



Research Note

The adoption of M-government services from the user's perspectives: Empirical evidence from the United Arab Emirates



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ABSTRACT

The primary aim of this study is to examine the factors that predict end users' intention to adopt mobile government (m-government) services in a developing country. The research is based upon a self-administered questionnaire survey of 120 current users' in the United Arab Emirates (UAE), a leader in m-government development in the Arab world. The study employs advanced statistical techniques to test an extended the Technology Acceptance Model (TAM) by incorporating the determinants of trust, cost, social influence, variety of services, perceived usefulness in information technology and demographic profiles. The findings revealed that trust and social influence are positively associated with end users intention to adopt m-government services in the UAE. By identifying the predictors of users' adoption of m-government, this study provides several theoretical and practical implications related to m-government service adoption.

1. Introduction

Technology adoption is a growingly vital research theme, as new technologies continuously emerged. With the advances of technology, and in particular mobile technology, it has transforming the pattern of many governments deliver their services to its employees, citizens, businesses and other organisations through mobile government (m-government). On the basis of the concept given by the Organisation for Economic Co-operation and Development (OECD/ITU, 2011), m-government is an extension or evolution of electronic government (e-government), whereby the transactions of businesses, dissemination of information and services are conducted in a mobile environment through mobile devices for public service delivery (OECD/ITU, 2011). The opportunity presented by m-government are reflected by the growth of mobile phones. According to the International Telecommunication Union (ITU) statistical report, mobile subscribers will surpass 7 billion users worldwide in 2015 (ITU, 2015). The implementation of m-government initiatives has been reported as leading to such benefits for governments, citizens, business and economic growth as it may increase government efficiency, improve communications and data coordination, expand service delivery, improve levels of information sharing, precision and personalisation in targeting users and delivering content, greater cost optimisation, faster and wider wireless networks, stronger digital equality and increasing the productivity and effectiveness of public service personnel (Hung, Chang, and Kuo, 2013; OECD/ITU, 2011).

Research on m-government service adoption is still nascent in nature as past research has focused on electronic government (e-government) services acceptance (Lawson-Body, Illia, Willoughby, & Lee, 2014), ignoring mobile communication technology (Wang, 2014). The factors studied here may be of beneficial in explaining user acceptance of the services as rigorous empirical research of m-government adoption behaviour of citizens in the Arab world is still yet to emerge (Rodrigues, Sarabdeen, & Balasubramanian, 2016). One of the associated factors that a uniform e-strategy cannot be attained is the fact that each geographic location has its own characterised social, economic, cultural, and political cobweb, which predominantly shaped m-government technologies, technological institution, and temporal contexts that merely influenced entertained options and decisions about whether or not to adopt an innovation. This study is among the pioneer empirical research that focuses on end users' behavioural intention towards m-government services in the UAE. As the UAE has made tremendous progress in the development of m-government services recently (Gulf News, 2014), this study has significant implications for practices in the region, and for further research on an m-government adoption model that is robust across cultures. Therefore, studying the factors that explaining the adoption of m-government in the UAE is essential for understanding the potential of this technology in the Arab context, in general and UAE in particular.

This study made several important empirical and theoretical contributions to studies on information technology. First, it applied the Technology Acceptance Model (TAM) model to examine end users

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decisions to adopt m-government in a developing country, which has not been widely explored in the literature. Secondly, it added four variables, trust, cost, social influence and variety of services, into the TAM model, to have better understanding on the role of numerous variables on end users' behavioural intentions to adopt m-government. Thirdly, this study made contributions to the knowledge in this area by examining whether the effect of extended TAM factors on m-government might be moderated by gender, age and monthly household income of the end users. Finally, the results of this study will have implications for those who attempt to promote m-government services among UAE populations.

The remainder of this paper is organised as follows. Next section presents a review of relevant literature. This is followed by hypotheses development and proposed research model for this study. The research method section will then be presented. After that, findings are presented and discussed. In the last section, the paper identifies contributions, limitations, and areas for further study before drawing a conclusion.

2. Literature review

2.1. Mobile government service in the United Arab Emirates (UAE)

The UAE m-government services plan was announced and initiated by His Highness Shaikh Mohammad Bin Rashid Al Maktoum, Vice-President and Prime Minister of the country and Ruler of Dubai on May 22, 2013, to provide services to their citizens anytime, anywhere and in convenience way (Gulf News, 2014). The focus was to relocate customer service centers into every customer's device (Waqas, 2013). The purpose was to offer simple, highly efficient, transparent procedures to meet customers' needs and expectations (Sheikhmohammed.ae, 2013). The UAE is one of such country in the Arab world that is setting an example for dedication to the transition from e-government to m-government (Waqas, 2013). His Highness said, "The government of the future works 24/7 and 365 days a year. A successful government is one that goes to the people and does not wait for them to come to it" (Emirates 24/7, 2015a). The m-government initiative draws its strength from UAE's accomplishments related to infrastructure and economic development, its mobile phone market, and individual use. The UAE has one of the world's leading infrastructures in the field of communication, with the number of mobile phone subscribers reaching approximately 14 million, which is an average of two telephones per capita (Sheikhmohammed.ae, 2013). A report released at end of year 2014 by Euro monitor forecasts that the mobile platform in the UAE will see no slowdown in the coming years, and will keep increasing to 4.3 million devices by 2018 (Kippreport, 2015).

Regarding readiness, the UAE is ranked first among all Arab countries on the Networked Readiness Index (NRI), issued by the World Economic Forum, and twenty-third among all 143 countries assessed in 2015 (TRA, 2015). In terms of the NRI's individual indicators, the UAE ranked first among Arab countries in terms of business-to-consumer Internet use, the E-participation Index, Internet access in schools, secure Internet servers, software piracy rates, and percentage of software installed (TRA, 2015). Table 1 summarises UAE rankings in the Global Competitiveness Report.

There is robust online use of government services in the UAE (Al-Hubaishi, Ahmad, & Hussain, 2017). According to data from 2015, 38.1 per cent of services are accessible on the Web (Hassan, 2013), and another report indicates aggressive online use through smartphones (Hassan, 2013). Online use is catalysed by numerous, affordable data plans offered by two national telecom service providers (Hassan, 2013) namely Etisalat and Emirates Integrated Telecommunications Company (known as DU). The UAE government has been enthusiastic toward ensuring that all government in the seven emirates (Dubai, Abu Dhabi, Ras Al-Khaimah, Sharjah, Umm Al-Quwain, Ajman and Fujairah) and private projects work toward the transition of the online systems to m-

Table 1
Key Finding for UAE Rank.

Indicators	Ranking
World ranking in Government procurement of advanced technology products	2
World ranking in quality of overall infrastructure	3
World ranking in burden of government regulation	3
World ranking in Foreign Direct Investment (FDI) and technology transfer (Investment bringing new technologies)	3
World ranking in mobile telephone subscriptions/100 population	6
World ranking in firm-level technology absorption	7
World ranking in availability of latest technologies	8
World ranking in individuals using internet	10
World ranking in mobile broadband subscriptions/100 population	11

Source: (TRA, 2015).

government in a near future, which has been the biggest initiative of the UAE government. Thus, this adds to the reasons behind choosing UAE for this study.

2.2. Factors affecting the adoption of m-government: technology acceptance model (TAM)

Many studies have proposed and examined various models to study the primary determinants of adoption and implementation of information technology (IT). One of the most commonly used model in the IT acceptance literature is Technology Acceptance Model (TAM) (Davis, 1989). The TAM was adapted from the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975) and was initially developed to examine technology adoption and use behaviours in the workplace context. Davis (1989) proposes that technology usage is determined by behavioural intention, which is affected by two key principles: perceived usefulness and perceived ease of use. Perceived usefulness is defined as "the extent to which a person believes that using a particular technology will enhance her/his job performance" (p. 320). Perceived ease of use is defined as "the degree to which a person believes that using a technology will be free from effort" (p. 320).

2.2.1. Perceived usefulness

The decision to adopt the technology depends on the degree individuals feel that using the technology will improve efficiency and work performance (Davis, 1989). Previous studies have examined the importance of perceived usefulness on retention behaviour (Park and Kim, 2013). Wang (2014) confirm that perceived usefulness has a positive effect on attitude toward m-government adoption. Likewise, Abdelghaffar and Magdy (2012) indicate that users' willingness to use m-government in Egypt is strongly influenced by their perception of its usefulness. So, the decision of users to adopt the m-government depends on the degree users believe that using the m-government will satisfies users with instrumental needs timely, personalised information and services in more convenient and easier way and helps users improve work efficiency and complete tasks in anytime and anywhere (Yuan, Archera, Connelly, & Sheng, 2010). Hence, the following hypothesis is stated:

H1: Perceived usefulness has a positive relationship with UAE users' decisions to adopt m-government

2.2.2. Perceived ease of use

In terms of perceived ease of use, researchers has demonstrated that there is direct and significant relationships between perceived ease of use and users' intentions to adopt a technology (Pan and Jordan-Marsh, 2010). As m-government is still relatively new to many users in the UAE, it would be therefore important to determine if they perceive m-government as being useful, easy to learn, or difficult to use, and whether this perception will lead to users' adoption decision. Although one may argue that m-government applications should therefore have a

simple interface, however, sometimes this might be done at the expense of features and functionalities (Bina and Giaglis, 2007; Chong, Chan, & Ooi, 2012). Ooi et al. (2011) further asserted that complexity of one specific system will become the inhibitor that discourages the adoption of an innovation. In this connection, the following hypothesis is proposed:

H2: Perceived ease of use has a positive relationship with UAE users' decisions to adopt m-government

3. The extended TAM model, hypotheses development and research model

The parsimony of TAM makes it a strong model to predict technology acceptance in various contexts. However, the original TAM also is limited by its parsimony since it cannot provide sufficient information for understanding adoption behaviours of m-government.

3.1. Trust

Users' trust stands as one of an important element which affects in their decisions to adopt new technologies such as m-government due to its relevance to deal with two critical conditions of digital means: uncertainty and risk of vulnerability (Gambetta, 2000). Research has showed that among the main element taken into consideration before using a system is security (Fang, Chan, Brzezinski, & Xu, 2006). M-government is relatively new development in UAE, and given the lack of confidence, sophistication of the user, security, face-to face interaction, and potential personal information that can be accessed by the providers, users might not trust m-government adequately. As m-government transactions involve transmitting data in a wireless environment setting, users are exposed to privacy and security risks (Radomir and Nistor, 2013). Privacy concerns exist wherever personally identifiable information is collected and stored, in digital form or otherwise. The possibility that information may be stolen, data corrupted and a fraud committed may become a reality (Suh and Han, 2003). Halaweh (2011) conducts an empirical research to validate that security positively influences users' attitude toward adoption of technology. The findings indicate that many privacy and security issues exist in information services provided over the Internet. In the context of m-government, an individual who considers the system to be safe and trustworthy will have a positive attitude towards m-government (Hung et al., 2013; Velsen, Geest, Wijngaert, Berg, & Steehouder, 2015). This study therefore hypothesis that:

H3: Trust has a positive relationship with UAE users' decisions to adopt m-government.

3.2. Cost

Past studies from Chong et al. (2012), Wei, Marthandan, Chong, Ooi, and Arumugam (2009) and Carlsson, Walden, and Bouwman (2006) revealed that price or cost is one of primary aspect that can slow the development of innovation. In terms of m-government, the cost may consist of initial mobile handset cost, ongoing network access cost, as well as subscription fee and service charge to which consumer believes he or she will be submitted to in the future (Gitau and Nzuki, 2014). However, one may argue that the UAE is one of the fast growing nations in Arab world and given the increasingly purchasing power and high profile of UAE consumers, which enjoys a high standard of living, the price of mobile devices that is compatible with the m-government application, the subscription of 3G and internet services, and m-government should not affect their adoption decisions. In this connection, the research hypothesis is:

H4: Cost has a positive relationship with UAE users' decisions to adopt m-government.

3.3. Social influence

In the initial adoption phase where the individuals have little or no experience on the related innovation, their beliefs would be greatly influenced by opinions expressed by reference groups (Venkatesh, Thong, & Xu, 2012). Social influence is the degree to which an individual perceives that important others believe the person should use the new technology (Chong, Darmawan, Ooi, & Lin, 2010). Wei et al. (2009) observed a key role played by other people's opinion, superior influence, expert opinions, family, friends, and colleagues are potential medium of influencing the decision to adopt new innovation technologies. Since the m-government is at its nascent stage, the marketers driven communication on mass media like internet, newspapers, television, radio, and magazines might also have profound influence in shaping the individual behaviour towards the use of m-government. Thus, the following hypothesis has been derived:

H5: Social influence has a positive relationship with UAE users' decisions to adopt m-government.

3.4. Variety of services

M-government has a great potential as it act as new interface between government and citizens and its application offers various services such as allowing users to get information more effectively, interact with government more efficiently, and conducting mobile transactions. Hung et al. (2013) in their study of mobile e-government services in Taiwan found that having a variety of services will increase end users' willingness to adopt m-government. However, the study on the range of services remains too limited to attract a solid conclusion. Therefore the following hypothesis is proposed:

H6: Variety of services has a positive relationship with UAE users' decisions to adopt m-government.

3.5. Demographic variables

One way to understand how different users interact with various m-government activities is to segment users based on their demographic profiles. Demographic profiles have been examined in the past in the adoption of technologies (Hernández, Jiménez, & Martín, 2011). An underlying assumption of the theoretical framework of this study is that factors to m-government adoption are defined by consumer's psychological profiles discriminate by demographic variables. However, existing model does not address the socioeconomic disparity of user, which are likely influence the utilisation and adoption level. Several authors have criticised and contended that each m-government consumer is expected to have its own personal experience; subjective by different circumstances of technology acceptance (Liu et al., 2014; Pantano and Priporas, 2016; Wangpipatwong, Chutimaskul, & Papasratorn, 2008). However, some e-government studies have omitted gender, age and average household monthly income as important contributory factors to measure the adoption intention (Abdelghaffar and Magdy, 2012; de Sena Abrahão, Moriguchi, & Andrade, 2016; Liu et al., 2014). Household income also was not included within the TAM (Davis, 1989), UTAUT (Venkatesh, Morris, Davis, & Davis, 2003) model and UTAUT2 (Venkatesh et al., 2012) model.

TAM2 (Venkatesh and Davis, 2000), UTAUT (Venkatesh et al., 2003) model and UTAUT2 (Venkatesh et al., 2012) model have considered gender as a moderator. The consideration of gender in models of behaviour was introduced in the gender schema theory that explains men and women are different in making-decision process (Bem, 1981). Earlier research has suggested that gender plays an important role in predicting behaviour in the context of information system research (Venkatesh et al., 2003, 2012; Venkatesh and Morris, 2000). Venkatesh and Morris (2000) explained that men and women use different socially constructed cognitive structure in making deci-

sion. Study by Venkatesh et al. (2003, 2012) found that the explanatory power TAM and UTAUT2 significantly increased after the inclusion of gender as a moderator. Specifically, gender was found to have a moderating impact on the influence of perceived usefulness, perceived ease of use, and social influence on behaviour intention (Venkatesh and Davis, 2000). Gender was significantly influence performance expectancy (similar to perceived usefulness), effort expectancy (similar to perceived ease of used), and social norm (similar to social influence) (Venkatesh et al., 2003, 2012), and price value (Venkatesh et al., 2012) on behavioural intention. Men was found to have stronger significant relationship compared to women in the relationship between performance expectancy and behavioural intention (Venkatesh et al., 2003). However, Venkatesh et al. (2012) found the gender effect between performance expectancy and behavioural intention was more pronounced on older women than men. This finding is not consistent with literature that establishes men place higher importance on the usefulness of the system (Venkatesh and Morris, 2000). Wang, Wu, and Wang (2009) failed to find support for the moderating effect of gender on the this relationship within the e-learning context. Venkatesh et al. (2003) established that effort expectancy for women is higher than men in the relationship with behavioural intention. The result is aligned with gender roles studies that suggest women generally have higher technology anxiety and lower in self-efficacy when dealing with technology (Tarhini, Hone, & Liu, 2014). However, in the e-learning context, Wang et al. (2009) was unable to establish the moderating effect of gender in the relationship between perceived ease of use and behavioural intention. In the context of e-government, gender effect was not found in the relationship between trust and adoption of e-invoice (Lian, 2015). Additionally, women is more pronounced than men in the in the relationship between price value (similar to cost) and behavioural intention (Venkatesh et al., 2012). The same pattern was found in several studies that gender effects the relationship between social norm (similar to social influence) and behavioural intention, in which the effect is stronger for women (Huang et al., 2012; Venkatesh et al., 2012; Venkatesh and Morris, 2000). This evidenced that women are trusting on other's opinion because of their better concious of other's feeling compared to men. As a result, women are easily influence and motivated by social pressure and affiliation (Venkatesh and Morris, 2000). Gender was not considered as moderating effects in the relationship between variety of services and intention behaviour within m-government by previous studies. The variety of services provided by m-government is important to provide quick and easy access to the information and services (Alotaibi & Roussinov, 2016). The utilisation of services require structure profiling to carter consumer demands to better understand the needs of consumer (Abu Bakar, Abdul Rahman, & Abdull Hamed, 2015). Gender was found to moderate the relationship between factors affecting the adoption of m-government, and the user intention to adopt m-government (Alotaibi and Roussinov, 2016; Hogue, 2016). They explained that demographic attributes affect perceptions associated with possible indicator of service adoption. However, gender was found to not significantly moderate (Abu-Shanab, 2015) or partially moderated (Guo, 2015; Tarhini et al., 2014) the m-government behaviour intention. Shareef, Kumar, Dwivedi, and Kumar (2016) added that factors influenced the adoption of online services must consider the gender issues. This aligned with a suggestion by Hogue (2016), to highlight the gender gap issue in the developing countries. The current study therefore explores whether it plays a role within this context. While a number of studies support the moderating role of gender in technology acceptance behaviour, there is still inconsistency in the findings, and remain unclear. In the context of this study, it is predicted that the effect of gender will be stronger for women than men.

The presence of age as a moderator would increase the explanatory power of a TAM (Chung, Park, Wang, Fulk, & McLaughlin, 2010). Investigation on consumer's age is particularly useful for explaining variation in m-government adoption behaviour. Venkatesh et al. (2012)

included age an important moderator within UTAUT model. Recent studies evidenced age as a moderator of the relationship between factors influenced the adoption of m-government and the intention to adopt m-government (Alotaibi and Roussinov, 2016; Ohme, 2014). Venkatesh et al. (2012) found the relationship between perceived usefulness and behaviour intention was stronger for younger employees within an organisational context. Chung et al. (2010) and Wang et al. (2009) have failed to empirically evidence the moderating effect of age on the relationship between perceived usefulness and behaviour intention within the online communities and the mobile learning system users respectively. Older users was found to have higher perceived ease of use when measured towards behavioural intention within ITAUT model (Venkatesh et al., 2003; Wang et al., 2009). Moderating effect of age on the impact of perceived ease of use on behavioural intention was not found within the context of online community engagement (Chung et al., 2010). Venkatesh et al. (2003) found older users have stronger effect of social influence in relationship with behavioural intention. Age also found to moderate the relationship between social influence and behavioural intention, and the effect was stronger for older people who used m-learning technology (Wang et al., 2009). In contrast to traditional stereotypes of age interaction to measure behavioural intention, Chopra and Rajan (2016) claimed age appears to be overlooked in measuring technology adoption in developing countries. Recent studies found age does not moderate the relationship between social influence and the adoption of m-government; and the relationship between trust and the adoption of m-government (Chopra and Rajan, 2016; Lian, 2015). Other study also has failed to replicate the effect (Ghaleb, Dajani, & Fadhil, 2013). Age also was evidenced for not significantly moderate (Lee and Rho, 2013) or partially moderated (Abu-Shanab, 2015; Tarhini et al., 2014) in other studies. Venkatesh et al. (2012) found age as significant moderator in the relationship between cost and intention behaviour in UTAUT model. Age has not previously been considered as moderating effects in the relationship between variety of services and intention behaviour within m-government by previous studies. The current study therefore explores whether it plays a role within this context. While a number of studies support the moderating role of age in technology acceptance behaviour, there is still inconsistency in the findings, and remain unclear. In the context of this study, it is predicted that the effect of age will be stronger for older consumer.

As much as the greater intention was given to gender and age in technology adoption context, the household income of m-government consumer might provide different viewpoint into the technology use and intention-behaviour. Per capita income of a country may affect the use and adoption intention in of m-government. The UAE is ranked at sixth from 10 richest countries list in 2016, having among the world's highest per capita income (Maceda, 2016). This highlights an average household income as an important moderating variable in this study. Consistent with e-Government Survey Report (United Nations, 2014) that specifies socioeconomic characteristics, such as income; is an important aspect of the e-government usage divide. Liu et al. (2014) argue socioeconomic disparity between urban and rural regions has been underestimated in previous studies. The inclusion of user's income into e-government adoption and utilisation was also suggested by Alghamdi and Beloff (2014) to be adopted in Saudi Arabia. Recent studies have empirically proven that household income gap significantly moderated the use and intention to adopt m-government in developing countries (Khayyat and Heshmati, 2013; Li, Liu, & Ji, 2014; Wangpipatwong et al., 2008). This study predicts that the effect will be greater for consumers whose earned higher household income compared to the lower household income consumers.

Hence, the following hypothesis is proposed:

H1a: Gender, age and household income have significantly moderate the relationship between perceived usefulness and UAE users' decisions to adopt m-government.

H2a: Gender, age and household income have significantly moder-

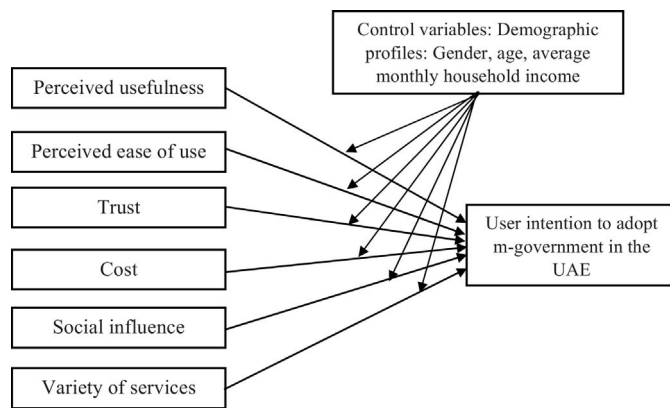


Fig. 1. The Theoretical Framework.

ate the relationship between perceived ease of use and UAE users' decisions to adopt m-government.

H3a: Gender, age and household income have significantly moderate the relationship between trust and UAE users' decisions to adopt m-government.

H4a: Gender, age and household income have significantly moderate the relationship between cost and UAE users' decisions to adopt m-government.

H5a: Gender, age and household income have significantly moderate the relationship between social influence and UAE users' decisions to adopt m-government.

H6a: Gender, age and household income have significantly moderate the relationship between variety of services and UAE users' decisions to adopt m-government.

3.6. Research model

Based on the literature review and hypotheses, the theoretical framework for this study is presented in Fig. 1. This study proposes that the intention to adopt m-government is driven by perceived usefulness, perceived ease of use, trust, cost, social influence, and variety of services with demographic profiles as the moderator.

3.7. Research methodology

3.7.1. Sample and procedure

Even though the measures used in this study have been used and validated (Abdelghaffar and Magdy, 2012; Fang et al., 2006; Liu, Zhao, Chau, & Tang, 2015; Rodrigues et al., 2016; Tan, Ooi, Chong, & Hew, 2014; Venkatesh et al., 2003; Wang, 2014), a draft of the questionnaire was reviewed by key experts to ensure the understandability and ease aspects of the questionnaires from the respondents' perspective. The pilot was conducted with five m-government users, two senior government officer, who are currently working in government agencies which offering m-government services, and three university professors, who main research filed are in the area of information technology and technology management. At the end of the pilot test, it was revealed that the respondents found the questionnaire is simple and easy to understand, and at the same time quicker to complete in terms of the time needed for completing the survey. Very few and minor suggestions came in, which were effectively addressed and incorporated in the final edition of the questionnaire in order to match UAE m-government context.

In order to empirically test the 6 hypotheses constructed, the survey strategy were employed and the self-questionnaire was administered (Saunders, Lewis, & Thornhill, 2007). All independent variables were measured using a five-point Likert-type scale with anchors ranging from 1 = "strongly disagree" to 5 = "strongly agree". A total of 24 items were used to measure the independent variables (excluding the

demographic variables). The questionnaire were in English language. The criterion for taking the survey was determined as 'having experience using m-government services system at least once in life time'. Hence, they will be able to understand the questions in the survey and should be able to provide the best inputs for the study. Experience user is suitable for technology acceptance study because a sense of intellectual perspective is important in predicting and explaining the adoption of m-government in the UAE. The Emiratization initiatives of the UAE in establishing the value perceived by the university students are important focus of research (Mahmud, Yogesh, Sven, & Norm, 2016; Lian, 2015).

The respondents were randomly sampled from 338 students from various universities in the UAE. This sample is selected due to the university's population comprises of diverse nationality, cultures and economic background to reflect the context of UAE. With the university's consent, the survey questionnaires were distributed to various classes, where the students were first informed on the purpose of the study. Students were informed to exclude their names, year of study, names of their respective institution, and study program to avoid respond bias. In spite of this sample characteristic, it is argue that the sample is appropriate because it is representative of the population of mobile device users, and they are more likely to adopt m-government compared to those who are non-mobile devices users. This is also consistent with the approach use by Chong et al. (2012) and Pan and Jordan-Marsh (2010). According to them, younger age users are more receptive to information technology and tend to be ready to adopt to new technologies. Therefore, it is believe that the use of such subjects in this study does not present a significant threat to external validity.

Participation in the study was voluntary and assured for anonymity using on-paper surveys. The reason for utilising on-paper survey instead online survey are as follows. First, this study investigates the consumer intention to adopt m-government in the UAE. On-paper survey is more effective to encapsulate the validated respondents to meet the requirements of this study. Second, even though studies have suggested an online approach is more autonomous than on-paper surveys (Dommeyer, Baum, Hanna, & Chapman, 2004; Fike, Doyle, & Connelly, 2010; Liu et al., 2015), however, on-paper survey was evidenced to have higher response rate (Cook, Heath, & Thompson, 2000; Santoso, Stein, & Stevenson, 2016; Tse-Hua and Xitao, 2008). Third, many studies have quoted the potential non-response-bias between on-paper survey and online survey were statistically insignificant (Hayslett and Wildemuth, 2004; Michaelidou and Dibb, 2006; Sappleton and Lourenco, 2016). To avoid duplication of responses, the sample was drawn from the list of registered university students for Spring Semester 2015–2016. It was found that the majority of subjects have experienced in using m-government.

3.7.2. Variables and measurement

All instruments were selected from the literature and were adapted for use in the context of m-government. Table 2 summarises the items related to each construct of the proposed model and studies that served as reference for their adaptation.

4. Results

Out of 177 responses, 57 surveys have been dropped due to incompleteness or having the same answer for all questions and left 120 valid responses that yielded a sufficient response rate of 36% (Nulty, 2008; Santoso et al., 2016). The sample contains a balance of male-female ratio irrespective of the imbalance representative of gender in higher education in the UAE (Abdulla and Ridge, 2011). Mean age and average monthly household income of participants are 27 years and AED45, 000 respectively. The detailed of demographic characteristics is shown in Table 3.

Table 2
Measuring Scales and References for the Proposed Constructs.

Construct	Items	References
Perceived usefulness (4 items)	U1: M-government allows me to improve work productivity. U2: M-government is convenient than traditional payment system. U3: Using m-government applications will enable me to accomplish the required more quickly. U4: Overall, I would find m-government to be advantageous.	Adapted from: Tan et al. (2014); Wang (2014); Wang (2014); Hung et al. (2013); Wei et al. (2009).
Perceived ease of use (5 items)	E1: Learning to operate m-government is easy for me. E2: I found m-government is easy to get to do what I wanted to do. E3: My interaction with m-government is clear and understandable. E4: It is easy for me to become skillful at using m-government. E5: I found m-government is easy to use.	Adapted from: Davis (1989); Brinkman, Haakma, and Bouwhuis (2009); Hung et al. (2013); Wang (2014); Wei et al. (2009).
Trust (5 items)	T1: Payments made through m-government is securely processed. T2: Transactions via m-government are secured. T3: I am confident with the security measures offered by m-government application. T4: Privacy on m-government is well-protected. T5: I believed that m-government is secured	Adapted from: Teo, Srivastava, and Li, (2008); Yuan, Zhang, Chen, Vogel, and Chu (2009); Chong et al. (2012); Wang (2014)
Cost (3 items)	C1: Good explanations of service fees. C2: All service fees are transparent. C3: Service fees are reasonable.	Adapted from: Liao, Tsou, and Huang (2007); Chong et al. (2012); Sim, Tan, Wong, Ooi, and Hew (2014)
Social influence (5 items)	I1: Friends and family members have influenced my decision to use m-government. I2: Mass media (e.g.: TV, radio and newspaper) have influenced my decisions in using m-government. I3: It is the current trend to use m-government. I4: People whose opinions that I value prefer that I use m-government for doing transaction. I5: I will use m-government if my colleagues use it.	Adapted from: Venkatesh et al. (2012); Chong et al. (2012); Sim et al. (2014).
Variety of services (2 items)	S1: The current available m-government application is attractive. S2: Current m-government services are up to my expectations	Adapted from: Pagani (2004); Chong et al. (2012).
Behavioural intention (4 items)	B1: I will use m-government in the near future. B2: I will purchase m-government enabled phones in the near future. B3: I am currently using m-government frequently. B4: I predict that I will continue to use m-government applications on a regular basis.	Adapted from: Venkatesh et al. (2012); Al-Gahtani, Hubona, and Wang (2007); Wei et al. (2009); Partala and Saari (2015).

Table 3
Demographics Profile of Respondents.

Demographics	Counts (%)	
Gender		
Male	60	(50.0%)
Female	60	(50.0%)
Age		
20 and below	13	(10.8%)
21–30	50	(41.7%)
31–40	30	(25.0%)
41–50	12	(10.0%)
51 and above	15	(12.5%)
Education		
Diploma	14	(11.7%)
Bachelor degree	61	(50.8%)
Master's degree	42	(35.0%)
Doctoral degree	3	(2.5%)
Average monthly household income (AED)		
Under 20,000	22	(18.3%)
20,000–39,999	34	(28.3%)
40,000–59,999	19	(15.8%)
60,000–79,999	12	(10.0%)
80,000–99,999	3	(2.5%)
100,000 and above	30	(25.0%)

4.1. Common methods bias testing

Since the sample data were gathered based on consumer's perception self-report, the Harman's single-factor test was executed to confirm the existence of common method bias of data. Principle component analysis was conducted and six-factors were extracted with cumulative variance explained of 71.15%, which was in an acceptable range (Beavers et al., 2013; Fabrigar, Wegener, MacCallum, & Strahan, 1999; Tabachnick and Fidell, 2001). The Bartlett's Test of Sphericity of $p < 0.000$ provides evidence of statistical difference for the observed correlation matrix (Pett, Lackey, & Sullivan, 2003). The Kaiser-Meyer-Olkin Test of Sampling Adequacy (KMO) of 0.871 measures the shared variance of the items (Beavers et al., 2013). The common method bias for this study was not significant as these results provided the strength of the relationships for suggested factorability of the observed variables.

4.2. Measurement model

Structural equation modelling was utilised to test the research model. The two-step modeling approach of Anderson and Gerbing (1988) was conducted to measure the convergent and discriminant validity of the constructs. Next, the hypotheses are tested using total disaggregation structural model.

Confirmatory factor analysis (CFA) was conducted using AMOS to examine the validity and reliability of the constructs. Average variance extracted (AVE), composite reliability (CR) and Cronbach's alpha (α), were calculated based on factor loadings (λ) of each item in a construct to measure the convergent and discriminant validity. As shown in Table 4, all λ s and AVEs have meet the threshold of 0.5, except for item-B3 (dropped due to $\lambda < 0.5$) (Fornell and Larcker, 1981). CRs are well above 0.6 as suggested by Tseng, Rnyei, and Schmitt (2006) and α of each construct is suffice at 0.7 and above (Nunnally, 1967; Nunnally and Bernstein, 1994). Hence, the convergent validity of the studied variables is good (Byrne, 2010).

The goodness-of-fit of CFI, NFI, TLI and RMSEA for this study is measured using the recommended indicators by Bentler and Bonett (1980), Byrne (2010), and Kenny, Kaniskan, and McCoach (2015). Instead of CMIN/df (Bentler and Bonett, 1980), this study adopted recommendation by Tabachnick and Fidell (2001) that suggest CMIN and df need to be reported separately if the sample is between 100–200. By convention, the good model fit for RMSEA is less than 0.08 (Byrne, 2010). NFI below 0.90 indicates a requirement to respecify the model. This study however adopted 0.80 cut-off of NFI as suggested by Satorra and Bentler (1994). TLI and CFI are chosen for fit indices due to its relative stability over number of variables in the studied model (Kenny and McCoach, 2003), and insensitive to sample size (Marsh, Hau, Balla, & Grayson, 1998). The treshole of 0.90 for both is applied in this study as suggested by Byrne (2010), and Kenny et al. (2015). CFI should be equal to or greater tha 0.90 to accept the model to indicate 90% of the co-variation of data can be reproduced by the studied model (Bentler and Bonett, 1980). In this study, the model has produce a suffice goodness-of-fit, CMIN = 248.75; CFI = 0.951; NFI = 0.853, TLI = 0.936 and RMSEA = 0.058. Thus, the good-fitting measurement model can interpret the causal paths of stucture model (Kenny et al., 2015). The ability of the studied model to reproduce the data is important to ensure the reasonable consistent with the data (Hoe, 2008).

Table 4
Factor Loadings, Average Variance Extracted, Composite Reliability and Cronbach's Alpha.

Variables/items	λ	AVE	CR	α
Behavioural intention		0.6	0.8	0.8
B1	0.8			
B2	0.7			
B3	0.8			
Perceived usefulness		0.6	0.8	0.7
U1	0.8			
U2	0.8			
U3	0.7			
U4	0.7			
Perceived ease of use		0.5	0.8	0.7
E1	0.7			
E2	0.8			
E3	0.7			
E4	0.6			
E5	0.7			
Trust		0.6	0.9	0.8
T1	0.9			
T2	0.9			
T3	0.8			
T4	0.7			
T5	0.6			
Cost		0.6	0.8	0.8
C1	0.9			
C2	0.8			
C3	0.7			
Social influence		0.5	0.8	0.7
I1	0.8			
I2	0.7			
I3	0.7			
I4	0.7			
I5	0.5			
Variety of services		0.6	0.8	0.8
S1	0.9			
S2	0.7			

There is no indication of multicollinearity for these constructs as all correlation coefficient (r) values are less than threshold value of 0.9 (Peng and Lai, 2012). Table 5 tabulated the result of r and r^2 of each construct. All r^2 are lower than AVEs to indicate an acceptable discriminant validity of the scales, except for perceived usefulness $\langle \rightarrow \rangle$ perceived ease of use, and perceived ease of use $\langle \rightarrow \rangle$ cost (Byrne, 2010; Fornell and Larcker, 1981).

4.3. Hypothesis testing

The hypotheses results were presented in Table 6. The results demonstrate that only trust ($\beta = 0.40$; $p < 0.00$) and social influence ($\beta = 0.38$; $p < 0.01$) have positive effects on behavioural intention ($R^2 = 0.74$). Perceived usefulness ($\beta = 0.21$; $p > 0.05$), perceived ease of use ($\beta = -0.09$; $p > 0.05$), cost ($\beta = -0.07$; $p > 0.05$),

Table 5
Discriminant Validity of the Constructs.

	1	2	3	4	5	6
1 Behavioural intention						
2 Perceived usefulness	0.7 ⁺ (0.5)	1				
3 Perceived ease of use	0.1 ⁺ (0.0)	0.0 (0.0)	1			
4 Trust	0.7 ⁺ (0.5)	0.6 ⁺ (0.4)	0.2 ⁺ (0.0)	1		
5 Cost	0.5 ⁺ (0.3)	0.7 ⁺ (0.5)	0.0 (0.0)	0.5 ⁺ (0.3)	1	
6 Social influence	0.8 ⁺ (0.6)	0.7 ⁺ (0.5)	0.2 ⁺ (0.0)	0.6 ⁺ (0.4)	0.6 ⁺ (0.4)	1
7 Variety of services	0.6 ⁺ (0.4)	0.7 ⁺ (0.5)	0.1 ⁺ (0.0)	0.4 ⁺ (0.2)	0.6 ⁺ (0.4)	0.7 ⁺ (0.5)

* $p < 0.05$; (r^2).

Table 6
Overall Analysis.

	Model 1	Model 2	Model 3	Model 4
χ^2	391.561			
df	282			
CFI	0.937			
NFI	0.813			
TLI	0.922			
RMSEA	0.057			
R^2	0.75			
Trust $\rightarrow$ behavioural intention	0.40 ⁺			
Social influence $\rightarrow$ behavioural intention	0.38 ⁺			
Trust $\times$ gender $\times$ age $\times$ average monthly household income				
χ^2		397.401		
df		283		
$\Delta \chi^2/\text{df}$		5.84/1		
CFI		0.934		
NFI		0.810		
TLI		0.918		
RMSEA		0.058		
R^2		0.76		
Trust $\rightarrow$ behavioural intention		0.56 ⁺		
Social influence $\rightarrow$ behavioural intention		0.27 ⁺		
Social influence $\times$ gender $\times$ age $\times$ average monthly household income				
χ^2			394.057	
df			283	
$\Delta \chi^2/\text{df}$			2.50/1	
CFI			0.936	
NFI			0.812	
TLI			0.9321	
RMSEA			0.057	
R^2			0.76	
Trust $\rightarrow$ behavioural intention			0.33 ⁺	
Social influence $\rightarrow$ behavioural intention			0.53 ⁺	
Trust $\times$ gender $\times$ age $\times$ average monthly household income				
Social influence $\times$ gender $\times$ age $\times$ average monthly household income				
χ^2				401.726
df				284
$\Delta \chi^2/\text{df}$				10.17/2
CFI				0.932
NFI				0.808
TLI				0.916
RMSEA				0.059
R^2				0.78
Trust $\rightarrow$ behavioural intention				0.51 ⁺
Social influence $\rightarrow$ behavioural intention				0.46 ⁺
Moderation		Yes	No	Yes

* Significant at $p < 0.05$.

and variety of service ($\beta = 0.10$; $p > 0.05$) have insignificantly effects on behavioural intention.

To measure the moderating effects of demographic variables of gender, age and average monthly household income, the dichotomous variables were coded into dummy variables following the procedure

proposed by Frazier, Tix, and Barron (2004). The testing result together with the fit indices for each model are tabulated in Table 6 for comparison. When trust is controlled, gender, age and average monthly household income are significantly moderated ($\Delta \chi^2/df = 5.84/1$; > 3.84) the relationship between trust ($\beta = 0.56$; $p < 0.05$), and perceived social influence ($\beta = 0.27$; $p < 0.05$), with coefficient determination ($R^2 = 0.76$) on behavioural intention. The significant relationship also evidenced when trust and social influence were controlled. Gender, age and average monthly household income are significantly moderated ($\Delta \chi^2/df = 10.17/2$; > 3.84) the relationship between trust ($\beta = 0.51$; $p < 0.05$), and social influence ($\beta = 0.46$; $p < 0.05$), with coefficient determination ($R^2 = 0.78$) on behavioural intention. These demographic variables were found to have insignificant moderation effect ($\Delta \chi^2/df = 2.50/1$; < 3.84) if influence was controlled in the relationship between trust, and social influence on behavioural intention.

These findings indicated that gender, age and average monthly household income have stronger effect on both trust and social influence because the R^2 increases from 0.76 to 0.78. However, when it comes to the strength of the relationship, gender, age and average monthly household income have more effect on trust than social influence. The overall results of the hypothesis testing is tabulated in Table 7 and illustrated in Fig. 2.

5. Discussion

The main purpose of this study is to examine the factors that predict end users' intention to adopt m-government services in the UAE. The study has extended the TAM model by incorporating the determinants of trust, cost, social influence and variety of services, as well as three moderator factors; gender, age and household income to adopt m-government. According to Chong et al. (2012) investigating demographic profiles of users is important as it may provide an insight to identify specific market segment for technological adoption. Consistent to the previous studies (Abu-Shanab, 2015; Alghamdi and Beloff, 2014; Alotaibi and Roussinov, 2016; de Sena Abrahão et al., 2016), this study offer empirical support for the theoretical framework to better understand the end users' intention to adopt m-government services. It is worth noting that the majority of participants in this study expressed generally positive response to trust and social influence constructs being measured in the model. This means that the end users were willing to embrace m-government services consistent with evolution of mobile device, emergence of mobile internet and mobile net applications and services in the UAE.

The result obtained from this study indicated that trust was the significant determinant of behavioural intention to adopt m-government. This is supported by past study as those conducted by Hung et al. (2013), Radomir and Nistor, (2013) and Velsen et al. (2015). Since trust having the strongest relationship with behavioural intention to adopt

m-government (H3, $\beta = 0.40$; $p < 0.05$), it is therefore the study believed that users in the UAE who found the system is beneficial to facilitate their mobility while upheld flexibility and efficiency were likely to attracted to the attributes offered by m-government. Furthermore, the advantages of having better delivery, quick and on time information as well as transactional services to the target market have satisfy the wishes of the users. This finding also aligned with an integrated Expectation-Confirmation Model (ECM) and TAM as proposed by Chong (2013). He explains that trust is the utmost factor in determining the behavioural intention to adopt m-government. Mobile technologies had been utilised to pave the way for better public delivery system. Even though m-government is new in the UAE, sophistication of delivery system that facilitates interaction with government services had provide a reliable and consistent platform to attract users to utilise the service. These features are considered the most important factors in trust. Given the online interaction as the sole medium, priority has been given to security and privacy. Assurance to protect personal and sensitive data has increased level of users' confidence. Trustworthy of the system created a positive attitude towards m-government adoption. This factor offers support for judgment in extending the TAM model due to its limitation for understanding adoption behaviours of m-government.

In terms of social influence factor, it was found that it is causally affect behavioural intention to adopt m-government service (H5, $\beta = 0.38$; $p < 0.05$). Previous studies have evidence that the intention to adopt m-government was depending on expectation of social influence of users (Abdelghaffar and Magdy, 2012; de Sena Abrahão et al., 2016; Venkatesh et al., 2012). This result supports an argument by Wei et al. (2009) about how others perceived m-government is considered the foundation for behavioural intention to adopt. The role of family, friends and colleagues could influence on behaviour and perceptions of users to adopt m-government. According to Gunkel, Schlaegel, and Taras (2016), high power-distance and collectivism culture of UAE have a great effect on social cooperation to influence obliging to shape behavioural intention. Shared experience and opinions is valued as perception determining that effect the decision to positively adopt m-government. In this context, positive experience on m-government services is translated in positive encouragement. There is high likely for users who are familiar with the system to help in promoting it to other users. Thus, when the number of m-government adoption reaches critical mass-point, the number of users is possible to snowball rapidly. This finding is similar to research conducted in Egypt (Abdelghaffar and Magdy, 2012), and Saudi Arabia (Alghamdi and Beloff, 2014) that explicated users interaction with m-government system is defined by culture compatibility and level of experience. Thus, this findings is consistent with Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) that introduced social influence as one of the key construct in technology acceptance model. The social influence determinant as recommended in UTAUT

Table 7
The Overall Results of the Hypothesis Testing.

Hypotheses	Results
H1: Perceived usefulness has a positive relationship with UAE users' decisions to adopt m-government	Not-supported
H2: Perceived ease of use has a positive relationship with UAE users' decisions to adopt m-government	Not-supported
H3: Trust has a positive relationship with UAE users' decisions to adopt m-government	Supported
H4: Cost has a positive relationship with UAE users' decisions to adopt m-government	Not-supported
H5: Social influence has a positive relationship with UAE users' decisions to adopt m-government	Supported
H6: Variety of services has a positive relationship with UAE users' decisions to adopt m-government	Not-supported
H1a: Gender, age and household income have significantly moderate the relationship between perceived usefulness and UAE users' decisions to adopt m-government	Not-supported
H2a: Gender, age and household income have significantly moderate the relationship between perceived ease of use and UAE users' decisions to adopt m-government	Not-supported
H3a: Gender, age and household income have significantly moderate the relationship between trust and UAE users' decisions to adopt m-government	Supported
H4a: Gender, age and household income have significantly moderate the relationship between cost and UAE users' decisions to adopt m-government	Not-supported
H5a: Gender, age and household income have significantly moderate the relationship between social influence and UAE users' decisions to adopt m-government	Supported
H6a: Gender, age and household income have significantly moderate the relationship between variety of services and UAE users' decisions to adopt m-government	Not-supported

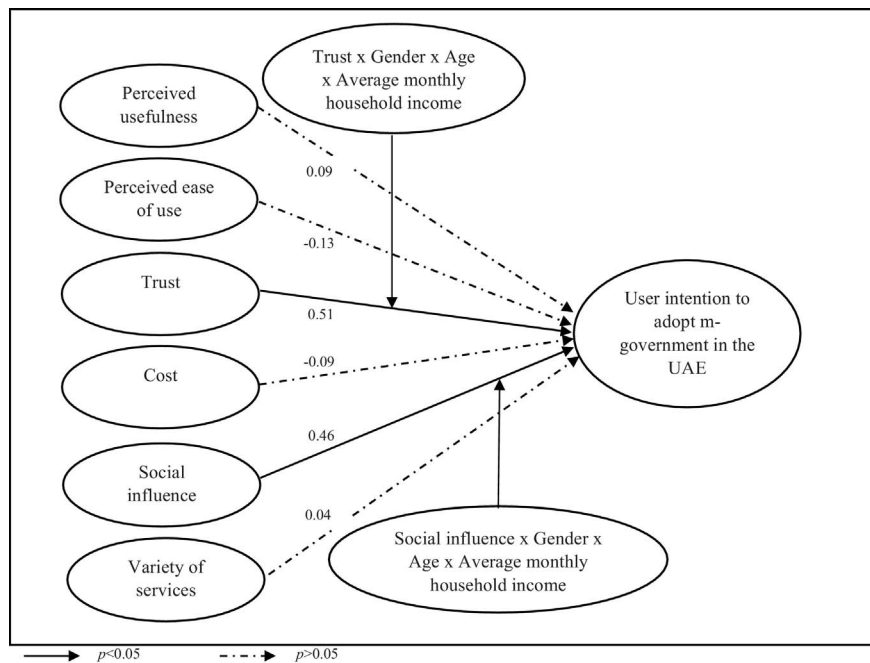


Fig. 2. Final Structure Model.

offers for a rigorous study of TAM. This is crucial as additional factor will provide a better behavioural-decision making examination on how and when it influences user's decision.

It is surprising however to find this study has contradicting result of the causality between perceived usefulness and behavioural intention to adopt m-government (H1, $\beta = 0.21$; $p > 0.05$) (Abdelghaffar and Magdy, 2012; Park and Kim, 2013; Wang, 2014) and conflicting with TAM model. This is consistent with result by Titah and Barki (2006) that questioned the validity of a direct extension of the TAM theory into investigating e-government adoption issues among public citizens in Australia. These results are contradicted with research findings that has validated perceived usefulness to be the most reliable antecedent to effect IT adoption behaviour among private employees, public employees, and public citizens. The users were found to be skeptical on the efficiency and work performance of m-government services. Since m-government service is relatively new in the UAE, user's awareness might significantly affects the intention to adopt the technology. It is suggested that consumer's situational individual preferences or constraints are expected to affect the consumer's concept of perceived usefulness in adoption e-government in the UAE. The essential of social process involved in observing the utility of the e-government application is linked to the social consequences of the consumers. Abdelghaffar and Magdy (2012) noted that awareness is important at the early stage of the adoption process. Repetitive information through advertisement on m-government services should be carried out, emphasising on its benefits will offer great knowledge on this system to the users to retention behaviour. This effort will directly affect psychological factors of thoughts, feelings, and other cognitive characteristics that might alter the users' attitude, and behaviour towards intention to adopt m-government. Furthermore, understanding and providing services that mostly required by users can significantly affect the thought of perceived usefulness of this system. King and He (2006) supported that perceived usefulness potentially affect actual use despite of attitude if the use of the technology offers direct benefits to the users. The result of this study may be linked to Hofstede (2001) study that found UAE score high in uncertainty avoidance culture dimension. It is reported that UAE citizens are culturally threatened by ambiguous or unknown situations, in which security as an important aspect in individual motivation.

Perceived ease of use was found to have insignificant relationship with behavioural intention to adopt m-government (H2, $\beta = -0.09$; $p > 0.05$). This result denied perceived ease of use a determinant in TAM model developed by Davis (1989) and does not support empirical findings in previous research (Bina and Giaglis, 2007; Chong et al., 2012; Pan and Jordan-Marsh, 2010). Similar with study conducted in Egypt (Abdelghaffar and Magdy, 2012), this study found that UAE users are more concerned with the benefits of the services regardless the mobile-interface and application usability. Evidenced on discouragement to adopt innovation due to system incompatibility (Ooi et al., 2011) was also proven in this study. It was found that type of compatible mobile operating system to support the usability of m-government services is an important factor to support the perceived ease of use of users. This result is further supported by earlier studies that argue easy use of technology may influenced user's perceived usefulness and directly affects consumer's intention to adopt (Gefen and Straub, 2004), and perceived ease of use might be contributable to increase consumer's perceived value of smartphone applications (Mouakket, 2009). It is consistent with argument that new technology involves with complexity and element of uncertainty; requires well-formed attitudes and efforts directing at using (Bagozzi, Davis, & Warshaw, 1992). Thus, it is suggested that m-government consumers in the UAE does not associated perceived ease of use to compatibility, relative advantage and complexity of the application. The high score recorded for uncertainty avoidance culture dimension in the UAE is suggested to effect the result. Nature of technology that involves with complexity may jeopardise perceived security of consumer. It requires a well-formed state of mind to successfully learn and adopt m-government.

This study evidenced that cost does not support the causal relation with behavioural intention to adopt m-government (H4, $\beta = -0.07$; $p > 0.05$), proven to be in line with study by Yang, Lu, Gupta, Cao, and Zhang (2012) but has pointed into opposite direction from other studies that found significant relationship between cost and behavioural intention to adopt m-government (Carlsson et al., 2006; Chong et al., 2012; Wei et al., 2009). This study establishes that costs is associated with the added-value of the m-government services offered to users. Thus attention must be given into users' references to evaluate cost. Taken into consideration that UAE is ranked in the top six of the world's

highest per capita income (Maceda, 2016), this study indicates that cost is not a significant factor for UAE users in adopting m-government behaviour. The socioeconomic characteristics of users including the disparity between urban and rural regions provide references on the cost evaluation of the system in use. This aligned with argument that difference between city and rural districts has been underestimated in previous studies (Liu et al., 2014). This finding is not consistent with integrated ECM-TAM model, which argue cost as a determinant to user acceptance of information technology. This study suggests that UAE consumers are relating cost as an indispensable element to perceived usefulness and perceived ease of use because it involves social processes in the development and implementation of m-government. Consistent with argument made by earlier studies that perceived value of m-government application should be embedded into perceived usefulness and perceived ease of use of consumer in measuring behavioural intention to adopt m-government. Even though the cost involved in engaging with behavioural intention to adopt m-government is important to be investigated, but hidden cost implicated from forming attitudes and intentions towards trying to learn to use the m-government prior to initiating efforts directing at using has been overlooked. It is recommended that the intangible value associated to the factors influenced consumer's decision about know, how and when m-government will be adopted should be taken into consideration.

While research has empirically evidence that variety of services allow for an efficient and interactive mobile transactions (Chong et al., 2012), but this current study confirmed the opposite (H6, $\beta = 0.10$; $p > 0.05$). Result shows that variety of service offered by m-government will not affect the willingness to adopt. The insignificant relationship between variety of service and behavioural intention to adopt m-government is related to the benefit and value-added offered by this system. Regardless the number of services provided via m-government, if the users beliefs these m-government services do not adding value to their preferences, the behavioural intention to adopt m-government will not be demonstrated. Therefore, value-added services should be prudently identified to add value to the m-government services. The value-added initiatives will initiate to m-government adoption behaviour. Studies suggest that government tend to assume the consumer's demand of m-government, but neglecting consumer's actual needs (Reddick, 2004, 2005). Supported by Gupta et al. (2008) that explains that in developing countries, government is providing services that are lacking the ability of address consumer's true needs and requirements. This gap created mismatch between supply and demand of services between the government and the consumers. According to Reddick (2005) the scale of thos gap is expected to be larger within developing countries since the supply-side involves variables including availability, quality, and usability of m-government services. This study suggests that the UAE consumers perceived the significant of variety of services towards intention to adopt m-government is linked to utilisation and ease of use of m-government; reflected from intangible value embedded into these factors. This is important because structure imperative rooted in the m-government system allows for collaborative consumer's decision-making participations. AlShehri and Drew (2010) posit that culture is difficult to resolute and is a complex issues, especially when involves the government's-citizen's collaboration. Even though these factors were found to be insignificant, further investigation ought to be conducted as these factors were evidenced to be positively significant in other studies.

5.1. Moderating effect of gender, age and average monthly household income

This study further investigated the moderating effect of gender, age and average monthly household income on the relationship between trust, social influence and behaviour intention to adopt m-government. The results in Model 4 indicate that gender, age and average monthly household income moderate the relationship between trust (H3a,

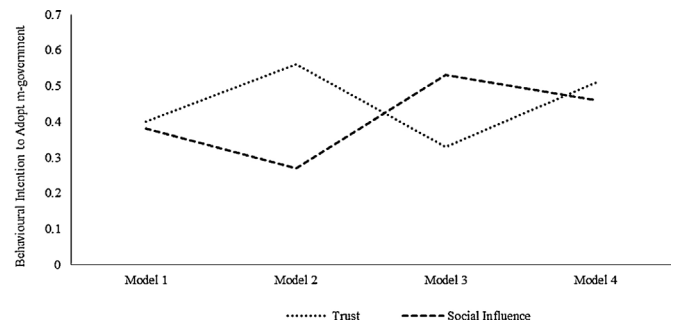


Fig. 3. The Effect of Moderator in Causal Analysis.

$\beta = 0.51$; $p < 0.01$), social influence (H5a, $\beta = 0.46$; $p < 0.01$) and behaviour intention to adopt m-government. As predicted, Model 2 shows the effect of gender, age and average monthly household income as moderating variable when only trust was controlled. The result evidenced that trust and behaviour intention to adopt m-government was found to be significantly moderated by gender, age and average monthly household income ($\beta = 0.56$; $p < 0.05$); and positive significant relationship was also established between social influence and behaviour intention to adopt m-government ($\beta = 0.27$; $p < 0.05$). In contrast, social influence was found to be significant when controlled towards behaviour intention to adopt m-government in Model 3 ($\beta = 0.53$; $p < 0.05$). Moderating variables of gender, age and average monthly household income have contributed to the coefficient value increased ($\Delta\beta = 0.26$), compared to Model 2. The causality between uncontrol trust and behaviour intention to adopt m-government was confirmed at ($\beta = 0.33$; $p < 0.05$); depreciated ($\Delta\beta = 0.26$). However, no differences were detected for perceived usefulness, perceived ease of use, cost, and variety of services. Fig. 3 illustrates the effect of moderating variable of gender, age and average monthly household income on the relationship between trust, social influence and behaviour intention to adopt m-government. It shows that the coefficient values were stronger and had a great contribution when gender, age and average monthly household income moderated the relationship on trust and social influence (both were controlled) over behaviour intention to adopt m-government; in comparison to other models.

Evidence on suggestion by Hogue (2016), to include gender as moderating variable to examine the acceptance of technology in the developing countries. Results were consistent with previous research that show gender plays an important role in the acceptance of technology (Alotaibi and Roussinov, 2016; Hogue, 2016; Shareef et al., 2016). Age was also found to be an important moderating variable in measuring the determinants of behaviour intention to adopt m-government (Alotaibi and Roussinov, 2016; Ohme, 2014). Age as moderating variable had been emphasised based on recommendation by Chopra and Rajan (2016) that argued on the absent of age factor in measuring technology adoption in developing countries. TAM does not explain the importance of having gender and age as moderating factors, however, it can be extended based on the fundamental assumption of UTAUT model (Venkatesh et al., 2003) that consistent with the findings this study. Nevertheless, none of the developed models had recommended socioeconomic disparity of user as an important factor of moderation analysis in technology acceptance studies. Although recent studies that have evidenced household income to significantly moderate the relationship between the determinants and intention to adopt m-government in developing countries (Khayyat and Heshmati, 2013; Li et al., 2014; Wangpipatwong et al., 2008); but its role in moderating the relationship between trust and social influence has yet to be established. Results of the present study consistent with argument by Pantano and Priporas (2016) that subjective circumstances defined by personal experience dictates users' ability to adopt technology. The significant relationship evidenced with the inclusion of users' average monthly household income as the moderating variable provided a basis

of argument; income as an important moderating variable of the e-government usage for TAM, ECM, and UTAUT extended model.

This study found an interesting result that the effect of trust on behavioural intention to adopt m-government is stronger for male consumers. This finding is not consistent with earlier literature that found the relationship between trust and adoption intention is stronger among women compared to men users (Huang et al., 2012; Venkatesh et al., 2012; Venkatesh and Morris, 2000). The same pattern was found in the relationship between social influence and behavioural intention to adopt m-government in the UAE. Female was found to have less effect on social influence than male users. This result is differ from findings reported by Venkatesh and Morris (2000), that posit women are easily influence and motivated by social pressure and affiliation. Older male was also found to have greater effect on trust and social influence compared to female in the relationship with behavioural intention. These result are consistent with earlier research that found older users have stronger effect of social influence in relationship with behavioural intention. However, none of the study has evidenced older consumers of m-government tend to have greater trust towards the system than the counterpart. This result supported argument made by Chopra and Rajan (2016) that suggest traditional stereotypes of age interaction to technology acceptance and behavioural intention was neglected in developing countries like UAE. Consumers with higher average monthly household income was apparent to have more effect toward trust and social influence compared to the consumers with lower average monthly household income, in the relationship to behavioural intention to adopt m-government. This result supports the arguments that socioeconomic disparity may further defined the important aspect of behavioural intention to adopt m-government (Liu et al., 2014; Maceda, 2016). This result also has empirically proven the suggestions to include user's household income into e-government adoption and utilisation in developing country (Alghamdi and Beloff, 2014; Khayyat and Heshmati, 2013; Li et al., 2014; Wangpipatwong et al., 2008). Thus, this study has proven that older male with higher average household income is found to have stronger effect in the relationship between trust and behavioural intention to adopt m-government. The similar pattern was found in the relationship between social influence and adoption intention; mature male with high income is stronger than female consumers in the UAE context.

6. Conclusion and implications

This study contributes to the growing body of literature by examining users' intentions to adopt m-government. This study offers several theoretical and practical contributions. In term of theoretical contributions, first, this research have extended the TAM model, and showed that improved model is able to predict the adoption of m-government in the UAE context, thus the model can be employed to set new directions for future research agenda of m-government technology adoption studies. Second, this is one of the first few studies investigating adoption of m-government in the UAE. The country is a fast growing developing nation in Middle East whereby users still remain their traditional Arab values and cultural even though they are becoming more modern and technology savvy. User's m-government adoption decisions in the UAE are complex due to various aspects such as psychological and technological factors. Therefore, understanding these aspects will provide future directions for related researchers. Third, including socioeconomic characteristic of user's household income as moderating variable has enhanced the TAM model. Although several researcher have expended the TAM model; notably Expectation-Confirmation Model and the TAM (Chong, 2013), TAM2 (Venkatesh & Davis, 2000), TAM3 (Venkatesh & Bala, 2008), and Unified Theory of Acceptance and Use of Technology (UTAUT1 and UTAUT2) (Venkatesh et al., 2003, 2012), but household income as an important variable in socioeconomic characteristics that might affects the strength of the relationship between factors prior to the intention of

adoption of m-government has been abandoned and underestimated in preceding studies. Theoretically, having household income as moderating variable offer a potential modification to suit the UAE context as socioeconomic disparity between urban and rural regions can be the factors that further explained the adoption and use of m-government. This extended TAM model, under the effect of gender, age and average household income as moderating variables provide additional insights about drivers of success and failure of m-government adoption. Although the impact of demographic characteristics have been added into most research, such investigations have been far more limited in m-government research as socioeconomic perspectives of the users were not taking into consideration in furthering the understanding of the phenomenon. By bringing well-established theoretical contribution to the m-government context, this study demonstrate the usefulness and generalisability of the theory.

On the practical contributions of this study, UAE government may want to apply the suggested strategies from this study to increase the number of users. Considering that trust and social influence have a significant relationship with UAE user decisions to adopt m-government, they should place more emphasis towards these determinants to attract more potential users. Policy makers can enhance users' acceptance of m-government services through effective communication by providing useful and trustworthy information platform. They should improve the security and privacy features of the systems. The policy makers should also change the perceptions of their users by emphasising the safety features offered by their applications. This could be done through effective marketing campaigns to educate current and potential users, or in creating awareness among them. On the other hand, for social influence, the government agency officials and m-government system developer are encouraged to create the word-of-mouth effect by employing social network channels to promote the service to their users who will then disseminate to their friend and family members.

6.1. Limitations and future research

Despite the contributions, this study has a few limitations which need to be considered when interpreting the findings. Firstly, the study is restricted to the UAE user's perspective and the homogeneity of target respondents comprised of primarily university students that may not be suitable to generalise for the UAE population as a whole. It would be interesting to test this framework to m-government users in more spreading out the students' group brackets as well as other geographical areas and compare a results with this study. Such cross-country or cross cultural comparisons studies would allow researchers to have better understanding and greater insight on the factors that affect m-government adoption. Second, m-government is still relatively new and an emerging trends in the UAE context. Future studies can consider measuring the diffusion of m-government activities across time, and examine whether the variables in this studied change at various m-government diffusion stages. Third, future study should use the longitudinal method to predict user behaviour over time since the model in this study is cross-sectional, which measures the intention only at a single point in time. Fourth, the study can be complemented with the evaluation of the impact of the factors prior to the intention of adoption m-government: performance and effort expectation, perceived cost and risk and facilitating conditions as proposed by Venkatesh et al. (2003) with the inclusion of experience and willingness to use as an additional to the current moderating variables.

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