Decision Making for Leaders: The Analytic Hierarchy Process for Decisions in a Complex World*, RWS Publications.
- Saaty, T.L. (2008), "Decision making with the analytic hierarchy process", *International Journal of Services Sciences*, Vol. 1 No. 1, pp. 83-98.
- Seffah, A. and Metzker, E. (2008), *Adoption-Centric Usability Engineering: Systematic Deployment, Assessment and Improvement of Usability Methods in Software Engineering*, Springer Science & Business Media.
- Seffah, A., Gulliksen, J. and Desmarais, M.C. (Eds) (2005), *Human-Centered Software Engineering- Integrating Usability in the Software Development Lifecycle*, Springer Science & Business Media, Vol. 8.
- Shareef, M.A., Archer, N. and Dwivedi, Y.K. (2012), "Examining adoption behavior of mobile government", *Journal of Computer Information Systems*, Vol. 53 No. 2, pp. 39-49.
- Shareef, M.A., Dwivedi, Y.K., Stamati, T. and Williams, M.D. (2014), "SQ mGov: a comprehensive service-quality paradigm for mobile government", *Information Systems Management*, Vol. 31 No. 2, pp. 126-142.
- Sharma, S.K. (2015), "Adoption of e-government services", *Transforming Government: People, Process and Policy*, Vol. 9 No. 2, pp. 207-222.
- Sipahi, S. and Timor, M. (2010), "The analytic hierarchy process and analytic network process: an overview of applications", *Management Decision*, Vol. 48 No. 5, pp. 775-808.
- Suo, H., Liu, Z., Wan, J. and Zhou, K. (2013), "Security and privacy in mobile cloud computing", *2013 9th International Mobile Computing Conference (IWCMC) and Wireless Communications*, IEEE, pp. 655-659.
- Taylor, S. and Todd, P.A. (1995), "Understanding information technology usage: a test of competing models", *Information Systems Research*, Vol. 6 No. 2, pp. 144-176.
- Thomas, L. and Saaty, T.L. (1980), *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation*, McGraw-Hill International Book Company.
- Thompson, R.L., Higgins, C.A. and Howell, J.M. (1991), "Personal computing: toward a conceptual model of utilization", *MIS Quarterly*, Vol. 15 No. 1, pp. 125-143.

-
- Telecommunications Regulatory Authority (TRA) (2014a), *Annual Marketing Review Report*, available at: www.tra.gov.ae/en/open-data/annual-market-review.aspx (accessed 14 February 2017).
- Telecommunications Regulatory Authority (TRA) (2014b), *2014 Annual Report of Smart Enabler's Government Indicator*, UAE.
- Telecommunications Regulatory Authority (TRA) (2015), *2015 Annual Report of Smart Enabler's Government Indicator*, UAE.
- Telecommunications Regulatory Authority (TRA) (2016), *MGOVERNMENT*, available at: www.tra.gov.ae/en/services-and-activities/mgovernment/details.aspxx (accessed 22 February 2017).
- UAE m-government (2016), *Best of m-government Service Award*, available at: www.mgov-award.ae/en/page/about (accessed 22 February 2017)
- Vargas, L.G. (1990), "Overview of the analytic hierarchy process & its applications", *European Journal of Operational Research*, Vol. 48 No. 1, pp. 2-8.
- Venkatesh, V. and Davis, F.D. (2000), "A theoretical extension of the technology acceptance model: four longitudinal field studies", *Management Science*, Vol. 46 No. 2, pp. 186-204.
- Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003), "User acceptance of information technology: toward a unified view", *Management Information Systems Research Center, University of Minnesota, MIS Quarterly*, Vol. 27 No. 3, pp. 425-478.
- Vincent, J. and Harris, L. (2008), "Effective use of mobile communications in e-government: how do we reach the tipping point?", *Information, Community and Society*, Vol. 11 No. 3, pp. 395-413.
- Walton, D. (2010), *Appeal to Expert Opinion: Arguments from Authority*, Penn State Press.
- Wei, C.C., Chien, C.F. and Wang, M.J.J. (2005), "An AHP based approach to ERP system selection", *International Journal of Production Economics*, Vol. 96 No. 1, pp. 47-62.
- Wu, M.Y., Chou, H.P., Weng, Y.C. and Huang, Y.H. (2008), "TAM-2 based study of website user behavior-using web 2.0 websites as an example", *WSEAS Transactions on Business and Economics*, Vol. 4 No. 8, pp. 133-151.
- Zawya (2015), "TRA honors winners of m-government magazine and smart application competitions", available at: www.zawya.com/story/TRA_honours_winners_of_mGovernment_magazine_and_smart_application_competitions-WAM20150305102030477/
- Zhao, F. and Khan, M.S. (2013), "An empirical study of e-government service adoption: culture and behavioral intention", *International Journal of Public Administration*, Vol. 36 No. 10, pp. 710-722.
- Zhao, F., Scavarda, A.J. and Waxin, M.F. (2012), "Key issues and challenges in e-government development: an integrative case study of the number one e-city in the Arab world", *Information Technology & People*, Vol. 25 No. 4, pp. 395-422.
- Ziamou, P.L. (2002), "Commercializing new technologies: consumers' response to a new interface", *Journal of Product Innovation Management*, Vol. 19 No. 5, pp. 365-374.

Corresponding author

Syed Zamberi Ahmad can be contacted at: drszamberi@yahoo.com

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgrouppublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com