Factors Influencing Users' Intentions to Use Mobile Government Applications in Saudi Arabia

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Abstract

In Saudi Arabia, although some m-government services and applications have been released, m-government is still in its infancy. To date, there have been insufficient empirical studies to (i) identify and measure the factors that influence users' intentions to use m-government applications in Saudi Arabia, (ii) measure the Saudi citizens' attitudes towards using m-government applications, (iii) measure the influence of three moderators (gender, age and usage experience) on relationships between independent factors—attitude toward use (ATU), perceived usefulness (PU) and perceived trustworthiness (TRU)—and the dependent factor behavioural intention to use (BIU), and (iv) validate and examine the applicability of the modified Technology Acceptance Model (TAM) to determine the above factors in the Saudi m-government context. Consequently, the main aim of this study is to identify and measure factors that influence users' intentions to use m-government applications in Saudi Arabia. It also aims to (i) measure the Saudi citizens' attitudes towards using m-government applications, (ii) measure the influence of gender, age and usage experience on relationships between independent factors—(ATU), (PU) and (TRU)—and the dependent factor BIU, and (iii) examine and validate the applicability of a modified TAM in the Saudi m-government context. Acknowledging and addressing these factors will support future m-government services and implementation.

This study adopted a mixed methods approach (explanatory sequential design). The first phase involved a quantitative study with more priority and weight to address study's aims. This was followed by a qualitative study using 14 citizens to confirm, interpret, explain and provide deeper understanding of the results from the quantitative study, especially unexpected results based on citizens' perceptions.

The quantitative results revealed that ATU, PU and TRU significantly and positively influence users' intentions to use m-government applications in the Saudi context. Perceived ease of use (PEU), awareness (AWAR) and perceived security (SEC) did not influence users' intentions to use m-government applications in Saudi Arabia. The results also showed that Saudi citizens have a positive attitude toward using m-government applications. Furthermore, the results revealed that the relationship between ATU and BIU is moderated by gender, age and usage experience: female, younger and less experienced users are more likely to use m- government applications compared with male, older and more experienced users. The relationships between PU and BIU, and TRU and BIU are not moderated by gender, age and usage experience. The quantitative results also revealed that the proposed TAM model has a good fit values and is valid in the Saudi m-government context.

The qualitative results confirmed the quantitative results regarding the influence of PU on BIU. If users perceived m-government applications to be useful in terms of saving time and effort, increasing productivity, and helping them to easily accomplish their goals they would use the m-government applications. The qualitative results also confirmed quantitative results regarding the influence of ATU on BIU: the benefits of using m-government applications such as saving time, effort and increasing productivity improved user attitudes toward using these applications. Finally, the qualitative results confirmed the quantitative results regarding the influence of TRU on BIU with users trusting the government that provided the applications to protect their data and enable them to achieve their goals.

The qualitative results also explain why PEU, AWAR and SEC did not influence BIU of m-government applications in the quantitative study. PEU did not influence BIU of m-government applications in the quantitative study because (i) users focusing on and needing useful services and caring less about ease of use of the applications, and (ii) some users face difficulty in using m-government applications. AWAR did not influence BIU of m-government applications in

the quantitative study because (i) the level of awareness is low among citizens, and (ii) users already trusting the government so doing what the government asks them. SEC did not influence BIU of m-government applications in the quantitative study because these applications have been provided by government who the users already trust or the users are more focused on useful services and do not care very much about security.

The qualitative results revealed that positive attitudes toward using m-government applications are stronger for females than males. As Saudi society is considered conservative, females prefer to do their work in their homes where they can meet societal circumstances and obligations. Using the m-government applications allows them to complete their relevant tasks from home. Given that they are currently also restricted from driving they are keen to use the m-government applications rather than having to go to the ministries personally. Younger citizens also prefer to use m-government applications (have more positive attitudes) than older citizens because younger generations usually like to discover new technology and are more familiar and experienced with technology. Also, as Saudi culture encourages younger people to serve older people and the young people usually have better skills in using new technologies. Finally, the qualitative results revealed that the attitude toward using m-government applications is stronger for citizens with less experience than those with more experience because they want to benefit from using new technologies and improve their e-skills, and most ministries in Saudi Arabia now only provide their services via electronic systems and applications. In summary, this study provides a clear picture about factors influence on users' intentions to use m-government applications in order to help decision makers in Saudi government to better implement m-government applications to furnish citizens with the associated benefits.

Declaration

"This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself."

Name: Raed Alotaibi.

Date: 08/12/2017

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List of Abbreviations

AGFI	Adjusted goodness of fit
Apps	Applications
ATU	Attitude toward Use
AWAR	Awareness
BIU	Behavioural Intention to Use
CFA	Confirmatory factor analysis
CFI	Comparative fit index
Df	Degree of Freedom
DOI	Diffusion of Innovations
EFA	Exploratory Factor Analysis
E-government	Electronic government
E-learning	Electronic learning
ENJ	Enjoyment
G2B	Government-to-Business
G2C	Government-to-Citizen
G2E	Government-to-Employee
G2G	Government-to-Government
GFI	Goodness of Fit Index
ICT	Information and communication technology
IFI	Incremental Fit Index
IS	Information Systems
KMO	Kaiser-Meyer-Olkin

KSA	Kingdom of Saudi Arabia
M-government	Mobile government
mG2B	M-government-to-business
mG2C	M-government-to-citizen
mG2E	M-government-to-employee
mG2G	M-government-to-government
ML	Maximum Likelihood
MyApp	Mobile Application
PEU	Perceived Ease of Use
PU	Perceived Usefulness
RMSEA	Root Mean Square Error Approximation
SEC	Perceived Security
SEM	Structural Equation Modelling
SPSS	Statistical Package for the Social Sciences
SRMR	Standardised Root Mean Square Residual
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
TRU	Perceived trustworthiness
UTAUT	Unified Theory of Acceptance and Use of Technology

List of Publications

Journal Publications based on the results of this thesis

Alotaibi, R., Houghton, L., & Sandhu, K. (2016). Exploring the Potential Factors Influencing the Adoption of M-Government Services in Saudi Arabia: A Qualitative Analysis. *International Journal of Business and Management*, *11*(8), 56-72.

Alotaibi, R., Houghton, L., & Sandhu, K. (2017). Factors Influencing Users' Intentions to Use Mobile Government Applications in Saudi Arabia: TAM Applicability. *International Journal of Advanced Computer Science and Applications*, *8*(7), 200-211.

Chapter 1: Introduction

1.1 E-government and M-government:

According to the World Bank (2011: 1), "E-government refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management." While, M-government is defined as the use of wireless technology (i.e. mobile communication) to provide government services to users. When using wireless technology, there is easy access to services, guaranteed mobility for users, and real-time access to information. These characteristics provide advantages to the government, which can provide services quickly (Althunibat et al., 2014).

Al-Hujran (2012) and Al-Hadidi and Rezgui (2010) asserted that m-government is part of e-government, but is another way to offer government services and information to citizens. Nava and Dávila (2005) and Assar (2015) argued that m-government and e-government are the same concept and that there is no difference between them except that m-government is an advanced type of e-government.

However, Al-Hadidi and Rezgui (2010) suggested that there is a significant difference between e-government and m-government regarding delivery time and access, since e-government uses wired networks to offer services to citizens, businesses and internal government operations, while m-government uses wireless technology and mobility support. E-government and m-government will be discussed in more detail later.

1.2 Research Problem

Many countries are now seeking to adopt new technology such as e-government or m-government to improve government services and delivery. Some countries have succeeded, and others have failed. For example, Saudi Arabia established its e-government project, Yesser, in 2005. The goal was to enable every citizen in Saudi Arabia to utilise and enjoy a specific set of online government services by 2010, anywhere and at any time, while maintaining personal data security (Alfarraj, 2013). However, according to Alshehri, Drew, and Alfarraj (2012), challenges and obstacles have prevented the complete adoption of e-government initiatives in Saudi Arabia. Although there has been progress in e-government implementation, generally, most e-government initiatives have experienced schedule delays and incomplete implementation (Alfarraj & Alhussain, 2013; Alfarraj, Alhussain, & Abugabah, 2013; Alassim, Alfayad, & Abbott-Halpin, 2017). This observation is shared by a recent study conducted by Alghamdi & Beloff (2016) which asserted that the adoption of e-government services is unsatisfactory in developing countries like Saudi Arabia.

M-government is a subset of and complements e-government (Althunibat, Alrawashdeh, & Muhairat, 2014; El Kiki & Lawrence, 2006; Kumar & Sinha, 2007; Mengistu, Zo, & Rho, 2009; Misra, 2009; Östberg, 2003; Sheng & Trimi, 2008). In Saudi Arabia there were 47.9 million mobile subscriptions in 2016, representing about 151% of the population (CITC, 2016). This indicates almost two mobile subscriptions per person. A recent study conducted claimed that 67% of the Saudi Arabian population uses a smart phone (Khan, 2016). Although Saudi Arabia has already adopted some m-government services and applications, Saudi m-government are still in their infancy (Alhussain, 2012; Alotaibi & Roussinov, 2015; Alrowili, Alotaibi, & Alharbi, 2015; Alsenaidy & Ahmad, 2012). Recent studies by Baabdullah, Nasseef, and Alalwan (2016) and Babullah, Dwivedi, and Williams (2015) claim that despite the

popularity of mobile phones, Saudi citizens have not completely adopted m-government. Recent study conducted by (Alotaibi & Roussinov, 2017) confirmed that , using m-government in Saudi Arabia is not popular becaue citizens' acceptance for mobile government services is considered low rate. To date, there have been no empirical studies examining why this is the case and what factors influence m-government applications uptake by Saudi citizens. Accordingly, the main aim of this study is to identify and measure factors that influence users' intentions to use m-government applications in Saudi Arabia. It also aims to (i) measure the Saudi citizens' attitudes towards using m-government applications, (ii) measure the influence of three moderators (gender, age and usage experience) on relationships between independent factors -attitude toward use (ATU), perceived usefulness (PU) and perceived trustworthiness (TRU) - and the dependent factor behavioural intention to use (BIU),(iii) It will also examine, validate, and develop the applicability of a modified Technology Acceptance Model (TAM), to achieve the project aims in the Saudi m-government context.

1.3 Research Questions and Hypotheses

The research questions and hypotheses were developed following a review of the relevant literature (see Chapter 2). To address the stated problems and achieve the study's research aims, specific research questions were identified. The main research question is:

Q1: What factors influence users' intentions to use m-government applications in Saudi Arabia?

The sub-research questions are as follows:

1. Does perceived ease of use (PEU) influence users' intentions to use m-government applications?

2. Does perceived usefulness (PU) influence users' intentions to use m-government applications?

3. Does attitude toward use (ATU) influence users' intentions to use m-government applications?

4. Do Saudi citizens have a positive attitude toward using m-government applications?

5. Does perceived trustworthiness (TRU) influence users' intentions to use m-government applications?

6. Does enjoyment (ENJ) influence users' intentions to use m-government applications?

7. Does awareness (AWAR) influence users' intentions to use m-government applications?

8. Does perceived security (SEC) influence users' intentions to use m-government applications?

9. To what extent do moderators (gender, age and usage experience) influence the relationships between exogenous (ATU, PU and TRU) and endogenous BIU in the research model?

10. Does the proposed model fit the Saudi m-government context?

Focusing on these research questions, this study posits the following hypotheses:

H1: Perceived ease of use PEU will have a significant positive influence on BIU m-government applications.

H2: Perceived usefulness PU will have a significant positive influence on BIU m-government applications.

H3: Attitude towards using ATU will have a significant positive influence on BIU m-government applications.

H4: Perceived trustworthiness TRU will have a significant positive influence on BIU m-government applications.

H5: Enjoyment ENJ will have a significant positive influence on BIU m-government applications.

H6: Awareness AWAR will have a significant positive influence on BIU m-government applications.

H7: Perceived security SEC will have a significant positive influence on BIU m-government applications.

H8: a1, a2, a3: The relationships between exogenous (ATU, PU and TRU) and endogenous BIU will be moderated by gender.

H9: b1, b2, b3: The relationships between exogenous (ATU, PU and TRU) and endogenous BIU will be moderated by age.

H10: c1, c2, c3: The relationships between exogenous (ATU, PU and TRU) and endogenous BIU will be moderated by usage experience.

1.4 Research Aims and Objectives

As previously noted, the main aim of this study is to identify and measure factors that influence users' intentions to use m-government applications in Saudi Arabia. It also aims to (i) measure the Saudi citizens' attitudes towards using m-government applications, (ii) measure the influence of three moderators (gender, age and usage experience) on relationships between independent factors (ATU, PU and TRU) and the dependent factor BIU, and (iii) examine and validate the applicability of a modified TAM to suit the aims of this study in Saudi m-government context. The modifications include some modifications to relationships between its factors to achieve the study's objectives and they also include three TAM constructs: (1) perceived ease of use (2) perceived usefulness, and (3) attitude towards using, four external factors: (1) perceived trustworthiness, (2) enjoyment, (3) awareness, and (4) perceived security,

and three moderators (demographic variables): (1) gender, (2) age, and (3) usage experience. Overall, this study will contribute knowledge to aid Saudi decision makers in understanding and addressing factors that influence users' intentions to use m-government applications.

The objectives related to the study's aims are as follows:

1. Identify and measure factors that influence users' intentions to use m-government applications in Saudi Arabia.

2. Measure Saudi citizens' attitudes towards to using m-government applications.

3. Measure the influence of three moderators (gender, age and usage experience) on relationships between independent factors (ATU, PU and TRU) and the dependent factor BIU in the research model.

4. Propose, examine, develop and validate a model of m-government that suits the Saudi cultural context.

1.5 Contributions of this Study

In terms of contributions to practice, this study will contribute knowledge of factors that influence users' intentions to use m-government applications and Saudi citizens' attitudes towards using m-government applications for the benefit of government decision makers involved in e-government and m-government initiatives. Acknowledging and addressing these factors will support future m-government services and implementation. The contributed knowledge concerning Saudi citizens' attitudes towards using m-government applications will also provide decision makers with a clearer picture of Saudi citizens' attitudes to support future services. This study may help the Saudi government to exploit sophisticated technologies, especially applications in smart devices, to more effectively provide services for its citizens. This study may also contribute to practice by determining the influence of three moderators (gender, age and usage experience) on relationships between independent factors (ATU, PU

and TRU) and the dependent factor BIU which can provide a clear picture for decision makers about different citizens' characteristics regarding using and adopting m-government applications. In short, this research may help the government to better implement m-government applications to furnish citizens with the associated benefits.

With respect to theoretical contributions, this study will contribute an examination and evaluation of the TAM's applicability, with some modifications, to suit the aims of this study in the Saudi m-government context. More specifically, this study will examine the TAM's applicability in assessing relationships between BIU and other factors—TAM constructs (PEU, PU and ATU) or external factors (TRU, ENJ, AWAR, SEC)—to measure the influence of these factors on users' intentions to use m-government applications in Saudi Arabia and to measure Saudi citizens' attitudes towards using m-government applications. This study will also measure the influence of moderator variables (gender, age and usage experience) on relationships between exogenous (ATU, PU and TRU) and endogenous (BIU).

To date, based on the literature review and our knowledge of the Saudi m-government context, the proposed model is the first of its kind to be adopted in this field in Saudi Arabia. Combining some important factors involved in using m-government applications derived from the literature with three important moderators will provide a better understanding of the factors that influence users' intentions to use m-government applications. The modified model may be adopted in other countries to understand the factors that influence their users' intentions to use m-government applications.

1.6 Research Approach and Methods

Initially, two verification studies will be conducted before the full study is carried out. The first study is a qualitative study (semi-structured interviews) with five experts from Yesser to verify the influence of external factors (TRU, ENJ, AWAR and SEC) on m-government adoption in

Saudi Arabia based on the experts' perceptions. In the second study, a questionnaire will be distributed to citizens to measure the validity and reliability of instrument before conducting the full study.

In the full study, a mixed-methods approach (explanatory sequential design) will be used to achieve the study's aims and objectives. As Chapter 3 will explain in more detail, mixed methods provide a deeper understanding of the phenomenon in question. The study will be conducted in two phases: first a quantitative method phase, whose results carry more priority and weight, followed by a qualitative method phase. The first phase will involve the distribution of a questionnaire to Saudi citizens. The questionnaire data will be used to:

1. Identify and measure factors that influence users' intentions to use m-government applications.

2. Measure Saudi citizens' attitudes towards to use m-government applications.

3. Measure the influence of gender, age and usage experience on relationships between exogenous (ATU, PU and TRU) and endogenous (BIU).

4. Propose, develop and examine the applicability of the modified TAM in the Saudi m-government context.

In the second phase, semi-structured interviews will be conducted with citizens to confirm, interpret, explain and provide deeper understanding of the results from the quantitative study, especially unexpected results based on citizens' perspectives.

1.7 Research Results

In summary, the results of the study will be:

1. The factors that influence or do not influence users' intentions to use m-government applications.

2. The Saudi citizens' attitudes toward using m-government applications.

3. The influence of moderators (gender, age and usage experience) on relationships between exogenous (ATU, PU and TRU) and endogenous (BIU), and the differences between the influence of female/male, younger/older and less experience/more experience on relationships between exogenous (ATU, PU and TRU) and endogenous (BIU).

4. Validation of the applicability of the modified TAM in the Saudi m-government context.

5. Identification of the most influential factors on BIU m-government applications in Saudi Arabia.

6. In depth understanding of the quantitative results, especially unexpected results based on citizens' perspectives.

1.8 Thesis Structure

The thesis is structured as follows:

A. Chapter 1: This chapter is the general introduction to the thesis. It presents the research problem, research questions and hypotheses, research aims and objectives, contribution of this study, research approach and methods, predicted research results and thesis structure.

B. Chapter 2: This chapter presents the literature review and highlights existing research gaps. First, this chapter presents the Saudi context [Saudi Arabia profile, society and culture in Saudi Arabia, Saudi Vision 2030, the e-government program (Yesser), and ICT in Saudi Arabia]. It then describes e-government and m-government generally (e.g. definitions, models, advantages, limitations) followed by a more specific description and discussion of e-government and m-government

in Saudi Arabia. This is followed by a section examining the relationship between e-government and m-government, and theories and models of technology acceptance [e.g. Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM)] followed by conceptual framework. The chapter concludes with a discussion of the gaps in the literature.

C. Chapter 3: This chapter presents the study's research methodology. Accordingly, it identifies the study's research paradigm and research design, explains the mixed methods approach, addresses both the quantitative methods and qualitative methods that will be used, describes the data collection methods for phase 1 (quantitative methods) and phase 2 (qualitative methods), and then presents procedures to analyse the quantitative and qualitative data. Verification studies, validity and ethical considerations are also presented in this chapter.

D. Chapter 4: This chapter presents the verification studies (qualitative study with experts from Yesser and pilot study with citizens).

E. Chapter 5: This chapter presents the quantitative results of data screening and demographic information for participants.

F. Chapter 6: This chapter presents the validity and reliability. This includes results regarding the validity (EFA), reliability [internal consistency (Cronbach's alpha) and item-total correlation] and overview of the SEM and measurement model using CFA.

G. Chapter 7: This chapter presents the model assessment and moderators' results. These include assessment of model fit, assessment of the hypotheses, assessment the Saudi citizens' attitude and moderators' results.

H. Chapter 8: This chapter presents the qualitative study. This includes the demographic data for participants, the qualitative data analysis, and a summary of the results.

I. Chapter 9: This chapter is a general discussion and includes major findings of the quantitative and qualitative studies, discussion of the results for each factor and summary.

J. Chapter 10: This chapter concludes the thesis and includes a summary of the study outcomes, contributions of the study, limitations and recommendations for future research.

Chapter 2: Literature Review

2.1 Saudi Context

2.1.1 Introduction

This section reviews some aspects of Saudi Arabia. First, it provides general information about Saudi Arabia and discusses Saudi society and culture. It then discusses and reviews the Saudi Vision 2030 that is considered the main goal for the Saudi government and the e-government program (Yesser). Finally, it reviews information and communication technologies (ICT) in Saudi Arabia.

2.1.2 Saudi Arabia profile

Saudi Arabia was founded in 1932 by King Abdul Aziz Abdul Rahman Al-Saud (KSA, 2016). It is located in The Middle East on the Arabian Peninsula. It is bordered to the north by Iraq, Jordan and Kuwait and to the south by Yemen and Oman. Saudi Arabia's land area is around two million km^2 making it the 14th largest country in the world. Based on land area, it is the second largest OPEC member country. Empty Quarter or Rub Al-Khali in Saudi Arabia is considered the largest sand desert in the world. Saudi Arabia has natural resources such as copper, iron ore, gold and natural gas. It is considered the biggest exporter of petroleum in the world and it has 18% of the world's petroleum reserves (OPEC, 2016). According to Al-Shehry, Rogerson, Fairweather, and Prior (2006), Saudi Arabia's economy is heavily reliant on oil. Consequently, government organizations play a key role in economic activity in Saudi Arabia.

The country consists of 13 provinces and celebrates its national day on September 23. It uses the Hijri calendar as its main calendar which began on the day that Prophet Mohammed (Peace be upon Him) migrated from Makkah to Madinah (KSA, 2016). Arabic is the main language and the Riyal is the national currency. The Saudi population was more than 31 million in 2015

and the capital city, Riyadh, has over than three million residents (OPEC, 2016). Saudi Arabia has two cities, Makkah and Al Madinah, which are considered holy cities for Muslims. The rules and systems in Saudi Arabia are based on the holy Quran and Sunnah from the Prophet Mohammed (Peace be upon Him) (Abunadi, 2012).

The climate in summer is very hot from June to August and temperatures can be over 45°C while humidity may reach 100% in coastal cities. In winter, temperatures may reach 0°C in most cities with the possibility of rainfall. Consequently, the length of working days in Saudi Arabia are often based on climate conditions (Aljowaidi, 2015).

2.1.3 Society and culture in Saudi Arabia

According to Al-Rashid (1986), society and culture in the Arabian Peninsula have been inherited by Saudi society and affect Saudi individuals. Islam is the main religion in Saudi Arabia and all Saudis are Muslims. The constitution and society rely on Islam in all procedures such as commercial transactions and the legal system. There are some general characteristics common to Arab society and Saudi society in particular, such as time is usually not important for people (e.g. appointments can be easily changed), people prefer to work in teams, only top management can make decisions without advice from staff, meetings usually take a long time and Saudis are generous (Brdesee, 2013).

Culture has an impact on all things in our life (G. Hofstede, 1991). Culture in Saudi Arabia results in the formation of some things such as tribes and religion. Al-Shehry (2009) claimed that to know and to study the Saudi culture, one should be aware of aspects that distinguish it from other cultures such as its tribal system and religion. Saudi Arabia plays a key role in the Muslim world because it has two holy mosques in Makkah and Madinah (Altameem, 2007). Islam relies on the holy Quran and Sunna from Prophet Mohammed (Peace be upon Him) to group behaviours and morals in society. In other words, Islam encourages Muslims to have a good morals (Aldraehim, 2013). The Quran ensures equality between people and maintains

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their rights regardless of characteristics such as wealth or positions. Therefore, in Muslim countries, the Quran has a significant influence in the creation of legal systems, Sharia law and common culture (Kabasakal & Bodur, 2002). Islam confirms that family and the relationships between its members are very important and encourages cooperation between individuals if they need help (Aldraehim, 2013). According to Al Alhareth, Al Alhareth, & Al Dighrir (2015), Saudi Arabia is considered to be a conservative country, religiously and socially. It has a complex and unique culture which is based on Islam and tribes.

Saudi culture is reliant on religion (Islam), so differs from other cultures that do not rely on religion such as Western cultures. Islam influences and controls the lives of people in Saudi Arabia as a comprehensive system for all activities in life. Therefore, to understand the culture in Saudi Arabia, it is important to understand the significant impact of Islam on Saudi society (Alfarraj, 2013). The Saudi tribal system is also an important part of its culture (Alfarraj, 2013). Al-Shehry (2009) claimed that tribes and kinship may negatively or positively impact individuals and their business.

In Saudi Arabia, the government encourages modernization of everything in its citizens' lives. The government has imported many experts to help transform Saudi Arabia into a developed country (Alfarraj, 2013). However, Al-Shehry (2009) noted that while Saudi Arabia has adopted new technology from different cultures, it remains conserved its cultural aspects that derive from Islam.

In general, Saudi culture is very compatible with that of other Gulf countries (i.e. Qatar, UAE, Kuwait, Oman, and Bahrain), but is very different from western cultures. For example, Western culture is based on individuality while Gulf countries are based on cooperation and helping others. Also, people in Gulf countries seek to know their neighbours. In other words, Gulf countries have three significant cultural aspects: tribe, clan and family (Alfarraj, 2013).

There are several social and cultural characteristics common in Arabs, such as obedience versus rebellion, vertical versus horizontal values, culture of the mind versus culture of the heart, charity versus justice, collectivity versus individuality, open versus closed mindedness and fatalism (Hill, Loch, Straub, & El-Sheshai, 1998, p. 6). Arab society has another characteristic where individuals are more tolerant and do not usually plan for future because of two things: they have a strong belief in fatalism and they can get help from their relatives if they need (Aldraehim, 2013). Previous studies, such as Agourram (2009), assert that the Arab characteristic of not planning for the future is much stronger in Saudi Arabia than other countries.

2.1.4 Saudi Vision 2030

The Saudi government has released its vision for future—Saudi Vision 2030. Saudi Vision 2030 is based on three pillars (Vision 2030, 2016):

1- Saudi Arabia has a very significant status in the Islamic and Arabic world because it has two holy mosques in Makkah and Madinah.

2- Saudi Arabia has the ability to make strong investments, so the government seeks to become a strong global investor and diversify its income resources.

3- Saudi Arabia has a good strategic location, so the government seeks to invest in this location to make Saudi Arabia a centre for global trade and a gateway to connect with the world. In other words, the Saudi government seeks to be a centre to connect the three continents.

Saudi Vision 2030 seeks to diversify and enhance the economy by using its strong resources to achieve this vision. It aims to (i) make Aramco a global industrial company rather than just an oil producer, (ii) create a public investment fund that will be the biggest sovereign wealth fund in the world, (iii) produce half the needs of its military using national companies to strengthen the army and create employment for local citizens, (iv) increase the adoption of

electronic services, and (v) adopt reform by using accountability and transparency (Vision 2030, 2016).

The Saudi government has started to implement some programs to achieve these goals. These include the government restructuring program, the strategic directions program, the fiscal balance program, the project management program, the regulations review program, the performance measurement program, the Saudi Aramco strategic transformation program, the public investment fund restructuring program, the human capital program, the national transformation program, the strategic partnerships program, the privatization program and the program for strengthening public sector governance (Vision 2030, 2016).

As mentioned previously, one of the objectives of Saudi Vision 2030 is to increase adoption of electronic services. This PhD study will enable government decision makers involved in m-government and e-government initiatives to acknowledge and address the factors that influence users' intentions to use m-government applications. This in turn will support future m-government services and their implementation.

2.1.5 E-government program (Yesser)

The Saudi Arabia government seeks to adopt e-government to help improve the Saudi economy .Consequently, the Saudi government released Royal Decree number 7/B/33181, dated 10/7/1424 (7/9/2003) to give responsibility to the Ministry of Communication and Information Technology (MCIT) for planning, management and improving the ICT sector via establishment of the e-government program (Yesser, 2015). The government allocated SAR 3 billion in its initial financial plan to establish and develop the project (Alfarraj, 2013) and in order to manage and control the e-government transformation process (Alassim, Alfayad, & Abbott-Halpin, 2017).

The e-government program in Saudi Arabia was established in 2005, and the Saudi government has been increasingly concerned with implementing the program for its many potential economic benefits. The Saudi government established a new government organization called Yesser to adopt e-government initiatives for five years. Yesser is under the control of three participants: the Ministry of Communications and IT, the Ministry of Finance, and the Communications and IT Commission (Yesser, 2015) (Appendix A).

Yesser is considered a controller and a reference for all e-government initiatives in Saudi Arabia, and is responsible for all legislation and procedures, as well as any problems with these initiatives. The purpose of implementing the e-government initiatives was so that, by 2010, every citizen in Saudi Arabia could enjoy and utilize a set of government services online, without effort, anywhere and at any time, while maintaining security over personal data (Alfarraj, 2013). E-government intiatives in Saudi Arabia will be discussed in more detail later.

2.1.6 Information and communication technologies ICT in Saudi Arabia

This section reviews the ICT status in Saudi Arabia. Lloyd (2005: 3) defined information and communication technologies (ICTs) as a set of technologies that "…generally relates to those technologies that are used for accessing, gathering, manipulating and presenting or communicating information. The technologies could include hardware (e.g. computers and other devices); software applications; and connectivity (e.g. access to the Internet, local networking infrastructure, video conferencing). What is most significant about ICT is the increasing convergence of computer-based, multimedia and communications technologies and the rapid rate of change that characterises both the technologies and their use."

Bingimlas (2009) claimed that, these days, ICT is considered very important for many organizations and businesses. Along the same lines, Al-Solbi and Mayhew (2005) pointed out that ICT may be a facilitator and an important factor in economic globalization. It has been stated that the huge improvement in ICT, enforced global competition, and the explosion of

digital connectivity have created new ways to compete and conduct business among organizations (Ndou, 2004).

Since 2012, Saudi Arabia has consistently ranked in the top 25% of countries in terms of network readiness with scores ranging from 4.6-4.8 out of 7 according to the World Economic Forum (WEF, 2013; WEF, 2016) (see Table 1 for summary).

Table 1 Summary of network readiness index in Saudi Arabia

Year	Rank	Number of countries	Score out 7
2012	34	142	4.6
2013	31	144	4.8
2014	32	148	4.8
2015	35	143	4.7
2016	33	139	4.8

Source: WEF (2013; 2016)

2.1.6.1 Spending on ICT Services

As long as organizations in Saudi Arabia wish to compete locally and globally, they must invest in ICT. In 2013, the total ICT spending in Saudi Arabia reached over SAR 102.56 billion which was a five-fold increase from the SAR 18 billion spent in 2001 (Figure 1) (CITC, 2013). In 2014, the total ICT spending in Saudi Arabia reached over SAR 111 billion (Figure 2), representing a growth rate of about 9% from 2013 (CITC, 2014). In 2015, the total ICT spending in Saudi Arabia was SAR 120 billion, representing a growth rate of about 7% over 2014 (Figure 3) (CITC, 2015). The latest report (CITC, 2016) found that, in 2016, the total ICT spending in Saudi Arabia was about SAR 130 billion, representing a growth rate of about 8.3% over 2015. It is expected that market information technology and telecommunications spending will continue to increase strongly in the future (CITC, 2016).

According to CITC (2013: 72), "The ICT market in the Kingdom is the largest in the Middle East in terms of market capitalization and volume of spending, and it accounts for more than 70% of the GCC ICT market. Capital investment in the past ten years has exceeded SAR 135 billion. This has been caused by a huge demand for high speed data and other modern services, requiring the operators to expand their domestic networks, including communications towers and service centres, and to upgrade their international communications capability."
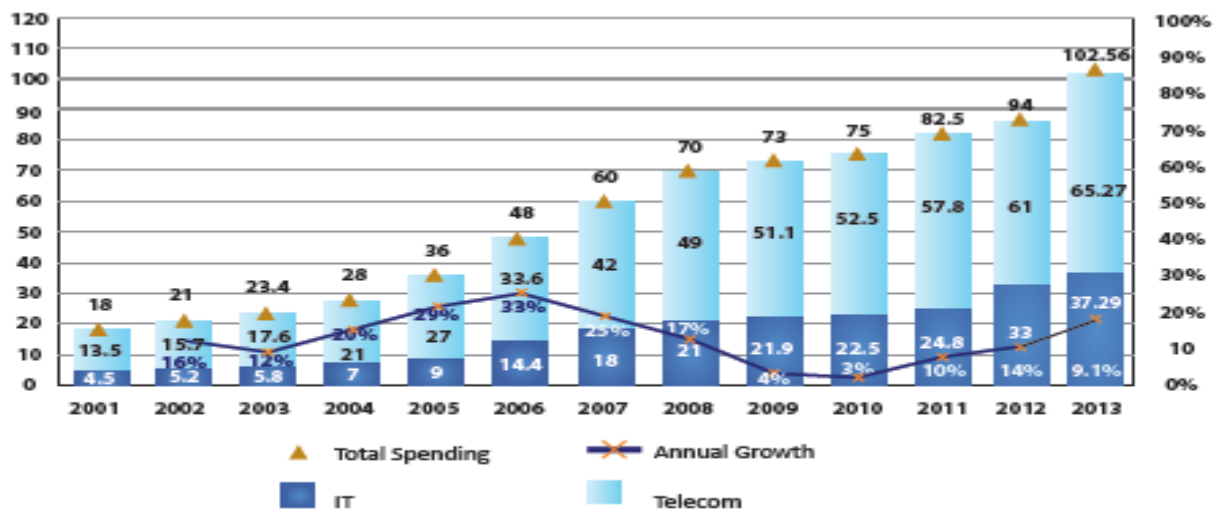
Figure 1 Growth of expenditure on ICT services in Saudi Arabia from 2001 to 2013 (CITC, 2013)
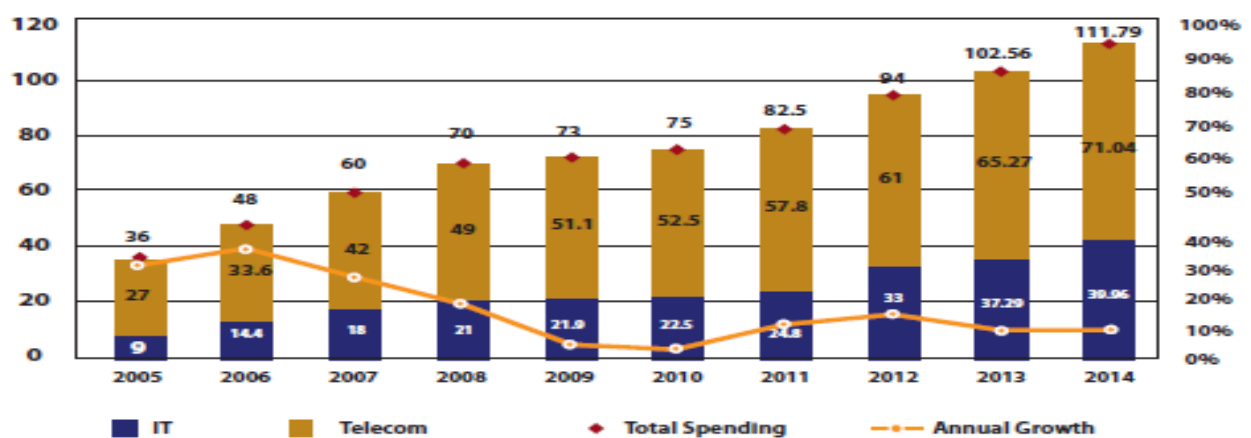
Figure 2 Growth of expenditure on ICT services in Saudi Arabia from 2005 to 2014 (CITC, 2014)
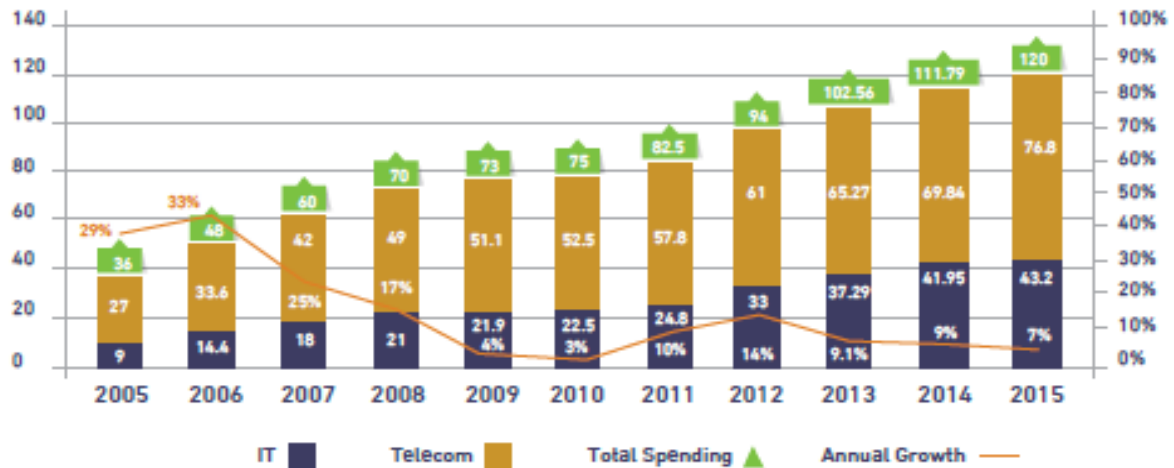
Figure 3 Growth of expenditure on ICT services in Saudi Arabia from 2005 to 2015 (CITC, 2015).

On the other hand, Al-Solbi and Mayhew (2005) found that there is lack of ICT infrastructure in Saudi Arabia—and, as a result, that the country is not ready to implement technology projects. This is caused by two things: first, Saudi society lacks the willingness to adopt ICT infrastructure, and second, there is a lack of policies and legislation regarding ICT practice in the country. Along the same lines, many studies have found that ICT infrastructure is a significant challenge in relation to the implementation of the e-government project (Almarabeh & AbuAli, 2010; Alshehri & Drew, 2010; Bwalya, 2009; Klamo, Huang, Wang, & Le, 2006).

2.1.6.2 Infrastructure and digital content

Since 2013, Saudi Arabia has been ranked in the top 25% of countries in terms of infrastructure and digital content with scores ranging from 5.1 to 5.4 out of 7 in reports by the World Economic Forum (WEF, 2013; 2014; 2015; 2016). These statistics are summarised in Table 2.

Table 2 Summary of infrastructure and digital content in Saudi Arabia

Year	Rank	Number of countries	Score out 7
2013	36	144	5.1
2014	33	148	5.3
2015	32	143	5.4
2016	36	139	5.2

Source: WEF (2013; 2014; 2015; 2016)

2.1.6.3 Importance of ICTs to government vision of the future

Since 2013, Saudi Arabia has been ranked in the top 5% of countries in terms of the importance of ICTs to government vision of the future with scores ranging from 5.2 to 5.4 out of 7 in reports by the World Economic Forum (WEF, 2013; 2014; 2015; 2016). These statistics are summarised in Table 3.

Table 3 Summary of the importance of ICTs to government vision of the future in Saudi Arabia.

Year	Rank	Number of countries	Score out 7
2013	7	144	5.4
2014	8	148	5.4
2015	8	143	5.2
2016	7	139	5.3

Source: WEF (2013; 2014; 2015; 2016)

2.1.6.4 Internet Usage

As previously mentioned, Saudi people seek and attempt to adopt ICT, especially Internet services and computers. The Saudi ICT adoption rate is considered one of the highest among developing countries (Al-Ghaith, Sanzogni, & Sandhu, 2010). According to CITC (2014), in Saudi Arabia, the rate of Internet usage has increased significantly in the last few years from 13% in 2005 to 63.7% in 2014. In 2001, only 5% of the population were Internet users, which

increased to 55.1% (16.5 million users) in 2013 (Figure 4, CITC, 2013), 19.6 million users in 2014 (Figure 5, CITC, 2014), 21.6 million users in 2015 (Figure 6, CITC, 2015), and 24 million users in 2016 (CITC, 2016).

It is expected that the rate of demand for the Internet will increase significantly over the next few years, due to the provision of a Fibre optic network which will provide very high speed internet (CITC, 2015). The rate of Internet usage has increased significantly in the last few years (47% in 2011 and 74.9% in 2016) due to the increasing use of social media such as Snapchat and Twitter (CITC, 2016).
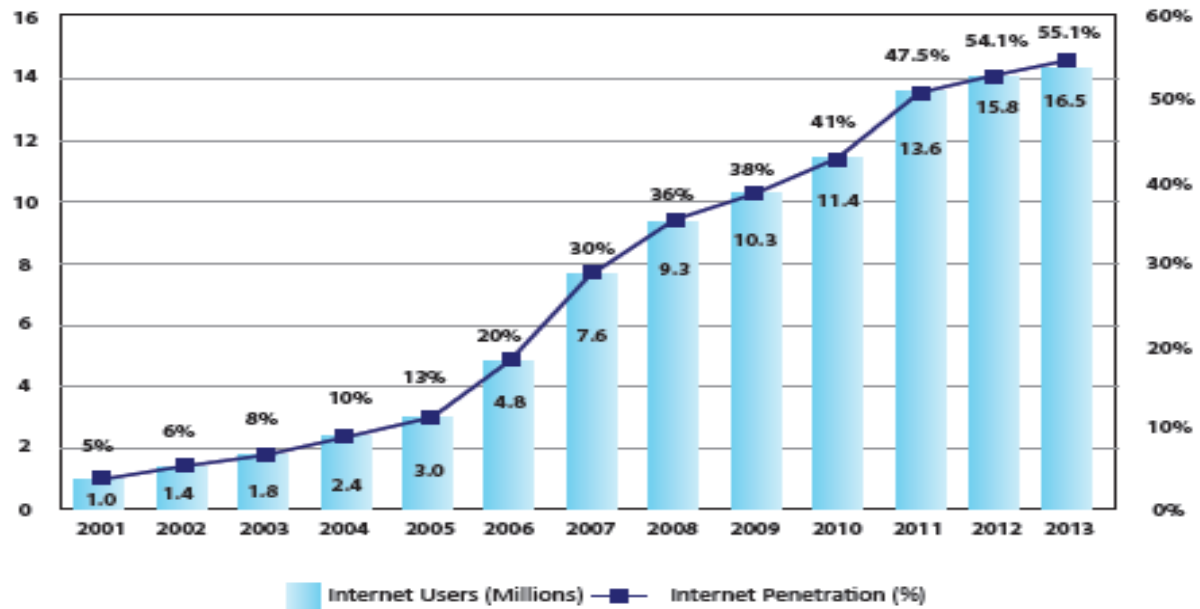
Figure 4 Number of Internet users in Saudi Arabia from 2001 to 2013 (CITC, 2013).
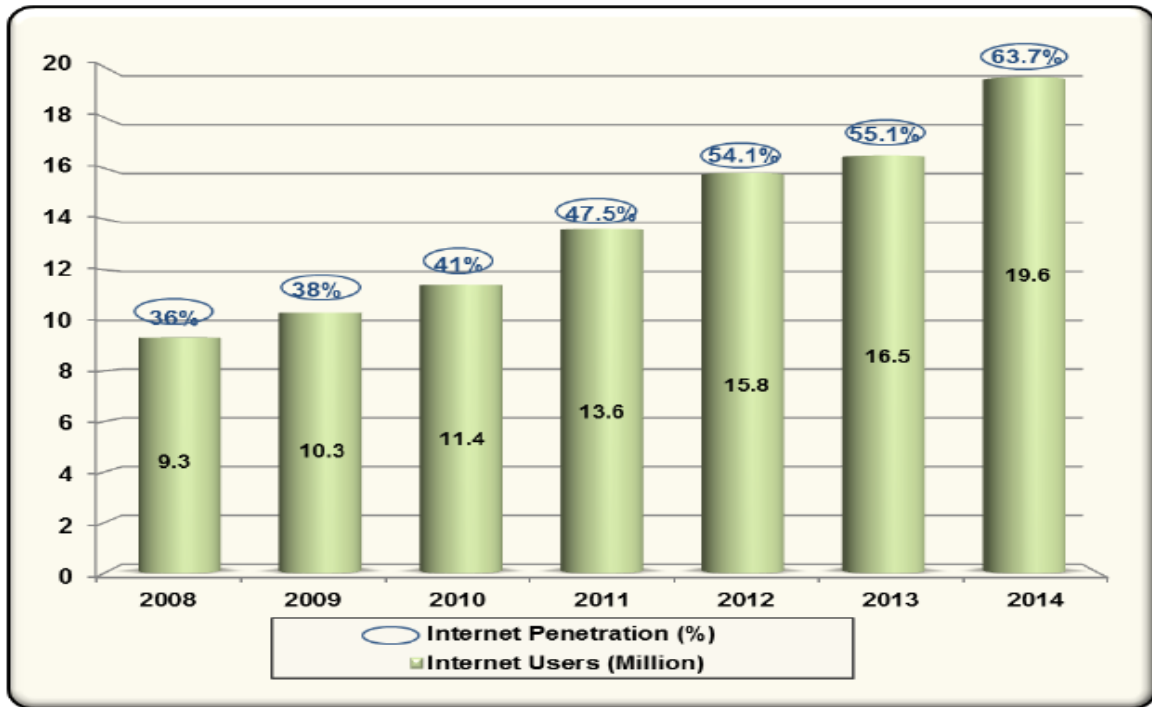
Figure 5 Number of Internet users in Saudi Arabia from 2008 to 2014 (CITC, 2014).
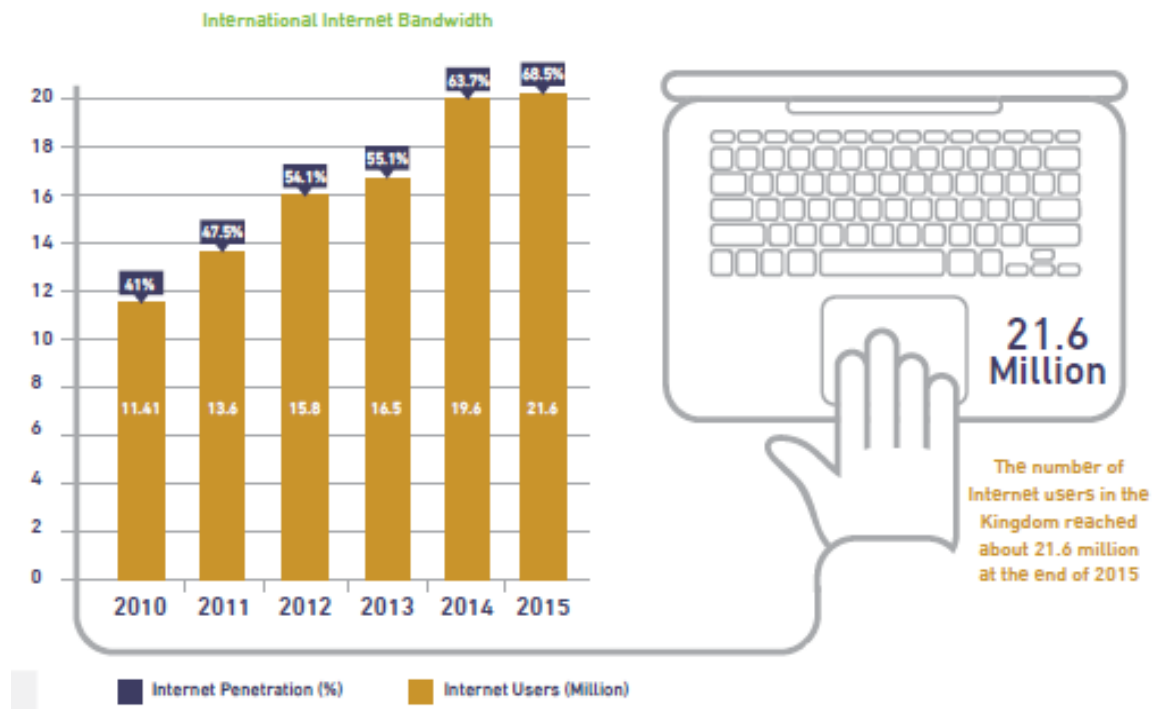
Figure 6 Number of Internet users in Saudi Arabia from 2010 to 2015 (CITC, 2015).

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2.1.6.5 Mobile services

Mobile services in Saudi Arabia have increased with massive growth in mobile phone use by Saudi citizens (Ahmad, Ansari, Akhtar, & Parveen, 2014). In 2013, there were 50.9 million mobile subscriptions, representing about 170% of the population (Figure 7) (CITC, 2013). In 2014, there were 53 million mobile subscriptions, representing about 171.4% of the population (Figure 8) (CITC, 2014). As noted in Figure 8, the number of subscriptions decreased in 2012 and 2013 due to the government prohibiting SIM card purchases without proper ID (CITC, 2014). In 2015, there were 53 million mobile subscriptions which was the same as in 2014, but only represented 167.5% of the population due to population increases (Figure 9, CITC, 2015). The latest report by CITC (2016) found that there were 47.9 million mobile subscriptions in 2016. The number of subscriptions in mobile services decreased in 2016 due the government applying some new policies regarding subscriptions such as cancelling inactive subscriptions (CITC, 2016).
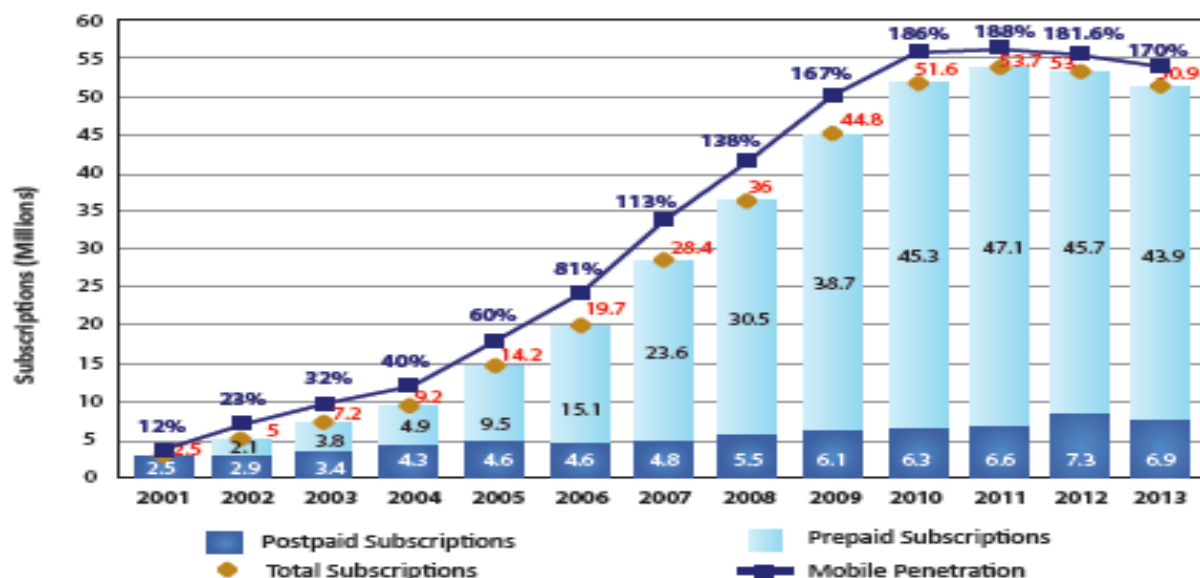
Figure 7 Mobile service market growth in Saudi Arabia from 2001 to 2013 (CITC, 2013).

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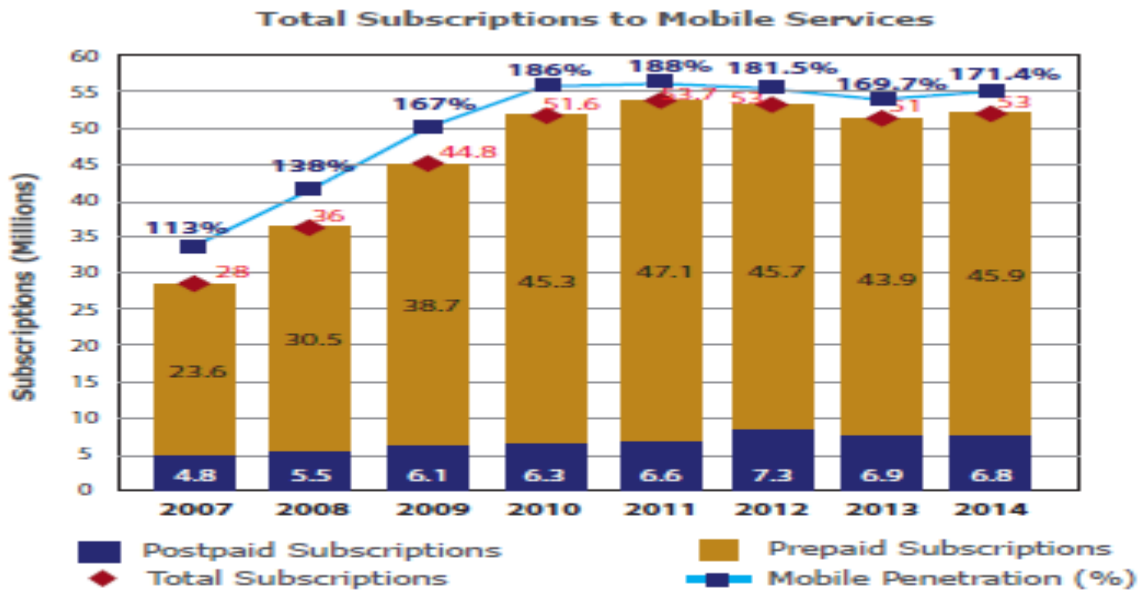
Figure 8 Mobile service market growth in Saudi Arabia from 2007 to 2014 (CITC, 2014).
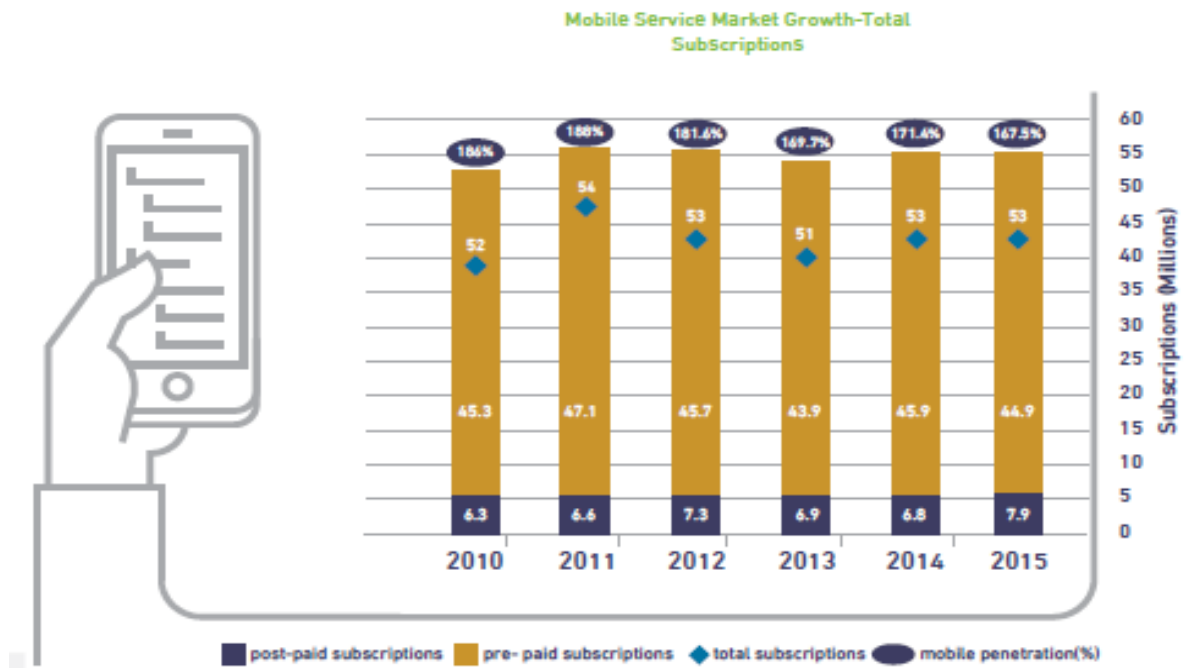
Figure 9 Mobile service market growth in Saudi Arabia from 2010 to 2015 (CITC, 2015).

In 2013, the number of subscriptions of using mobile broadband in Saudi Arabia was 14.27 million subscriptions, representing about 47.6% of the population (Figure 10, CITC, 2013). As shown in Figure 11, the number mobile broadband subscriptions was 29 million at the end of 2014, representing about 94.5% of the population (CITC, 2014). The number of mobile broadband subscriptions was 33.4 million at the end of 2015, representing about 106% of the population (Figure 12, CITC, 2015). The latest report by CITC (2016) found that the number of mobile broadband subscriptions was 23.9 million. This decrease in the number of mobile broadband subscriptions is attributed to the government applying some new policies regarding subscriptions such as having to connect subscriptions with personal fingerprints (CITC, 2016).
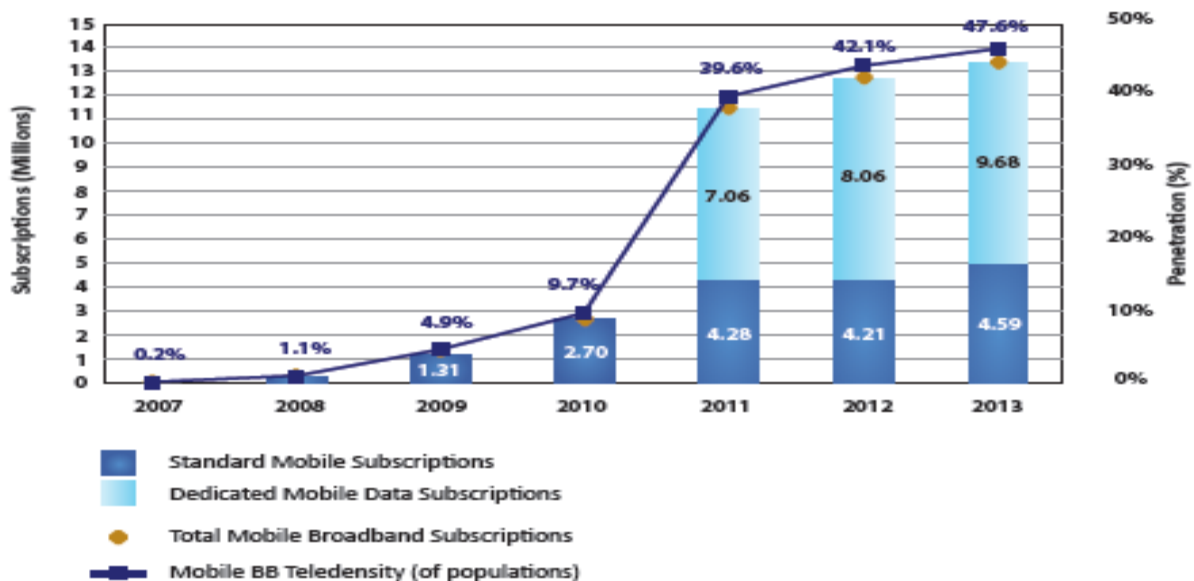
Figure 10 Mobile broadband services market growth in Saudi Arabia from 2007 to 2013 (CITC, 2013).
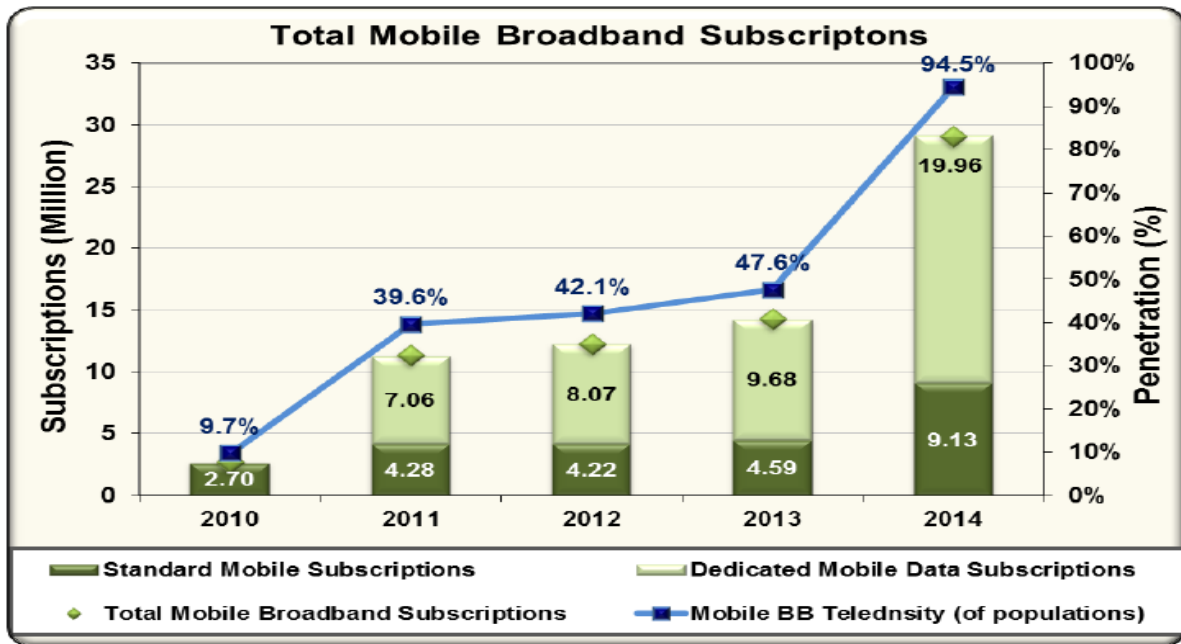
Figure 11 Mobile broadband services market growth in Saudi Arabia from 2010 to 2014 (CITC, 2014)
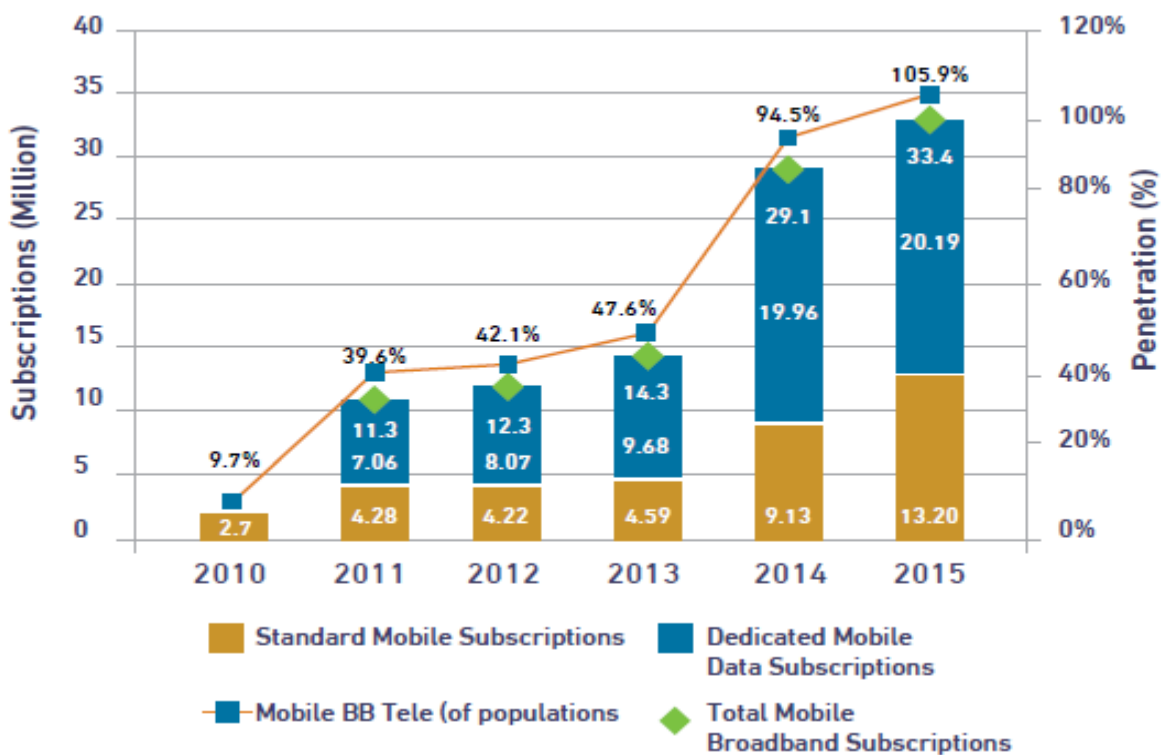
Figure 12 Mobile broadband services market growth in Saudi Arabia from 2010 to 2015 (CITC, 2015).

To conclude, the ICT infrastructure in Saudi Arabia continues to develop and grow, despite the existence of problems that have prevented the implementation of electronic projects, such as e-government, in the past. There is investment in ICT infrastructure by Saudi organizations, and there has been significant expenditure to improve and develop ICT to compete both locally and globally. There has been a significant increase in the use of mobile and wireless technology in Saudi Arabia. This will assist the government in adopting m-government applications, which are easier than other types of applications.

2.1.7 Developing countries

In developing countries, especially Arab countries, m-government services and applications are still in their early stages, although there is a high penetration rate of mobile users (Abu-Shanab & Haider, 2015; Al-Busaidi, 2012; Yfantis, Vassilopoulou, Pateli, & Usoro, 2013). The same problem exists in the Saudi m-government context.

In addition, as mentioned previously, this study adopted the TAM model to identify and measure the factors that influence users' intentions to use m-government applications in the Saudi context. It has been suggested that the TAM can be used in and is appropriate for use in different countries (McCoy, Galletta, & King, 2007). Other studies, such as the work of Al-Gahtani (2001), have asserted that the TAM constructs are reliable and valid for predicting IS adoption in the Arab culture in general, and the Saudi culture more specifically. Also, as mentioned previously, Saudi culture is very compatible with that of other Arab countries, especially Gulf countries. Therefore, the proposed model in this study, which aimed to explain and identify the factors that influence users' intentions to use m-Government applications in the Saudi context, may also be useful for other Arab countries which seek to adopt m-government applications. Because the Saudi context is similar to that of other neighbouring countries, it is considered that the results of this study could be generalised to those countries,

as other studies have shown previously. However, further testing would be required to confirm that.

2.1.8 Summary

Saudi Arabia has an important position in the Islamic and Arabic world. It is also a member of OPEC and is considered the biggest exporter of petroleum in the world with 18% of the world's petroleum reserves. Saudi culture differs from other cultures and plays a key role in new technology acceptance. ICT in Saudi Arabia has grown and improved and most electronic projects have seen progress in their implementation. This ICT growth and improvement will support the government in the successful adoption of m-government applications.

2.2 E-government

2.2.1 Definition of e-government and its models

Z. Fang (2002) defined e-government as a method used by governments to provide electronic services to users using modern ICTs, especially the Internet, while making these services easy to access. E-government aims to improve government services and to enhance opportunities to collaborate in processes and democratic procedures. In the 21st century, e-government seeks to support a strong relationship between governments and citizens and to provide lower cost and higher quality services. It also seeks to bring businesses and citizens closer to their governments. E-government aims to transform external and internal relationships through the Internet, technology and other modern media to provide continuous improvements to services and collaborations in government elections (Z. Fang, 2002). Alghamdi & Beloff (2016) state that e-government aims to increase the connection between government and users (governmental sectors, citizens and business) by exploiting ICT technologies to provide government services in efficient and effective way which increases engagement and interaction between government and users.

There are four main models of e-government: government-to-government (G2G), government-to-employee (G2E), government-to-citizen (G2C) and government-to-business (G2B). G2G aims to enhance productivity and efficiency and reduce costs by allowing different government sectors to work together using the Internet and modern technologies. G2E aims to allow online communication between employees and the government. G2C aims to provide government services anytime and anywhere to citizens online. G2B aims to provide government services to commercial sectors (Nyakwende & Al Mazari, 2012) See Appendix B for more details.

2.2.2 E-government benefits and advantages

There are many benefits of implementing e-government for citizens, government sectors and businesses. E-government initiatives give users easy access to services because these services are available 24 hours a day, seven days a week. Moreover, e-goverment provides certain benefits that reduce the cost and enhance the productivity of government sectors by potentially allowing the effective sharing of data between government sectors (Alshehri & Drew, 2010). According to Alfarrai (2013), the advantages to implementing e-government initiatives include secure services; increased computer literacy; easier access to information; faster, cheaper and better services; increased trust between institutions and parents; less corruption and accountability; and increased transparency. Along the same lines, Alshehri and Drew (2011) pointed out that e-government can improve the technical skills of users and staff, help develop good relationships between citizens and government sectors, and build trust. It allows citizens to share in the government's decisions and systems and assists with continuing development within the country (Alomari, Sandhu, & Woods, 2010). The study by Alghamdi & Beloff (2016) claims that e-government can help the government provide their services with accountability, interactivity, effectiveness, efficiency and transparency. Furthermore, e-government provides high-quality services to different stakeholders, minimizes costs and speeds up processes (Alassim et al., 2017).

2.2.3 E-government in Saudi Arabia

As mentioned previously, the e-government program "Yesser" was established in 2005 with the aim that by 2010, every citizen in Saudi Arabia could enjoy and utilize a set of government services online, without effort, anywhere and at any time, while maintaining security over personal data. However, the government's aim to provide electronic services has not been accomplished (Alfarraj, 2013). According to Alshehri et al. (2012), in Saudi Arabia, e-government initiatives have not been completely adopted because there are challenges and obstacles preventing their adoption. While many ministries in Saudi Arabia have web sites, Alshehri et al. (2012) noted that eight ministries had websites but did not use the basic technical features of e-government initiatives. Moreover, 10 ministries were in the first stage of implementing e-government initiatives, three ministries were in the second stage, and six ministries had no electronic services at all. Alfarraj and Alhussain (2013) and Alfarraj et al. (2013) emphasize that there is progress in implementing e-government initiatives, but that, generally, e-government initiatives have not been implemented completely, and most have experienced delays in their schedules. This is confirmed by a recent study conducted by Alassim et al. (2017) who found that there are some issues within the public sector that delay the implementation of the e-government project in Saudi Arabia. Consequently, the Yesser program now aims to encourage and enable government sectors to implement and adopt e-government services to increase productivity and efficiency by reducing centralization and improving coordination between government sectors. In other words, Yesser is the supervisor and controller for all e-government initiatives released from government sectors in Saudi Arabia (Yesser, 2015).

A recent study conducted by Alghamdi & Beloff (2016) asserted that, in developing countries like Saudi Arabia, the adoption of e-government services is not satisfactory. There are low levels of adoption and use, and it is considered as being in the first adoption stage due to the

many problems and challenges that prevent utilization, adoption and implementation of these services. In addition, the Saudi government seeks to provide electronic services to citizens anywhere and at anytime, but this access does not yet exist (Khan, 2016). However, according to a United Nations (2014) survey regarding e-government, in 2012 Saudi Arabia was ranked 41 in terms in e-government readiness; by comparison, in 2014, it was ranked 36, with a score of 0.69 (see Appendix C). In 2016, Saudi Arabia was ranked 44 and was one of the top 10 countries for e-government in Asia based on the e-government development index (EGDI) (United Nations, 2016, see Appendix D).

To summarise, the e-government in Saudi Arabia is continuously being implemented and is therefore making progress. However, it has not yet been completely implemented and there have been delays due to a number of challenges which are discussed in the next section.

2.2.4 Challenges, barriers and factors influencing the adoption of e-government initiatives in Saudi Arabia

As previously discussed, the e-government has not been completely implemented because of certain challenges and barriers. This section identifies and descibes the challenges, barriers, and additional factors that influence the adoption of e-government initiatives in Saudi Arabia in more detail.

According to Al-Tourki, El-Sofany, Al-Sadoon, & Al-Howimel (2012), certain challenges and barriers may prevent the implementation of e-government initiatives in Saudi Arabia. These include: resistance to a change in electronic ways, a lack of policy and regulations regarding e-usage, a lack of partnership and collaboration, a lack of strategic planning, financial barriers, a lack of qualified personnel and training, a lack of programs to promote e-government benefits and advantages, culture, leaders and management support, ICT infrastructure and privacy, security and trust in e-services. However, Alateyah, Crowder, and Wills (2013) asserted in their study that there are other factors that encourage citizens to adopt e-government initiatives in

Saudi Arabia. These include: information security, culture, accessibility, relative advantage, compatibility, complexity, technical infrastructure, age, education, lack of awareness, service quality, reliability, availability and speed of delivery. A recent study conducted by Alghamdi & Beloff (2016) found a positive relationship between perceived benefits, awareness and previous experience and intentions to use e-government services. They also found a positive relationship between perceived simplicity, technical quality of service, and regulations & policies and the perceived e-readiness of e-government. They found no positive relationship between accessibility and perceived e-readiness of e-government (Alghamdi & Beloff, 2016). The study conducted by Alassim et al. (2017) found that there are some organizational factors influencing the implementation of the e-government project within the public sector in Saudi Arabia. They include misunderstanding the new policy and regulations, lack of visioning and planning, top management commitment, low level of cooperation with Yesser, updating the infrastructure, resistance to change and lack of continuous training.

2.3 M-government

This study focuses on identifying and measuring the factors that influence users' intentions to use m-government applications in Saudi Arabia. This topic was chosen for a number of reasons, (i) e-government system has not yet been completely implemented to serve society (Alghamdi & Beloff, 2016; Alassim et al., 2017), (ii) while m-government is a subset of and complements e-government (Althunibat et al., 2014; El Kiki & Lawrence, 2006; Kumar & Sinha, 2007; Mengistu et al., 2009; Misra, 2009; Östberg, 2003; Sheng & Trimi, 2008), so m-government applications may help the government to effectively provide services (iii) the m-government in Saudi Arabia is in its infancy (Alotaibi & Roussinov, 2015; Alrowili et al., 2015). In addition, recent studies by Baabdullah et al. (2016) and Babullah et al. (2015) claim that Saudi citizens have not completely adopted m-government. A recent study conducted by Alotaibi &

Roussinov (2017) confirmed that using m-government in Saudi Arabia is not popular because citizens' rate of acceptance of mobile government services is low.

This section provides additional details about the definition of m-government, the goals, advantages, and objectives of m-governments, m-government services and applications in Saudi Arabia, the drivers and factors that influence the adoption of an m-government.

2.3.1 Definition of m-government

According to Alotaibi & Roussinov (2017), m-government services comprise governmental services which are provided by mobile devices. Al-Hadidi (2010: 56) defined m-government as "a) Future government that provides for citizens, companies and government to deliver personalised government services through wireless networks, b) Multi-channel Government that overcomes current limitations of e-Government and supports mobility and accessibility and, c) Wired-Wireless Convergence Network that can access government service anytime and anywhere."

Similarly, Moon (2004: 9) defined m-government as "Broadly, m-government is defined as government's efforts to provide information and services to public employees, citizens, businesses, and non-profit organizations through wireless communication networks and mobile devices such as pagers, PDAs, cellular phones, and their supporting systems."

Al-Hadidi (2010: 57) argued that "M-government is a natural and inevitable extension of e-government". Snellen and Thaens (2008) defined m-government as the application of mobile devices, such as handheld PCs, PDAs and mobile telephones, citizens use in the exchanges among officials, organizations, individuals and public administration.

M-government is connected to users through certain features, such as WAP, MMS, SMS, the worldwide web, and satellite. M-government is the method by which the government seeks to gain the benefits of mobile technology and provide government services to users through

mobile services (Althunibat et al., 2014). Kushchu (2007) noted that m-government uses all types of wireless technology and communication, including applications, services and devices, to offer advantages related to all parts of e-government, such as businesses, all government sectors and citizens. El Kiki and Lawrence (2006) agreed that m-government must be viewed as a tool for government, rather than a new type of government in itself. Along the same lines, some researchers (Kumar & Sinha, 2007; Sheng and Trimi 2008; Misra 2009) firmly believe that m-government is a subset of and complement to e-government (see Appendix E). Alsenaidy and Ahmad (2012) confirmed that m-government can achieve the goals of e-government via exploiting the high rates of usage of mobile phones among citizens.

M-government, like e-government, has four types:

- M-government-to-citizen (mG2C): connection between government and citizens.

- M-government-to-business (mG2B): connection between government and business.

- M-government-to-employee (mG2E): connection between a government and its employees.

- M-government-to-government (mG2G): connection between a government and its sectors (Mengistu et al., 2009).

Ntaliani, Costopoulou, and Karetsos (2008) noted that, today, most interactions are mG2C. There are five types of M-government methods to provide services to citizens. These are Multimedia Messaging Services (myMMS), mobile payment (MyPay), Short Message Service (mySMS), Mobile Application (MyApp) and Unstructured Supplementary Service Data (myUSSD) (Abu Bakar, Rahman, & Hamed, 2015). This PhD study focuses on mG2C and Mobile Application (MyApp) to identify and measure the factors that influence users' intentions to use m-government applications based on citizens' perspectives.

M-government was chosen for this study because it has many advantages and objectives. In Saudi Arabia, m-government could assist the government in effectively providing services to citizens, which is the main advantage of an m-government. Moreover, there have been very few studies about the factors influencing users' intentions to use m-government applications in Saudi Arabia.

2.3.2 Advantages, goals, and objectives of m-government

Sandy and McMillan (2005) stated that there are many advantages for citizens and government using pocket PCs, tablets, handheld terminals, SMS, PDAs and mobile or cellular telephones, which include: increased productivity of public servants, better access to data for public servants in the field, in situ service delivery for citizens, increased channels for service interaction and instant updates to information and data. In addition, m-government has the advantages of easy infrastructure setup, improved e-government efforts, ease of learning, inclusiveness, remote area access and low cost (Alsenaidy & Ahmad, 2012; Jahanshahi, Khaksar, Yaghoobi, & Nawaser, 2011; Mengistu et al., 2009; Snellen & Thaens, 2008). Alomari, Elrehail, and Al Shibly (2013) asserted that the advantages of m-government include: the provision of location-based government services, on-time information delivery, mobility, ubiquity, time savings, ease of use and improved emergency management. A recent study conducted by Assar (2015) confirmed all m-government advantages noted in previous studies, but also pointed out two new advantages: international trade benefits and democratic reforms. Althunibat et al. (2014) claimed that the goal of m-government is to attract users to use government services, since m-government is easily accessible for services 24 hours a day, seven days a week. Along the same line, m-government improves connection methods between citizens and the government, encourages citizens to participate in local community matters, provides e-government services with certain additional features (e.g. timeliness, convenience) and implements and provides e-government services to citizens, particularly in distant locations

for which the government has not provided services, such as rural areas (Al-Hadidi, 2010). According to Alotaibi and Roussinov (2015), m-government has some unique advantages including that it is easy to receive messages from government services via mobile phone.

2.3.3 M-government services and applications in Saudi Arabia

This section discusses m-government services and applications in Saudi Arabia in greater detail. According to Alhussain (2012), m-government applications currently exist in several countries to support the efficient provision of services. Most of the m-government applications concern weather updates, emergency assistance, traffic updates, field inspections, tracking systems for stolen vehicles and notification for bills and taxes. According to Ahmad et al. (2014), some m-government services that are available from the Saudi government are:

1- Health Mobile:

The Ministry of Health connects with citizens via text message (SMS) to provide updates on disease prevention, health and medicine.

2- Tracking of Higher Education Information:

The Ministry of Higher Education connects with citizens, especially students and their parents, about general educational information and specific student education information, once the users have registered their names and mobile numbers on the Ministry of Higher Education site.

3- Riyadh and Madinah Education:

The Ministry of Education enables users to connect by sending some attachment files and SMSs.

4- Appointments and Document Tracking:

The Supreme Council of Justice offers services to citizens regarding the scheduling of appointments, the issuing of mobile messages to acknowledge the receipt of documents and the sending of reference numbers and dates to increase productivity.

5- Employee Inquiry:

The Ministry of Labor offers services to allow citizens to inquire about their employee status (e.g. position, salary,any organization) by sending an SMS containing their ID number.

6- Traffic Offense:

Citizens and residents can inquire about their traffic offenses by sending their National ID and IQAMA number to providers of this service.

7- Health Appointment Reminders:

Some hospitals provide this service to remind patients of their appointments with physicians by sending SMSs to patients containing times, appointment dates and medical building locations (Ahmad et al., 2014).

Alsenaidy and Ahmad (2012) noted that other m-government services already in use in Saudi Arabia include:

1- SMS Services:

King Saud University offers this service for students, professors and staff to help them connect with each other about materials and academic curricula for studies. There are certain procedures for activating this service.

2- iTVTC Services:

The Technical and Vocational Training Corporation (iTVTC) provides this service to assist users in getting information and training. This service is offered through a free download on smart mobile phones (e.g. Apple, Android).

3- Apply for Mortgage Loan "Moyassar":

This service assists citizens in getting mortgage loans easily by sending a text message (SMS) to the number 50111 (Alsenaidy & Ahmad, 2012).

One popular example of an m-government application in the Saudi government is the Noor mobile application. The Noor application was launched by the Ministry of Education in 2015 as an application for e-learning on mobile devices with various platforms and Windows 8 (Assar, 2015). It seeks to gain the advantages of mobile applications and tablet devices to provide services for all users. Noor is managed via a central database and system of information. This system is anticipated to serve more than 10 million users, including 5.5 million students in 34,000 schools, as well as decision-makers, teachers, administrators and parents. This procedure will help the Ministry of Education keep up with the rapid development of global technology related to mobility and wireless technology. The Ministry is seeking to exploit these technologies in educational processes. This application offers various services for parents, administrators, students and teachers, in which students can review their marks, progress and schedules. It also helps teachers increase their productivity. In addition, it allows parents to follow and know their children's' study schedules and progress and to connect directly with teachers (Assar, 2015). The Education Ministry (2014) identified that the Noor system has some important sub-systems, such as the acceptance of new entrants system, the testing system, the educational supervision system, the system of student activity, the guidance system, the teacher affairs system and the talented students system.

In summary, some Saudi Arabia m-government services, such as employee inquiry, have been effectively used by citizens. Some ministries use text messages (SMS) to distribute their news or services because SMS is very popular in Saudi Arabia. The newest and most popular m-government application in Saudi Arabia is called Noor; it is used to serve the education process as discussed above.

Although some m-government services and applications have been provided in Saudi Arabia, m-government is still considered as being in the first stage (Alhussain, 2012; Alotaibi & Roussinov, 2015; Alrowili et al., 2015; Alsenaidy & Ahmad, 2012). Recent studies by Baabdullah, Nasseef, and Alalwan (2016) and Babullah, Dwivedi, and Williams (2015) claim Saudi citizens have not completely adopted m-government. A recent study conducted by Alotaibi & Roussinov (2017) confirmed that using m-government in Saudi Arabia is not popular because citizens' rate of acceptance of mobile government services is low. Despite this, m-government is becoming more popular than e-government in the country. As mobile phone use has seen massive growth among citizens (Ahmad et al., 2014), with 47.9 million mobile subscriptions in 2016 (151% of the population) (CITC, 2016) and most (67%) of the Saudi population using a smart phone (Khan, 2016), the government can take steps to transfer their services from an e-government to an m-government to take advantage of this preference for mobile services and use.

2.3.4 Drivers and factors influencing the adoption of m-government

Drivers play a key role in the adoption of m-government. According to Kushchu (2007), drivers refer to the conditions, prerequisites, and recommendations that aid in the adoption of an m-government. Khare, Dixit, and Chaudhary (2011) pointed out that the switch from e-government to m-government in developing countries requires certain drivers to assist in the shift. These drivers are (i) a high number of mobile phone users using the internet via Wireless Application Protocol (WAP) services provided over general packet radio services (GPRSs),

(ii) the lower cost of mobile phones compared to internet technology, (iii) the ease of use of mobile phones, and (iv) the high rate of mobile phone use in developing countries. Kushchu (2007) claimed that other driving factors that influence citizens' attitudes towards the adoption of m-government are education level, socio-economic characteristics, age, gender, income and language differences. Al-Hadidi (2010) noted that the factors influencing the adoption of m-government are mobile device penetration and the emergence of mobile Internet. In developing countries, the key factors potentially influencing m-government adoption are cost, complexity of use of computer technology and the mobile, and the educational level of users (Alotaibi & Roussinov, 2015). In Saudi Arabia, the lack of m-government readiness and expensive internet services are important challenges to implementing m-government services (Alssbaiheen & Love, 2015). It has been found that social influence have a positive influence on users' intention to adopt m-government services (Ahmad & Khalid, 2017).

2.4 Relationship Between E-government and M-government

This section demonstrates the relationship between e-government and m-government by reviewing previous studies. Some researchers have claimed that m-government is a subset of and complement to e-government (Althunibat et al., 2014; El Kiki & Lawrence, 2006; Kumar & Sinha, 2007; Mengistu et al., 2009; Misra, 2009; Östberg, 2003; Sheng & Trimi, 2008). So, m-government is considered an extension of e-government rather than a replacement (Alssbaiheen & Love, 2015). It has also been noted that m-government has same principles as e-government but has more unique advantages (Alotaibi & Roussinov, 2015). In addition, some researchers have asserted that traditional e-government benefits are still important for supporting and transforming m-government, since e-government is an important basic component of m-government (Abanumy & Mayhew, 2005; Antovski & Gusev, 2005; Kim, Yoon, Park, & Han, 2004; Scholl, 2005).

Jahanshahi et al. (2011) noted that some researchers believe that m-government is like e-government, in that it is an independent tool used by governments to fulfil basic objectives. On the other hand, some researchers have claimed that m-government helps provide government services for the public and that it is part of e-government. Cilingir and Kushchu (2004) noted that there is a dependency between m-government and e-government; i.e. m-government cannot be implemented without e-government's infrastructure. Therefore, m-government must be inserted into the design of e-government. Similarly, Alomari et al. (2013) asserted that m-government is a key factor in the adoption and success of e-government services because m-government is popular, easy to use, provides services through sophisticated methods, and provides all the advantages of an m-government discussed previously. Therefore, some researchers have suggested a move to m-government (Al-Hadidi, 2010) to quickly implement e-government services.

In short, m-government is a subset of and a complement to e-government and offers a new way of implementing an e-government. Currently, there is a global technological revolution occurring, especially with regards to smart devices (mobile devices) that use wireless technologies. Therefore, it makes sense for governments to provide services to citizens via apps on these mobile devices. Therefore, this study will identify and measure the factors that influence users' intentions to use m-government applications, with the aim of encouraging decision-makers in the Saudi government to implement m-governmental services quickly and effectively.

2.5 Theories and Models of Technology Acceptance

This section presents the popular theories and models of technology acceptance that have been developed in the IS field to measure user acceptance of new technology. The section first presents the range of models used to date. This is followed by the conceptual model and

hypotheses for this study including the justification for the selection of the TAM model, TAM

constructs, external factors, moderators and research model.

2.5.1 Theory of Reasoned Action (TRA)

TRA is very influential model in information systems and commonly used in psychology

(Sheppard, Hartwick, & Warshaw, 1988; Venkatesh, Morris, Davis, & Davis, 2003).

According to Davis, Bagozzi and Warshaw (1989), TRA has been examined in different

domains and has proven successful in explaining and predicting behaviour. TRA was

developed for the main goal of enhancing the understanding of relationships between

intentions, attitudes and behaviour (Davis et al., 1989; Glanz, Rimer, & Viswanath, 2015). In

the same vein, TRA focuses on behavioural intention (BI) not attitude, because it aims to

examine and evaluate human behaviour (Ajzen & Fishbein, 1980,). TRA adopted by (Fishbein

& Ajzen, 1975, Figure 13).
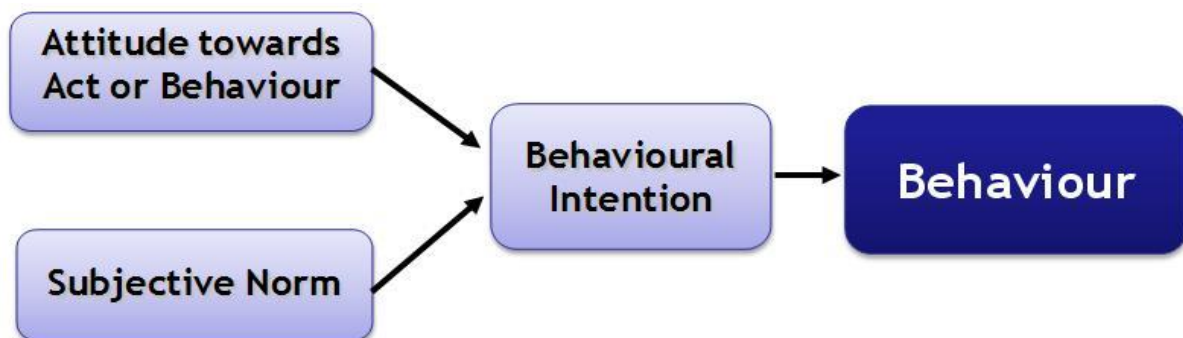
Figure 13 Theory of Reasoned Action (TRA), from Fishbein & Ajzen (1975).

According to Fishbein and Ajzen (1975: 288), behavioural intention is defined as "person's

subjective probability that he will perform some behaviour". Ajzen and Fishbein (1980: 57)

define subjective norms as "refers to the person's subjective norm, that is, his perception that

most people who are important to him think he should or should not perform the behaviour in

question." In other words, subjective norms indicate to the individual facing social pressure

whether or not to execute the behaviour (Liker & Sindi, 1997). Positive or negative attitudes in TRA are derived from beliefs that come from behaviour or action (Abunadi, 2012). Madden, Ellen, and Ajzen (1992) claimed that the magnitude of the relationship between intentions and behaviour may be affected by three conditions:

1- Extent that the degree of measuring the intention and the behavioural criterion correspond with respect to their levels of specificity.

2- Extent that the degree of performing the intention is under the control of the individual.

3- The constancy of intentions between performance of behaviour and time of measurement.

TRA has been adopted in some previous IS studies to examine the factors influencing the adoption of new technologies such as e-trends, wireless technologies and the Internet (Clark & Soliman, 1999; Hansen, Jensen, & Solgaard, 2004; Hartwick & Barki, 1994; Yoh, Damhorst, Sapp, & Laczniak, 2003).

2.5.2 Theory of Planned Behaviour (TPB)

TRA has a significant limitation in that attitude may be considered a norm, while the opposite may be occurring (Ajzen, 1985). Another limitation of TRA is that the person has to work without any other external limitations (Brdesee, 2013). TPB is considered an extension of TRA to address these limitations, particularly the issue of insufficient volitional control (Ajzen, 1985). TPB has been a common model for examining and predicting human behaviour for the past 20 years (Ajzen, 1991; Teo, 2012).

Perceived behavioural control in TPB is an additional construct that influences behavioural intention and behaviour (Figure 14). According to Mishra (2014), TPB consists of attitude towards the behaviour, subjective norm (SN) and perceived behavioural control (PBC). In Figure 14 we see that behavioural intention is influenced by attitude, subjective norm and perceived behavioural control, while behaviour is influenced by behavioural intention and perceived behavioural control.
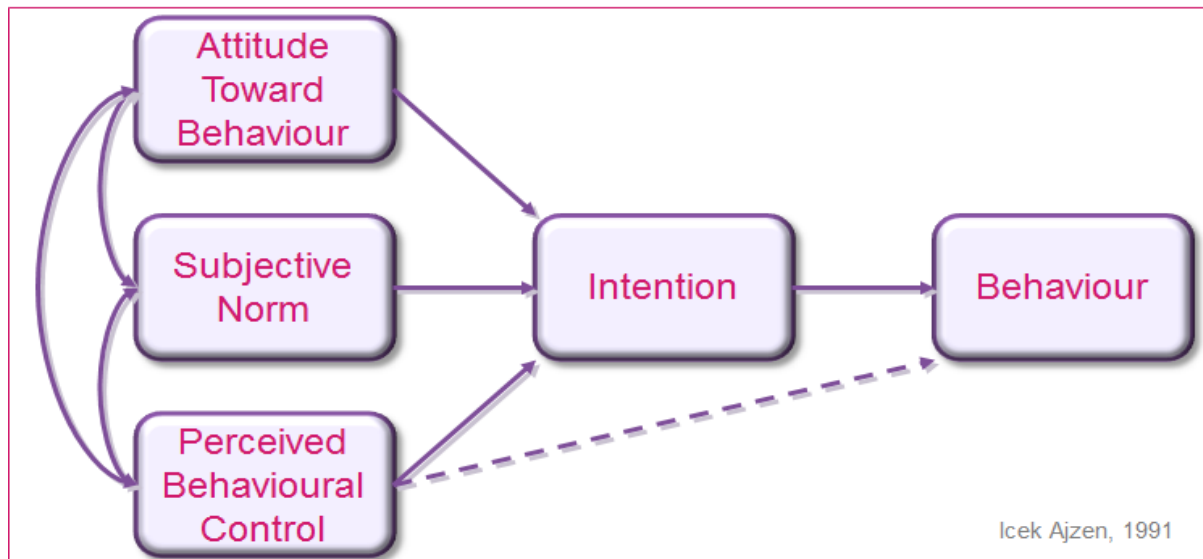
Figure 14 Theory of Planned Behaviour (TPB), from Ajzen (1991).

Attitude toward the behaviour, subjective norm, and perceived behavioural control combine to form behaviour intention. Attitudinal belief leads to positive or negative attitude, normative beliefs lead to subjective norm or social pressure, and control beliefs lead to perceived behavioural control (Ajzen, 2002). Behavioural intentions are variables that explain how the people want and are willing to attempt to perform a behaviour. Attitude toward the behaviour is defined as people's belief and feelings, either negative or positive, regarding the behaviour performance (Teo, 2012). According to Teo (2012: 5) subjective norms are defined as "one's perception of whether people important to the individual think that the behaviour should be performed" and perceived behavioural control is defined as "an individual's beliefs about the presence of factors that may facilitate or hinder performance of the behaviour."

According to Mishra (2014), TPB has been adopted in many studies in different domains to examine user behaviour in different cultures (Eastern and Western) such as e-coupon usage (Kang, Hahn, Fortin, Hyun, & Eom, 2006), green consumption (Sparks & Shepherd, 1992),

predictors of smoking behaviour (Godin, Valois, Lepage, & Desharnais, 1992), and e-commerce services (Bhattacherjee, 2000).

2.5.3 Technology Acceptance Model (TAM)

TAM was first introduced in 1986 to measure new technology acceptance (Davis, 1986). TAM is derived from the Theory of Reasoned Action (TRA) and states that beliefs impact on intentions, and intentions impact on actions (Carter & Bélanger, 2005). There are differences between the TAM and the TRA, in that the TAM is used for the adoption of new technologies and focuses on users' attitudes, behaviours and perceptions in the adoption of the technology, while the TRA is more general and can be used for various types of cases (Dickerson, 2013). According to Carter & Bélanger (2005: 8) "TAM is based on the theory of reasoned action, which states that beliefs influence intentions, and intentions influence one's actions."

TAM is expected to measure user acceptance of new technologies based on various factors, including behavioural intention to use, attitude towards use, perceived usefulness and perceived ease of use (Alharbi & Drew, 2014; Davis, 1989, Figure 15). According to Davis (1989: 320), perceived usefulness can be defined as "the degree to which a person believes that using a particular system would enhance his or her job performance", and perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort." Al-Hujran, Al-dalahmeh and Aloudat (2011: 95), define behavioural intention as "the strength of one's intention to perform a specified behaviour" while attitudes are defined as "an individual's positive or negative feelings (evaluative affect) about performing the target behaviour" (Al-Adwan, Al-Adwan, & Smedley, 2013: 6).
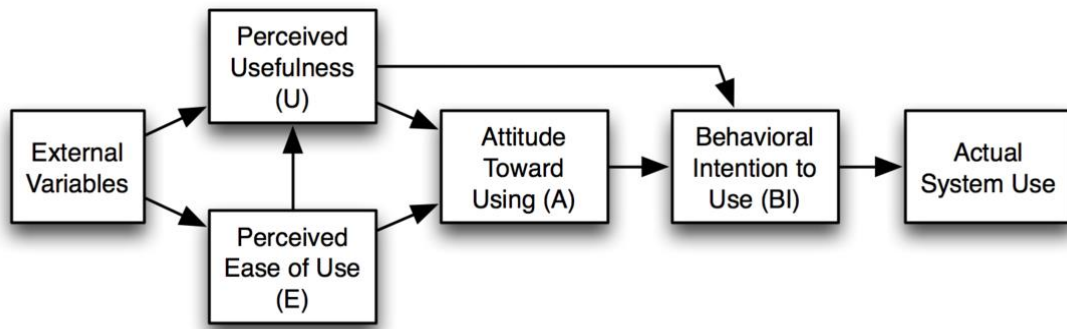
Figure 15 The Technology Acceptance Model (TAM), from Davis (1989).

It has been demonstrated that the TAM is an IS model that aims to "…provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified. Additionally, it provides a basis for tracing the impact of external factors on internal beliefs, attitudes, and intentions" (Aldraehim, 2013: 90).

Figure 15 demonstrates the relationships among the TAM constructs with behavioural intention being directly influenced by attitude towards use and perceived usefulness and indirectly influenced by perceived ease of use. Attitude towards use is directly affected by perceived usefulness and perceived ease of use, while perceived usefulness is directly influenced by perceived ease of use. Moreover, perceived ease of use and perceived usefulness are influenced by external variables (Alharbi & Drew, 2014). Actual use is directly influenced by behavioural intention to use.

The TAM has been used to test and assess many new technologies, such as voice mail, and has also been applied to study various applications, such as the World Wide Web and online educational settings (Jaeger & Matteson, 2009). The TAM can be used to help organizations

and individuals make appropriate decisions to solve problems and choose suitable approaches to solve existing problems (Jaeger & Matteson, 2009). TAM can potentially be applied before the adoption of any new technology (Shih, 2004).

2.5.4 Technology Acceptance Model (TAM2)

Venkatesh and Davis (2000) introduced TAM2 by extending the original TAM to incorporate social influence processes and cognitive instrumental processes. According to Venkatesh and Davis (2000), all factors in social influence and cognitive instrumental processes have a strong significant impact on users acceptance of new technology. Social influence processes represent three social factors that influence users' acceptance of new technology: image, subjective norms and voluntariness. Cognitive instrumental processes represent four determinants of perceived usefulness: output quality, job relevance, result demonstrability and perceived ease of use (Venkatesh & Davis, 2000). TAM2 consists of the original TAM constructs and the new constructs: subjective norms, image, job relevance, output quality, result demonstrability, experience and voluntariness (Venkatesh & Davis, 2000, Figure 16).
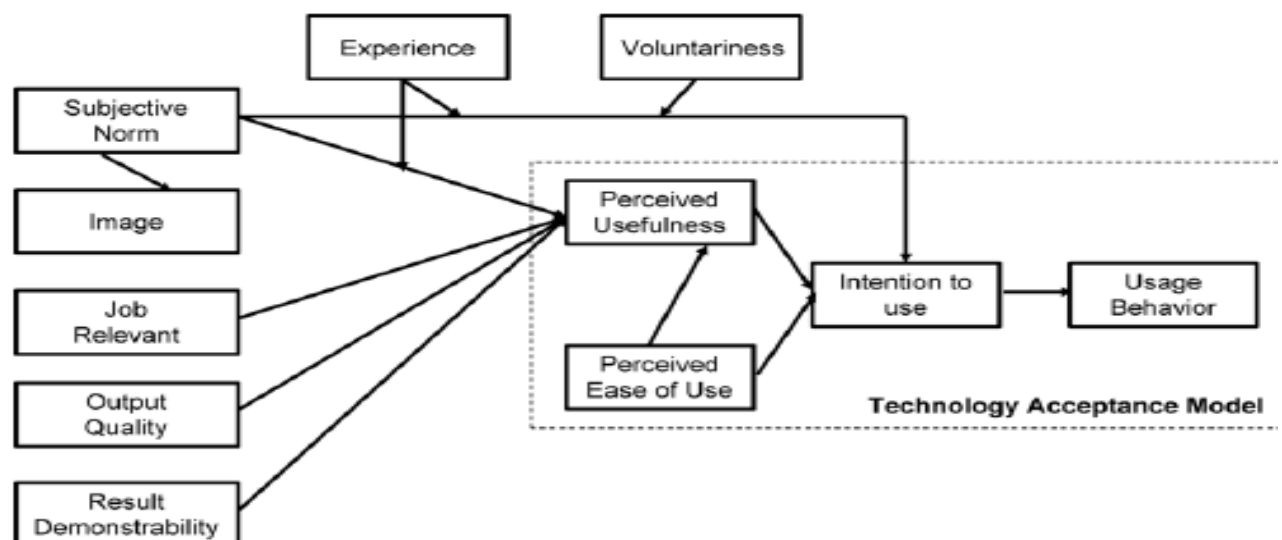
Figure 16 TAM2, extension of the original TAM, from Venkatesh and Davis (2000)

According to Venkatesh and Davis (2000: 188-192), voluntariness is defined as "the extent to which potential adopters perceive the adoption decision to be non-mandatory" while image is defined as "the degree to which use of an innovation is perceived to enhance one's…. status in

one's social system." Job relevance is defined as "an individual's perception regarding the degree to which the target system is applicable to his or her job." Output quality refers to users considering and thinking about how the system will implement their job. Result demonstrability is defined as "tangibility of the results of using the innovation."

Many studies have adopted TAM2 to examine new technology acceptance. Sang and Lee (2009) studied a conceptual model of e-government acceptance in the public sector and found that subjective norms in TAM2 positively impact on image. They also found that TAM2 is valid for examining and successfully understanding new technology acceptance (adoption and usage). M. Wu, Chou, Weng, and Huang (2008) studied the adoption of Web 2.0 websites usage behaviour using TAM 2 and found that all social and cognitive instrumental processes influenced Web 2.0 usage, except image.

2.5.5 Diffusion of Innovation Theory (DOI)

A study supported by the Iowa Agriculture Experimental Station to distribute hybrid corn between farmers was the main reason behind the creation of the Theory of Innovation Diffusion (Ryan & Gross, 1943). Rogers (1962) investigated the factors that militated against the adoption of innovative farming practices. After many studies conducted over the next 50 years, Rogers developed the Diffusion of Innovation Theory model in 2003 (Rogers, 2003).

DOI seeks to clarify and explain how new innovations and technologies are accepted by individuals and organizations, and how the new innovations and technologies diffuse in society. DOI has ability to explain the acceptance of new innovations and technologies at three levels: individuals, organizations and society (Rogers, 2003). There are differences between the diffusion process and the adoption process. Essentially, the adoption process happens at the individual level whereas the diffusion process occurs at the society level (Rogers, 2003). According to Rogers (2003: 5,11), diffusion is defined as "the process in which an innovation is communicated through certain channels over time among the members of a social system."

Innovation is defined as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption."

DOI consists of four main elements: innovation, communication channel, time and social system (Rogers, 2003). The five major attributes of innovations are relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). According to (Rogers, 2003: 15-16) Relative advantage is defined as "the degree to which an innovation is perceived as being better than the idea it supersedes". Compatibility is "the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters." Complexity is "the degree to which an innovation is perceived as relatively difficult to understand and use." Trialability is "the degree to which an innovation may be experimented with on a limited basis" while observability is "the degree to which the results of an innovation are visible to others."

There are five main steps in the innovation-decision process presented in Figure 17: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. The innovation-decision process starts with knowledge about a new innovation to form an attitude toward the innovation, then the decision to reject or accept the innovation. This is followed by implementation of the innovation and confirmation of the decision (Rogers, 2003). In Figure 18, Rogers (2003) categorizes the adaptors on the basis of innovativeness into: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards.
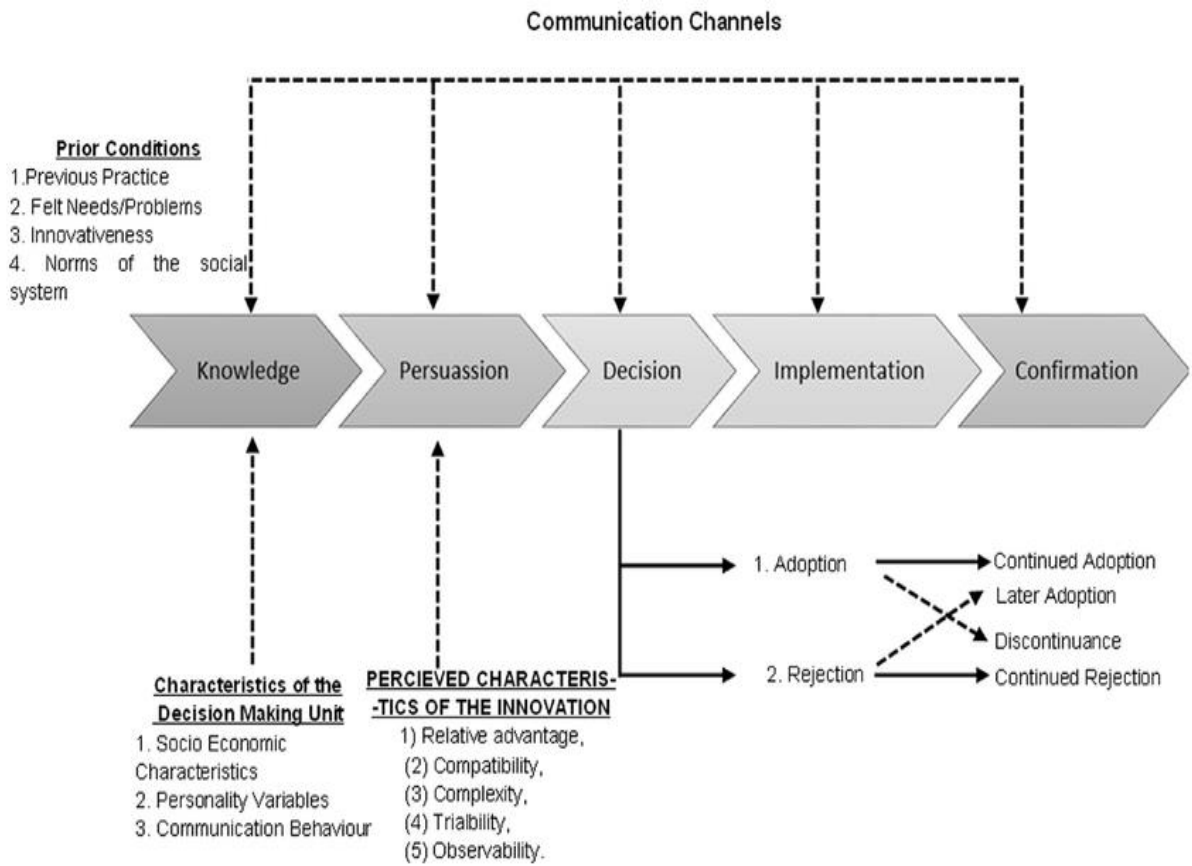
Figure 17 A model of stages in the innovation-decision process, from Rogers (2003)
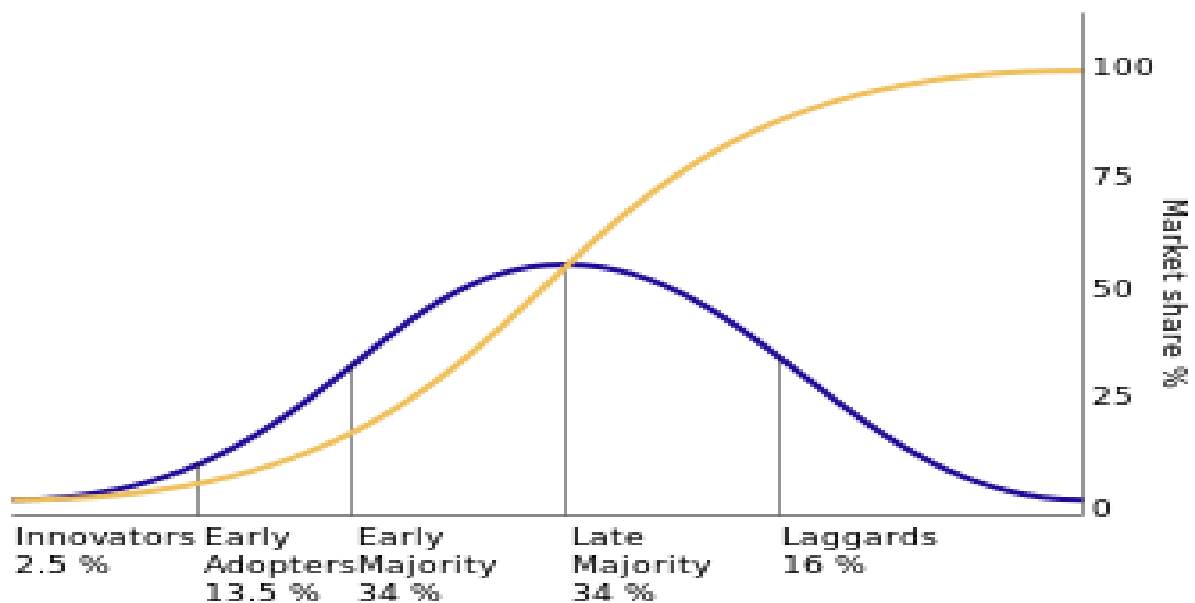
Figure 18 Adaptor categorization on the basis of innovativeness, from Rogers (2003).

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2.5.6 Unified Theory of Acceptance and use of Technology (UTAUT)

UTAUT was introduced by Venkatesh, Morris, et al. (2003) to explain and understand behavioural intention to use and enhance the usage behaviour of new technology. Venkatesh, Morris, et al. (2003) introduced this model to present a clearer and more complete picture of the acceptance process. They reviewed and combined eight previous models in IS acceptance of new technology to produce this model (Figure 19). These models were TAM, TPB, DOI, Model of PC Utilisation, Combined TAM and TPB, Motivational Model, Social Cognitive Theory and TRA. UTAUT had the ability to explain 70% of the variance in intention to use new technology (which is greater than all the previous individual models) when they examined UTAUT in six different organizations. Venkatesh, Morris, et al. (2003) created and developed UTAUT in four steps:

1- Review, discuss and assess the eight acceptance models in the acceptance literature.

2- Empirically compare the eight models.

3- Combine all elements in the eight models to formulate the Unified Theory of Acceptance and Use of Technology (UTAUT).

4- Empirically validate UTAUT.
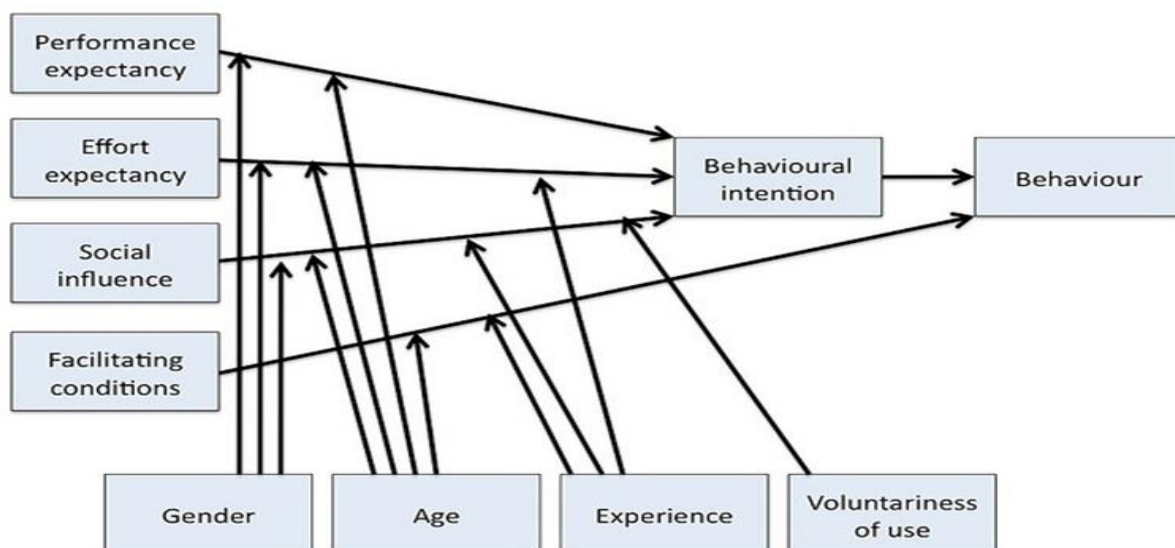
Figure 19 UTAUT, from Venkatesh, Morris, et al. (2003).

UTAUT has four constructs that determine behavioural intention and use behaviour: performance expectancy, effort expectancy, social influence and facilitating condition. It also has four moderators: gender, age, experience, and voluntariness (Venkatesh, Morris, et al., 2003).

Venkatesh, Morris, et al. (2003: 447-453) defined performance expectancy as "degree to which an individual believes that using the system will help him or her to attain gains in job performance", and effort expectancy as "the degree of ease associated with the use of the system." Social influence is defined as "the degree to which an individual perceives that important others believe he or she should use the new system", while facilitating conditions is defined as "the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system".

Behavioural intention is directly influenced by performance expectancy, effort expectancy, and social influence, while use behaviour is directly influenced by facilitating condition and Behavioural intention. The effect of performance expectancy on behavioural intentions will be moderated by gender and age. The effect of effort expectancy on behavioural intentions will be moderated by age, gender and experience. The effect of social influence on behavioural intentions will be moderated by gender, age, experience, and voluntariness. The effect of facilitating condition on use behavioural will be moderated by age and experience (Venkatesh, Morris, et al., 2003).

The UTAUT has been used and examined by many studies in different domains (Al-Shafi & Weerakkody, 2010; Al Imarah, Zwain, & Al-Hakim, 2013; AlAwadhi & Morris, 2008; Alzahrani & Goodwin, 2012; Anderson & Schwager, 2004; Khechine, Lakhal, Pascot, & Bytha, 2014; Thomas, Singh, & Gaffar, 2013; Wang & Yang, 2005).

2.5.7 Conceptual framework

2.5.7.1 Justification of selection of the TAM model

This study adopts the original basic TAM with some modifications to relationships between its factors to achieve the study's objectives. Therefore, this study focuses on the relationships between behavioural intention to use (BIU) and other factors, either TAM constructs or external factors, derived from the literature review, to identify and measure the factors that influence users intentions to use m-government applications in the Saudi context. BIU is therefore considered the crux of this project.

As the main aim of this study is to identify and measure the factors that influence users intentions to use m-government applications, TAM was selected as the research model because it enables the study of how external factors influence attitude, intention to use, and belief (Park, 2009). Moreover, TAM was selected for this study because the researcher wanted to introduce some external factors to the model based on the literature review and measure their influence on BIU m-government applications in Saudi context.

In addition, TAM is a suitable model to predict user behaviour of new technologies (Park, 2009) because most other technology acceptance models focus only on technical factors (Alharbi & Drew, 2014). According to Al-Hujran et al. (2011), TAM is used to predict and explain users' acceptance of new technologies, proposing that constructs like perceived usefulness and perceived ease of use are key factors in IS acceptance behaviours and IT. Along similar lines, Chau (1996) states that the TAM is one of the most effective models in research seeking to determine factor acceptance in information systems/technology. TAM is also widely used in IS to predict the intention to use new technologies (Al-Busaidi, 2012) and the acceptance of new technologies (Ahmad & Khalid, 2017, Al-Busaidi & Al-Shihi, 2010; Alharbi & Drew, 2014; Ma & Liu, 2004; Moon & Kim, 2001). Davis et al. (1989) confirmed

that TAM is used to identify determinants of user acceptance for new technology and to predict user behaviour making it the most suitable model for this study.

As mentioned previously, this study also aims to contribute to theory by empirically validating and examining the applicability of the TAM, including external factors and three moderators (gender, age, and usage experience), in the Saudi m-government context. Many studies have empirically found that TAM is valid to measure intention to use (Al-Busaidi, 2012). For example, many prior studies (Adams, Nelson, & Todd, 1992; Alharbi & Drew, 2014; Chau, 1996) have empirically confirmed that the TAM has high validity. Along the same lines, Al-Hujran et al. (2011) pointed that many studies have used the TAM to evaluate users' attitudes towards new technology (e.g. e-mail), and it has been shown that the TAM has a high level of credibility. The TAM has been used to examine the e-government field (Al-Hujran et al., 2011; Alomari, Woods, & Sandhu, 2012; Alotaibi, Sandhu, & Houghton, 2014; Alsaghier, Ford, Nguyen, & Hexel, 2009; Wangpipatwong, Chutimaskul, & Papasratorn, 2008), e-learning and learning management systems (Alharbi & Drew, 2014; Y. Lee, 2006; S. Liu, Liao, & Pratt, 2009; Ong & Lai, 2006; Roca, Chiu, & Martínez, 2006), and in e-commerce (e.g. Çelik, 2011; Gefen, Karahanna, & Straub, 2003; C. Liu, Marchewka, Lu, & Yu, 2005)). Finally, the TAM has also been applied in several m-government studies (Ahmad & Khalid, 2017, Alotaibi & Roussinov, 2016; Alrowili et al., 2015; Althunibat et al., 2014). McCoy, Galletta, and King (2007) mentioned that the TAM can be used in and is appropriate for different countries. Other studies, such as the work of Al-Gahtani (2001), have asserted that the TAM constructs are reliable and valid for predicting IS adoption in the Arab culture in general, and the Saudi culture more specifically. Therefore, TAM is considered to be the most suitable model for this study.

2.5.7.2 TAM constructs

2.5.7.2.1 Perceived ease of use (PEU)

In this study, PEU is defined as the degree to which a user believes that using m-government applications does not require much effort and is easy to use. According to Ong, Lai, and Wang (2004), behavioural intention to use e-learning is influenced by PEU. Tsu Wei, Marthandan, Yee-Loong, Ooi, and Arumugam (2009) claimed that in many previous studies PEU is a key factor in new technologies adoption such as m-commerce, online banking and wireless internet. Alharbi and Drew (2014) found that PEU has a positive impact on intention to use a Learning Management System (LMS) in Saudi Arabia. A recent study conducted by Abu-Shanab and Haider (2015) found that PEU has a positive influence on intention to use m-government services (specifically SMS mobile services) in Jordan. A recent study conducted by Hamid, Razak, Bakar, & Abdullah (2016), found that PEU has a positive effect on continuing intention to use e-government in Malaysia. Consequently, the following is hypothesised:

H1: Perceived ease of use (PEU) will have a significant positive influence on behavioural intention to use (BIU) m-government applications.

2.5.7.2.2 Perceived usefulness (PU)

In this study, PU is defined as a user who thinks that his or her job will be more productive and efficient by using m-government applications. Davis (1989) found that BIU is positively influenced by PU. So, PU is considered an important factor that may lead to rejection or acceptance of the new technology (Davis, 1989). A previous study conducted by Wong and Hiew (2005) claimed that perceived usefulness is a crucial factor that supports m-commerce adoption. Zafiropoulos, Karavasilis and Vrana (2012) found that PU has a positive effect on intention to use an e-government service by teachers in Greece. In the same vein, a later study (Alharbi & Drew, 2014) supports this result. They found that PU has a significant positive influence on BIU learning management systems (LMS) in Saudi Arabia. Other recent studies

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found that increased PU of using m-government services has significant positive impacts on BIU of m-government services (Almarashdeh & Alsmadi, 2017; Alrowili et al., 2015). Consequently, the following is hypothesised:

H2: Perceived usefulness (PU) will have a significant positive influence on behavioural intention to use (BIU) m-government applications.

2.5.7.2.3 Attitude towards using (ATU)

In this study, positive ATU is defined as a user who has a positive feeling and wants to use m-government applications. Davis (1989) found that BIU is positively influenced by ATU. So, ATU is considered an important factor that may lead to rejection or acceptance of the new technology (Davis, 1989). Maditinos (2007) found that attitude has a positive impact on intention to use e-commerce in Greece. Moreover, Alharbi and Drew (2014) found that ATU has a positive impact on intention to use an LMS in Saudi Arabia. A later study (Alrowili et al., 2015) found that attitude toward using m-government services has a positive effect on intention to use these services. A recent study conducted by Liu & Bing (2017) found that ATU has a positive effect on e-government adoption in Vietnam. Consequently, the following is hypothesised:

H3: Attitude towards using (ATU) will have a significant positive influence on behavioural intention to use (BIU) m-government applications.

2.5.7.3 External factors
2.5.7.3.1 Perceived Trustworthiness (TRU)

Al-Busaidi (2012: 51) defined trustworthiness as "perception of confidence in the electronic marketer's reliability and integrity." Alsaghier et al. (2009: 298) defined trust as "an individual's (trustor, here is citizen) belief or expectation that another party (trustee, here e-government) will perform a particular action important to the trustor in the absence of trustor's

control over trustee's performance." According to Gefen and Straub (2003) and Palvia (2009), trust is an important variable and has an effect on people's intentions to adopt new technology. Tsu Wei et al. (2009) found a strong positive relationship between trust and m-commerce adoption. Along the same lines, Alomari, Woods, and Sandhu (2009) asserted that there is a significant positive relationship between trust and people's intentions to use e-government initiatives.

According to Alsaghier et al. (2009), many studies have demonstrated that trust is a critical factor for social and economic interactions. It has been pointed out that a lack of trust is one of the main challenges and barriers in the adoption of e-government initiatives (Bélanger & Carter, 2008; Horst, Kuttschreuter, & Gutteling, 2007). In addition, Warkentin, Gefen, Pavlou, and Rose (2002) proposed that the government should focus more on trust and on seeking to build trust to encourage citizens to adopt online services. Furthermore, Almarabeh and AbuAli (2010) recommended that the government should start by focusing on short-term results to increase users' trust—and then maximize the project once trust has been achieved. This is because many authors agree that trust is an important factor in the adoption of e-government initiatives (Abunadi, 2012; Alomari et al., 2009; Alsaghier et al., 2009; Bélanger & Carter, 2008; Horst et al., 2007; J. Lee, Kim, & Ahn, 2011; Warkentin et al., 2002; West, 2008). Al-Busaidi (2012) confirmed that many users hesitation to use and adopt m-government initiatives is due to a lack of trust in technology and that this negatively impacts users' attitudes and intentions. In addition, Alrowili et al. (2015) found that trust has a positive effect on users' intention to use m-government services. A later study (Almarashdeh & Alsmadi, 2017) found that perceived trust in technology has a positive influence on behavioural intention to use m-government services. Consequently, the following is hypothesised:

H4: Perceived trustworthiness (TRU) will have a significant positive influence on behavioural intention to use (BIU) m-government applications.

2.5.7.3.2 Enjoyment (ENJ)

Enjoyment may play an important role in the adoption of m-government and people's intentions to use it. Davis, Bagozzi, and Warshaw (1992: 113) defined enjoyment as "the extent to which the activity of using a certain technology is perceived as being enjoyable in its own right, apart from any performance consequences that may be anticipated." It has been suggested that enjoyment is a crucial factor in the adoption of new technology (Davis et al., 1992; Kulviwat et al., 2007; Sun & Zhang, 2006a). Along the same lines, Trappey and Woodside (2005) confirmed that consumers are more likely to accept advertising through mobile devices when the advertising is enjoyable and fun. Similarly, Anckar and D'incau (2002) pointed out that perceived enjoyment is one of the key factors to inspire and encourage users to use mobile services anywhere and anytime.

Sun and Zhang (2006a) claimed that enjoyment encourages users to underestimate the perceived difficulty related to using technology, thus leading to the adoption of new technology. It has been identified that there is a positive relationship between perceived enjoyment and attitudes towards the adoption of new technology (Suki & Suki, 2011). Teo, Lim, and Lai (1999) found that perceived enjoyment has a positive impact on internet usage in Singapore. Furthermore, it has been asserted that perceived enjoyment has a positive effect on online shopping intentions (Ramayah & Ignatius, 2005). Igbaria, Iivari, and Maragahh (1995) argued that enjoyment is one of the most important motivators to accept or reject new technologies. X. Fang, Chan, Brzezinski, and Xu (2005) confirmed that perceived enjoyment is a positive factor in users' attitudes towards the adoption of mobile services and assists in the rapid adoption of mobile services. According to Abad, Díaz, and Vigo (2010), there is a significant relationship between perceived enjoyment and behavioural intention to use mobile technology in Hedonic scenarios. In addition, it has been found that perceived enjoyment has direct effect on technology acceptance and use (Venkatesh, Thong, & Xu, 2012). Along the

same lines, it has been found that perceived enjoyment has a great positive effect on the intention to adopt e-book readers (Antón, Camarero, & Rodríguez, 2013). A recent study conducted by L. Chin and Ahmad (2015) found that there is a significant relationship between perceived enjoyment and consumers' intentions to use an e-payment system in Malaysia. A recent study conducted by Rouibah, Lowry, & Hwang (2016) found that perceived enjoyment positively affects consumer's intention to adopt online payment systems in Kuwait. Consequently, the following is hypothesised:

H5: Enjoyment (ENJ) will have a significant positive influence on behavioural intention to use (BIU) m-government applications.

2.5.7.3.3 Awareness (AWAR)

Cambridge online dictionary (http://dictionary.cambridge.org/dictionary/english/awareness) defines awareness as "knowledge that something exists, or understanding of a situation or subject at the present time based on information or experience." In addition, Nasser and Jasimuddin (2017: 15), defined awareness as "people's knowledge of technology and the availability of electronic services." According to Alomari (2011), the lack of awareness is one factor that prevented Jordanian citizens from adopting e-government. Therefore, he suggested that governments should raise the awareness of citizens to encourage them to adopt new technology (Alomari, 2011). Similarly, Al-Hadidi (2010) asserted that users' awareness of technology is a main factor in its adoption. It has been confirmed that awareness is one factor in the successful adoption of m-government (Al-Hadidi, 2010). Moreover, Alotaibi et al. (2014) recommended that awareness should be raised in users because it is considered a vital factor in the acceptance of new electronic systems.

A previous study by Alomari et al. (2012) found that three factors played crucial roles in the acceptance of new systems: awareness of the Internet, workers with information technology

skills and understanding the Internet. Previous studies (Abunadi, 2012; Al-Tourki et al., 2012) recommended that media such as newspapers, social networks such as Facebook and television advertisements should be used to raise the awareness of citizens. Alfarraj (2013) also noted that in developing countries, awareness is an essential factor in the adoption of information systems projects. It has been suggested that awareness programs should focus on the managers in organizations and agencies rather than staff because managers affect the staff's attitudes and have an important role in the acceptance of new technology (Alotaibi et al., 2014). Kumar and Madhumohan (2014) found a positive relationship between awareness and internet banking adoption. Along the same lines, a recent study conducted by Meftah, Gharleghi and Samadi (2015) showed that awareness has a positive significant influence on the intention to adopt e-government in Bahrain. A recent study conducted by Kariyawasam & Jayasiri (2016) found that there is a positive relationship between awareness of e-banking and the level of usage of internet banking. Consequently, the following is hypothesised:

H6: Awareness (AWAR) will have a significant positive influence on behavioural intention to use (BIU) m-government applications.

2.5.7.3.4 Perceived Security (SEC)

In this study, perceived security includes perceived privacy. According to Smith and Jamieson (2006: 23), "Security means the protection of records and data that are held for the purpose of recording, administering, and monitoring the actions and policies of government agencies." Security is an essential factor in the acceptance of new technology. When users feel that government websites are unsafe, they will not use the sites because they want to protect their personal data (Teo, Srivastava, & Jiang, 2008). It has been asserted that privacy and security are the most important problems challenging the adoption of m-government (Chang & Kannan, 2003). Alotaibi et al. (2014) claimed that privacy and security are very important factors in using government services while X. Fang et al. (2005) found that security is a large barrier to

the adoption of mobile services. Al-Busaidi (2012) recommended that to improve the adoption of m-government services, the government must assure users that their personal data will be protected and not sold to others. It has been found that security has a positive impact on intention to use tourism m-payment systems (Peng, Xiong, & Yang, 2012). Security is also a key factor for users in using mobile banking (Mahad, Mohtar, Yusoff, & Othman, 2015). A recent study conducted by Ramavhona & Mokwena (2016) found that security has a significant effect in the adoption of Internet banking in South Africa. Consequently, the following is hypothesised:

H7: Perceived security (SEC) will have a significant positive influence on behavioural intention to use (BIU) m-government applications.

2.5.7.4 Moderators (Demographic variables)

Studying gender, age and usage experience will provide a clearer picture for decision makers in government about differences between citizens' characteristics regarding using and adopting m-government applications. Bouwman, Carlsson, Molina, and Walden (2007) claimed that demographic variables are very important to study in m-government services context because they can explain how users adopt m-government services and provide a clear map regarding intention to adopt m-government services. It has been noted that, analysis based on demographic factors is considered to be a method that can be employed to understand how different users interact with m-government services (Ahmad & Khalid, 2017).

Jambulingam (2013) confirmed that gender and age impact on behavioural intention to use m-learning while Porter and Donthu (2006) reported that attitude toward Internet usage differs significantly based on education, age and income. Tarhini, Hone, and Liu (2014b) found that including age and gender as moderators in a TAM model will increase the explanatory power of the model.

Yol, Serenko, and Turel (2006: 1961) define moderators as "variables that affect the strength or direction of relationships between exogenous and endogenous variables." In this study, gender, age and usage experience are used as moderators to measure their influence on relationships between independent factors (ATU, PU and TRU) and the dependent factor (BIU) in the proposed research model. The relationships between independent factors and the dependent factor may be strong or weak depending on the moderator influence.

2.5.7.4.1 Gender

Gender has a crucial role in predicting usage behaviour in IS studies (Tarhini et al., 2014b; Venkatesh & Morris, 2000; Venkatesh, Morris, et al., 2003). Several studies have asserted that gender is considered an influencing variable in predicting internet use (MacGregor & Vrazalic, 2006). Some previous studies in western culture have found that female are not likely to use new technology than male (Chen & Wellman, 2004; MacGregor & Vrazalic, 2006; Venkatesh & Morris, 2000). In the same line, other studies have showed that women are less confident in using computers and use them less frequently than men (Siddiqui, 2008). Simon (2001) found that gender has different impacts on ICT initiatives within different cultures. On other hand, Al-Busaidi (2012) claimed that females are more likely to use e-government than males in Oman. Ramírez-Correa, Arenas-Gaitán, and Rondán-Cataluña (2015) found that females had a stronger preference for adopting an e-learning platform than males in two different universities, one in Chile and one in Spain. A recent study conducted by Kishore and Sequeira (2016) found that the relationship between ATU and BIU m-banking services is moderated by gender.

The relationship between performance expectancy (similar to PU) and BIU is also significantly moderated by gender with stronger preferences for males (Venkatesh, Morris, et al., 2003). Mohammed, Nor, and Norshidah (2014) found that perceived usefulness is more important for

males than females. José, Sánchez, Muñoz, and Francisco (2014) claimed that perceived usefulness has a greater influence on males than females which means that usefulness can drive males to use new services more than females. On the other hand, Ramírez-Correa et al. (2015) claimed that the relationship between perceived usefulness and BIU an e-learning platform is moderated by gender with a stronger influence on females.

According to Awad and Ragowsky (2008), the relationship between trust and intention to shop online is moderated by gender and is stronger for females than males. Alshehri (2013) found that the relationship between trust and BIU e-government services in Saudi Arabia is moderated by gender with a stronger influence on males. José et al. (2014) claimed that the perception of trust is more important for females than males and can increase their intention to adopt e-services. Consequently, the following is hypothesised:

H8 a1, a2, a3: The relationships between (attitude toward use (ATU), perceived usefulness (PU) and perceived trustworthiness (TRU)) and behavioural intention to use (BIU) m-government applications will be moderated by gender.

2.5.7.4.2 Age

Previous studies have revealed that age has a direct and moderating influence on acceptance of new technology, behavioural intention and adoption (Chung, Park, Wang, Fulk, & McLaughlin, 2010; Porter & Donthu, 2006; Venkatesh, Morris et al., 2003). Generally, older people have lower rates of internet usage than young people (Porter & Donthu, 2006). Meyer (2007) showed that older people were less qualified and less likely to adopt and use ICT than younger people. Van Ittersum et al. (2006) found that age had a negative influence on acceptance of new products and that acceptance of technology decreases with age. Many previous studies state that age is a key demographic variable that has moderating and direct impacts on acceptance of technology, behavioural intention and adoption (Tarhini et al.,

2014b). A recent study conducted by Kishore and Sequeira (2016) found that the relationship between ATU and BIU m-banking services is moderated by age.

The relationship between performance expectancy (like PU) and BIU is also moderated by age (Venkatesh, Morris, et al., 2003). Sun and Zhang (2006b) noted that younger people had a stronger relationship between PU and BIU in the adoption decision than older people. A later study by Alshehri (2013) found that the relationship between performance expectancy (like PU) and BIU e-government services in Saudi Arabia is moderated by age with stronger influences for younger users. He also found that the relationship between trust and BIU e-government services in Saudi Arabia is moderated by age with stronger influences for younger users (Alshehri, 2013). Malik, Hiekkanen, and Nieminen (2016) found that younger people show a higher level of trust than older people when sharing their photos on Facebook. Consequently, the following is hypothesised:

H9 b1, b2, b3: The relationships between (attitude toward use (ATU), perceived usefulness (PU) and perceived trustworthiness (TRU)) and behavioural intention to use (BIU) m-government applications will be moderated by age.

2.5.7.4.3 Usage experience

Alharbi and Drew (2014: 146) define usage experience as "individual involvement in or exposure to a particular system and the accumulative skills the user gains by using the system." Venkatesh and Davis (2000) identified usage experience as a crucial factor in the adoption of new technology. Wangpipatwong et al. (2008) claimed that continued use of e-government services provides certain advantages for users, and they pointed out that the real success for IS systems depends on continued—not temporary—use. Alshehri and Drew (2010) and Al-Tourki et al. (2012) argued that one of the reasons delaying the successful adoption of e-government initiatives is low level use of these initiatives, since there are no policies, regulations or laws

regarding the use of e-government services. Along the same lines, Corbitt, Thanasankit, and Yi (2003) and Salam, Iyer, Palvia, and Singh (2005) pointed out that if users have more experience using the Internet, they may be more likely to buy online.

Harris, Rettie, and Cheung (2005) compared Hong Kong and the UK with regards to the adoption of m-commerce and found that the rate of adoption of m-commerce in Hong Kong is lower than in the UK because usage experience in Hong Kong is lower than in the UK. Users accept and are comfortable with new technologies when they have experience in using the technology (J. Wu & Wang, 2005). Venkatesh, Ramesh, and Massey (2003) suggested that a condition for the success of m-commerce and e-commerce is users' experiences—that is, whether users are satisfied and whether these services satisfy their needs. Lin (2011) argued that the length of time of user experience may be a critical factor in the continued intention to use e-learning, suggesting that user expertise has a positive influence on user loyalty and attitudes. The relationship between ATU and continued intention to use e-learning is moderated by experience with stronger influences for users who have more experience than less experienced users (Lin, 2011). Alsamydai (2014) found that usage experience has a significant positive influence on BIU mobile banking services. Many studies about user behaviour have included experience as a moderator variable (Liébana-Cabanillas, Sánchez-Fernández, & Muñoz-Leiva, 2014; Martínez-Torres, Díaz-Fernández, Toral, & Barrero, 2015). A recent study by Francisco, Francisco, Juan, & María (2016) found that experience moderates the intention to use mobile payments in virtual social networks.

Lin (2011) found that experienced users have stronger relationships between PU and continued intention to use e-learning than less experienced users. According to Tarhini, Hone, and Liu (2014a), usage experience significantly moderates the relationship between PU and BIU Internet technology. Liébana-Cabanillas et al. (2014) found that relationships between PU and BIU m-payment tools are moderated by experience. Martínez-Torres et al. (2015) stated that

experienced users have a stronger relationship between PU and BIU than inexperienced users. It has been found that user experience moderates the relationship between perceived usefulness and behavioural intentions (Francisco et al., 2016).

Giannakos, Pateli, and Pappas (2013) noted that users who have more experience have higher levels of trust when they intend to use online shopping than less experienced users. Alshehri (2013) found that the relationship between trust and BIU to use e-government services in Saudi Arabia is moderated by usage experience with stronger influences for experienced users. It has been found that experienced users will have greater trust in the use of online applications (Francisco, Juan, & Francisco, 2014). Consequently, the following is hypothesized:

H10 c1, c2, c3: The relationships between (attitude toward use (ATU), perceived usefulness (PU) and perceived trustworthiness (TRU)) and behavioural intention to use (BIU) m-government applications will be moderated by usage experience.

2.5.7.5 Summary of previous studies

The table below summarizes previous studies to identify the sources of the factors used in this study.

Table 4 Summary of previous studies

Factors	Previous studies
Perceived usefulness PU	(Davis, 1989, Wong & Hiew, 2005; Zafiropoulos, Karavasilis & Vrana,2012; Alharbi & Drew, 2014; Almarashdeh & Alsmadi, 2017; Alrowili et al., 2015).
Perceived ease of use PEU	(Ong, Lai, and Wang, 2004;Tsu Wei, Marthandan, Yee-Loong, Ooi, & Arumugam ,2009; Alharbi & Drew ,2014; Abu-Shanab and Haider ,2015; Hamid, Razak, Bakar, & Abdullah, 2016).
Attitude toward using ATU	(Davis, 1989; Maditinos, 2007; Alharbi & Drew ,2014; Alrowili et al., 2015; Liu & Bing, 2017).

Perceived Trustworthiness TRU	(Abunadi, 2012; Al-Busaidi, 2012; Alomari et al., 2009; Alsaghier et al., 2009; Gefen and Straub,2003; Palvia, 2009;Bélanger & Carter, 2008; Horst et al., 2007; Almarabeh and AbuAli, 2010;Tsu Wei et al. (2009) ;J. Lee et al., 2011; Warkentin et al., 2002; Wei et al., 2009; West, 2008; Alrowili et al. 2015; Almarashdeh & Alsmadi, 2017).
Enjoyment ENJ	(Davis et al., 1992; Kulviwat et al., 2007; Sun & Zhang, 2006a; Trappey and Woodside,2005; Anckar and D'incau,2002; Suki & Suki, 2011; Teo, Lim, and Lai, 1999; Ramayah & Ignatius, 2005; Igbaria, Iivari, and Maragahh,1995; X. Fang, Chan, Brzezinski, and Xu, 2005; Abad, Díaz, and Vigo, 2010; Venkatesh, Thong, & Xu, 2012; Antón, Camarero, & Rodríguez, 2013; L. Chin and Ahmad, 2015; Rouibah, Lowry, & Hwang, 2016).
Awareness AWAR	(Abunadi, 2012; Al-Tourki et al., 2012; Alfarraj, 2013; Alotaibi et al., 2014; Meftah et al. 2015; Alomari,2011; Al-Hadidi, 2010; Alomari et al. 2012; Alfarraj, 2013; Kumar & Madhumohan, 2014; Meftah, Gharleghi & Samadi, 2015; Kariyawasam & Jayasiri, 2016).
Perceived Security SEC	(Al-Busaidi, 2012; Alotaibi et al., 2014; Chang & Kannan, 2003; X. Fang et al., 2005; Teo et al., 2008; Mahad et al. 2015; Peng, Xiong, & Yang, 2012; Mahad, Mohtar, Yusoff, & Othman, 2015; Ramavhona & Mokwena, 2016).
Moderator of gender	(Tarhini et al., 2014b; Venkatesh & Morris, 2000; Venkatesh, Morris, et al., 2003; (MacGregor & Vrazalic, 2006; Chen & Wellman, 2004; MacGregor & Vrazalic, 2006; Venkatesh & Morris, 2000; Siddiqui, 2008; Simon, 2001; Al-Busaidi, 2012; Ramírez-Correa, Arenas-Gaitán,& Rondán-Cataluña, 2015; Kishore & Sequeira,2016; Mohammed, Nor, & Norshidah, 2014; José, Sánchez, Muñoz, & Francisco, 2014; Awad & Ragowsky, 2008; Alshehri, 2013).
Moderator of Age	(Chung, Park, Wang, Fulk, & McLaughlin, 2010; Porter & Donthu, 2006; Venkatesh, Morris et al., 2003; Meyer, 2007; Van Ittersum et al. 2006; Tarhini et al., 2014b; Sun & Zhang, 2006b; Alshehri 2013; Malik, Hiekkanen, & Nieminen, 2016; Kishore & Sequeira, 2016).

Moderator of usage experience	(Venkatesh & Davis, 2000; Wangpipatwong et al. 2008; Alshehri & Drew, 2010; Al-Tourki et al. 2012; Corbitt, Thanasankit, & Yi ,2003; Salam, Iyer, Palvia, & Singh, 2005; Harris, Rettie, & Cheung , 2005; J. Wu & Wang, 2005; Venkatesh, Ramesh, & Massey, 2003; Lin, 2011; Alsamydai, 2014; Liébana-Cabanillas, Sánchez-Fernández, & Muñoz-Leiva, 2014; Martínez-Torres, Díaz-Fernández, Toral, & Barrero, 2015; Francisco, Francisco, Juan, & María, 2016; Tarhini, Hone, & Liu, 2014a; Tarhini, Hone, & Liu , 2014a; Martínez-Torres et al. ,2015; Giannakos, Pateli, & Pappas, 2013; Alshehri, 2013; Francisco, Juan, & Francisco, 2014).

2.5.7.6 Research model

The research model is presented in Figure 20. It consists of seven independent factors (PEU, PU, ATU, TRU, ENJ, AWAR and SEC) and one dependent factor (BIU) and there are proposed positive relationships between all independent factors and BIU. The research model also includes three moderators—gender, age and usage experience— to measure the influence of these moderators on the relationships between (ATU, PU and TRU) and BIU. The main research question and 10 sub-research questions have already been discussed in detail in Chapter 1 (section 1.2) and the 10 hypotheses discussed here in section 2.5.7.
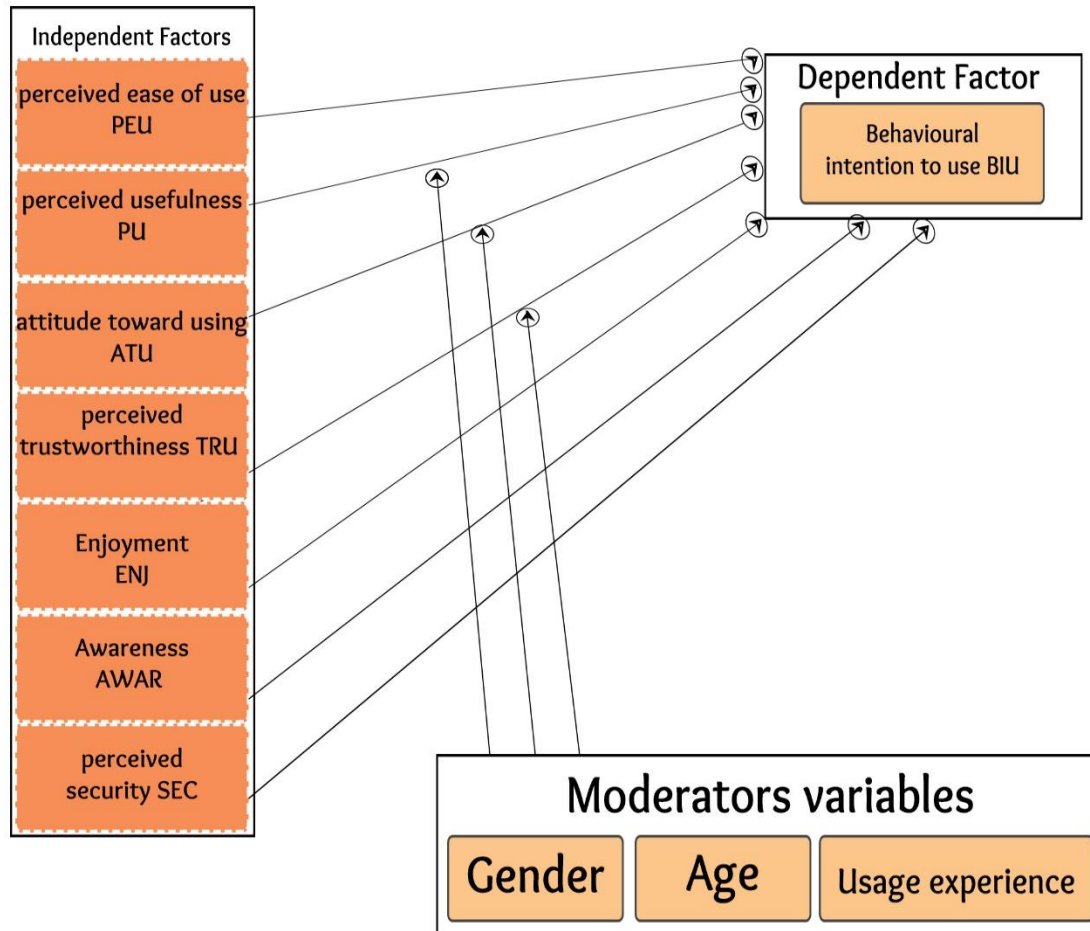
Figure 20 Research model for this study

2.6 Gaps in the literature

Based on the review of the literature:

1. The Saudi government seeks to provide electronic services to citizens anywhere and anytime, but that has still not occurred (Khan, 2016). E-government services have not been completely implemented in Saudi Arabia due to several challenges and problems (Alfarraj & Alhussain, 2013; Alfarraj, Alhussain, & Abugabah, 2013; Alassim, Alfayad, & Abbott-Halpin, 2017). In developing countries like Saudi Arabia, the adoption of e-government services is poor (Alghamdi & Beloff, 2016).

2. M-government is a subset of and complement to e-government (Althunibat et al., 2014; El Kiki & Lawrence, 2006; Kumar & Sinha, 2007; Mengistu et al., 2009; Misra, 2009; Östberg, 2003; Sheng & Trimi, 2008). In Saudi Arabia, mobile phone use has seen massive growth among citizens (Ahmad et al., 2014). In 2016 there were 47.9 million mobile subscriptions, representing about 151 % of the population (CITC, 2016) which indicates almost two mobile subscriptions per person. Most of the Saudi population (67%) uses a smart phone (Khan, 2016).

3. In Saudi Arabia some m-government services and applications have been released to provide governmental services but m-government is still in its first stage (Alhussain, 2012; Alotaibi & Roussinov, 2015; Alrowili et al., 2015; Alsenaidy & Ahmad, 2012). Recent studies by Baabdullah et al. (2016) and Babullah et al. (2015) claim that Saudi citizens have not completely adopted m-government yet. Also, a recent study conducted by Alotaibi & Roussinov (2017) confirmed that using m-government in Saudi Arabia is not popular because citizens' rate of acceptance of mobile government services is low.

Consequently, it is clear that (i) there have been insufficient empirical studies to identify and measure the factors that influence users' intentions to use m-government applications in Saudi Arabia, (ii) there have been insufficient empirical studies to measure the Saudi citizens' attitudes towards using m-government applications, (iii) there have been insufficient empirical studies to measure the influence of three moderators (gender, age and usage experience) on relationships between independent factors (ATU, PU and TRU) and dependent factor BIU, and (iv) there have been insufficient empirical studies to validate and examine the applicability of the modified TAM model in the Saudi m-government context.

Therefore, this research will examine this topic in depth based on citizens' perspectives. The present study will be an empirical study, and will adopt a mixed method (explanatory

sequential design) approach to understand citizens' opinions of using m-government applications in the Saudi context. Ultimately, this study will provide decision makers in the Saudi government with a clear picture about factors influencing users' intentions to use m-government applications, Saudi citizens' attitudes toward using m-government applications, and the influence of gender, age and usage experience on relationships between independent factors (ATU, PU and TRU) and dependent factor BIU.

Chapter 3: Methodology

3.1 Introduction

As mentioned previously, the main aim of this study is to identify and measure factors that influence users' intentions to use m-government applications in Saudi Arabia. Additional aims are to measure the attitude of Saudi citizens toward using m-government applications, and to measure the influence of three moderators (gender, age and usage experience) on relationships between independent factors (ATU, PU and TRU) and the dependent factor BIU. It also aims to develop and validate a modified TAM model in the Saudi m-government context.

This chapter discusses the research methodology adopted in this study in more detail. According to Muthuviknesh and Kumar (2014: 65), research methodology is "A systematic way to solve a problem. It is a science of studying how research is to be carried out. Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology."

Overall, this chapter will present the study's research paradigm, research design, research approach, data collection methods, procedures to analysis the data, verifications studies, validity and ethical considerations.

3.2 Research Paradigm

According to Deshpande (1983: 101), a research paradigm is "a set of linked assumptions about the world which is shared by a community of scientists investigating that world." Similarly, Kuhn (1970: 175) defines a research paradigm as "a set of values and techniques which is shared by members of a scientific community, which acts as a guide or map, dictating the kinds

of problems scientists should address and the types of explanations that are acceptable to them."

In general, research paradigms inform a study's main issues, hypotheses, and methods used to obtain data and findings (Neuman, 2006). When a research paradigm is effectively implemented, "the empirical data is connected in a logical sequence to a study's initial research questions to its conclusion" (Al-Busaidi, 2012: 61).

There are three main research paradigms in empirical studies in the field of information systems (IS): (1) positivism, (2) interpretivism, and (3) critical social theory (Galliers, 1991; Orlikowski & Baroudi, 1991). Because few IS studies use critical social theory (Neuman, 1997), this section will address only positivism and interpretivism.

Positivist studies use quantitative methods to test hypotheses and search for external factors or fundamental laws. Interpretivist studies use qualitative methods to understand the phenomenon itself (Al-Hadidi, 2010). As a research philosophy, positivism assumes that the phenomena under study truly exist and are measurable by external observers (Pervan, 1994). In contrast, interpretivism focuses on human opinions in social life, as interpreted by the researcher (Al-Hadidi, 2010). Table 5 presents the main differences between these two paradigms.

Researchers should identify their adopted research paradigm in each study to provide guidance and justification for the chosen research procedures (Creswell, 2009). In the IS field, positivism is fairly common. For instance, in the 1980s, 97% of IS studies adopted a positivist paradigm (Orlikowski & Baroudi, 1991). Positivist studies embrace the following important assumptions, as outlined by (Phillips & Burbules, 2000):

1. Positivist researchers do not prove a hypothesis; instead, they indicate a failure to reject the hypothesis.

2. Positivist studies often begin by testing a theory.

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3. Positivist researchers collect data from participants using instruments.

4. Positivist researchers focus on the relationships between factors, approaching them as questions or hypotheses.

5. Positivist researchers emphasise validity and reliability to ensure accurate, unbiased findings.

Table 5 Main differences between positivism and interpretivism

Assumptions	Positivism	Interpretivism
Reason for research	To discover natural laws so people can predict and control events	To understand and describe meaningful social action
Nature of social reality	Stable pre-existing patterns or order that can be discovered	Fluid definitions of a situation created by human interaction
Nature of human beings	Self-interested and rational individuals who are shaped by external forces	Social beings who create meaning and who constantly make sense of their worlds
Role of common sense	Clearly distinct from and less valid than science	Powerful everyday theories used by ordinary people
Theory looks like	A logical, deductive system of interconnected definitions, axioms, and laws	A description of how a group's meaning system is generated and sustained
An explanation that is true	Is logically connected to laws and based on facts	Resonates or feels right to those who are being studied
Good evidence	Is based on precise observations that others can repeat	Is embedded in the context of fluid social interactions
Place for values	Science is value-free, and values have no place except when choosing a topic	Values are an integral part of social life: no group's values are wrong, values only differ

Source: W. Neuman (1997: 83)

This study aims to examine and measure individual factors that influence users' intentions to use m-government applications and so adopts a positivist paradigm as it seeks to directly study a phenomenon by examining its component parts (Krauss, 2005). Although positivist studies typically adopt quantitative methods, this study uses a mixed methods approach. The researcher will start with a questionnaire (quantitative method), which is a basic method used to answer research questions and carries more weight than qualitative methods. This is followed by semi-

structured interviews (qualitative method) to confirm, interpret, explain and provide deeper understanding of the results from the quantitative study, especially unexpected results based on citizens' perspectives.

3.3 Research Design

Creswell (2009: 5) defined research design as "a plan or proposal to conduct research, involves the intersection of philosophy, strategies of inquiry, and specific methods." According to Bryman and Bell (2007: 40), "a research design provides a framework for the collection and analysis of data." .

As previously noted, the researcher chose to adopt a positivist paradigm with a mixed-methods approach to collect data using quantitative methods (questionnaire) and qualitative methods (semi-structured interviews), reflecting a sequential explanatory design.

Figure 21 presents the research design for this study, which includes six phases:

1. Comprehensive literature review. A comprehensive literature review will allow the researcher to gain knowledge about other studies, gather more information about the topic, identify research gaps, and determine the main factors that may influence users' intentions to use m-government applications in Saudi Arabia. Using this knowledge, the researcher will identify the main research question and sub-research questions, choose and formulate the research model, and propose relevant hypotheses.

2. Development of conceptual model. The researcher will propose a research model with factors that may influence users' intentions to use m-government applications and the hypotheses based on the literature review. The study will use a mixed methods approach, including both quantitative and qualitative methods in a sequential explanatory design. The researcher will also formulate more sub-research questions based on the hypotheses.

3. Verification. In this phase, two verification studies are conducted. First, the researcher conducts semi-structured interviews with experts involved in the implementation of e-government and m-government (Yesser) in Saudi Arabia. This qualitative data is analysed to validate and verify the influential external factors derived from the literature review on m-government adoption. Second, the instrument is validated via distribution of the questionnaire (as a pilot study) to Saudi citizens.

4. Quantitative data collection and analysis. When the external factors and questionnaire are validated, the researcher collects data using quantitative methods (questionnaire). This phase aims to achieve four things: (i) measure the extent of the factors' influence on users' intentions to use m-government applications in Saudi Arabia, (ii) measure the attitude of Saudi citizens towards using m-government applications, (iii) measure the influence of gender, age and usage experience on relationships between independent factors (ATU, PU and TRU) and dependent factor BIU, and (iv) measure, validate and develop the applicability of the modified TAM in the m-government context in Saudi Arabia.

5. Qualitative data collection and analysis. The researcher conducts semi-structured interviews with Saudi citizens to collect data to confirm, interpret, explain and provide deeper understanding of the quantitative results, especially unexpected results based on citizens' perspectives.

6. Discussion of quantitative and qualitative results and draw conclusion.
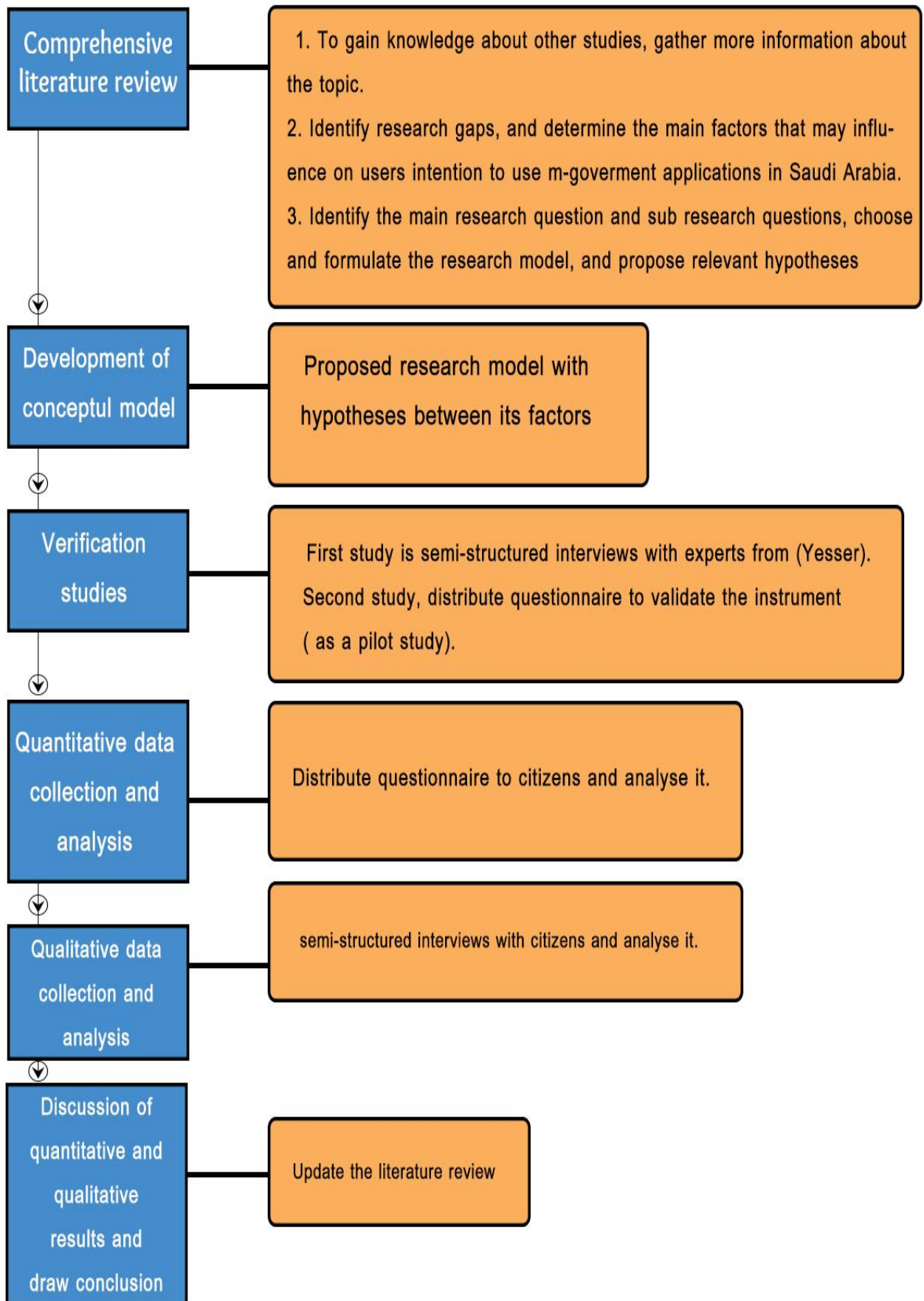
Figure 21 Research design used in this study

3.4 Research Approach

3.4.1 Mixed methods

As previously mentioned, this study adopts a mixed-methods approach (explanatory sequential strategy) to achieve the study's objectives. Creswell (2013: 4) defined mixed methods as "an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data and using distinct designs that may involve philosophical assumptions and theoretical frameworks." Mixed-methods research integrates quantitative and qualitative methods in a single study or related studies (Johnson, Onwuegbuzie, & Turner, 2007) and contains and combines narrative and numerical data (Aaron, 2011). Mixed-methods designs provide a greater understanding of a problem than quantitative or qualitative methods alone can and have recently become more popular (Creswell, 2013).

Adopting only one research method can limit one's understanding of the phenomenon under study (Babbie, 2004). Accordingly, many researchers support adopting mixed methods to minimise the limitations faced in single-method designs (Creswell, 2003; Mertens, 2010; M. Saunders, Lewis, & Thornhill, 2007). Mixed-methods designs increase the validity of findings and combine elements of quantitative and qualitative research to develop a better understanding of the results (Al-Hadidi, 2010; Alsaghier, 2010). These designs are stronger than single-method designs because using several data collection methods enables researchers to obtain more evidence to understand the research problem and answer research questions that one method alone cannot address (Creswell & Clark, 2011). Overall, mixed-methods approaches enable researchers to apply the best of both qualitative and quantitative methods (Creswell, 2003) and explore a broader scope by collecting different data from different sources using different tools (Bonoma, 1985). However, there are some obstacles when conducting mixed methods studies such as different skills, resource and time (Creswell & Clark, 2011).

There are several types of mixed-methods strategies, including sequential explanatory strategy, sequential exploratory strategy, sequential transformative strategy, concurrent triangulation strategy, concurrent embedded strategy, and concurrent transformative strategy (Creswell, 2009). As previously noted, this study will implement a sequential explanatory strategy, first adopting quantitative methods with more priority and weight. This is followed by qualitative methods to confirm, interpret, explain and provide deeper understanding of the quantitative results based on citizens' perspectives. Sequential explanatory strategy is a common strategy in mixed methods used to interpret and explain results from quantitative studies, especially unexpected results (Creswell, 2009).

According to (Creswell, 2014: 224) sequential explanatory strategy is defined as " a design in mixed methods that appeals to individuals with a strong quantitative background of from fields relatively new to qualitative approaches" . The sequential explanatory strategy includes two phases (Figure 22). Phase 1 is quantitative research (quantitative data collection and analysis) with more priority and weight, and phase 2 is qualitative research (qualitative data collection and analysis) to interpret and explain quantitative results (Creswell, 2009). In this strategy, the quantitative phase usually builds the qualitative phase by informing the types of questions that should be asked and the types of participants to select (purposeful) (Creswell, 2014). The main strength of this strategy is that it is very clear and easy to implement because it is straightforward to report and to describe (Creswell, 2003).
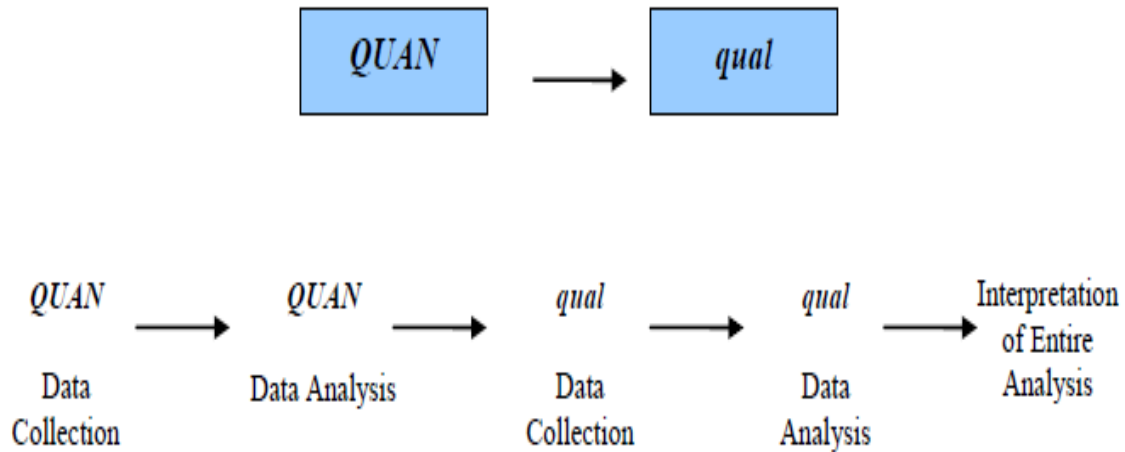
Figure 22 Sequential explanatory strategy, from Creswell (2009)

3.4.2 Quantitative methods

Quantitative research is the main method of this study and has more priority and weight. In the most general sense, a quantitative study is any study that aims to collect numerical data (Al-Hadidi, 2010). More specifically, " a quantitative approach is one in which the investigator primarily uses postpositivist claims for developing knowledge (i.e. cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories), employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistical data" (Creswell, 2003: 18).

When the research paradigm is positivist, researchers use quantitative methods to collect data from participants (Abunadi, 2012), obtaining numerical data that researchers then analyse quantitatively to identify relationships between factors that explain phenomena (Abugabah, Alfarraj, & Sanzogni, 2009; Neuman, 2006). Accordingly, quantitative methods reflect a deductive process (Creswell, 2003; Kanaan, 2009). Researchers should use quantitative studies to "specify how and why the variables and relational statements are interrelated" (Creswell,

2003: 120). Furthermore, because they can gather data from large samples and usually use computer programs for analyses, quantitative methods enable researchers to generalise findings to a larger population (Aldraehim, 2013).

In general, researchers can use quantitative methods to examine hypotheses, show relationships between variables, show frequencies, and produce descriptive data (Alotaibi et al., 2014). However, while quantitative methods are more focused than qualitative methods (Aldraehim, 2013) they cannot provide more details and cannot answer questions that begin with 'what' or 'why' (Kanaan, 2009).

3.4.3 Qualitative methods

Qualitative methods enable researchers to explore and inspect the experiences and opinions of people in depth and determine the relevant issues (Hennink, Hutter, & Bailey, 2010). Creswell (2012: 300) defined qualitative research as "An inquiry process of understanding based on distinct methodological approach to inquiry that explores a social or human problem. The researcher builds a complex, holistic picture, analyses words, reports detailed views of participants, and conducts the study in a natural setting."

In general, qualitative methods focus on an insider's perspective to explore phenomena and understand the meaning of the phenomena from individual perspectives (Hennink et al., 2010; Murray,1998), enabling researchers to obtain a richer understanding of phenomena (Chadwick, Gill, Stewart, & Treasure, 2008). Most qualitative studies focus on human behaviour and examine cultural factors that influence human behaviour and beliefs (Green, 1999). In this study, the researcher adopts qualitative methods in the second phase to confirm, interpret, explain and provide deeper understanding of the quantitative study results.

Sofaer (1999) confirmed that qualitative methods are particularly helpful in the construction of hypotheses, creation or improvement of frameworks and theories, and collection of large

quantities of data about complicated phenomena. Because qualitative research focuses on descriptive data, not numbers (Punch, 2005), it is especially useful when exploring questions of 'why' and 'what' (Hennink et al., 2010; S. Khan, 2014; Murray, 1998). Table 6 presents the key differences between quantitative and qualitative approaches.

Table 6 Key differences between quantitative and qualitative approaches

Quantitative Approach	Qualitative Approach
Based on meanings derived from numbers	Based on meanings expressed through words
Collecting results in numerical and standardised data	Collecting results in non-standardised data requiring classification into categories
Analysis conducted through diagrams and statistics	Analysis conducted through conceptualisation

Source: I. Dey (1993)

3.5 Data Collection

3.5.1 Phase 1: Quantitative methods
3.5.1.1 Questionnaire
A questionnaire was developed based on verification studies (semi-structured interviews with experts in Yesser and a pilot study for citizens). The researcher used a self-administered questionnaire in the full study to collect data from participants. This quantitative method is cross-sectional as the researcher will collect data from a variety of participants over a short period. Appendix F includes the refined questionnaire after input from the verification studies.

A questionnaire is "a preformulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives" (Alomari, 2011: 96). Researchers often use questionnaires to identify factors that influence the adoption and acceptance of new technology, taking advantage of the low cost and limited time required (Abunadi, 2012). Furthermore, questionnaires improve ease of access to participants and increase the likelihood of receiving truthful responses (Al-Hadidi, 2010). With respect to the development of a

questionnaire, Balnaves and Caputi (2001) warned that words used in questionnaires can affect results; thus, researchers should be careful about their wording. In particular, they should use easy and clear language to ensure participants' understanding (Al-Hujran et al., 2011). The study questionnaire has been validated because it has been used and adopted in previous studies (e.g. Al-Busaidi, 2012; AL-Majali, 2012; Alharbi & Drew, 2014; Alotaibi et al., 2014; Alrowili et al., 2015; Davis, 1989) after some modifications to fit the m-government context in Saudi Arabia.

In this study, the main aims of the questionnaire are to collect data from many participants, to examine the hypotheses and to examine, validate, and develop the applicability of the modified TAM in the Saudi m-government context. As the respondents were native Arabic speakers, they received an Arabic copy of the questionnaire, which was sent to expert translators to ensure clarity and avoid errors (see Appendix G). The researcher distributed an online link to the questionnaire to participants via social media (Twitter, social networks and Facebook), newsgroups, forums, and an instant texting application email group. This allowed the researcher to collect data from a large population while providing clear instructions on how to complete the questionnaire.

To improve the response rate, the researcher adopted some techniques recommended by Alsaghier (2010), in particular, (i) the questionnaire is as brief as possible, and (ii) the first page of the questionnaire introduces the researcher and explains the significance of the study and its objectives. Each week, the researcher sent follow-up reminders about the questionnaire to participants through email and social networks. This survey was conducted over three months from February to May, 2016.

The initial page of this questionnaire asks participants to participate in this research. It contains general information about the research and its aims, and some information about ethical

concerns to obtain consent from participants. The questionnaire consisted of four parts. Part one asked about demographic characteristics, and parts two and three listed items related to the TAM model constructs and external factors. Finally, part four allowed for participants' comments and offered research results to those who left an email address. All TAM constructs and external factors were measured at seven levels using a Likert-type scale. Participants were asked to choose from 7 = Strongly Agree, 6 = Moderately Agree, 5 = Slightly Agree, 4 = Neutral, 3 = Slightly Disagree, 2 = Moderately Disagree and 1 = Strongly Disagree.

3.5.1.2 Sampling

Sample size and design are very important in obtaining a representative sample (Cavana, Delahaye, & Sekaran, 2001; Zikmund, 2003) and ensuring the generalizability of the results (Sandelowski, 2000). Sampling is also a tool for choosing questionnaire respondents (Alsahli, 2009). In general, researchers should choose a target population that fulfils the research aims and makes them accessible and quantifiable (Balnaves & Caputi, 2001). In this study, the target population was Saudi citizens (male and female) who have internet access. Accordingly, the study sample for the questionnaire was a group of Saudi citizens who have internet access.

This study used probability sampling (random sampling) , because that will enable a good generalisation of results for the whole population (Creswell, 2014), which is defined as a technique in which "each unit (e.g. persons, cases) in the accessible population has an equal chance of being included in the sample, and the probability of a unit being selected is not affected by the selection of other units from the accessible population (i.e. the selections are made independently)" (Teddlie & Yu, 2007: 79). Therefore, as this study seeks to generalise the results for Saudi citizens (the target population), the researcher employed social media (Twitter, social networks and Facebook), newsgroups, forums, and an instant texting application email group to distributed the link to the online questionnaire to participants.

Considering that the questionnaire was internet-based, it was not assumed that the coverage was free of errors due to the lack of internet penetration into households—it was expected that the link to the questionnaire may not reach all possible participants. However, this study concerns the behavioural intention to use m-government applications, which ultimately needs one to be connected to the internet. Therefore, the issue of bias is limited. In addition, the number of Saudi citizens was more than 20 million in 2015 (KSA, 2016). Therefore, it is difficult to give all Saudi citizens an equal chance to participate in this study due to limited time and resources. The lack of time and resources did not allow researchers to use alternative methods, such as mail or phone, to deliver the questionnaire to potential participants.

3.5.2 Phase 2: Qualitative methods
3.5.2.1 Semi-structured interviews

In phase 2 of the study, the researcher conducted semi-structured interviews with 14 Saudi citizens with different demographic characteristics. Interviews provide valuable opportunities to collect a significant amount of data (Al-Busaidi, 2012), making them one of the best methods for understanding participants (Punch, 2005). Thus, interviews are a popular data collection method in qualitative research (Alfarraj, 2013; Myers & Newman, 2007).

There are three types of interviews: (1) unstructured interviews, (2) structured interviews, and (3) semi-structured interviews (Jupp, 2006). According to Myers and Newman (2007), semi-structured interviews are popular in IS studies because they provide researchers with opportunities to explore a topic in more depth and complete the scene using both prepared questions and improvisation. This style of interview allows researchers to ask participants about their personal experiences and opinions on particular points (Rabionet, 2011). These interviews often afford greater reliability, validity, and ease of implementation (Copeland et al., 1976).

This study employed semi-structured interviews for two reasons. First, given the complex phenomenon under study, it is appropriate to explore the participants' opinions and perceptions and obtain more details. Second, the semi-structured nature of the interviews eliminates the need to have the same interview schedule for each participant, allowing the researcher to explore relevant avenues as they arise (Louise & While, 1994). Furthermore, semi-structured questions give participants more autonomy and allow them to speak freely (Witzel, 2000).

Before conducting the interviews in this study, the researcher invited participants to participate and obtained formal permission (consent) for the interviews through phone or email. When conducting the interviews, the researcher observed the following practices suggested in the literature. First, the researcher began by introducing the general topic and aims of the study to inform participants about pertinent details. Then the researcher asked for formal consent from participants to participate in this study and to record the interviews. The researcher then asked general questions about demographic data, and then narrowed in on m-government applications, especially the quantitative results and focused on unexpected results.

The researcher used three instruments when conducting the interviews: note-taking, recordings, and interviewing guidelines. Combining notes with recordings is very important in developing an understanding of a topic. Likewise, interviewing guidelines provide flexibility in an interview while helping the researcher remember to ask about important things to fulfil the purpose of the study.

3.5.2.2 Unit of analysis and sampling

When conducting interviews, researchers should prepare research questions and then choose participants who can answer those questions (Murray, 1998). In this study, the interview questions were open-ended questions designed to confirm, interpret, explain and provide deeper understanding of the quantitative results. The interview questions were designed and participants chosen based on the quantitative results.

Fourteen citizens were interviewed in this part of the study. The researcher chose this sample size because many scholars suggest that a sample size of five to 50 is sufficient for a qualitative study (Dworkin, 2012). The 14 participants were selected using purposive sampling based on their demographic characteristics and to obtain different opinions. Researchers can use purposive sampling to obtain rich data about an issue (Alsaghier, 2010). During formulation of the interview questions, the researcher did not mention the quantitative results to participants to obtain unbiased responses.

The expected length of each interview was about 50 minutes. As most participants will be native Arabic speakers, the interview questions will be translated into Arabic, and the final version was sent to expert translators to avoid errors and ensure clarity. After collecting data from the participants, the researcher translated the participants' answers into English for analyses. Appendix H includes a copy of the interview questions (English and Arabic versions) for Saudi citizens. Some questions may be modified after the first interviews or new questions developed during the interviews as a result of improvisation during the interviews.

3.6 Data Analysis

3.6.1 Procedures to analyse quantitative data

Statistical package program SPSS version 22 and AMOS 24 were used to analyse the quantitative data. The researcher conducted three procedures to analyse the data:

1. Data screening with descriptive analysis:

In this procedure, missing data, outliers and normality distribution were checked to ensure data are prepared for analysis. Descriptive data for the demographic data about participants was then examined, with a clear description of the frequency and percentage for each group to provide a clear picture about participants.

2. Measurement scale analysis:

After data screening, this procedure aims to examine the validity and reliability of scales in the questionnaire to ensure the instruments are valid and reliable in the Saudi m-government context. It also aims to examine and validate the applicability of the modified TAM in the Saudi m-government context.

In this procedure, the sample was separated into two randomly assigned samples using SPSS syntax for validation. The first sample was used to conduct exploratory factor analysis EFA with Varimax rotation. After identifying the scale structure via EFA, the researcher measured the reliability of the instrument using Cronbach's alpha and item-total correlations to examine the reliability. The second sample was used to confirm the item-scale constructs identified via EFA using SPSS AMOS 24 to run CFA.

3. Model assessment and moderator results:

This procedure addresses the four aims of this study based on the entire sample. First, it aims to identify and measure the factors that influence users' intentions to use m-government applications in the Saudi Arabian context via Maximum Likelihood. Second, it aims to measure Saudi citizens' attitudes towards using m-government applications. Third, it aims to validate and examine the applicability of the modified TAM in the Saudi m-government context by running the structural model to measure the goodness-of-fit.

Fourth, multi-group analysis was conducted to measure the influence of moderators (gender, age and usage experience) on relationships between exogenous (ATU, PU, and TRU) and endogenous (BIU) in the research model. This was done following the procedures below:

1. Sample is divided into two samples for each moderator.
2. The structural model was run simultaneously for the two samples separately to measure the goodness-of-fit for the model.

3. Path coefficients for the two samples were calculated by pairwise comparison, considering the critical ratio for differences among the two samples (Tarhini et al., 2014b).

3.6.2 Procedures to analyse qualitative data

This study followed four guiding principles presented by Denscombe (2007: 287) to analyse semi-structured interviews:

1. The analysis of the data and the conclusions drawn from the research should be firmly rooted in the data.

2. The researcher's explanation of the data should emerge from a careful and meticulous reading of the data.

3. The researcher should avoid introducing unwarranted preconceptions into the data analysis.

4. The analysis of data should involve an iterative process.

Several steps were followed in this study to analyse the semi-structured interviews:

1. The researcher initially transcribed all semi-structured interviews.

2. The transcripts were carefully read and verified.

3. All transcripts were analysed to confirm, interpret, explain and provide deeper understanding of the quantitative results.

3.7 Verification studies

Two studies were conducted for verification. The first study used semi-structured interviews with experts to verify the influential external factors, especially the factors that are not TAM constructs, on m-government adoption. The second study involved the distribution of the study questionnaire to citizens as a pilot study to measure the validity and reliability of instrument.

3.7.1 First study

3.7.1.1. Semi-structured interviews with experts

The researcher conducted semi-structured interviews with Yesser members to verify the influential external factors found during the literature review, especially factors that are not TAM constructs, on m-government adoption. The researcher conducted five face to face interviews with experts involved in the implementation of e-government and m-government in Saudi Arabia. All interviews were conducted at Yesser.

The expected length of each interview was about 40 minutes. As most participants are native Arabic speakers, the interview questions were translated into Arabic, and the final version was sent to expert translators to avoid errors and ensure clarity. After collecting data from the participants, the researcher translated the participants' answers into English for analyses. Appendix J includes a copy of the interview questions (English and Arabic versions) for Yesser members. These questions could be modified after the first interviews or new questions developed during the interviews due to improvisation during interviews.

3.7.1.2 Analysis of semi-structured interviews

A thematic analysis was conducted to analyse the qualitative data based on the view of the experts. According to Thorne (2000: 69), a thematic analysis is defined as the "method that depends on constant comparative analysis processes to develop ways of understanding human phenomena within the context in which they are experienced." Braun and Clarke (2006) state that thematic analyses have been broadly conducted in qualitative studies.

According to Braun and Clarke (2006), there are six phases of thematic analysis:

1. Familiarizing yourself with your data

This involves writing, reading, and re-reading the data and writing notes about initial ideas.

2. Generating initial codes

This phase seeks to create initial codes (see Appendix N). These are considered the most basic of the raw data, and they are of interest to the analyst.

3. Searching for themes

This phase focuses on the analysis of themes rather than codes and involves sorting the different codes into potential themes and collating all the relevant coded data extracts within the identified themes.

4. Reviewing themes

In this phase, themes are checked in relation to coded extracts and the full data set.

5. Defining and naming themes:

In this step, themes are named and clearly defined regarding what your themes are and what they are not.

6. Producing the report

In this step, the scholarly report, which contains the data analysis and the results, is produced.

3.7.2 Second study

3.7.2.1 Survey pilot study

Al-Busaidi (2012) maintained that conducting a pilot study is extremely important to achieving some objectives such as testing the layout of questionnaires, gaining familiarity with respondents, testing questionnaire wording, and estimating response rate and questionnaire completion time. The researcher conducted a pilot study to test the validity and reliability of the questionnaire questions and ensure that the questions would fulfil the study's aims (Saunders, Lewis, & Thornhill, 2009). Fraenkel and Wallen (2000) recommend conducting a pilot study before conducting an actual study to identify issues in the actual study. Some of the

reasons that Teijlingen, Rennie, Hundley, and Graham (2001) mentioned for conducting a pilot study include:

- To improve the research plan and research questions.

- To collect primary data.

- To test and develop research instruments.

Cooper and Schindler (1998) noted that the size of a pilot study might be between 25 and 100 participants. In this study, the pilot study was conducted after the semi-structured interviews with the Yesser experts. One hundred citizens were asked to participate in the pilot study. The researcher refined the final version of the questionnaire for the full study based on the results of the pilot study.

3.7.2.2 Analysis for pilot study

1. Demographic analysis of the sample:

This section is an overview of the participants' demographic information including gender, age, place of residence, qualifications, occupation and experience with m-government applications.

2. Validity

Validity for constructs in the instrument were tested by calculating the correlation coefficient between BIU and other constructs to ensure that they achieved the study's objectives.

3. Reliability (Cronbach's alpha)

The researcher measured the reliability of the instrument using the Cronbach's alpha reliability coefficient and Cronbach's alpha reliability if an item was deleted.

3.8 Validity

This questionnaire has been validated because has been used and adopted in previous studies (e.g. Al-Busaidi, 2012; AL-Majali, 2012; Alharbi & Drew, 2014; Alotaibi et al., 2014; Alrowili et al., 2015; Davis, 1989) with some modifications to fit the m-government context. Many prior studies (e.g. Adams et al., 1992; Alharbi & Drew, 2014; Chau, 1996) have empirically confirmed that the TAM has high validity. In addition, it has been asserted by many studies, such as the work of Al-Gahtani (2001), that the TAM constructs are reliable and valid for predicting IS adoption in the Saudi culture. Along the same lines, Al-Hujran et al. (2011) highlighted that many studies have used the TAM to evaluate users' attitudes towards new technology (e.g. e-mail), and it has been shown that the TAM has a high level of credibility. The TAM has been used and examined in the e-government field (Al-Hujran et al., 2011; Alomari et al., 2012; Alotaibi et al., 2014; Alsaghier et al., 2009; Wangpipatwong et al., 2008) e-learning and learning management systems (Alharbi & Drew, 2014; Y. Lee, 2006; S. Liu et al., 2009; Ong & Lai, 2006; Roca et al., 2006), e-commerce (e.g. Çelik, 2011; Gefen et al., 2003; C. Liu et al., 2005), and several m-government studies (Alotaibi & Roussinov, 2016; Alrowili et al., 2015; Althunibat et al., 2014).

Validity is difficult to achieve in qualitative studies (Whittemore, Chase, & Mandle, 2001). To support the reliability and validity of a study, researchers can use consultants as external examiners to prevent bias on the part of either the researcher or the participants and, thereby, achieve both reliability and validity (Brink, 1987), as 'validity and reliability are related' (Oluwatayo, 2012: 399). The researcher can also ask participants to listen to the recorded interview (Alanezi, Mahmood, & Basri, 2012) and provide transcripts of the recorded interviews.

Despite these methods for supporting the validity of a study, many individuals believe qualitative studies contain bias because it depends on the researcher's opinions and skills (Sofaer, 1999). Furthermore, according to Gluud (2006: 497), "selective or delayed publication of the findings of trials with unwanted results seems to be a widespread problem." Accordingly, to establish validity, the researcher should present results objectively and refrain from twisting them to suit individual needs (Sofaer, 1999). More specifically, IS researchers should consider the following seven principles, published by Klein and Myers (1999), to achieve validity and reliability and minimise bias in their studies: (1) the hermeneutic circle, (2) contextualisation, (3) interaction between the researchers and the subjects, (4) abstraction and generalisation, (5) dialogical reasoning, (6) multiple interpretations, and (7) suspicion.

3.9 Ethical Considerations

With respect to the ethical considerations involved in this study, the researcher conducted the study with justice, honesty, and the promise of no harm. The participants have the right to easy access to research results and the choice (non-compulsory) to participate. Furthermore, the relationship between the participants and the researcher will remain positive (Terrell, 2012).

Before conducting the questionnaire, the researcher requested the consent of participants to participate in this study (which was implied when they participated in this study and returned the questionnaire). The researcher did not record data without consent from participants. The initial page of the questionnaire (Appendix F) includes some instructions and information about the ethics concerns for this study.

Researchers must consider specific ethical concerns when conducting interviews. For example, the researcher should protect the participants' information and inform participants about the study and its aims while reducing the potential for harm (DiCicco-Bloom & Crabtree, 2006). To obtain formal permission (consent) for the interviews in this study, the researcher contacted

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each participant via phone or email. The researcher obtained formal permission from all participants before conducting and recording the interviews. The researcher also protected the recordings of the personal interviews and requested permission from all participants in the event of publication. Finally, the researcher obtained official permission from the Saudi Arabian Cultural Mission and Griffith University (GU Protocol Number IBA/18/15/HREC) to conduct this study (Appendix K).

3.10 Summary

This chapter presents the study research paradigm, research design, research approach, data collection methods, procedures to analyse the data, validation studies, validity and ethical considerations. Before conducting the full study, there were two verification studies: (i) a qualitative study with experts in Yesser to verify the influence of external factors on m-government adoption, and (ii) a pilot study with Saudi citizens to measure the validity and reliability of the questionnaire instrument.

This study adopted a mixed methods in an explanatory sequential design to answer the research questions and achieve its goals. The main method adopted in this study was the quantitative (questionnaire), which was used to (i) measure factors' influence on users' intentions to use m-government applications, (ii) measure the attitude of Saudi citizens toward using m-government applications, (iii) measure the influence of three moderators (gender, age and usage experience) on relationships between independent factors (ATU, PU and TRU) and dependent factor BIU, and (iv) It was also used to validate and develop the applicability of the modified TAM in the m-government context in Saudi Arabia. Therefore, the research paradigm was positivist. The first phase of the study involved quantitative methods with more priority and weight, followed by qualitative interviews with 14 Saudi citizens to confirm, interpret, explain and provide deeper understanding of the quantitative study results.

Chapter 4: Verification Studies

4.1 Introduction

This chapter presents the two verification studies. The first study is a qualitative study with five experts from Yesser to verify the influence of four external factors (TRU, ENJ, AWAR and SEC) taken from the literature review, on the adoption of m-government. The second study takes the factors that influence the adoption of m-government based on experts' perspectives and statistically tests them with TAM constructs (PEU, PU, ATU and BIU) in a pilot study to measure the validity and reliability of instrument before conducting the full study (Figure 23).
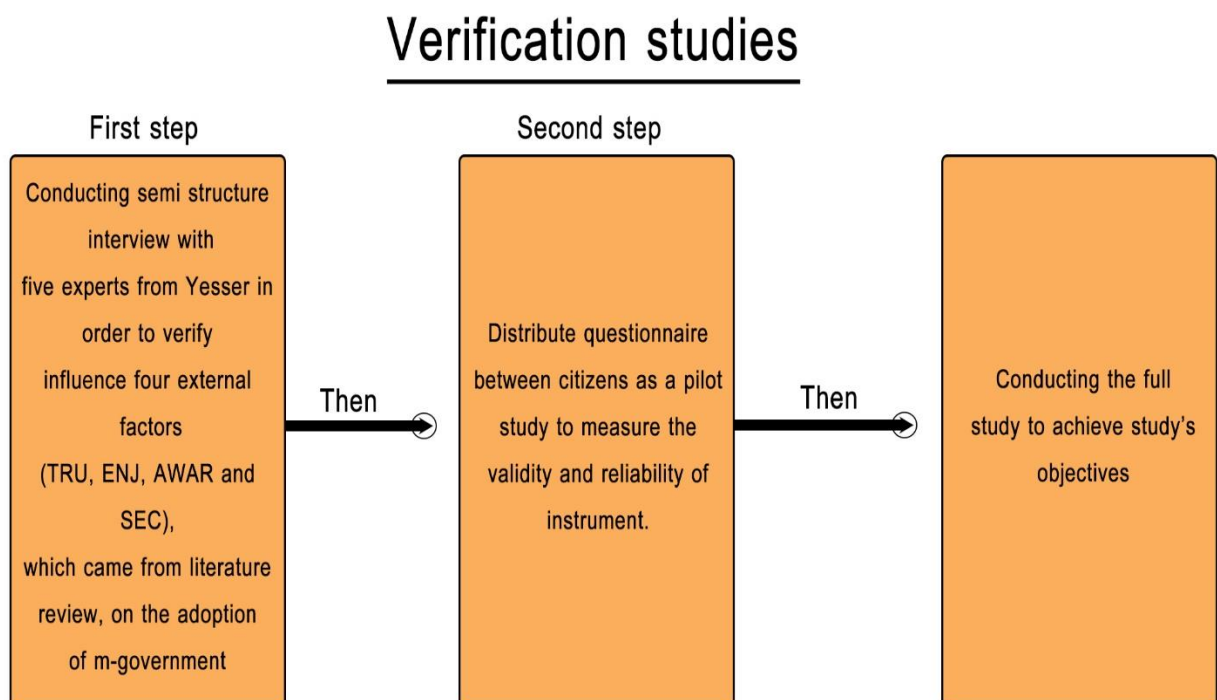
Figure 23 Steps in verification studies

4.2 First Verification Study: Qualitative study

4.2.1 Introduction

As mentioned previously, this study was conducted to verify the influence of four external factors (TRU, ENJ, AWAR and SEC) that came from the literature review, on the adoption of m-government. The verification was based on the perceptions of experts in Yesser. This section describes the qualitative data analysis and discusses the findings. Semi-structured interviews were conducted with five experts from Yesser, and a thematic analysis of the data was conducted to analyse the data. This study presents findings that may contribute to the m-government context in Saudi Arabia.

The five main themes revealed in the qualitative study are the adoption of m-government in Saudi Arabia, perceived trustworthiness, enjoyment, awareness and perceived security. All themes are mentioned in previous studies but enjoyment will be excluded from this study because the most experts did not believe it to be an important factor in the Saudi m-government context. The next sections cover demographic data, the themes and sub-themes that emerged in the data analysis, qualitative data analysis, a summary of the findings, and a comparison of the findings with those of previous studies.

4.2.2 Demographic data

Semi-structured interviews were conducted with five experts from Yesser. The participants were selected by the research manager in Yesser. The interviews were conducted to verify the influence of external factors, which came from the literature review, on the adoption of m-government to help develop the questionnaire. Demographic data was collected about the participants and the e-government (Yesser) background, including nationality, qualifications, work experience, and position (Appendix L). The length of interview and comments about the interview were also recorded.

4.2.3 Themes and sub-themes in the results of the data analysis

The themes and sub-themes of factors that may influence the adoption of m-government in Saudi Arabia are presented in Table 7. All codes, themes and sub-themes are provided in Appendix M.

Table 7 Themes and sub-themes discovered in the data analysis

Themes	Sub-Themes
• M-government adoption in Saudi Arabia	• M-government is the best option. • Some services have been implemented through mobile devices.
• Perceived trustworthiness	• Trust the app and its work. • Trust in provider.
• Enjoyment	• Enjoyment in the adoption of m-government
• Awareness • Perceived security	• Service integration • Trust the app and its work. • Awareness of governmental sectors and citizens • Privacy in work apps

The first theme concerns the adoption of m-government in Saudi Arabia. One participant stated, "*Based on our situation with governmental organizations, definitely m-government is the best option.*" The product manager for m-government in Yesser asserted, "*M-government is not optional; it is very necessary. M-government is compulsory development these days. M-government is considered a compulsory development these days, and organizations must follow these developments to provide their services through these developments.*" Another participant noted, "*absolutely yes, m-government is better while there are not any security reasons.*" Along the same line, the initiatives manger in Yesser confirmed, "*We are concerned about that because we are convinced that m-government is best option for implementing government services.*" However, one participant stated, "*There are difficulties in transferring some services to m-government.*" Regarding the provision of services through mobile devices, one participant confirmed, "*There are more than 30 applications from governmental*

organizations. Every three months there are about two to three applications released from governmental organizations such as Abshar." Another participant claimed, *"Yesser assists organizations to provide their services. For example, the apps that are provided by government organizations are Safeer."* When the solution architecture specialist was asked about the services provided through mobile devices, he responded, *"Yes, a few, such as Absher and Safeer".*

Another theme that emerged from the data analysis was perceived trustworthiness. One participant noted, *"I think in Saudi Arabia, citizens trust apps that have been released from a trusted source like governmental organizations. So, if trust increases, that leads to increases in the adoption of m-government services. So, trust is a crucial factor in the adoption of m-government."* Similarly, a product manager for the m-government in Yesser mentioned that *"simple mistakes made by organizations when they create apps and when they want to upload it on store, it is uploaded under the developer's name. Citizens will not use this app because they do not know if this app is for a governmental organization or not. So simple mistakes destroyed trust."* This participant also confirmed that trust is an important factor in the adoption of m-government, saying, *"Trust has an influence on the adoption of m-government. Also, citizens' trust in the source of the app and the app's reliability will affect the adoption of m-government."* Moreover, another participant asserted, *"Absolutely, trust has a positive effect on the adoption of m-government."* He also talked about another aspect of trust: *"Sometimes the user thinks this service does not work on a mobile, and that leads to abandoning the app."* However, the initiatives manger in Yesser said, *"We care about and are aware of that. If there is a lack of trust, the app will not be used."* A specialist in performance indicator measurement also asserted that trust is important in the adoption of m-government, saying, ***"I strongly support including this factor. This factor is very important."***

Regarding the theme of enjoyment, one participant claimed, *"If the user enjoys using services that means the user is happy and satisfied with these services and that affects the adoption of m-government. So, enjoyment is important factor."* Similarly, another participant stated, *"enjoyment is a crucial factor in the adoption of m-government."* In contrast, the business requirement and architecture manager noted the following about enjoyment: *"I think it does not have a role in this matter because I think a citizen uses apps from governmental organizations for a specific objective, not for enjoyment. I do not think enjoyment will assist and encourage citizens to use apps because there are many other entertaining apps in mobile phones. Therefore, I think citizens use governmental apps for specific goals. To conclude, enjoyment does not affect the adoption of m-government."* Another participant responded, *"I think it does not have an effect on the adoption of m-government because mobile phones have many other entertaining apps."* Similarly, the product manager for m-government asserted, *"it does not have an influence on the adoption of m-government. For example, I downloaded Abshar not for enjoyment but to use services. These days in Saudi Arabia, enjoyment is not considered a factor in the adoption of m-government."*

Two other themes that may influence the adoption of m-government are awareness and perceived security. One participant said, *"We talked about trust, but there are other factors that should be prioritized. One is awareness about government services. Awareness is an important factor where raising awareness among users leads to increased usage and that leads to increased trust in services."* This participant also noted, *"Privacy is an important factor, and it needs more attention from organizations that provide services."* Another participant claimed that some other themes may influence the adoption of m-government. The first factor concerned the *"integration between governmental organizations. I think creating integration of services between organizations will make citizens more relaxed, which will lead them to adopt apps. I think integration has a big influence on the adoption of m-government."* The

second factor concerned the *"errors and flaws in apps, including design issues, usability of the app and so on, which may affect citizens' decision to adopt m-government."* The third one was perceived security. This participant said, *"Privacy is very important in this matter. When the citizen knows that some other persons will read his personal data in apps, that will lead to abandoning of these apps. In other words, if privacy increases in apps, it will lead to citizens adopting them, and the opposite is correct."* In regard to awareness, particularly *"marketing (advertising for apps). If the app does not have a good advertisement, it will not be adopted successfully. In other words, awareness has a positive effect on the adoption of apps."* The product manager for m-government in Yesser also commented on awareness, saying, *"I think the most important factor in this matter is awareness, especially in the governmental sectors. Awareness has a big influence on the adoption of m-government. Therefore, awareness is an important factor in citizens adopting m-government."* Another participant asserted the importance of security, saying, *"I think privacy is very important for users, especially in our culture. So I think privacy is vital factor in m-government."* The initiatives manager in Yesser concluded, *"I think there are two main important factors in the adoption of m-government, which are awareness and privacy."*

The next section discusses the themes in more detail, particularly their reflections on the findings of the literature review.

4.2.4 Qualitative data analysis

This qualitative study was conducted with experts to verify the influence of external factors (TRU, ENJ, AWAR and SEC) from the literature review, on the adoption of m-government. This information will be used to develop the questionnaire before it is used in the second verification study (pilot study) to measure its validity and reliability.

4.2.4.1 M-government adoption in Saudi Arabia

This section discusses the adoption of m-government in Saudi Arabia. As previously mentioned, in Saudi Arabia, the use of mobile phones has increased rapidly—up to 47.9 million mobile subscriptions in 2016 (CITC, 2016) with most of the population (67%) using a smart phone (Khan, 2016). Similarly, the initiatives manager in Yesser cited the latest reports, saying, *"There are reports finding that the percentage of using mobile phones in the Kingdom of Saudi Arabia is almost 190%. So, m-government is very important to adopt as a main channel to provide services."* The product manager for m-government in Yesser asserted, *"m-government is not optional, it is very necessary. M-government is a compulsory development these days. M-government is considered a compulsory development these days, and organizations must follow these developments to provide their services through these developments."* All other participants confirmed that m-government is the best option for implementing e-government services.

In Saudi Arabia, the adoption of m-government is in its infancy. Most m-government services and applications are in the first stage, although some services and applications have already been released (Alhussain, 2012; Alotaibi & Roussinov, 2015; Alrowili et al., 2015; Alsenaidy & Ahmad, 2012) . With regard to this point, one participant confirmed, *"There are more than 30 applications from governmental organizations. Every three months, about two to three applications are released from governmental organizations such as Abshar."* When the solution architecture specialist was asked about the services provided through mobile devices, he responded, *"Yes, a few such as Absher are Safeer."* This result is supported by recent studies by Baabdullah et al. (2016) and Babullah et al. (2015) claiming that Saudi citizens have not completely adopted m-government.

4.2.4.2 Perceived trustworthiness

Another important theme that emerged from the data analysis is perceived trustworthiness. Trust is an important variable because it has an effect on people's intentions to adopt new technology (Gefen & Straub, 2003; Palvia, 2009). Tsu Wei et al. (2009) found a strong positive relationship between trust and the adoption of m-commerce. Similarly, Alomari et al. (2009) found a significant positive relationship between trust and people's intentions to use e-government initiatives. Alrowili et al. (2015) found that trust has a positive effect on users' intention to use m-government services. One participant in the present study asserted, "*Absolutely. Trust has a positive effect on the adoption of m-government.*" Another participant also noted, "*I think in Saudi Arabia citizens trust apps that have been released from a trusted source like a governmental organization. So, if trust increases that leads to increases in the adoption of m-government services. So trust is a crucial factor in the adoption of m-government.*" Al-Busaidi (2012) confirmed that many users hesitate to use and adopt m-government initiatives because they do not trust technology, which negatively affects users' attitudes and intentions. However, if the user trusts the app, realizes its benefits and sees that it works without any errors, he or she is likely to adopt the app. This was confirmed by one participant, who said, "*integration between governmental organizations. I think creating the integration of services between organizations will make citizens more relaxed, and that leads to adopting the apps. I think integration has a big influence on the adoption of m-government.*" The same participant said, "*Errors and flaws in apps, including design issues, usability of the app and so on may affect citizens' decisions to adopt m-government.*" The initiatives manager in Yesser agreed that trust is an important factor in the adoption of m-government, saying, "*We care about and are aware of that. If there is lack of trust, the app will not be used.*"

4.2.4.3 Enjoyment

Previous studies have found that enjoyment is a crucial factor in the adoption of new technology (Davis et al., 1992; Kulviwat et al., 2007; Sun & Zhang, 2006a). Anckar and D'incau (2002) pointed out that enjoyment is a key factor in inspiring and encouraging users to use mobile services anywhere and anytime. Similarly, one participant said, "*If the user enjoys using services, that means user is happy and satisfied with these services and that affects the adoption of m-government. So, enjoyment is an important factor.*" Another participant noted, "*enjoyment is a crucial factor in the adoption of m-government.*"

In contrast, the business requirement and architecture manager said "*I think it does not have a role in this matter because I think a citizen uses apps from governmental organizations for a specific objective, not for enjoyment. I do not think enjoyment will assist and encourage citizens to use apps because there are many other entertaining apps in mobile phones. So, I think citizens use governmental apps for specific goals. To conclude, enjoyment has no effect on the adoption of m-government.*" Another participant responded, "*I think [enjoyment] does not affect the adoption of m-government because mobile phones have many other entertaining apps.*" Similarly, the product manager for m-government asserted, "*it does not influence the adoption of m-government. For example, I downloaded Abshar not for enjoyment but to use services. These days in Saudi Arabia, enjoyment is not considered a factor in the adoption of m-government.*" This result is supported by Koenig-Lewis, Marquet, Palmer, and Zhao (2015) who found that perceived enjoyment has no significant influence on intention to use m-payment services in France. Although enjoyment has significantly influenced BIU in some studies, enjoyment was excluded from this study because most experts claimed that it does not influence the adoption of m-government in the Saudi context.

4.2.4.4 Awareness

Awareness is another important theme that emerged from the data analysis. Alfarraj (2013) noted that in developing countries, awareness is an essential factor in the adoption of information systems projects. The results of a recent study conducted by Meftah et al. (2015) showed that awareness has a positive significant influence on the intention to adopt e-government in Bahrain. Similarly, the product manager for m-government in Yesser asserted, *"I think the most important factor in this matter is awareness, especially in governmental sectors. Awareness has a big influence on the adoption of m-government. Therefore, awareness is an important factor for citizens to adopt m-government."*

 Alotaibi et al. (2014) also asserted that users' awareness is important because it is a vital factor in the acceptance of new electronic systems. They also recommended that awareness programs should focus on managers in organizations and agencies rather than staff because managers influence the staff's attitudes and have an important role in ensuring the acceptance of the new technology (Alotaibi et al., 2014). The initiatives manger in Yesser confirmed, *"I think there are two main important factors in the adoption of m-government, awareness and privacy."* Several previous studies (Abunadi, 2012; Al-Tourki et al., 2012) recommended that media such as newspapers, social networks such as Facebook, and television advertisements should be used to raise the awareness of citizens. Similarly, the business requirement and architecture manager asserted, *"marketing (advertising for apps). If the app is not well advertised, it will not be adopted successfully. In other words, awareness has a positive effect on apps adoption."*

4.2.4.5 Perceived Security

Perceived security is another important theme revealed by the data analysis. When users feel that government websites are unsafe, they will not use these sites because they want to protect their personal data (Teo et al., 2008). Similarly, the business requirement and architecture manager stated, *"Privacy is very important in this matter. When the citizen knows that some*

other persons will read his personal data in apps, it will lead to him abandoning these apps. In other words, if the privacy of apps increases, that will lead to adopting them, and the opposite is correct." Regarding the adoption of m-government services, Al-Busaidi (2012) recommended that the government must assure users that their personal data will be protected and not sold to others. A previous study asserted that privacy is the most essential problem affecting the adoption of m-government (Chang & Kannan, 2003). Alotaibi et al. (2014) also mentioned that security is a very important factor in the use of government services. In the same line, a recent study by Mahad et al. (2015) claimed that security is a key factor for users in using mobile banking. In this study, a participant asserted, "*I think privacy is very important for users especially in our culture. So, I think privacy is a vital factor in m-government.*" Similarly, a previous study found that security was a large barrier to the adoption of mobile services (X. Fang et al., 2005). The initiatives manger in Yesser confirmed, "*I think there are two main important factors in the adoption of m-government, awareness and privacy.*"

4.2.5 Research model based on the qualitative findings

The research model shown in Figure 24 was developed after the qualitative phase of the study was completed. This model has six independent factors: PEU, PU, ATU, TRU, AWAR and SEC, and one dependent factor BIU, and includes three moderators: gender, age and usage experience.
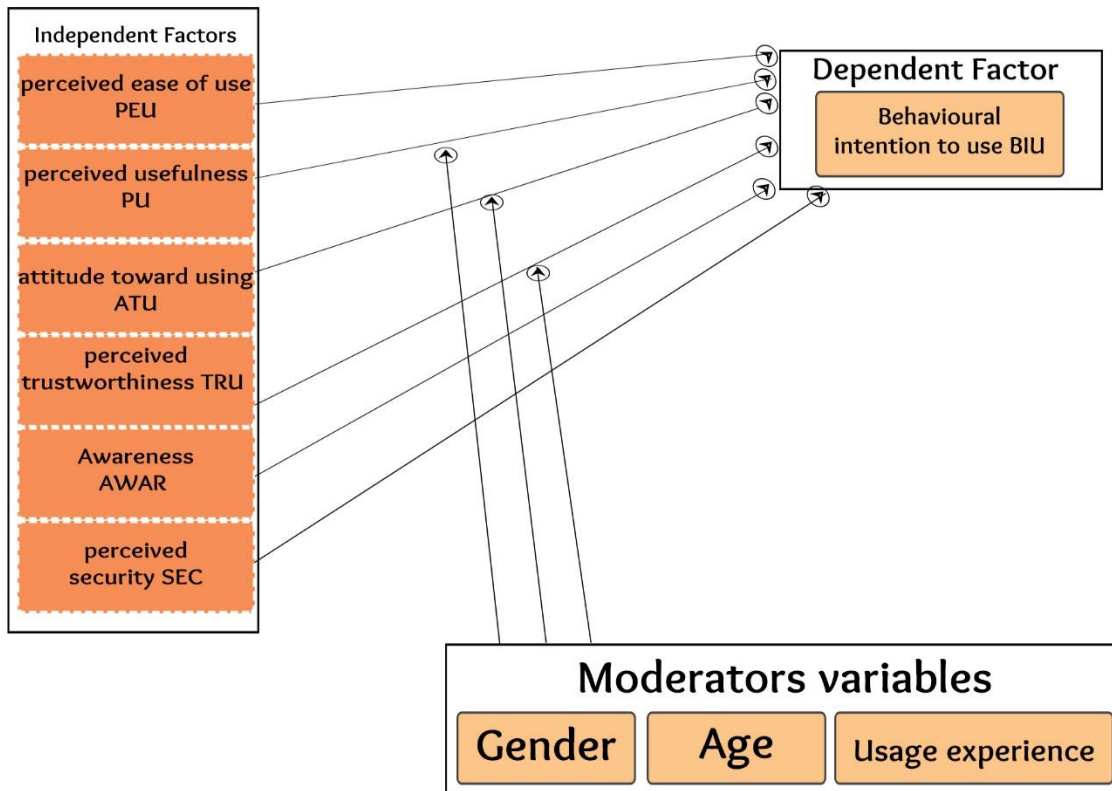
Figure 24 Research model in this study before conducting the pilot study.

4.2.6 Summarizing and confirming that findings align with previous studies

This verification study identified five themes regarding the factors that may influence the adoption of m-government. Table 8 summarizes the findings and, with the exception of enjoyment, compares them to the findings of previous studies. Table 8 presents the findings of previous studies that conform to the current study's findings.

Table 8 Conformity of current findings with previous findings

Theme	Previous studies
M-government adoption in Saudi Arabia	(Alhussain, 2012; Alrowili et al., 2015; Alsenaidy & Ahmad, 2012; Ahmad et al., 2014; Alotaibi & Roussinov, 2015; Baabdullah et al. (2016); Babullah et al. (2015); Alotaibi & Roussinov, 2017).
Perceived trustworthiness	(Abunadi, 2012; Al-Busaidi, 2012; Alomari et al., 2009; Alsaghier et al., 2009; Gefen and Straub,2003; Palvia, 2009;Bélanger & Carter, 2008; Horst et al., 2007; Almarabeh and AbuAli, 2010;Tsu Wei et al. (2009) ;J. Lee et al., 2011; Warkentin et al., 2002; Wei et al., 2009; West, 2008; Alrowili et al. 2015; Almarashdeh & Alsmadi, 2017).

Awareness	(Abunadi, 2012; Al-Tourki et al., 2012; Alfarraj, 2013; Alotaibi et al., 2014; Meftah et al. 2015; Alomari,2011; Al-Hadidi, 2010; Alomari et al. 2012; Alfarraj, 2013; Kumar & Madhumohan, 2014; Meftah, Gharleghi & Samadi, 2015; Kariyawasam & Jayasiri, 2016).
Perceived Security	(Al-Busaidi, 2012; Alotaibi et al., 2014; Chang & Kannan, 2003; X. Fang et al., 2005; Teo et al., 2008; Mahad et al. 2015; Peng, Xiong, & Yang, 2012; Mahad, Mohtar, Yusoff, & Othman, 2015; Ramavhona & Mokwena, 2016).

4.2.7 Summary

This phase of the study presents and discusses the qualitative data collected from the Yesser experts through semi-structured interviews. The data analysis revealed five main themes and nine sub-themes that may influence the adoption of m-government. The main themes are: the adoption of m-government in Saudi Arabia, perceived trustworthiness, enjoyment, awareness and perceived security. These themes were found in previous studies on the adoption of new technology. The theme of enjoyment is not included in the research model for the following studies as the most experts did not believe it to be an important factor in the Saudi m-government context.

4.3 Second verification study: Pilot Study

A pilot study was conducted with 100 questionnaires distributed to Saudi citizens. Before distribution, the questionnaire was reviewed by three expert consultants regarding its translation and construction. The experts provided comments regarding rewording and spelling of certain items, especially in the Arabic version, to provide clarity. A revised version of the questionnaire was sent back to the experts for additional feedback and to determine an estimated time for participants to complete the questions. The experts suggested that 35–40 minutes was sufficient. The second version of the questionnaire was refined based on the experts' comments, and the final version was assessed by supervisors, who approved it for use in this study.

A statistical equation was adopted from Krejcie & Morgan (1970) to determine the sample size required for this study. In the equation below, n is the sample size, p is the expected proportion sample, N is the population size, X^2 is confidence level and D is the degree of accuracy:

$$n = \frac{x^2 NP(1-P)}{D^2(N-1) + X^2 P(1-P)} = \frac{(1.96)^2 \times 20.700.000 \times 0.5 \times (1-0.5)}{(0.05)^2 \times (20.700.000-1) + (1.96)^2 \times 0.5 \times (1-0.5)} = 384.15288$$

Therefore, the minimum sample size required for this study is no less than 384 participants.

This means that 384 participants were needed to achieve 95% confidence in the results (P = 0.5 and X^2 = 1.96), with degree of accuracy, D = 0.05.

The questionnaire used adapted 7-point Likert-type (or interval) scales to measure different items, with participants asked to choose one of the following: 7 = Strongly Agree, 6 = Moderately Agree, 5 = Slightly Agree, 4 = Neutral, 3 = Slightly Disagree, 2 = Moderately Disagree and 1 = Strongly Disagree. Fifty-eight completed questionnaires were returned. The data were entered into SPSS 22 for statistical analyses.

4.3.1 Demographic analysis of the sample

Table 9 summarises the participants' demographic information including gender, age, place of residence, qualifications, occupation and experience with m-government applications. The following sections describe these factors in detail.

➢ **Gender, age and place of residence.** Most participants were male (47, 81%) with nearly half of the respondents aged 30–39 (28, 48.3%). In contrast, the smallest group of respondents were aged 50-59 (4, 6.9%). Most participants were living in a city (33, 56.9%), while 43.1% (25) were living in a village.

➢ **Qualifications.** Most participants held a postgraduate degree (20, 34.5%) or a bachelor degree (19, 32.8%). The other education levels were high school degrees (13, 22.4%) and diploma degrees (6, 10.3%).

- **Occupation.** Thirty-four (58.6%) participants worked in a government organization while the smallest group of participants were businessmen (1, 1.7%). The other participants were students (8), private sector workers (8) or had other occupations (7).
- **Experience with m-government applications.** Sixteen participants had not previously used m-government applications, fifteen participants had less than one year's experience, fourteen participants had from one year to less than two years' experience, four participants had from two years to less than three years' experience and nine participants had experience with m-government applications for three years or more.

Table 9 Demographic information for participants in the pilot study (n = 58)

Information		Number of participants	Percentage of sample
Gender	Male	47	81%
	Female	11	19%
Age	< 30	8	13.8%
	30 < 40	28	48.3%
	40 < 50	18	31%
	50 <60	4	6.9%
Residence	City	33	56.9%
	Village	25	43.1%
Qualifications	High school	13	22.4%
	Diploma	6	10.3%
	Bachelor	19	32.8%
	Postgraduate	20	34.5%
Occupation	Students	8	13.8%
	Working in a government organization	34	58.6%
	Working in the private sector	8	13.8%
	Businessmen	1	1.7%
	Other	7	12.1%

Experience with m-government applications	Have not used m-government applications	16	27.6%
	Less than one year	15	25.9%
	one year/less than two years	14	24.1%
	two years/less than three years	4	6.9%
	Three years or more	9	15.5%

4.3.2 Validity

Many prior studies have empirically confirmed that the TAM has high validity (Adams et al., 1992; Alharbi & Drew, 2014; Chau, 1996). This questionnaire has also been validated as it was used and adopted in several previous studies (e.g. Al-Busaidi, 2012; AL-Majali, 2012; Alharbi & Drew, 2014; Alotaibi et al., 2014; Alrowili et al., 2015; Davis, 1989).

Previous studies have revealed significant correlations between BIU and the other constructs used in this study (PEU, PU, ATU, TRU, AWAR and SEC). Table 10 presents the significant correlations between BIU and the other constructs (PEU, PU, ATU, TRU, AWAR and SEC) in this study. Consequently, it can be concluded that all constructs in this instrument were valid.

Table 10 Correlations between BIU and the other constructs

	PEU	PU	ATU	TRU	AWAR	SEC
BIU	0.734	0.881	0.882	0.811	0.479	0.536

4.3.3 Reliability (Cronbach's alpha)

The reliability of the questionnaire (attitudes scale)—through the creation of an internal consistency coefficient between items—was determined by the value of the Cronbach's alpha reliability coefficient (0.971). This value is considered acceptable for the purposes of scientific research. Table 11 shows the reliability coefficient values between the different items.

All values for each group were higher than 0.70 and the overall reliability for this instrument was 0.97, which is considered excellent. Therefore, the results of this study can be considered reliable.

Table 11 Reliability coefficient values

Section	Number of items	Cronbach Alpha reliability
Perceived Ease of Use (PEU)	6	.899
Perceived Usefulness (PU)	6	.955
Attitude Toward Usage (ATU)	3	.961
Behavioural Intention to Use (BIU)	3	.914
Perceived trustworthiness (TRU)	5	.905
Awareness (AWAR)	3	.895
Perceived Security (SEC)	5	.897
The Scale	**31**	**.971**

Table 12 shows the reliability coefficient values when an item was deleted from the scale using the Cronbach's alpha coefficient. Therefore, Table 11 reflects the contribution of each item to the value of the reliability coefficient.

The values of alpha in Table 12 should be around 0.971 because the overall Cronbach's alpha, or reliability, for this instrument is 0.971. Table 12 is used to find values of alpha larger than the overall alpha (0.971), because if deleting an item increases the alpha, the item should be deleted to improve reliability. None of the items increased reliability when they were deleted, so all items were retained in the questionnaire.

Table 12 Reliability of the scale coefficient values when an item was deleted

	Question No.	Cronbach's Alpha if Item was deleted
Perceived Ease of Use (PEU)	PEU1	0.902
	PEU2	0.870

	PEU3	0.886
	PEU4	0.874
	PEU5	0.868
	PEU6	0.887
Perceived Usefulness (PU)	PU1	0.949
	PU2	0.943
	PU3	0.947
	PU4	0.943
	PU5	0.949
	PU6	0.950
Attitude Toward Usage (ATU)	ATU1	0.940
	ATU2	0.943
	ATU3	0.944
Behavioural Intention to Use (BIU)	BIU1	0.921
	BIU2	0.851
	BIU3	0.862
Perceived Trustworthiness (TRU)	TRU1	0.866
	TRU2	0.885
	TRU3	0.871
	TRU4	0.921
	TRU5	0.876
Awareness (AWAR)	AWAR1	0.828
	AWAR2	0.850
	AWAR3	0.878
Perceived Security (SEC)	SEC1	0.931
	SEC2	0.854
	SEC3	0.858
	SEC4	0.860
	SEC5	0.858

4.4 Summary

This chapter developed a questionnaire based on two verification studies: a qualitative study with experts from Yesser and a pilot study with Saudi citizens. The qualitative study showed

that TRU, AWAR and SEC may influence m-government adoption but ENJ has little or no influence. Consequently, ENJ is excluded from the main study and the questionnaire consists of the TAM constructs (PEU, PU, ATU and BIU) and three external factors (TRU, AWAR and SEC). The questionnaire was validated by the pilot study with results showing that questionnaire is valid and reliable. Therefore, the final questionnaire for use in the full study consists of the TAM constructs (PEU, PU, ATU and BIU), the three external factors (TRU, AWAR and SEC).

Chapter 5: Data Screening and Measurement Scale Analysis

5.1 Data Screening and descriptive data:

5.1.1 Introduction

This section describes the data screening process undertaken to ensure data are prepared for analysis. It also presents descriptive data regarding the participants. First, this section describes the research questionnaire including its contents and how the data were collected. Next, it discusses the data screening, i.e. checking for missing data, outliers and normality distribution. Finally, descriptive data for the demographic information about participants is presented and summarised for each demographic group.

5.1.2 Overview of Research Questionnaire

The questionnaire was distributed in Saudi Arabia for three months (February to May, 2016) to a random sample of male and female Saudi citizens who have internet access. The initial page of the questionnaire contains a message for the participants asking them to participate in this research. It also contains general information about the research, its aims and some instructions, especially about ethical concerns, to obtain consent from participants. As described previously, the questionnaire consisted of four parts. Part one asked about demographic characteristics, and parts two and three listed items related to the TAM model constructs and external factors. Finally, part four allowed participants to make comments and offered to send the research results to those who left an email address. All TAM constructs and external factors were measured at seven levels on a Likert-type scale. Participants were asked to choose from 7 = Strongly Agree, 6 = Moderately Agree, 5 = Slightly Agree, 4 = Neutral, 3 = Slightly Disagree, 2 = Moderately Disagree and 1 = Strongly Disagree. More than 1,600 questionnaires were randomly distributed to citizens in Saudi Arabia via social media (Twitter,

social networks and Facebook), newsgroups, forums, and an instant texting application email group. To improve rate responses, reminder messages were sent every week to encourage participation.

5.1.3 Data Screening

Before starting the data analysis, the collated variables were screened, a process which is considered essential to obtaining accurate findings (Alshehri, 2013). Data screening can include examining the variables for missing values and outliers (Levy, 2006). In this study, the data were screened for missing values, outliers and normal distributions as discussed below.

Missing data points are a common obstacle to data analysis within social research (Tabachnick & Fidell, 2007). Identifying and dealing with missing responses is considered fundamental to data analysis (Hair, Black, Babin, Anderson, & Tatham, 2006). As mentioned above, more than 1,600 questionnaires were distributed among Saudi citizens. A total of 1,152 (72%) of the 1,600 questionnaires were returned. Of those, 370 (23%) questionnaires were incomplete and 782 (48%) included full responses. As mentioned in the pilot study, the minimum sample size required for this study to achieve a 95% confidence level in the results was 384 participants. Because 782 questionnaires were returned complete, which was more than double what was needed for this study, questionnaires with missing data were discarded. Moreover, the full response rate of 782 (48%) questionnaires was considered adequate because a 30% response rate is considered acceptable for survey analysis (Sekaran, 2003).

As part of the data screening, all variables were checked for outlier values and highly skewed distributions. No outliers were found. Many of the Likert items (scale 1-7) and the scale scores based on these items were negatively skewed. That is, participants tended to give high ratings to items, usually in the moderately agree (6) to strongly agree (7) interval, particularly for items related to ATU. For this reason, both the items and the associated scale scores were somewhat negatively skewed. Closer observation of the ratings suggested that hardly any of the

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participants were prepared to give negative ratings, and relatively few were prepared to give a

neutral rating. Most of the participants were, therefore, in effect using a four-point scale that

utilised the four main positive responses (4 = Neutral, 5 = Slightly Agree, 6 = Moderately

Agree and 7 = Strongly Agree). This being the case, it is hardly surprising that the items and

scales were negatively skewed. After examining the general tendency towards

negatively skewed responses, there did not seem to be any good reason for transforming these

variables. Therefore, the data are considered ready for the next steps in the analysis.

5.1.4 Demographic Analysis of the Sample

This section describes the 782 participants and their groupings into different demographic

categories. The following sections describe these factors in detail.

5.1.4.1 Gender,

As indicated in table 13 and figure 25, the vast majority of participants who completed this
questionnaire were male 613 (78.4%) with 169 (21.6%) female respondents.

Table 13 participants' gender

Information		Number of participants	Percentage of sample
Gender	Male	613	78.4%
	Female	169	21.6%
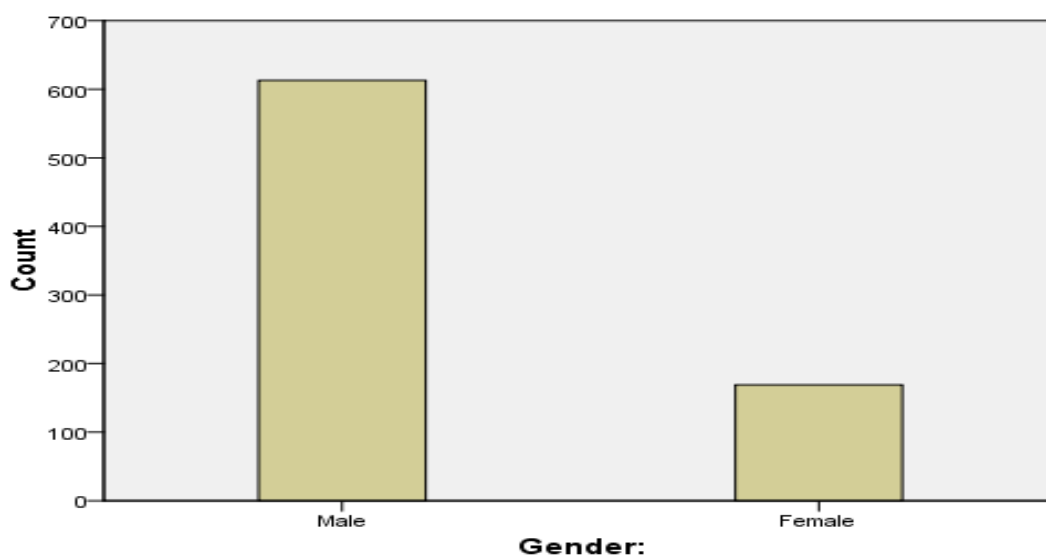
Figure 25 participants' gender

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5.1.4.2 Age

As indicated in table 14 and figure 26, nearly half of the respondents were aged 30–39 (46.3%, 362), followed by the group aged < 30 (35%, 274). Also, the group aged 40–49 represented 14.3% (112) of the sample .In contrast, the smallest groups of respondents were aged 60 or more (0.5%, 4) or aged 50–59 (3.8%, 30).

Table 14 Age of participants

Information		Number of participants	Percentage of sample
Age	< 30	274	35%
	30 < 40	362	46.3%
	40 < 50	112	14.3%
	50 < 60	30	3.8%
	60 or more	4	0.5%
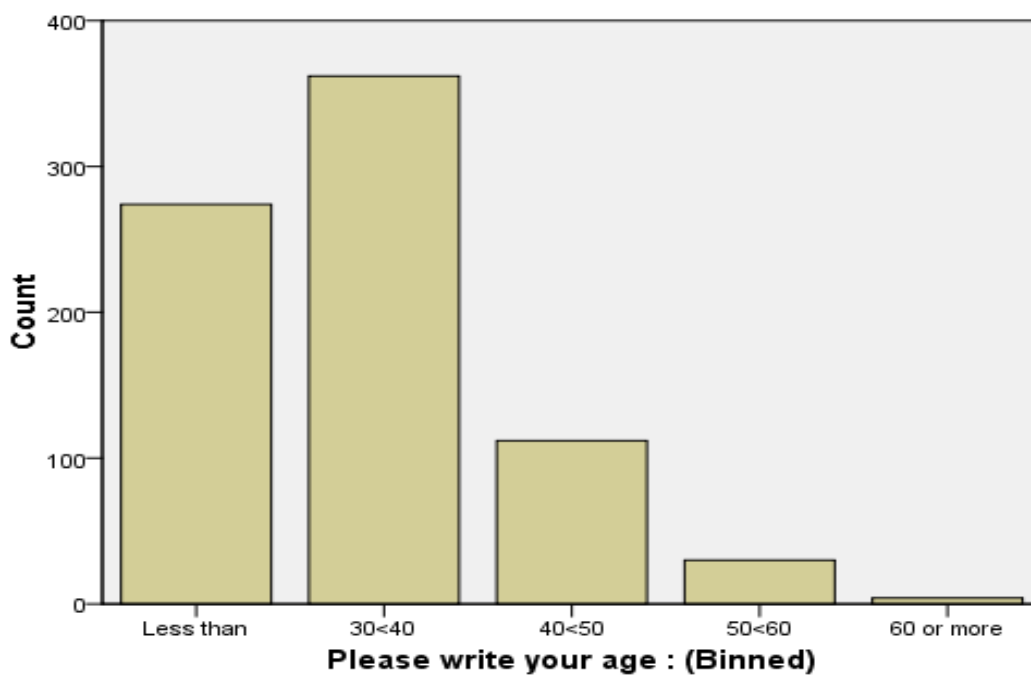
Figure 26 Age of participants

5.1.4.3 Place of residence

As indicated in table 15 and figure 27, the vast majority of participants were living in a city (81.6%, 638), with only 18.4% (144) living in a village.

Table 15 Place of residence for participants

Information		Number of participants	Percentage of sample
Where participants resided	City	638	81.6%
	Village	144	18.4%
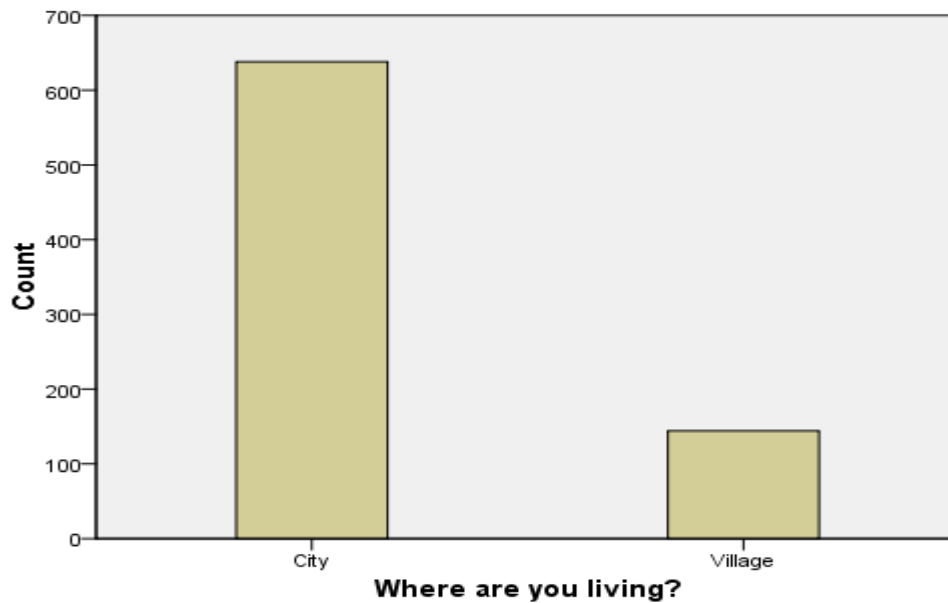
Figure 27 Place of residence for participants

5.1.4.4 Qualifications

As indicated in table 16 and figure 28, five education levels were listed in this questionnaire.

Almost 50% of participants held a bachelor's degree (48%, 375), followed by participants with

a postgraduate degree (23.9%, 187). The other education levels included a high school degree

(13.4%, 105) and a diploma degree (13.7%, 107). Eight participants (1%) had other

qualifications.

Table 16 Education levels for participants

Information		Number of participants	Percentage of sample
Qualifications	High School	105	13.4%
	Diploma	107	13.7%
	Bachelor	375	48%
	Postgraduate	187	23.9%
	Other	8	1%
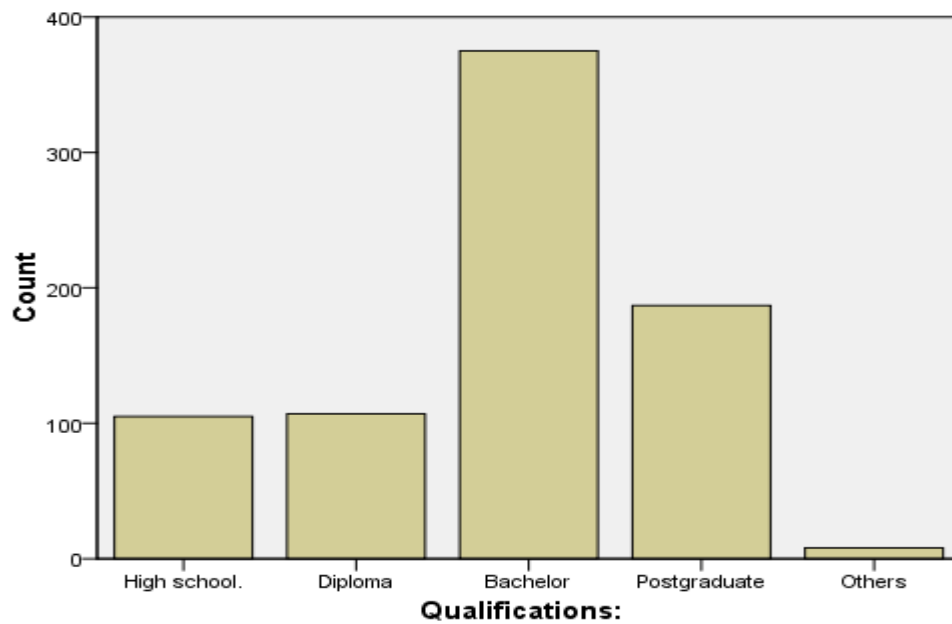
Figure 28 Education levels for participants

5.1.4.5 Occupation

As indicated in table 17 and figure 29, More than half (63.9%, 500) of the participants worked

in a government organization while 98 (12.5%) participants worked in the private sector.

Ninety-seven students participated in this study (12.4%), and 69 (8.8%) had other occupations.

The smallest group of participants were businessmen (2.3%, 18).

Table 17 participants' occupation

Information		Number of participants	Percentage of sample
Occupation	Students	97	12.4%
	Working in a government organization	500	63.9%
	Working in the private sector	98	12.5%
	Businessmen	18	2.3%
	Other	69	8.8%
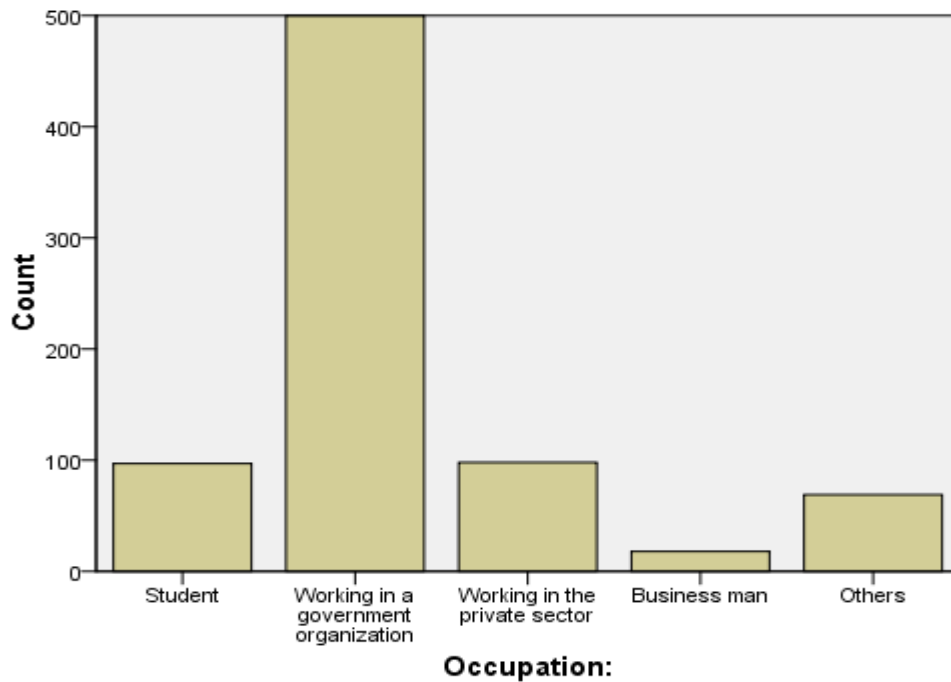
Figure 29 participants' occupation

5.1.4.6 Experience with m-government applications

As indicated in table 18 and figure 30, almost one quarter of the participants (187, 23.9%) had

not used m-government applications while 157 (20.1%) had less than one year's experience.

The remainder had more experience: 125 (16%) had from one year to less than two years, 137

(17.5%) had from two years to less than three years and 176 (22.5%) had experience with m-

government applications for three years or more.

Table 18 Participants' experience with m-government applications

Information		Number of participants	Percentage of sample
Experience with m-government applications	Have not used m-government applications	187	23.9%
	Less than one year	157	20.1%
	One year/less than two years	125	16%
	Two years/less than three years	137	17.5%
	Three years or more	176	22.5%

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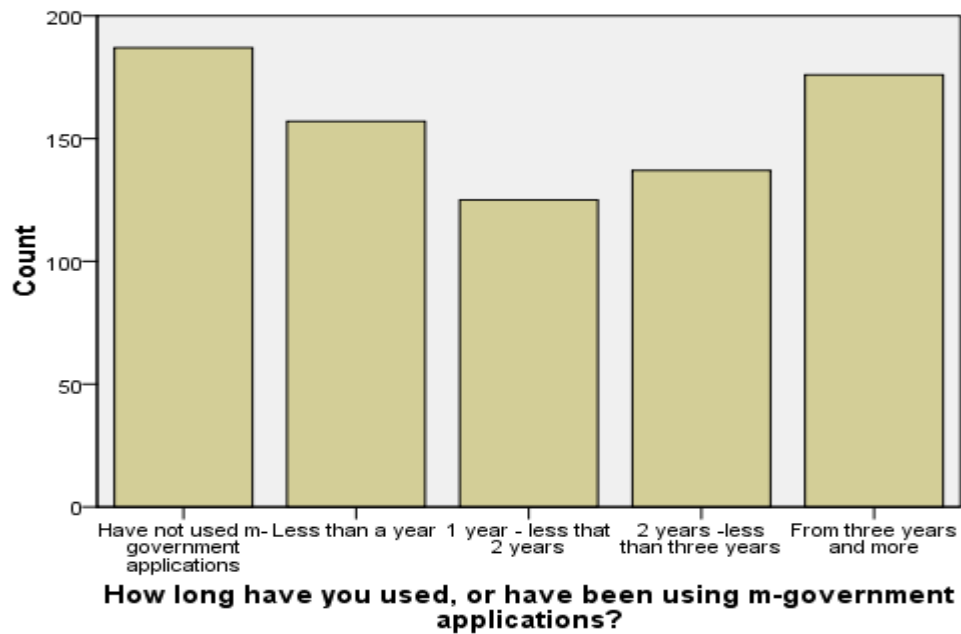
Figure 30 Participants' experience with m-government applications

5.1.5 Summary

This section covered the initial steps of the data analysis, which included an overview of the

research questionnaire, data screening and descriptive data for participants. There were some

questionnaires with missing data; however, they were discarded because the number of

completed responses was sufficient to ensure a high level of confidence in the outcomes. In

addition, many of the items were negatively skewed values because the majority of participants

tended to rate items highly, especially with regard to ATU items. After examining the general

tendency towards negatively skewed responses, no good reason for transforming these

variables emerged. Therefore, the dataset is ready for the next steps in the analysis—EFA, CFA

and SEM—which are presented in the next chapters.

5.2 Measurement Scale Analysis

5.2.1 Introduction

This section examines the validity and reliability of the scales in the questionnaire to ensure the instrument is valid and reliable in the Saudi m-government context. It also examines and validates the applicability of the modified TAM in the Saudi m-government context.

First, the sample was split for validation into two randomly assigned samples using SPSS syntax because this method enhances the credibility of the model (Ahmed, 2012). One sample (n = 388) was used to conduct exploratory factor analysis (EFA) with Varimax rotation. After identifying the scale structure via EFA, the reliability of the instrument was measured using Cronbach's alpha and item-total correlations (n = 388). The other sample (n = 394) was used to confirm the item-scale constructs identified via EFA using SPSS AMOS 24 to run confirmatory factor analysis (CFA). These tests are discussed in more detail in the following sections.

5.2.2 Validity and Reliability

Construct validity is defined as the extent to which the items in an instrument reflect the theoretical construct. Construct validity is also defined as the extent to which one can measure the concept that should be measured (Bagozzi, Yi, & Phillips, 1991). In the same vein, Netemeyer, Bearden, and Sharma (2003) and Turocy (2002) claimed that validity seeks to measure the extent to which the instrument achieves its goals. Factor analysis is a popular analytical tool to measure construct validity (Turocy, 2002).

In this study, Exploratory Factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to measure construct validity by randomly splitting the sample into two samples. According to Dik, Eldridge, Steger, and Duffy (2012: 7), "This approach allows for cross validation of the final factor structure in a subsample that is relatively independent from efforts to refine the item pool. This reduces capitalizing on sample-specific variance." One-half of the

sample (n = 388) was used in an EFA to explore the scale's underlying factor structure and then measure the reliability of the instrument by using Cronbach's alpha and item-total correlations. The other half (n = 394) was used in a CFA to test the goodness-of-fit of the revealed factor structures (Ng, 2013).

5.2.2.1 Exploratory Factor analysis (EFA)

Exploratory factor analysis (EFA) is used for several purposes such as developing and testing instruments (Osborne & Costello, 2005). According to Field (2005: 619), "this technique has three main uses: (1) to understand the structure of a set of variables, (2) to construct a questionnaire to measure an underlying variable, (3) to reduce a data set to a more manageable size while retaining as much of the original information as possible." Anderson and Gerbing (1988) stated that EFA is especially helpful if relationships between factors are not clear and there is no detailed theory to clarify these relations in an initial analysis. While all factors in this study were adopted from previous studies (based on the literature review), EFA was considered appropriate because most of these factors have not been applied previously in an m-government context in Saudi Arabia.

5.2.2.1.1 Factorability of items

Factorability indicates that items are fit to be factorized with regard to inter-correlation between factors (Pallant, 2005; Tabachnick & Fidell, 2007). One might expect factors to be correlated because all factors seek to measure the same objective (Tabachnick & Fidell, 2007). Kaiser-Meyer-Olkin (KMO) was examined to assess the adequacy of sampling. According to Netemeyer et al. (2003), the values of KMO correlation for EFA analysis results are adequate if above 0.6 to 0.7. Field (2009) asserted that KMO values less than 0.5 indicate unacceptable sampling adequacy while those greater than 0.9 indicate excellent sampling adequacy. Consistent with this, de Vaus (2002) asserted that KMO values should be above 0.5. Table 19 shows that the KMO value for an EFA that includes all constructs was 0.932, which indicates

excellent sampling adequacy for this study. Moreover, Bartlett's Test of Sphericity (Approx. Chi-Square = 10163.185) was highly significant ($p < 0.001$) and is consistent with there being a sufficient relationship between the items included in the analysis (Field, 2005). These findings support the factorability of the EFA conducted for these factors (Field, 2005; Hair et al., 2006; Pallant, 2005).

Table 19 KMO and Bartlett's Test of Sphericity results

Test Bartlett's and KMO	
KMO	0.932
Approx. Chi- Square	10163.185
Df	465
Sig.	0.000

5.2.2.1.2 Factor extraction and rotation

EFA requires two important steps, (1) factor extraction, and (2) factor rotation, to provide a suitable solution in which an acceptable number of factors represent a construct (Pallant, 2005). Factor extraction seeks to determine the number of factors by detecting factors based on specific criteria and methods, while factor rotation seeks to provide a clear interpretation of a given factor solution (Tabachnick & Fidell, 2007). Principal component analysis (PCA) is a very common extraction method used to determine the factors that explain the structure of the variables (Alnatheer, 2012). PCA is used to obtain an empirical abstraction of the number of factors and to identify the factors in the data (Alshehri, 2013). One reason to use PCA is when the researchers "wish to arrive at a smaller number of variables that will account for or capture most of the variance in the observed variables" (Norm O'Rourke & Hatcher, 2013: 1). In this study the researcher is, in fact, confirming an existing factor structure using two methods (PCA, & SEM CFA).

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Varimax rotation was conducted in this study because it is a very commonly used rotation that maximises the orthogonality (independence) of separate factors (Tabachnick & Fidell, 2007). Varimax rotation also more clearly separates factors (Hair et al., 2006). After Varimax rotation, factor loadings are produced. Factor loadings less than 0.4 should be discarded because they are considered too low a value (Field, 2005; Hair et al., 2006). In this study, any factor loading value less than 0.5 was excluded to ensure that all items have practical significance (Hair et al., 2006). Data were analysed using EFA with Varimax rotation in SPSS Version 22, with the results presented in Table 20. Table 20 shows seven factors: perceived ease of use (PEU), perceived usefulness (PU), attitude toward using (ATU), behavioural intention to use (BIU), perceived trustworthiness (TRU), awareness (AWAR) and perceived security (SEC). In summary, the EFA test returned a seven-component solution that explained 76.746 % of the cumulative variance, with a KMO measure of sampling of 0.932, which is consistent with these items being highly suitable for factor analysis.

Table 20 Rotated component matrix

	Component						
	1	2	3	4	5	6	7
PEU1	0.732						
PEU2	0.750						
PEU3	0.798						
PEU4	0.739						
PEU5	0.755						
PEU6	0.669						
PU1		0.586					
PU2		0.740					
PU3		0.775					
PU4		0.813					
PU5		0.752					
PU6		0.688					
ATU1						0.835	
ATU2						0.804	
ATU3						0.859	
BIU1							0.740

BIU2						0.694
BIU3						0.597
TRU1			0.697			
TRU2			0.664			
TRU3			0.765			
TRU4			0.714			
TRU5			0.697			
AWAR1				0.846		
AWAR2				0.856		
AWAR3				0.862		
SEC1		0.761				
SEC2		0.839				
SEC3		0.850				
SEC4		0.747				
SEC5		0.810				

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

5.2.2.2 Reliability

According to Drost (2011: 106), "reliability is consistency of measurement or stability of measurement over a variety of conditions in which basically the same results should be obtained." After identifying the scale structure via EFA, the researcher measured the reliability of the instrument using Cronbach's alpha and item-total correlations based on the half-sample used for the EFA (n = 388). In this study, and based on the EFA results, there were seven factors included in the research model, namely: perceived ease of use (PEU), perceived usefulness (PU), attitude toward using (ATU), behavioural intention to use (BIU), perceived trustworthiness (TRU), awareness (AWAR) and perceived security (SEC).

5.2.2.2.1 Internal consistency

Sekaran (2003) asserted that internal consistency is a very common measure of reliability in Information Systems (IS). Internal consistency relates to consistent responses for items to scale a single measurement (Kline, 2005). In this study, the researcher measured internal consistency reliability by calculating Cronbach's alpha, using SPSS Version 22. Previous studies have also

used Cronbach's alpha to measure internal consistency (Field, 2005; Hinton, Brownlow, McMurray, & Cozens, 2004; Straub, Boudreau, & Gefen, 2004). High values of Cronbach's alpha indicate that measures are reliable (Straub, 1989). Reliability can be divided into four ranges: values of up to 0.50 have low reliability; from 0.50 to 0.70 moderate reliability; from 0.70 to 0.90 high reliability; and from 0.90 above, excellent reliability (Hinton et al., 2004). Hair et al. (2006) also noted that Cronbach's alpha values should be 0.7 or higher if one is to conclude that the internal consistency is reliable. The researcher calculated Cronbach's alpha for each of the seven factors in this study using SPSS Version 22. The results presented in Table 21 indicate that all values were higher than 0.70 and most were above 0.9, which is considered excellent reliability. Furthermore, when all items were entered at the same time, the overall reliability for this instrument was 0.947, which is considered excellent. Therefore, the results of this study can be considered reliable in Saudi m-government context.

Table 21 Reliability coefficient values

Constructs	Number of items	Cronbach Alpha reliability	Comments
Perceived Ease of Use (PEU)	6	0.900	Excellent reliability
Perceived Usefulness (PU)	6	0.927	Excellent reliability
Attitude toward using (ATU)	3	0.907	Excellent reliability
Behavioural intention to use (BIU)	3	0.816	High reliability
Perceived trustworthiness (TRU)	5	0.894	High reliability
Awareness (AWAR)	3	0.962	Excellent reliability
Perceived security (SEC)	5	0.914	Excellent reliability
Overall reliability	**31**	**0.947**	**Excellent reliability**

5.2.2.2.2 Item-total correlations

Lu, Lai, and Cheng (2007) asserted that item-total correlation reflects correlations between items which examine the construct of an instrument. If the correlation values of two items are

0.3 or higher, it means the items are measuring the same thing; if it is less than 0.3, the items are measuring something different (Hair et al., 2006; Pallant, 2005). In this study, item-total correlations were analysed using SPSS version 22 and the results are presented in Tables 22 to 28 below. All values of item correlation for each factor were significant and greater than 0.3, which means that items in each factor reliably measured the same construct.

Table 22 Correlation matrix for perceived ease of use (PEU)

	PEU1	PEU2	PEU3	PEU4	PEU5	PEU6
PEU1	1.0000	0.678	0.616	0.527	0.631	0.590
PEU2	0.678	1.000	0.715	0.593	0.622	0.589
PEU3	0.616	0.715	1.000	0.665	0.706	0.552
PEU4	0.527	0.593	0.665	1.000	0.590	0.716
PEU5	0.631	0.622	0.706	0.590	1.000	0.741
PEU6	0.590	0.589	0.552	0.539	0.588	1.000

Table 23 Correlation matrix for perceived usefulness (PU)

	PU1	PU2	PU3	PU4	PU5	PU6
PU1	1.0000	0.676	0.636	0.572	0.546	0.556
PU2	0.676	1.000	0.716	0.738	0.707	0.695
PU3	0.636	0.716	1.000	0.818	0.666	0.652
PU4	0.572	0.738	0.818	1.000	0.796	0.716
PU5	0.546	0.707	0.666	0.796	1.000	0.741
PU6	0.556	0.695	0.652	0.716	0.741	1.000

Table 24 Correlation matrix for attitude toward using (ATU)

	ATU1	ATU2	ATU3
ATU1	1.000	0.737	0.770
ATU2	0.737	1.000	0.791
ATU3	0.770	0.791	1.000

Table 25 Correlation matrix for behavioural intention to use (BIU)

	BIU1	BIU2	BIU3
BIU1	1.000	0.615	0.517
BIU2	0.615	1.000	0.677
BIU3	0.517	0.677	1.000

Table 26 Correlation matrix for perceived trustworthiness (TRU)

	TRU1	TRU2	TRU3	TRU4	TRU5
TRU1	1.000	0.674	0.591	0.555	0.682
TRU2	0.674	1.000	0.566	0.514	0.687
TRU3	0.591	0.566	1.000	0.787	0.614
TRU4	0.555	0.514	0.787	1.000	0.660
TRU5	0.682	0.687	0.614	0.660	1.000

Table 27 Correlation matrix for awareness (AWAR)

	AWAR1	AWAR2	AWAR3
AWAR1	1.000	0.884	0.901
AWAR2	0.884	1.000	0.901
AWAR3	0.901	0.901	1.000

Table 28 Correlation matrix for perceived security (SEC)

	SEC1	SEC2	SEC3	SEC4	SEC5
SEC1	1.000	0.719	0.674	0.567	0.617
SEC2	0.719	1.000	0.823	0.677	0.665
SEC3	0.674	0.823	1.000	0.698	0.738
SEC4	0.567	0.677	0.698	1.000	0.731
SEC5	0.617	0.665	0.738	0.731	1.000

5.2.3 Overview of SEM

A Structural Equation Model (SEM) comprises a collection of statistical methods that can be used to clarify and analyse relationships between variables (Hair, Black, Babin, & Anderson, 2010). SEM has two components: the measurement model and the structural model (Hair et al., 2006; Hoyle, 1995; Kline, 2005). SEM seeks to test theoretical models (Hair et al., 2006).

It tests hypotheses between variables by measuring the magnitude of the path of the coefficient between variables (Byrne, 2001). Gefen, Straub, and Boudreau (2000) recommended the use of SEM in IT/IS studies, especially in behavioural studies. SEM describes the relationships between variables clearly by using graphic diagrams (Kline, 2005). Confirmatory factor analysis (CFA) is used to measure the model by assessing the indicators used to measure the latent variables (Hoyle, 1995). In this study, the SEM procedure—confirmatory factor analysis—was conducted via SPSS AMOS 24. CFA was used as a measurement model. This procedure measured the validity of the factor structure of half the sample (n = 394). SPSS AMOS 24 was then used to assess relationships between variables via a structural model that used the entire sample (n = 782), as reported in Chapter 7.

5.2.4 Measurement model using CFA

CFA is a SEM analysis technique (Byrne, 2010; Hair et al., 2010), primarily used to measure the construct validity of the hypothesised factor structure (Hair et al., 2006). Harrington (2009) claimed that there are four reasons for conducting CFA: testing method effects; construct validation; psychometric evaluation of measures; and testing measurement invariance. CFA is a suitable technique to measure the validity of scales (Bhattacherjee & Premkumar, 2004). It focuses on the construct's validity and the model's overall fit. It assesses the measurement theory by using empirical evidence of the validity of items (Hair et al., 2010). CFA can examine the relationship between a group of continuous latent variables and a group of observed variables (Baker, 2004). In addition, CFA is conducted to define the goodness of fit between data collected in a study and a model used in another study (Weitzner, Meyers, Steinbruecker, Saleeba, & Sandifer, 1996). Finally, CFA is widely used to analyse latent variables (W. Chin & Todd, 1995).

Fit indices used to assess the fit of the measurement model include: CMIN (minimum discrepancy); Chi-Square (χ^2); Goodness-of-fit (GFI); Adjusted goodness of fit (AGFI);

Comparative fit index (CFI); Incremental fit index (IFI); and the Root Mean Square Error Approximation (RMSEA) (Hair et al., 2010). If the value of χ^2/df (CMIN/df) is <3, it indicates a good fit, and if >3 but <5, it indicates an acceptable fit (Brown, 2006; Byrne, 2010; Hair et al., 2010). A RMSEA value <0.05 indicates excellent fit; if RMSEA is >0.05 and <0.08, there is a good fit; and if the RMSEA value >0.08 but <0.1, that is an acceptable fit (Byrne, 2010; Hooper, Coughlan, & Mullen, 2008). A GFI, IFI or CFI value >0.95 indicates an excellent fit; if the value is <0.95 but >0.90 that indicates a good fit; a value <0.90 but >0.80 indicates an acceptable fit. In addition, an AGFI value >0.80 indicates a good fit (Barrett, 2007; Dawes, Faulkner, & Sharp, 1998; Gefen et al., 2000; Greenspoon & Saklofske, 1998; Hair et al., 2010). Hooper et al. (2008) claimed that values of χ^2/df and RMSEA closer to zero indicated a better fit while GFI, CFI, and IFI values closer to one indicate a better fit for the model. If the value of the correlation between constructs is <0.85, the model is valid (Kline, 2005). Table 29 summarises the criteria for assessing the model.

Table 29 Summary of model assessment criteria.

Fit indices	Criteria	References
χ^2/df (CMIN/df)	<3 is a good fit; <5 is an acceptable fit	Brown, 2006; Byrne, 2010; Hair et al., 2010
RMSEA	<0.05 is an excellent fit; <0.08 is a good fit; <0.1 is an acceptable fit.	Byrne, 2010; Hooper et al., 2008
GFI, AGFI, IFI and CFI	AGFI >0.80 is a good fit; GFI, IFI and CFI >0.95 is an excellent fit; >0.90 is a good fit; >0.80 is an acceptable fit.	Barrett, 2007; Dawes et al., 1998; Gefen et al., 2000; Greenspoon & Saklofske, 1998; Hair et al., 2010
Correlation between constructs	<0.85 is valid	Kline, 2005

AMOS 24 was used to conduct the CFA for all constructs to assess the model fit using half of sample (n = 394) for this study (Figure 31). The results presented in Tables 30 and 31 reveal

that the model has a good fit values and is valid, with all values of correlations between constructs <0.85. Therefore, the model is fit and valid in Saudi m-government context.

Table 30 Results of the model goodness-fit indices using CFA

Fit indices	Result	Comment
χ^2/df (CMIN/df)	1.987	Good fit
RMSEA	0.050	Good fit
GFI	0.886	Acceptable fit
AGFI	0.857	Good fit
IFI	0.960	Excellent fit
CFI	0.959	Excellent fit
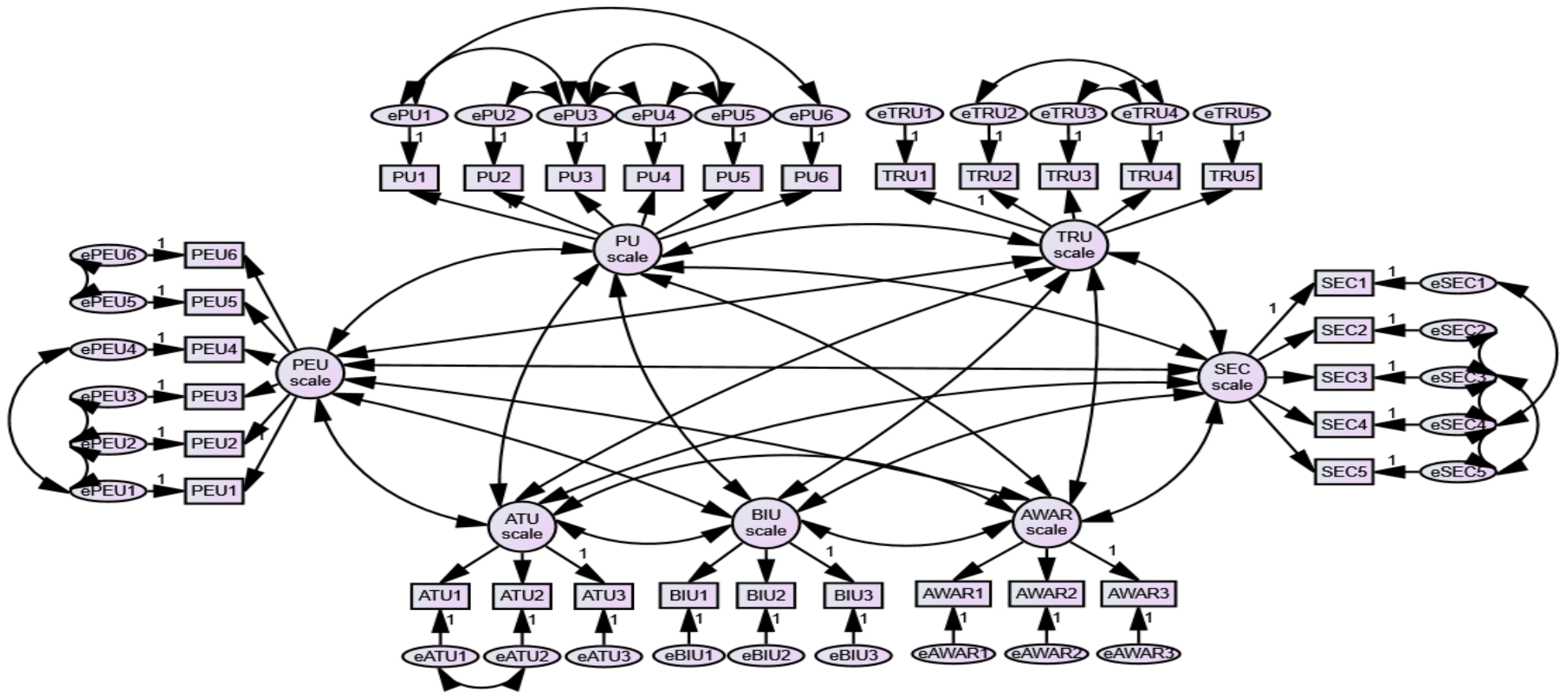
Figure 31 CFA for all constructs

Table 31 Correlations between constructs

Correlation between Constructs	Results
TRU <--> SEC	0.705
AWAR <--> SEC	0.636
BIU <--> AWAR	0.279
ATU <--> BIU	0.803
PEU <--> ATU	0.629
PEU <--> TRU	0.677
ATU <--> TRU	0.572
PU <--> TRU	0.667
PEU <--> SEC	0.416
ATU <--> SEC	0.268
AWAR <--> TRU	0.443
BIU <--> SEC	0.426
BIU <--> TRU	0.690
PU <--> SEC	0.363
PU <--> PEU	0.719
PU <--> ATU	0.667
PU <--> BIU	0.712
PEU <--> BIU	0.634
ATU <--> AWAR	0.205
PEU <--> AWAR	0.344
PU<--> AWAR	0.274

As revealed in Table 32, the model included a range of standardised regression weights consistent with moderate to strong positive relations between constructs.

Table 32 Standardized regression weights

Standardized Regression Weights	Results
PU1 <--- PU	0.728
PU2 <--- PU	0.860

PU3 <--- PU	0.749
PU4 <--- PU	0.758
PU5 <--- PU	0.835
PEU1 <--- PEU	0.771
PEU2 <--- PEU	0.764
PEU3 <--- PEU	0.781
PEU4 <--- PEU	0.745
PEU5 <--- PEU	0.791
ATU3 <--- ATU	0.829
ATU2 <--- ATU	0.811
ATU1 <--- ATU	0.911
BIU3 <--- BIU	0.796
BIU2 <--- BIU	0.827
BIU1 <--- BIU	0.780
AWAR3 <--- AWAR	0.930
AWAR2 <--- AWAR	0.964
AWAR1 <--- AWAR	0.937
PEU6 <--- PEU	0.734
PU6 <--- PU	0.792
TRU1 <--- TRU	0.800
TRU2 <--- TRU	0.784
TRU3 <--- TRU	0.784
TRU4 <--- TRU	0.778
TRU5 <--- TRU	0.822
SEC1 <--- SEC	0.800
SEC2 <--- SEC	0.810
SEC3 <--- SEC	0.794
SEC4 <--- SEC	0.734
SEC5 <--- SEC	0.737

5.2.5 Summary

In this study, the entire sample (n = 782) was randomly split into two samples. One half-sample

(n = 388) was used to run the EFA. After identifying the scale structure via EFA, the reliability

of the instrument was measured using Cronbach's alpha and item-total correlations. The other

half-sample (n = 394) was used to run the CFA. The EFA test returned a seven-component

solution explaining 76.746% of the cumulative variance, with a KMO measure of sampling of 0.932, consistent with these items being highly suitable for factor analysis. Cronbach's alpha coefficient was very high for all constructs, ranging from 0.816 to 0.962, with an overall reliability of 0.947 which means that instrument is reliable in the Saudi m-government context. Examination of item-total correlations between items indicates that all values of the item correlation for all seven factors exceeded 0.3, which suggests that the items in each factor measure the same thing and are reliable. Based on the results of this chapter, the model fits the dataset and the factor structure is valid for the Saudi m-government context.

Chapter 6: Model Assessment and Moderator Results

6.1 Introduction

This chapter addresses the main aim of this study which is to identify and measure the factors that influence users' intentions to use m-government applications in the Saudi Arabian context by examining six hypotheses via Maximum Likelihood. This chapter also addresses the other aims of this study:

1. To measure the Saudi citizens' attitudes towards using m-government applications.

2. To measure the influence of moderators (gender, age and usage experience) on relationships between exogenous (ATU, PU, and TRU) and endogenous (BIU) in the research model.

3. To validate and examine the applicability of the modified TAM in the Saudi m-government context.

This chapter presents the outcomes of a structural equation model (SEM) based on the entire sample (n = 782) that assessed model fit and examined the six hypotheses via Maximum Likelihood. According to Hair et al. (2010), structural models can be used to assess and evaluate two things: model fit (fit indices) and the relationships between variables (hypotheses).

6.2 Assessment of Model Fit

AMOS 24 was used to perform a SEM for all constructs to assess the model fit using the entire sample (n = 782) (Figure 32). Fit indices used to assess the fit of the measurement model include: CMIN (minimum discrepancy); Chi-Square (χ^2); Goodness-of-fit (GFI); adjusted goodness of fit (AGFI); Comparative fit index (CFI); Incremental fit index (IFI); and the Root

Mean Square Error Approximation (RMSEA) (Hair et al., 2010). If the value of χ^2/df (CMIN/df) is <3, it indicates a good fit, and if >3 but <5, it indicates an acceptable fit (Brown, 2006; Byrne, 2010; Hair et al., 2010). A RMSEA value <0.05 indicates excellent fit; if RMSEA is >0.05 and <0.08, there is a good fit; and if the RMSEA value >0.08 but <0.1, that is an acceptable fit (Byrne, 2010; Hooper, Coughlan, & Mullen, 2008). A GFI, IFI or CFI value >0.95 indicates an excellent fit; if the value is <0.95 but >0.90 that indicates a good fit; a value <0.90 but >0.80 indicates an acceptable fit. In addition, an AGFI value >0.80 indicates a good fit (Barrett, 2007; Dawes, Faulkner, & Sharp, 1998; Gefen et al., 2000; Greenspoon & Saklofske, 1998; Hair et al., 2010). A summary of the criteria for the model fit are presented in Table 33.

Table 33 Summary of the criteria for model assessment

Fit indices	Criteria	References
χ^2/df (CMIN/df)	<3 is good fit, <5 is acceptable fit	Brown, 2006; Byrne, 2010; Hair et al., 2010
RMSEA	<0.05 is excellent fit, <0.08 is a good fit, <0.1 is acceptable fit	Byrne, 2010; Hooper et al., 2008
AGFI, GFI, IFI and CFI	AGFI >0.80 is good fit. GFI, IFI and CFI >0.95 is excellent fit; >0.90 is good fit; >0.80 is acceptable fit.	Barrett, 2007; Dawes et al., 1998; Gefen et al., 2000; Greenspoon & Saklofske, 1998; Hair et al., 2010

The results of the SEM model fit using the entire sample (n = 782) reveal that the model has a good fit values in the Saudi m-government context (Table 34).

Table 34 Results of the model goodness-fit indices by structural model

Fit indices	Result	Comment
χ^2/df (CMIN/df)	2.623	Good fit
RMSEA	0.046	Excellent fit
GFI	0.916	Good fit

AGFI	0.897	Good fit
IFI	0.966	Excellent fit
CFI	0.966	Excellent fit
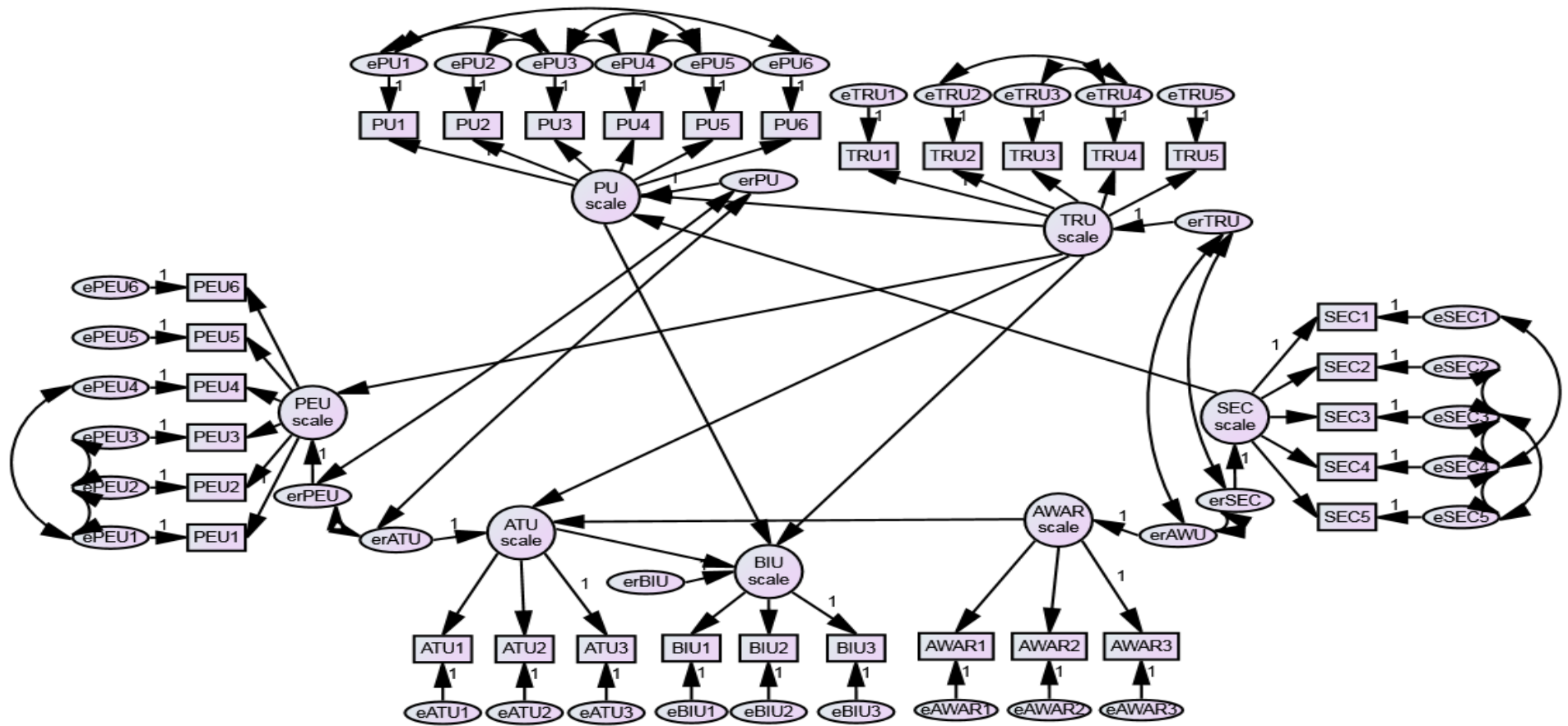
Figure 32 Structural equation model (SEM) for the overall research model

6.3 Assessment of the Hypotheses

The structural equation model (SEM) for the entire sample (n = 782) examined six hypotheses via Maximum Likelihood, by calculating each pathway for significance and estimating the strength of each path in terms of the obtained Beta value (β). The six hypotheses tested in this section are presented in Table 35. In this stage, the researcher is reporting the significant outcomes only.

Table 35 Summary of hypotheses

Hypothesis	Hypothesis statement
H1	Perceived ease of use PEU will have a significant positive influence on behavioural intention to use BIU m-government applications.
H2	Perceived usefulness PU will have a significant positive influence on behavioural intention to use BIU m-government applications.
H3	Attitude towards using ATU will have a significant positive influence on behavioural intention to use BIU m-government applications.
H4	Perceived trustworthiness TRU will have a significant positive influence on behavioural intention to use BIU m-government applications.
H5	Awareness AWAR will have a significant positive influence on behavioural intention to use BIU m-government applications.
H6	Perceived security SEC will have a significant positive influence on behavioural intention to use BIU m-government applications.

Maximum Likelihood estimation was conducted using the entire sample (n = 782) and the results are presented in Figure 33. Significant paths were found between behavioural intention to use BIU, and perceived usefulness, attitude toward using and perceived trustworthiness (Table 36). Therefore, these hypotheses (H2, H3 and H4) are confirmed and supported in the Saudi m-government context. Non-significant paths, involving perceived ease of use, awareness and perceived security, mean that H1, H5 and H6 are not supported in the Saudi m-government context.

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The results in Table 36 revealed that attitude toward use (ATU) has the greatest influence on BIU m-government applications in Saudi Arabia followed by perceived usefulness (PU) and perceived trustworthiness (TRU).

Table 36 Assessment of accepted hypotheses

Path	Hypothesis	Hypothesis statement	Path weight Beta β	Overall results
BIU <--- PU	H2	PU will have a significant positive influence on BIU m-government applications.	0 .266	Significant P<0.001
BIU<--- ATU	H3	ATU will have a significant positive influence on BIU m-government applications.	0 .484	Significant P<0.001
BIU <--- TRU	H4	Perceived trustworthiness will have a significant positive influence on BIU m-government applications.	0 .247	Significant P<0.001

6.4 Assessment of Saudi Citizens' Attitudes Toward Using M-government Applications

The Maximum Likelihood analysis revealed that ATU has a significant positive influence (the most influential factor) on BIU m-government applications. The results of the preliminary analysis and data screening also revealed that participants tended to give high ratings to items (positive responses), usually in the moderately agree (6) to strongly agree (7) interval, particularly for items related to ATU. Based on these results, we can conclude that Saudi citizens have a positive attitude toward using m-government applications. In other words, Saudi citizens considered that the m-government applications are a good and positive idea, and they will use the m-government applications in the future because they have a positive attitude toward using these applications.
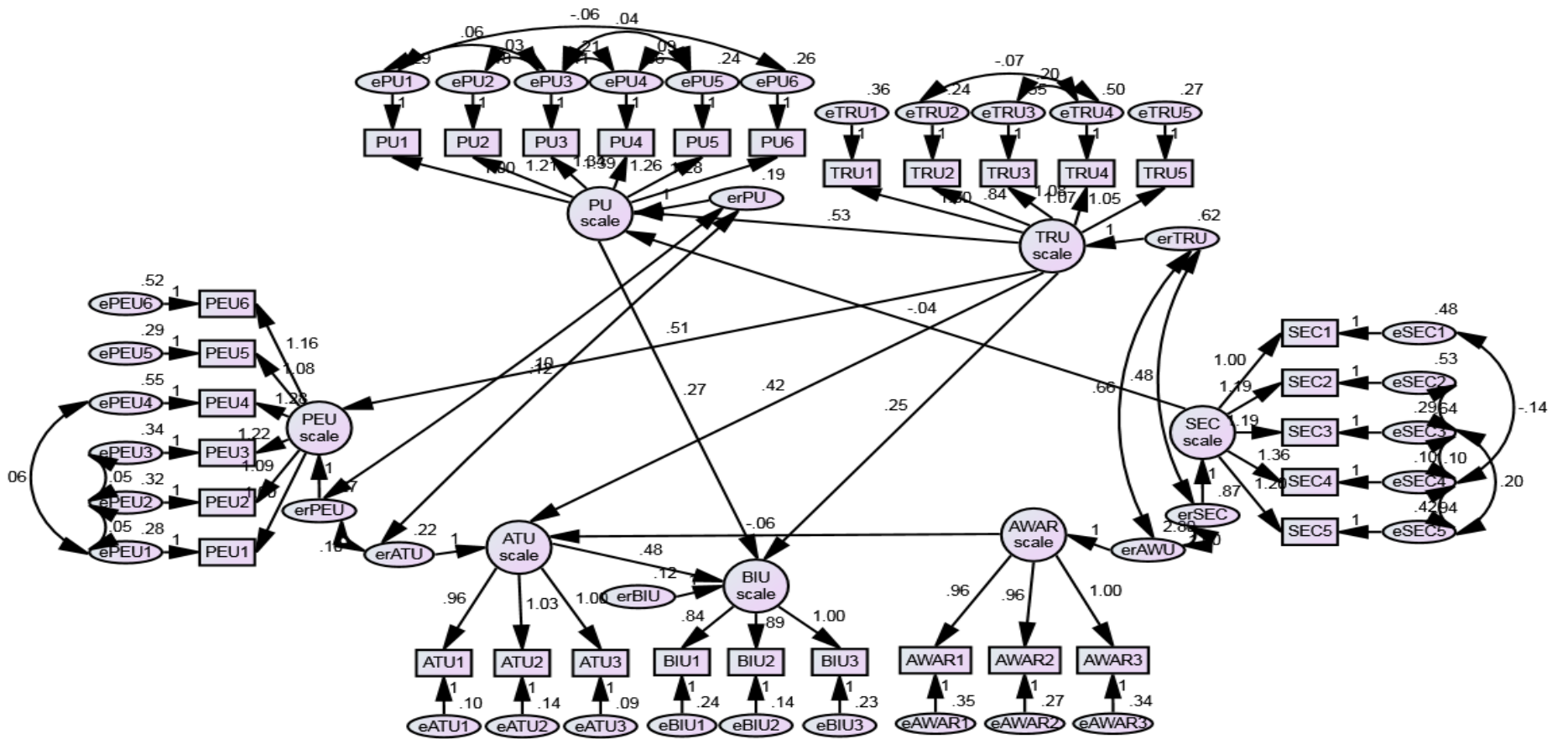
Figure 33 Structural equation model (SEM) for standardized path coefficients

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6.5 Assessment of the Influence of Moderators

Multi-group analysis was conducted to measure the influence of moderators (gender, age and usage experience) on relationships between exogenous factors (ATU, PU, and TRU) and the endogenous factor (BIU) in the research model. Hair et al. (2010) recommended first measuring the goodness-of-fit for the model before measuring the influence of moderators on relationships between exogenous and endogenous factors. Therefore, the sample was divided into two samples for each moderator and the structural model was simultaneously run for the two separate samples to measure the goodness-of-fit for the model. Path coefficients for the two samples were calculated by pairwise comparison, considering the critical ratio for differences among the two samples (Tarhini et al., 2014b).

The research question regarding the moderator variables is:

To what extent do moderators (gender, age and usage experience) influence relationships between exogenous factors (ATU, PU, and TRU) and the endogenous factor (BIU) in the research model?

The moderator hypotheses are:

H7 a1, a2, a3: The relationships between exogenous (ATU, PU, and TRU) and endogenous (BIU) will be moderated by gender.

H8 b1, b2, b3: The relationships between exogenous (ATU, PU, and TRU) and endogenous (BIU) will be moderated by age.

H9 c1, c2, c3: The relationships between exogenous (ATU, PU, and TRU) and endogenous (BIU) will be moderated by usage experience.

6.5.1 Influence of gender
The vast majority of the 782 participants who completed this questionnaire were male (613, 78.4%) compared to 169 females (21.6%). The structural model was run separately for males

and females and the results of the model goodness-fit indices revealed that the model had an acceptable fit for both the male group (χ^2/df (CMIN/df) = 2.875; RMSEA = 0.055; GFI = 0.945; AGFI = 0.919; IFI = 0.969; CFI = 0.969) and the female group (χ^2/df (CMIN/df) = 2.579; RMSEA = 0.097; GFI = 0.847; AGFI = 0.818; IFI = 0.941; CFI = 0.941).

The results of the multi-group analysis presented in Table 37. The relationship between ATU$\rightarrow$BIU is significantly moderated by gender and stronger for females than males. The relationships between TRU$\rightarrow$BIU and PU$\rightarrow$BIU are not moderated by gender.

Table 37 Influence of gender on the relationships between (ATU, TRU and PU) and BIU

Hypothesis	Path	Female		Male		z-score	Results
		Estimate	P	Estimate	P		
H7a1	PU$\rightarrow$BIU	0.255	0.000	0.321	0.000	-0.877	Rejected
H7a2	ATU$\rightarrow$BIU	0.339	0.000	0.207	0.000	2.288**	Supported
H7a3	TRU$\rightarrow$BIU	0.444	0.000	0.501	0.000	-0.746	Rejected

Notes: *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.10

6.5.2 Influence of age

To make analysis of age groups easier, the entire sample of participants (n=782) were divided into two age groups: 18-39 years (younger) and ≥40 years (older). In this study, there were 636 younger (81.32%) participants and 146 older (18.67%) participants. The structural model was run separately for younger and older participants and the results of the model goodness-fit indices revealed that the model had a good fit for both the younger (χ^2/df (CMIN/df) = 2.451; RMSEA = 0.064; GFI = 0.921; AGFI = 0.884; IFI = 0.967; CFI = 0.966) and older group (χ^2/df (CMIN/df) = 2.143; RMSEA = 0,052; GFI = 0.940; AGFI = 0.912; IFI = 0.977; CFI= 0 .976).

The results of the multi-group analysis presented in Table 38. The relationship between ATU→

BIU is significantly moderated by age and is stronger for younger participants than older ones.

The relationships between PU→BIU and TRU→BIU are not moderated by age.

Table 38 Influence of age on the relationships between (ATU, TRU and PU) and BIU

Hypothesis	Path	Older		Younger		z-score	Results
		Estimate	P	Estimate	P		
H8b1	PU→BIU	0.321	0.000	0.194	0.015	-1.211	Rejected
H8b2	ATU→BIU	0.398	0.000	0.556	0.000	1.66*	Supported
H8b3	TRU→BIU	0.204	0.000	0.294	0.000	1.266	Rejected

Notes: *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.10

6.5.3 Influence of usage experience

To make analysis of usage experience easier, the entire sample of participants (n=782) was

divided into two experience groups: <1 year (less experience) and ≥1 year (more experience).

There were slightly fewer participants with less experience (344; 43.98%) than those with more

experience (438, 56.01%). The structural model was run separately for each group and results

of the model goodness-fit indices revealed that the model had an acceptable fit for both the less

experienced group (χ^2/df (CMIN/df) = 2.385; RMSEA = 0.064; GFI = 0.922; AGFI = 0.886;

IFI = 0.970; CFI = 0.970) and the more experienced group (χ^2/df (CMIN/df) = 3.216; RMSEA

= 0,071; GFI = 0.917; AGFI = 0.879; IFI = 0.950; CFI = 0.950).

The results of the multi-group analysis presented in Table 39. The relationship between ATU→

BIU is significantly moderated by usage experience with a stronger relationship for less

experienced users. The relationships between PU→BIU and TRU→BIU are not moderated by

usage experience.

Table 39 Influence of usage experience on the relationships between (ATU, TRU and PU) and BIU

Hypothesis	Path	Less experience		More experience		z-score	Results
		Estimate	P	Estimate	P		
H9c1	PU→BIU	0.309	0.037	0.198	0.000	0.956	Rejected
H9c2	ATU→BIU	0.659	0.000	0.348	0.000	3.171***	Supported
H9c3	TRU→BIU	0.275	0.000	0.254	0.000	-0.287	Rejected

Notes: *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.10

6.6 Summary

This chapter identified and measured the factors that influence users' intentions to use m-government applications in the Saudi Arabian context via Maximum Likelihood. The results revealed that PU, ATU and TRU have a significant positive influence on BIU m-government applications while PEU, AWAR and SEC did not have a significant influence. This chapter also demonstrated that Saudi citizens have a positive attitude toward using m-government applications. The chapter also examined and validated the applicability of the modified TAM and demonstrated that the model has a good fit values in the Saudi m-government context. Finally, this chapter measured the influence of moderators (gender, age and usage experience) on relationships between exogenous factors (ATU, PU, and TRU) and the endogenous factors (BIU) in the research model. The results revealed that gender, age and usage experience moderate the relationship between ATU and BIU but not those between PU and BIU and TRU and BIU. The relationship between ATU and BIU is stronger for females, younger users, and users with less experience.

Chapter 7: Qualitative Data Analysis

7.1 Introduction

An explanatory sequential strategy was applied in this study. This involves two phases: a quantitative method with more priority and weight in the overall results (Chapters 5-6), followed by qualitative methods to confirm, interpret, explain and provide deeper understanding of the quantitative results (this chapter).

In this chapter, 14 semi-structured interviews were conducted with Saudi citizens (Appendix O). Table 40 summarises the demographic data about the 14 participants including gender, age and experience in using m-government applications.

Table 40 Demographic data for participants

Participant	Gender	Age	Experience
1	Male	48	2 years
2	Female	26	NO Experience
3	Male	18	NO Experience
4	Female	24	NO Experience
5	Female	23	NO Experience
6	Female	35	NO Experience
7	Male	30	4 years
8	Male	60	2 years
9	Male	28	1.5 years
10	Male	32	2 years
11	Male	41	1 year
12	Male	36	3 years
13	Female	49	2 years
14	Female	45	6 months

7.2 Qualitative Data Analysis

The principles and steps used to analyse the qualitative data have already been described in Chapter 3 (section 3.6.2).

7.2.1 The relationship between perceived ease of use PEU and BIU

The quantitative results showed that PEU did not have a significant positive influence on BIU m-government applications. This result was incompatible with previous studies in the literature. Therefore, in this qualitative study, participants were asked to provide detailed responses about the influence of PEU on their intention to use m-government applications. The qualitative results revealed that the majority of participants agreed that PEU has a significant positive influence on their intention to use m-government applications which is contrary to the quantitative results.

Some participants provided reasons which explain why PEU was not found to significantly influence BIU m-government applications in the quantitative study. First, most participants stated that users focus on and need useful services and do not care very much about ease of use these applications. Participant 1 said "*I think the usefulness of applications is more important than their ease of use. But it is better to combine these two characteristics to encourage citizens to use these applications.*" Participant 2 stated "*I think the ease of use of applications is very important but, at this time, providing beneficial services to citizens via m-government applications is more important than the ease of using these applications.*" Participant 6 confirmed this saying "*at this time in Saudi Arabia, I think m-government applications are not popular among citizens because some government sectors have not provided their services via mobile applications. So I do not care about ease of use but I focus on getting government services via applications*" while Participant 12 stated "*I think it is preferable but not a must because I will use it anyway.*"

Another reason stated by some participants, is that some users face difficulties when using m-government applications. Participant 7 noted that "*I think most m-government applications are very complex for users, especially those who do not have experience with technology. So, users face some difficulties in using these applications.*" Participant 14 asserted that "*I think some m-government applications are not easy to use because they do not have clear instructions to describe how to use them.*"

In summary, although PEU did not have a significant positive influence on BIU m-government applications in the quantitative study, it did have a significant effect in the qualitative study. Reasons to explain why PEU did not have a significant positive influence on BIU m-government applications in the quantitative study include: (i) users being more concerned about having access to and using a useful service than how easy the service is to use, and (ii) some users face difficulties when using m-government applications.

7.2.2 The relationship between perceived usefulness PU and BIU

The quantitative results showed that PU had a significant positive influence on BIU m-government applications. In this qualitative study, participants were asked about the influence PU on their intention to use m-government applications provide deeper understanding of the quantitative results. The qualitative results revealed that all participants strongly agreed that PU has a significant positive influence on their intention to use m-government applications, which confirmed the quantitative results.

Some participants stated that the reasons for this result are that the usefulness of these applications will save time and effort. Participant 14 commented "*because if the application is beneficial, that will increase my intention to use it and that will save me time and effort instead of travelling to get government services.*" Participant 1 confirmed that explanation saying "*if the applications are not useful I will not use them because that will waste my time and efforts.*"

Participant 3 stated "*I do not want to waste my time in using applications that are not beneficial. So, the usefulness of using applications will encourage me to use them.*"

Participants also stated that the usefulness of these applications will help users accomplish their work easily which leads to increased productivity. Participant 4 commented "*because if m-government applications are useful, they will fulfil my needs and encourage me to use them.*" Participant 6 said "*the usefulness of applications will increase my intention to use them because these applications will assist me to easily accomplish my work.*" Participant 8 noted that "*When usefulness increases, that leads to an increase in the use of these applications because using these applications will increase productivity for the government and citizens.*" Furthermore, Participant 12 confirmed that "*because if the application will get the job done, it will be more useful to use it, especially if it has extra features like tracking, enquiring.*"

To conclude, the qualitative study demonstrated that PU has a significant positive influence on users' intentions to use m-government applications, which confirmed the quantitative results. This is primarily due to savings in time and effort, increased productivity, and helping users easily accomplish their work.

7.2.3 The relationship between attitude towards using ATU and BIU

The quantitative results showed that ATU had a significant positive influence on BIU m-government applications. In this qualitative study, participants were asked about the influence ATU on their intention to use m-government applications. The qualitative results revealed that the majority of participants strongly agreed that ATU has a significant positive influence on their intention to use m-government applications, which confirmed the quantitative results.

The main reason for this result provided by participants was that users want to get the benefits of using m-government applications, such as saving time, effort and increasing productivity. Participant 1 stated that "*I have a positive attitude towards using these applications. I want to*

get the benefits from these applications." Participant 2 said "*because these applications will serve me well and facilitate my efforts to obtain many things that I need.*" Along the same line, Participant 3 confirmed that "*because using these applications will facilitate many things in my life, such as increased productivity, saving time and convenience.*" Participant 6 agreed asserting that "*these applications will assist me to accomplish my work easily in my home, save my time and effort, and do not require me to travel to government sectors to accomplish my work.*"

To conclude, the qualitative study revealed that ATU has a significant positive influence on users' intentions to use m-government applications, which confirmed the quantitative results. This was primarily due to users wanting to get the benefits of m-government applications.

7.2.4 The relationship between perceived trustworthiness TRU and BIU

The quantitative results showed that TRU had a significant positive influence on BIU m-government applications. In this qualitative study, participants were asked about the influence TRU on their intention to use m-government applications. The qualitative results revealed that all participants strongly agreed that TRU has a significant positive influence on their intention to use m-government applications, which confirmed the quantitative results.

The main reason for this result is that users trust the government which provided the applications to accomplish their tasks and protect their data. Participant 1 stated "*these applications have been provided by the government, I trust them and use them*", while Participant 2 said "*Because these applications have been provided by the government and not individuals, my trust in these applications is very high and that will encourage me to use them.*" Participant 4 said "*if these applications are released by the government, trust is very high*", which was confirmed by Participant 6 who asserted that "*it is natural that I trust m-government applications because these applications have been provided by the government.*" Participant 9 stated that "*because if I trust the application, that will encourage me to use it and to upload my*

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data because I trust the provider to serve me and to protect my data", while Participant 11 said "*because I feel m-government applications are trustworthy because I trust the government sectors to allow me to accomplish my tasks and protect my data, which encourages me to use these applications.*"

To conclude, the qualitative study revealed that TRU has significant positive influence on users' intentions to use m-government applications, which confirmed the quantitative result. This is primarily due to users trusting the government which provided the applications.

7.2.5 The relationship between awareness AWAR and BIU

The quantitative results showed that AWAR did not have a significant positive influence on BIU m-government applications which incompatible with the results of previous studies. Therefore, in this qualitative study, participants were asked to provide details about the influence of AWAR on their intention to use m-government applications. The qualitative results revealed that the majority of participants agreed that AWAR had a significant positive influence on their intention to use m-government applications which is contrary to the quantitative results.

Several reasons were provided by the participants which explain why AWAR was not found to significantly influence BIU m-government applications in the quantitative study. First, the low level of awareness among citizens. Participant 1 stated "*I think the level of awareness is low between citizens. Some citizens do not care about these applications and their use, and government sectors do not spread awareness between citizens very well*", which was supported by Participant 2 who said "*I think, at this time, Saudi society is not very technologically aware so there is a lack of awareness of these applications. So, I think the government should provide workshops and training courses for citizens who want to use these applications, and also the government should increase awareness among citizens via media to encourage them to use these applications.*"

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Participant 6 highlighted some of the reasons for lack of awareness among citizens "*I think there is a lack by government sectors in spreading awareness about their service among citizens. So, government sectors should use media and social media to spread awareness of their services among citizens to encourage them to use them*" while Participant 8 stated "*I think there are not enough advertisements for m-government applications from government sectors. For example, yesterday my friend told me about a new m-government application from the Saudi Commission for Tourism and National Heritage. If he did not tell me about that, I will not know about this application and not use it. So, I think some citizens do not know about some m-government applications, because if they did, they will use them to get government services.*" Participant 10 highlighted another issue leading to low awareness among citizens "*I think awareness in our society is low due to the absence of workshops by government sectors to encourage citizens to use these applications. Also, there is no educational system compatible with the technological revolution these days. Also, I think the media does not adopt a good role in increasing awareness among citizens.*" Participant 11 stated that there was also "*a lack of users who share their experiences to encourage others to use these applications. For example, I encouraged my friend to renew his passport via the Absher application. At first he was not confident about that, but when he used the Absher application and accomplished the task effectively, he said that he did not expect that from the application.*" Finally, Participant 13 said "*I think there is a lack of awareness because schools and governments do not encourage people to use these applications.*"

Another reason for the low awareness among citizens was identified by Participant 4 "*I think it is not necessary to know and use these applications because I can get government services via traditional processes.*" Participant 5 agreed saying "*I think some citizens still prefer a traditional process to get government services. So, they do not care about these applications.*" This was confirmed by Participant 14 who said "*I think awareness among citizens about these*

applications is still not widespread and some citizens have resistance to change because they prefer nepotism to get government services and they know if they use applications nepotism will not be possible."

Another reason to explain this unusual result is that some users already trust the government, so they will do as the government asks them. Participant 7 stated that "*I think awareness is not a crucial factor to increase my intention to use m-government applications, because I already trust the government sectors (providers). In short, while all these applications provide government services and are provided by the government, awareness is not very important for users because users already trust the government. Also, now when I go to the government sector to get government services via the traditional way, they will ask me to get these services via their systems. I mean that it will become compulsory for citizens to get government services in that way.*" This was confirmed by Participant 9 who said "*I already trust the government and users already know about these applications and their benefits. So, it does not influence me very much.*"

To conclude, although AWAR did not have a significant positive influence on BIU m-government applications in the quantitative study, it did have a significant effect in the qualitative study. Reasons to explain why AWAR did not have a significant positive influence on BIU m-government applications in the quantitative study include: (i) the low level of awareness among citizens due to some users being resistant to change and preferring traditional process, and (ii) some users already trusting the government and therefore doing what the government asks them.

7.2.6 The relationship between perceived security SEC and BIU

The quantitative results showed that SEC did not have a significant positive influence on BIU m-government applications which is incompatible with the results of previous studies. Therefore, in this qualitative study, participants were asked for detailed responses about the

influence of SEC on their intention to use m-government applications. The qualitative results revealed that the majority of participants agreed that SEC has a significant positive influence on their intention to use m-government applications which is contrary to the quantitative results.

Participants provided several reasons for why SEC did not have a significant positive influence on BIU m-government applications in the quantitative study. The first reason stated by most participants is that these applications have been provided by government and as users already trust the government, they do not care about security. Participant 1 said that "*I think that while these applications have been provided by the government, I am not concerned very much about security because I already trust the government to protect my data. However, if we want to talk about other applications, such as mobile banking applications, security is a very important factor because I do not trust the providers very much.*" Along the same lines, Participant 2 noted that "*while these applications have been provided by government, citizens are very trustful of the government to protect their data. Therefore, citizens do not worry very much about security when they use m-government applications.*" Participant 5 confirmed this observation saying that "*because these applications have been released by government, they will definitely be secure and I will not hesitate to use them*", while Participant 10 stated "*I think the majority of citizens trust the government, so they do not care about security.*"

Another reason for this unusual result is that users focus on and need useful services and care less about security. Participant 13 stated that "*I think in Saudi Arabia users do not care about security because they want to accomplish their works via m-government applications as fast as possible without thinking of any security issues.*"

To conclude, although SEC did not have a significant positive influence on BIU m-government applications in the quantitative study, the qualitative results revealed that SEC was important.

Participants suggested that the insignificant influence of SEC on BIU m-government applications in the quantitative study may be due to users trusting applications provided by the government and users focus on useful services rather than security.

7.2.7 Gender

The quantitative results revealed that gender had significantly moderated the relationship between ATU and BIU and was stronger for females than males, i.e. females were more likely to use m-government applications than males. This result was incompatible with results from many previous studies. So, in this qualitative study, participants were asked about differences between females and males regarding their attitude toward using m-government applications. The qualitative results revealed that the majority of participants agreed that the attitude toward using m-government applications is stronger for females which confirmed the quantitative result.

Participants stated several reasons explaining why females have more a significant positive attitude toward using m-government applications than males. First, as Saudi society is considered conservative, females prefer to do their work in their homes via these applications, so their attitude toward using these applications is stronger than for males. Participant 8 said "*As our society is conservative, it is the biggest reason to encourage females to learn and use m-government applications from home.*" Participant 10 confirmed this stating "*because I think females feel a great freedom in using m-government applications, due to the fact that our society is conservative and it is difficult for them to go out to get government services, so they are keen to use these applications in their home.*" Along the same lines, Participant 1 asserted "*because females can use these applications to get government services from their homes while males can get government services by going to a ministry and getting services from there. I mean that, in Saudi society, it is difficult for females to go to ministries to get services but it is easy for them to get government services by using these applications from home.*" Participant

4 added "*females want to get the benefits of using applications that allow them to access government services from home.*"

The second reason is the certain circumstances and obligations that females sometimes experience. Participant 5 stated "*because females sometimes are in circumstances such as being divorced or widowed and do not have a breadwinner. Therefore, these applications are very useful for them to use from their homes*", while Participant 7 said "*because I think Saudi culture prefers that females access government services online rather than in traditional ways, because females usually have some obligations such as caring for their kids and husbands. Therefore, females in Saudi Arabia have positive attitude toward using m-government applications more than males.*"

A third potential reason is that females usually like to discover and use new things. Participant 6 noted that "*in Saudi Arabia, it is natural that females like to discover and use new technologies more than males because males usually are very busy with their work and they are not very interested in discovering new technologies.*" This was confirmed by Participant 8 who stated "*because females usually like to learn and use new things, including new technologies.*"

The last reason participants proposed to explain this result is that females in Saudi Arabia cannot drive to go ministries, so they want to use these applications instead. Participant 13 claimed that "*This is because in Saudi Arabia, females can't drive cars. Therefore, it is easier for them to use m-government applications instead.*"

To conclude, the qualitative study revealed that the attitude toward using m-government applications is stronger for females than males which confirmed the quantitative results. The main reasons for this result are (i) that the Saudi society is considered conservative, so females prefer work from home using these applications, (ii) females sometimes have certain

circumstances and obligations making it preferable for them to use applications, (iii) females usually like to discover and use new things, and (iv) females in Saudi Arabia cannot drive to go ministries.

7.2.8 Age

The quantitative results showed that age significantly moderated the relationship between ATU and BIU and was stronger for younger participants, i.e. younger citizens are more likely to use m-government applications than older ones. This result is compatible with previous studies. So, in this qualitative study, participants were asked about the differences between younger and older users regarding their attitude toward using m-government applications. The qualitative results revealed that the majority of participants agreed that the attitude toward using m-government applications is stronger for younger than older users which confirmed the quantitative result.

Several reasons were proposed by participants to explain why younger users have more a significant positive attitude toward using m-government applications than older users. First, younger people usually like to discover new technology, and are more familiar with and have more experience with technology than older people. Participant 13 said "*they [younger people] are familiar with the technology, while aged people might find it difficult to use these applications.*" Participant 1 stated that "*because younger people are usually more educated than older people and younger people have also grown up with these technologies so they are more familiar with them than older people. Also, older people are more familiar with and prefer the traditional process to get government services than by technological processes.*" Participant 2 confirmed this saying "*because the young generation has learned to use new technologies more than the older generation. So, we can say that this generation is the technological generation. Also, I think younger people have more experience in using technology and getting the benefit of these applications than older people*", while Participant

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6 said "*because younger people like to use and discover new technologies more than older people.*" Participant 8 also agreed saying "*because younger people usually tend to use sophisticated things, including new technologies, more than older people.*"

Another reason for this result could be that Saudi culture encourages younger people to serve older people. Participant 7 stated that "be*cause Saudi culture encourages younger people to serve older people. So, younger people want to know about and use these applications, not for themselves, but to help their elders such as neighbours, fathers, mothers or other relatives.*" Along the same lines, Participant 8 confirmed that "*in Saudi society, younger people should usually serve their elders so that younger people should learn about and use these applications to assist elders such as fathers and mothers.*"

The last reason proposed is that young people usually have better skills to use new technologies than older people which was stated by Participant 8 "*Also, some new technologies need skills such as the English language and younger people are better in those skills than older people.*"

To conclude, the qualitative results revealed that the attitude toward using m-government applications is stronger for younger people which confirmed the quantitative results. The main reasons for this result are (i) younger people usually like to discover new technology, are more familiar with and have experience with technology than older people, (ii) Saudi culture encourages younger people to serve older people, and (iii) younger people usually have better skills to use new technologies than older people.

7.2.9 Usage experience

The quantitative results showed that usage experience significantly moderated the relationship between ATU and BIU and was stronger for less experienced users, i.e. users who have less experience have a more significant positive attitude toward using m-government applications than experienced users. This result is incompatible with those from previous studies. So, in this

qualitative study, participants were asked about the differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications. The qualitative results revealed that the majority of participants agreed that attitude toward using m-government applications is stronger for less experienced than more experienced users which confirmed the quantitative results.

Participants proposed several reasons to explain these unusual results. First, users who have less experience want to use new technologies to obtain their benefits, such as m-government applications. Participant 1 noted "*users who have less experience want to learn and use new technologies such as m-government applications to gain the benefits of the government services provided by these applications.*" Participant 2 stated "*because they want to improve and develop themselves by using new technologies more than users who have more experience. Also, they want to get government services and gain the benefits of these applications.*" Along the same lines, Participant 3 claimed that "*because I think users who have less experience have the desire and are keen to use new technologies, including m-government applications, and benefit more from these applications than users who have more experience.*" While Participant 11 stated "*They regret not using these applications when they hear from users how useful the applications are in completing their work. Therefore, users who have less experience are more enthusiastic than others to use these applications.*" Participant 10 thought that, "*users who have less experience are more curious to discover and use new technologies than users who have more experience, because they want to gain the benefits of the technological revolution.*"

Another reason could be that most ministries in Saudi Arabia now provide their services only via electronic systems and applications, as observed by Participant 1, "*most ministries now ask citizens to access all government services through systems and applications, and this encourages users who have less experience to use these applications.*"

To conclude, the qualitative study revealed that the attitude toward using m-government applications is stronger for users who have less experience which confirmed the quantitative results. Proposed explanations include (i) less experienced users want to use new technologies to get the benefits and (ii) most ministries in Saudi Arabia now only provide their services via systems and applications.

7.3 Summary

Semi-structured interviews were conducted with citizens to confirm, interpret, explain and provide deeper understanding of the quantitative results, especially unexpected results relating to PEU, AWAR, SEC, gender and usage experience. The results from the qualitative study are summarised below:

1. Most participants agreed that PEU has a significant positive influence on their intention to use m-government applications which was incompatible with the quantitative results. Reasons to explain why PEU did not have a significant positive influence on BIU m-government applications in the quantitative study include (i) users focusing on and needing useful services and caring less about ease of use of the applications, and (ii) some users face difficulty in using m-government applications.

2. All participants strongly agreed that PU has a significant positive influence on their intention to use m-government applications which confirms the quantitative results. Participants suggested that this is because useful applications will save time and effort, increase productivity, and enable users to easily accomplish their work.

3. Most participants strongly agreed that ATU has a significant positive influence on their intention to use m-government applications which confirms the quantitative results. The main reason for this result is that users want to get the benefits of using

m-government applications such as saving time and effort, and increased productivity.

4. All participants strongly agreed that TRU has a significant positive influence on their intention to use m-government applications which confirms the quantitative results. The main reason for this result is that users trust the government which provided the applications to accomplish their tasks and protect their data.

5. Most participants agreed that AWAR has a significant positive influence on their intention to use m-government applications which is incompatible with the quantitative results. Reasons to explain why AWAR did not have a significant positive influence on BIU m-government applications in the quantitative study include (i) the low level of awareness among citizens due to some users resisting change and preferring traditional process, and (ii) some users already trusting the government so doing what the government asks them.

6. Most participants agreed that SEC has a significant positive influence on their intention to use m-government applications which is incompatible with the quantitative results. Reasons to explain why SEC did not have a significant positive influence on BIU m-government applications in the quantitative study include (i) users already trusting the government, and therefore not caring about security in m-government applications, and (ii) users being focused on useful services rather than security.

7. Most participants agreed that attitude toward using m-government applications is stronger for females than males which confirms the quantitative results but is incompatible with many previous studies. Several reasons for this result were proposed by participants: (i) Saudi society is considered conservative, so females prefer to work from homes using these applications, (ii) females sometimes have

certain circumstances and obligations, making them keen to use m-government applications, (iii) females usually like to discover and use new things, and (iv) females in Saudi Arabia cannot drive to go ministries.

8. Most participants agreed that attitude toward using m-government applications is stronger for younger than older users which confirms the quantitative results. The three main reasons for this result are: (i) younger people usually like to discover new technology, are more familiar with and have more experience with technology than older people, (ii) Saudi culture encourages younger people to serve older people, and (iii) younger people usually have better skills to use new technologies than older people.

9. Most participants agreed that the attitude toward using m-government applications is stronger for less experienced than more experienced users which confirms the quantitative results but is incompatible with previous studies. Participants stated two reasons for this result: (i) less experienced users want to use new technologies to obtain the benefits, and (ii) most ministries in Saudi Arabia now only provide their services via systems and applications.

Chapter 8: General Discussion

8.1 Introduction

This research was conducted in two phases, a quantitative questionnaire followed by a qualitative interview. This chapter presents the results of both phases in more detail to provide a clear picture of the factors influencing users' intentions to use m-government applications in Saudi Arabia. Each factor is discused separately to better elucidate the extent of its influence on BIU. The chapter finishes with some recommendations for decision makers in the Saudi government to enable the effective and rapid uptake of m-government applications by citizens.

8.2 Major Findings of the Quantitative Study

Details of the major findings of the quantitative study can be found in Chapter 7. In summary, the main outcomes from analyses of the 782 questionnaires were:

1. Perceived usefulness (PU), attitude toward use (ATU) and perceived trustworthiness (TRU) had a significant positive influence on behavioural intention to use (BIU) m-government applications.

2. Perceived ease of use (PEU), awareness (AWAR) and perceived security (SEC) did not influence BIU m-government applications.

3. Saudi citizens have a positive attitude toward using m-government applications and considered these applications a good and positive idea.

4. The relationship between ATU→BIU is moderated by gender with a stronger influence in females than males. The relationships between PU→BIU and TRU→BIU are not moderated by gender.

5. The relationship between ATU→BIU is moderated by age with a stronger influence in younger users than older users. The relationships between PU→BIU and TRU→BIU are not moderated by age.

6. The relationship between ATU→BIU is moderated by usage experience with a stronger influence in less experienced compared to more experience users. The relationships between PU→BIU and TRU→BIU are not moderated by usage experience.

7. The model has a good fit values for the Saudi m-government context.

8. Attitude toward use (ATU) has the greatest influence on BIU m-government applications in Saudi Arabia followed by perceived usefulness (PU) and perceived trustworthiness (TRU).

8.3 Major Findings of the Qualitative Study

Details of the major findings of the qualitative study can be found in Chapter 8. In summary, the main outcomes from analyses of the 14 semi-structured interviews were:

1. Most participants agreed that PEU has a significant positive influence on their intention to use m-government applications which is incompatible with the quantitative results. Reasons to explain why PEU did not have a significant positive influence on BIU m-government applications in the quantitative study include (i) users focusing on and needing useful services and caring less about ease of use of the applications, and (ii) some users face difficulty in using m-government applications.

2. All participants strongly agreed that PU has a significant positive influence on their intention to use m-government applications which confirms the quantitative results. Participants suggested that this is because useful applications will save time and effort, increase productivity, and enable users to easily accomplish their work.

3. Most participants strongly agreed that ATU has a significant positive influence on their intention to use m-government applications which confirms the quantitative results. The main reason for this result is that users want to get the benefits of using m-government applications such as saving time and effort, and increased productivity.

4. All participants strongly agreed that TRU has a significant positive influence on their intention to use m-government applications which confirms the quantitative results. The main reason for this result is that users trust the government which provided the applications to accomplish their tasks and protect their data.

5. Most participants agreed that AWAR has a significant positive influence on their intention to use m-government applications which is incompatible with the quantitative results. Reasons to explain why AWAR did not have a significant positive influence on BIU m-government applications in the quantitative study include (i) the low level of awareness among citizens due to some users resisting change and preferring traditional process, and (ii) some users already trusting the government so doing what the government asks them.

6. Most participants agreed that SEC has a significant positive influence on their intention to use m-government applications which is incompatible with the quantitative results. Reasons to explain why SEC did not have a significant positive influence on BIU m-government applications in the quantitative study include (i) users already trusting the government, and therefore not caring about security in government applications, and (ii) users being focused on useful services rather than security.

7. Most participants agreed that attitude toward using m-government applications is stronger for females than males which confirms the quantitative results but is

incompatible with many previous studies. Several reasons for this result were proposed by participants: (i) Saudi society is considered conservative, so females prefer to work from homes using these applications, (ii) females sometimes have certain circumstances and obligations, making them keen to use m-government applications, (iii) females usually like to discover and use new things, and (iv) females in Saudi Arabia cannot drive to go ministries.

8. Most participants agreed that attitude toward using m-government applications is stronger for younger than older users which confirms the quantitative results. The three main reasons for this result are: (i) younger people usually like to discover new technology, are more familiar with and have more experience with technology than older people, and (ii) Saudi culture encourages younger people to serve older people, and (iii) younger people usually have better skills to use new technologies than older people.

9. Most participants agreed that the attitude toward using m-government applications is stronger for less experienced than more experienced users which confirms the quantitative results but is incompatible with previous studies. Participants stated two reasons for this result: (i) less experienced users want to use new technologies to obtain the benefits, and (ii) most ministries in Saudi Arabia now only provide their services via systems and applications.

8.4 Discussion of the Results

8.4.1 The influence of perceived ease of use (PEU) on users' intentions to use m-government applications

Perceived ease of use (PEU) can be defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989: 320). Davis expanded this point in stating that PEU is a factor that plays a key role in the adoption of new technology. In the

context of this research into Saudi m-government context, PEU is defined as the user's belief that using m-government applications will be easy and free of effort. The hypothesis and sub-research question for this factor are:

H1: Perceived ease of use PEU will have a significant positive influence on behavioural intention to use BIU m-government applications.

Q1: Does PEU influence users' intentions to use m-government applications?

The Maximum Likelihood analysis revealed that PEU does not influence BIU m-government applications in the Saudi context. This result contradicts those of many studies that found PEU had a significant positive influence on BIU (e.g. Abu-Shanab & Haider, 2015; Alharbi & Drew, 2014; Davis, 1989; Sharma & Chandel, 2013). However, our result is supported by Park (2009), who found that PEU did not have a significant influence on intention to use e-learning in Korea and Abaza and Saif (2015) who found that PEU had no significant influence on intention to use m-government. Luthfihadi and Dhewanto (2013) found that PEU did not influence intention to use the e-commerce forum Jual Beli (FJB) Kaskus, in Indonesia. Candra (2013) found that ease of use had no significant effect on intention to use internet banking in Indonesia while Gilbert, Balestrini, and Littleboy (2004) reported that ease of use did not influence intention to use e-government services. Some studies (e.g. Davis, 1989; Karahanna & Straub, 1999) stated that ease of use was not a strong factor for measuring the intention to use new systems but was better for predicting usefulness.

The semi-structured interviews with citizens explored why PEU did not appear to have a significant positive influence on users' intentions to use m-government applications in Saudi Arabia. Most participants proposed several reasons to explain this result. First, as m-government applications have not been adopted completely in Saudi Arabia, users are more focused on whether a service is useful rather than how easy it is to use. For example, Participant

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2 stated *"I think the ease of use of applications is very important but, at this time, providing beneficial services to citizens via m-government applications is more important than the ease of using these applications."* This was supported by Participant 6 who said *"at this time in Saudi Arabia, I think m-government applications are not popular among citizens because some government sectors have not provided their services via mobile applications. So I do not care about ease of use but I focus on getting government services via applications."* This explanation is supported by some previous studies that claim the use of m-government in Saudi Arabia is still in its infancy (Alhussain, 2012; Alotaibi & Roussinov, 2015; Alrowili et al., 2015; Alsenaidy & Ahmad, 2012).

Another reason stated by some participants is that some users face difficulties when using m-government applications. For example, Participant 7 noted that *"I think most m-government applications are very complex for users, especially those who do not have experience with technology. So, users face some difficulties in using these applications"*, and Participant 14 who asserted *"I think some m-government applications are not easy to use because they do not have clear instructions to describe how to use them."*

This result indicates that users may accept the difficulty in using m-government applications which have already been released or are struggling to use these applications because they want to get services. The result may also indicate that most participants have much experience in using technology, so they do not care about the ease of use of the applications. This is supported by Davis et al. (1989) and Venkatesh (2000) who claimed that when users obtain a lot of experience using the system, the relationship between PEU and BIU will be insignificant.

It goes without saying that decision makers in the Saudi government who are involved with m-government applications, especially Yesser, should provide the services via applications in a user-friendly way with clear and simple instructions to encourage users to use and operate these

applications. In addition, application designers and developers should take into account the different characteristics of potential users—such as whether or not they are educated and whether they have experience with software use in general—when producing applications for the general public.

8.4.2 The influence of perceived usefulness (PU) on users' intentions to use m government applications

According to Davis (1989: 320), perceived usefulness (PU) can be defined as "the degree to which a person believes that using a particular system would enhance his or her job performance." Perceived usefulness is important factor because it may lead to rejection or acceptance of the new technology (Davis, 1989). In the Saudi m-government context, perceived usefulness PU is defined as a user thinking that his or her job will be more productive and efficient using m-government applications. The hypothesis and sub- research question for this factor are:

H2: Perceived usefulness PU will have a significant positive influence on behavioural intention to use BIU m-government applications.

Q2: Does PU influence users' intentions to use m-government applications?

Maximum Likelihood analysis revealed that PU has a significant positive influence on BIU m-government applications in Saudi Arabia. This outcome indicates that most participants will intend to use m-government applications if they consider these applications useful. That is, PU will drive the Saudi citizens to use m-government applications more than PEU. This result supports several previous studies. Zafiropoulos et al. (2012), found that PU has a positive effect on intention to use an e-government service by teachers in Greece. Alharbi and Drew (2014) found that PU has a significant positive influence on BIU learning management systems (LMS) in Saudi Arabia while Alrowili et al. (2015) observed that increased PU of using m-government services had a significant positive impact on BIU of m-government services. A later review by

Baabdullah, Nasseef, and Alalwan (2016) stated that many studies have confirmed that PU has a key role in users' intentions to use m-government services in a m-government context. In short, this result indicates that as Saudi citizens consider the m-government applications useful for accomplishing their tasks, they are more likely to use the applications.

In the semi-structured interviews on PU, some participants provided reasons for this result including: useful applications will save time, save effort, increase productivity, and help users easily accomplish their work. For example, Participant 6 said that "*the usefulness of applications will increase my intention to use them because these applications will assist me to easily accomplish my work.*" Participant 8 noted that "*When usefulness increases, that leads to an increase in the use of these applications because using these applications will increase productivity for the government and citizens.*"

Therefore, decision makers in the Saudi government who provide m-government applications for citizens, especially Yesser, should consider PU when providing these applications. This is logical because if the applications do not provide a useful service for citizens, the applications will not be used. To this end, the government should conduct a study (through a questionnaire or similar survey) to determine what services citizens are looking for, and then provide these services in their applications. All ministries should provide their services via applications which are considered useful by the public to encourage citizens to quickly use m-government applications as their first choice of service type.

8.4.3 The influence of attitude toward use (ATU) on users' intentions to use m-government applications

According to one definition (Al-Adwan et al., 2013: 6), attitudes are "an individual's positive or negative feelings (evaluative affect) about performing the target behaviour." In the Saudi m-government context, a positive attitude is defined as that of a user who considers m-government

applications are a good and positive idea. The hypothesis and sub- research question for this factor are:

H3: Attitude towards using ATU will have a significant positive influence on behavioural intention to use BIU m-government applications.

Q3: Does ATU influence users' intentions to use m-government applications?

The Maximum Likelihood analysis revealed that ATU has a significant positive influence on BIU m-government applications in Saudi Arabia. This result is compatible with previous research. Maditinos (2007) found that attitude has a positive impact on intention to use e-commerce in Greece. Alharbi and Drew (2014) stated that ATU has a positive impact on intention to use an LMS in Saudi Arabia. This outcome is supported by a later study (Alrowili et al., 2015), which found that attitude toward using m-government services has a positive effect on intention to use these services.

Q4: Do Saudi citizens have a positive attitude toward using m-government applications? As mentioned above, the Maximum Likelihood analysis revealed that ATU has a significant positive influence (the most influential factor) on BIU m-government applications. The results of the preliminary analysis and data screening also revealed that participants tended to give high ratings to items, usually in the moderately agree (6) to strongly agree (7) interval, particularly for items related to ATU. In other words, most participants were in effect using a four-point scale that utilised the four main positive responses (4 = Neutral, 5 = Slightly Agree, 6 = Moderately Agree and 7 = Strongly Agree) for items related to ATU.

These results indicate that Saudi citizens have a positive attitude toward using m-government applications and they intend to use these applications in the future to effectively and efficiently accomplish their work. This outcome is supported by Alhussain and Drew (2010) which found that most participants (male and female) want to use government services via mobile devices

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in Saudi Arabia. This result means that citizens should easily use and adopt m-government applications without any resistance to change which will support the government in successfully providing these applications.

The semi-structured interviews explored why ATU has a significant positive influence on users' intentions to use m-government applications in Saudi Arabia. Some participants stated that the positive attitude was due to users wanting to get the benefits of using m-government applications such as saving time, effort and increasing productivity. For example, Participant 1 stated "*I have a positive attitude towards using these applications. I want to get the benefits from these applications.*" Participant 2 added "*because these applications will serve me well and facilitate my efforts to obtain many things that I need*".

Decision makers in the Saudi government who are providers of m-government applications for citizens, should continue to promote the positive ATU of citizens by expanding the provision of services via applications. Ministries should also provide services to contribute towards the transition to m-government, e.g. education programs and feedback about ease of use should be implemented during the rollout of these services as well as user-friendly designs.

8.4.4 The influence of perceived trustworthiness (TRU) on users' intentions to use m-government applications

Al-Busaidi (2012: 51) defined trustworthiness as "perception of confidence in the electronic marketer's reliability and integrity." Alsaghier et al. (2009: 298) defined trust in terms of trustor and trustee— "an individual's (trustor, here a citizen's) belief or expectation that another party (trustee, here e-government) will perform a particular action important to the trustor in the absence of the trustor's (citizen's) control over the trustee's (e-government's) performance." The hypothesis and sub- research question for this factor are:

H4: Perceived trustworthiness TRU will have a significant positive influence on behavioural intention to use BIU m-government applications.

Q5: Does TRU influence users' intentions to use m-government applications?

The Maximum Likelihood analysis revealed that TRU has a significant positive influence on BIU m-government applications in Saudi Arabia. This result indicates that most participants in this study trust m-government applications and their benefits. They also trust these applications to perform services via smart phones. This outcome is consistent with the literature. Carter & Bélanger (2005) observed that when trust in the internet and government increased, the intention to use e-government services also increased. Carter and Weerakkody (2008) found that trust has a positive impact on e-government services in the UK while Alrowili et al. (2015) discovered that perceived trust has a direct positive effect on users' intentions to use m-government services. Alotaibi and Roussinov (2015) support this outcome, finding that perceived trustworthiness has a strong significant correlation with intention to use m-government services. This view is shared by many authors who agree that trust is an important factor in the adoption of e-government and m-government initiatives and services (Abunadi, 2012; Almarashdeh & Alsmadi, 2017; Alomari et al., 2009; Alsaghier et al., 2009; Bélanger & Carter, 2008; Horst et al., 2007; J. Lee et al., 2011; Warkentin et al., 2002; West, 2008).

The semi-structured interviews with citizens identified main reason for the positive influence of TRU on users' intentions to use m-government applications in Saudi Arabia. Some participants stated that users trust the government which provided these applications to accomplish their tasks and protect their data. For example, Participant 2 stated "*Because these applications have been provided by the government and not individuals, my trust in these applications is very high and that will encourage me to use them.*" Participant 9 claimed "*if I trust the application, that will encourage me to use it and to upload my data because I trust the provider to serve me and to protect my data.*"

This result indicates that trust is very important for citizens when using m-government applications. That is, trust in the government can drive Saudi citizens to use m-government applications. The results also indicate that the level of trust in m-government applications among citizens is very high.

Decision makers in the Saudi government should try to build up trust with Saudi citizens to encourage them to use services via m-government applications. In addition, application designers and developers should build trustworthy applications that accomplish tasks and ensure user privacy. The government should start by focusing on short-term results (small-scale applications) to increase user trust, they can then expand the project more easily and completely throughout the population once trust has been achieved (Almarabeh & AbuAli, 2010). Also, ministries should commit themselves to be trustworthy for the users they serve.

8.4.5 The influence of awareness (AWAR) on users' intentions to use m-government applications

Cambridge online dictionary (http://dictionary.cambridge.org/dictionary/english/awareness) defines awareness as "knowledge that something exists, or understanding of a situation or subject at the present time based on information or experience." According to Nasser and Jasimuddin (2017: 15), awareness is defined as "people's knowledge of technology and the availability of electronic services." The hypothesis and sub- research question for this factor are:

H5: Awareness AWAR will have a significant positive influence on behavioural intention to use BIU m-government applications.

Q6: Does AWAR influence users' intentions to use m-government applications?

The results of the quantitative study revealed that awareness does not have a significant influence on behavioural intention to use BIU m-government applications in the Saudi context. This outcome is incompatible with some previous empirical studies. For example, Safeena,

Hundewale, and Kamani (2011) found that awareness has a positive influence on intention to adopt m-banking. Mulero (2012) found that awareness has a positive impact on intention to use social network marketing. However, Ehteshami, Hachesu, Esfahani, and Rezazadeh (2013) supported this result finding that the relationship between rate of awareness of medical students in the clinical stage and mobile health technology applications is not significant in Iran. Islam, Khan, Ramayah, and Hossain (2011) observed no significant relationship between awareness and m-commerce adoption in Bangladesh. A recent study conducted by Nasser and Jasimuddin (2017) claimed that there is a lack of awareness about m-government service availability among citizens in UAE.

The semi-structured interviews with citizens explored why AWAR did not have a significant influence on users' intentions to use m-government applications in Saudi Arabia. Most participants proposed several reasons to explain this result. First, the level of awareness of m-government applications is low among citizens due to some users being resistant to change and preferring traditional processes. For example, Participant 1 stated "*I think the level of awareness is low between citizens. Some citizens do not care about these applications and their use, and government sectors do not spread awareness between citizens very well*", while Participant 5 said "*I think, some citizens still prefer a traditional process to get government services. So, they do not care about these applications.*" This outcome supported by Alssbaiheen and Love (2015) who claimed that in Saudi Arabia users are not aware of the advantages of m-government, so government should seek to improve and develop awareness among citizens. Several previous studies have recommended that media, such as newspapers, social networks such as Facebook and television advertisements should be used to raise the awareness of citizens (Abunadi, 2012; Al-Tourki et al., 2012).

Another reason stated by some participants is that some users trust the government so they will do as the government asks them. For example, Participant 7 stated "*I think awareness is not a*

crucial factor to increase my intention to use m-government applications, because I already

trust the government sectors (providers). In short, while all these applications provide

government services and are provided by the government, awareness is not very important for

users because users already trust the government. Also, now when I go to the government

sector to get government services via the traditional way, they will ask me to get these services

via their systems. I mean that it will become compulsory for citizens to get government services

in that way." This was confirmed by Participant 9 who said "*I already trust the government*

and users already know about these applications and their benefits. So, it does not influence

me very much."

To summarize, this outcome may indicate that most participants believe that awareness has

little or no influence on BIU m-government applications, which might indicate that participants

have not received enough information about m-government applications, so they are not aware

about them. This outcome may also indicate that awareness is not an important factor driving

the participants to use m-government applications because they will do as the government asks.

The recommendation for decision makers in Saudi government is that they should distribute

information for citizens about m-government applications and their benefits via the media to

increase user awareness. Application designers and developers should build these applications

accompanied by a brochure that consists of clear instructions explaining how to use the

applications for distribution to citizens to increase their awareness levels.

8.4.6 The influence of perceived security (SEC) on users' intentions to use m-government applications

The following definition by Smith and Jamieson (2006: 23) is relevant for the current study:

"security means the protection of records and data that are held for the purpose of recording,

administering, and monitoring the actions and policies of government agencies." The

hypothesis and sub-research question for this factor are:

H6: Perceived security SEC will have a significant positive influence on behavioural intention to use BIU m-government applications.

Q7: Does SEC influence users' intentions to use m-government applications?

The quantitative results revealed that security does not significantly influence BIU m-government applications in the Saudi context. This result is incompatible with some previous empirical studies. For example, security has a positive impact on intention to use internet banking in Malaysia (Lallmahamood, 2007). Peng et al. (2012) found that security has a positive impact on intention to use tourism m-payment systems while Mahad et al. (2015) claimed that security is key factor for users in using mobile banking

However, this outcome is supported by several other studies. Ratten (2014) found that privacy concerns do not influence purchase intentions of cloud computing services in India and the USA. A later study found that security is not a big concern for consumers who intend to adopt cloud computing in the USA or Australia (Ratten, 2015). More recently, Faqih (2016) found that increased security does not lead to increased intention to use online channels for purchase in Jordan.

The semi-structured interviews with citizens explored why SEC did not have a significant influence on users' intentions to use m-government applications in Saudi Arabia. Some participants stated that as these applications have been provided by government and users already trust the government, users do not care about security and are focused instead on useful services. For example, Participant 5 stated "*because these applications have been released by government, they will definitely be secure and I will not hesitate to use them.*" Participant 10 confirmed "*I think the majority of citizens trust the government, so they do not care about security.*" Participant 13 claimed "*I think in Saudi Arabia users do not care about security*

because they want to accomplish their works via m-government applications as fast as possible without thinking of any security issues."

This outcome indicates that most participants believe that security has little or no influence on BIU m-government applications, which might indicate that participants do not care about security because they trust applications which are released by the government. This outcome also suggests that security is not an issue for the majority of participants who intend to use m-government applications because they have been using the internet for a long time and are aware about security and privacy problems (Faqih, 2016). Also, as citizens are focused on obtaining useful services, they care less about security issues associated with m-government applications.

Saudi government decision makers should continue to be concerned about this security and try to increase the level of perceived security in applications, despite it not being a concern in the current study. The government should provide services via secure applications to encourage all users to adopt and use these applications. In fact, increased perceived security is considered an advantage. Application designers and developers should ensure the applications are secure. Finally, the Saudi government should issue laws to protect users if they have problems regarding security and privacy when using mobile government applications.

8.4.7 Moderator of gender

The hypotheses and sub-research question for this moderator are:

H7: a1, a2, a3: The relationships between exogenous (ATU, PU and TRU) and endogenous (BIU) will be moderated by gender.

Q8: To what extent do gender influence on relationships between exogenous (ATU, PU and TRU) and endogenous (BIU)?

The quantitative results revealed that gender has a significant moderating effect on the relationship between ATU and BIU and is stronger for females. This result was unexpected and indicates that Saudi females have a more positive attitude toward using m-government applications than males which suggests they are more likely to use m-government applications. This result is compatible with some studies, such as Ramírez-Correa et al. (2015), who found females had a more positive ATU an e-learning platform than males in two different universities in Chile and Spain. Kishore and Sequeira (2016) found that relationships between ATU and BIU m-banking services is moderated by gender. This result may also indicate that female's positive attitudes may be due to them hearing a lot about the benefits of using m-government applications. This is compatible with G. Hofstede and Hofstede (2004) and Venkatesh and Morris (2000) who claimed that others' ideas and opinions have a stronger influence on females than males. Venkatesh and Morris (2000) note that social pressure can motivate females more easily because they have a better understanding of others' feelings than males.

Also, the quantitative results revealed that gender did not have a significant moderating effect on the relationships between PU and BIU and TRU and BIU. These results are incompatible with some empirical studies. Mohammed et al. (2014) found that perceived usefulness is more important for males than females. Ramírez-Correa et al. (2015) found that the relationship between perceived usefulness and BIU an e-learning platform is moderated by gender—being stronger for females. José et al. (2014) claimed that perception of trust more important for females than males and can increase their intention to adopt e-services.

This outcome, however, may indicate that both males and females consider PU and TRU important factors in using m-government applications. In other words, usefulness and trust can drive females and males to use m-government applications.

The semi-structured interviews further explored the differences between females and males regarding their ATU m-government applications. Most participants agreed that ATU m-government applications is stronger for females than males which confirmed the quantitative results and was again incompatible with many previous studies. Participants provided several reasons for this result including: (i) because Saudi society is considered conservative, females prefer to work from home via using these applications, (ii) females sometimes have certain circumstances and obligations, making them keen to use m-government applications (iii) females usually like to discover and use new things, and (iv) females in Saudi Arabia cannot drive to go ministries, so want to use these applications instead. For example, Participant 8 said "*As our society is conservative, it is the biggest reason to encourage females to learn and use m-government applications from home.*" This observation was confirmed by Participant 10 "*because I think females feel a great freedom in using m-government applications, due to the fact that our society is conservative and it is difficult for them to go out to get government services, so they are keen to use these applications in their home.*" Participant 5 stated "*because females sometimes are in circumstances, such as being divorced or widowed, and do not have a breadwinner. Therefore, these applications are very useful for them to use from their homes*", while Participant 7 added "*because I think Saudi culture prefers that females access government services online rather than in traditional ways, because females usually have some obligations such as caring for their kids and husbands. Therefore, females in Saudi Arabia have positive attitude toward using m-government applications more than males.*" Participant 8 suggested the positive ATU in females was "*because females usually like to learn and use new things, including new technologies.*", while Participant 13 claimed that "*This is because in Saudi Arabia, females can't drive cars. Therefore, it is easier for them to use m-government applications instead.*"

In summary, this result indicates that females have a strong desire to use these applications and have more positive feelings about using m-government applications than males. Consequently, females are more likely to use m-government applications than males. This result may be due to: (i) because Saudi society is considered conservative, females prefer to work from home via using these applications, (ii) females sometimes have certain circumstances and obligations, making them keen to use m-government applications (iii) females usually like to discover and use new things, and (iv) females in Saudi Arabia cannot drive to go ministries, so want to use these applications instead. Therefore, decision makers in the Saudi government who are providers of m-government applications for citizens should focus on providing specific services for females and distributing information for citizens, especially males, about m-government applications and their benefits via the media to increase positive attitudes toward using these applications.

8.4.8 Moderator of age

The hypotheses and sub-research question for this moderator are:

H8: b1, b2, b3: The relationships between exogenous (ATU, PU and TRU) and endogenous (BIU) will be moderated by age.

Q9: To what extent do age influence on relationships between exogenous (ATU, PU and TRU) and endogenous (BIU)?

The quantitative results revealed that age has a significant moderating effect on the relationship between ATU and BIU and is stronger for younger users. This result indicates that younger citizens have a more positive ATU m-government applications than older citizens and is compatible with the literature review. For example, Porter and Donthu (2006) claimed that old people have a lower rate of internet usage than young people. Meyer (2007) showed that older people are less qualified and less likely to adopt and use ICT than young people. Tacken,

Marcellini, Mollenkopf, Ruoppila, and Szeman (2005) had a similar result demonstrating that young users use new technologies more that old users. Alshehri (2013) found that, in Saudi Arabia, younger users were more likely to use e-government services than older users due to their higher levels of computer self-efficacy (Alshehri, 2013; Tarhini et al., 2014a). A recent study conducted by Kishore and Sequeira (2016) showed that the relationship between ATU and BIU m-banking services is moderated by age.

Also, the quantitative results revealed that age did not significantly moderate the relationships between PU and BIU and TRU and BIU. This result is supported by Chung et al. (2010) who found that age did not moderate the relationship between PU and BIU online communities. Tarhini et al. (2014a) reported that the relationship between PU and BIU a web-based learning system was not moderated by age. These results indicate that there are no differences between the age groups in terms of perceived usefulness and trust when they are using m-government applications. The outcome may actually indicate that both groups consider PU and TRU important factors in using m-government applications. In other words, the significant relationships between PU and BIU and TRU and BIU do not differ with age. This result incompatible with some empirical studies such as Li and Lai (2011) who claimed that younger users focus on useful new technology to improve their jobs more than older users. It has also been found that the relationship between trust and BIU e-government services in Saudi Arabia is moderated by age and is stronger for younger users (Alshehri, 2013).

The semi-structured interviews examined the differences between younger and older users regarding their ATU m-government applications. Most participants agreed that ATU m-government applications is stronger for younger than older users which confirmed the quantitative results. Some of the main reasons proposed by participants for this result were: (i) younger users like to discover new technology, are more familiar with and have more experience with technology than older users, (ii) Saudi culture encourages younger people to

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serve older people, and (iii) younger people usually have better skills to use new technologies than older people. For example, Participant 2 stated "*because the young generation has learned to use new technologies more than the older generation. So, we can say that this generation is the technological generation. Also, I think younger people have more experience in using technology and getting the benefit of these applications than older people.*" This was confirmed by Participant 6 saying "*because younger people like to use and discover new technologies more than older people.*" Participant 7 observed that "*because Saudi culture encourages younger people to serve older people. So, younger people want to know about and use these applications, not for themselves, but to help their elders such as neighbours, fathers, mothers or other relatives*", while Participant 8 added "*Also, some new technologies need skills such as the English language and younger people are better in those skills than older people.*"

In summary, this result indicates that younger users have strong desire to use these applications and have more positive feelings about using m-government applications than older users. Consequently, younger users are more likely to use m-government applications than older users. This result may be due to: (i) younger users like to discover new technology, are more familiar with and have more experience with technology than older users, (ii) Saudi culture encourages younger people to serve older people, and (iii) younger people usually have better skills to use new technologies than older people. Therefore, decision makers in the Saudi government who are providers of m-government applications for citizens should focus on providing specific services for younger users. They should also distribute information for older citizens about m-government applications and their benefits via the media to increase positive attitudes toward using these applications. Finally, they should provide the services via applications in a user-friendly way with clear and simple instructions to encourage older citizens to use these applications.

8.4.9 Moderator of usage experience

Alharbi and Drew (2014: 146) defined usage experience as "individual involvement in or exposure to a particular system and the accumulative skills the user gains by using the system." The hypotheses and sub-research question for this moderator are:

H9: c1, c2, c3: The relationships between exogenous (ATU, PU and TRU) and endogenous (BIU) will be moderated by usage experience.

Q10: To what extent do usage experience influence on relationships between exogenous (ATU, PU and TRU) and endogenous (BIU)?

The quantitative results revealed that usage experience significantly moderated the relationship between ATU and BIU and was stronger in less experienced users. This result indicates that less experienced have a more positive ATU m-government applications than more experienced users. This may be due to less experienced users hearing a lot about the benefits of using m-government applications, and consequently having a positive ATU. This result is supported by Tarhini et al. (2014a) who found that students who have less experience are more likely to use an e-learning system in Lebanon when they get recommendations from others.

On other hand, this result is inconsistent with other studies in the literature review such as Azam, Quaddus, and Rahim (2010) who found that when experience increases, the intention to accept new technology will also increase. Alshehri (2013) claimed that inexperienced users are not likely to use and adopt new technology more than experienced users. However, this result may indicate that users who have more experience do not care about ATU m-government applications because they have already been using these applications for a while. The result may also indicate that some experienced users have had a bad experience when using m-government applications, such difficulty in using these applications, so they form negative attitudes about them.

Also, the quantitative results revealed that usage experience did not have a significant moderating effect on the relationships between PU and BIU and TRU and BIU. These results indicate that there are no differences between experience groups in terms of perceived usefulness and trust when using m-government applications. This outcome may indicate that both groups consider PU and TRU as important factors in using m-government applications. However, these results are incompatible with some studies. For example, Venkatesh and Davis (2000) found that experience in using technology positively moderated the relationship between PU and BIU. Martínez-Torres et al. (2015) reported that some previous studies claimed that experienced users had a stronger relationship between PU and BIU than inexperienced users. Alshehri (2013) found that the relationship between trust and BIU e-government services in Saudi Arabia is moderated by usage experience and stronger for experienced users.

The semi-structured interviews examined the differences between more and less experienced users regarding their ATU m-government applications. Most participants agreed that ATU m-government applications is stronger for less experienced than more experienced users which confirmed the quantitative results. Two main reasons to explain this result were proposed by participants: (i) less experienced users have a more positive ATU because they want to use new technologies to obtain their benefits, and (ii) most ministries in Saudi Arabia now only provide their services via systems and applications. For example, Participant 3 claimed that "*because I think users who have less experience have the desire and are keen to use new technologies, including m-government applications, and benefit more from these applications than users who have more experience*", while Participant 11 stated that "*They regret not using these applications when they hear from users how useful the applications are in completing their work. Therefore, users who have less experience are more enthusiastic than others to use these applications.*" Participant 10 added, "*Because users who have less experience are more curious*

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to discover and use new technologies than users who have more experience, because they want to gain the benefits of the technological revolution." Finally, Participant 1 observed "*most ministries now ask citizens to access all government services through systems and applications, and this encourages users who have less experience to use these applications.*"

To conclude, the results indicate that less experienced users have a strong desire to use these applications and have more positive ATU m-government applications than more experienced users. That is, users who have less experience are more likely to use m-government applications than users who have more experience. This result may be due to many government services only being available via these applications so less experienced users have no choice but to use the applications and they want to use new technologies to obtain their benefits. Decision makers in the Saudi government who are providers of m-government applications for citizens should focus on providing the services via applications in a user-friendly way with clear and simple instructions for two reasons (i) to encourage less experienced users to use and operate these applications and (ii) to improve the experience for more experienced users to increase their positive attitudes toward using these applications.

8.4.10 Model refinement

This section discusses the amended research model designed after the results of the quantitative and qualitative studies were analysed. This section also presents all independent factors that influence BIU m-government application in Saudi Arabia including the influence of the moderators on the different relationships.

The three most influential factors are presented in Table 41. Attitude toward using (ATU) is the most influential factor on BIU m-government applications in Saudi Arabia followed by perceived usefulness (PU) and perceived trustworthiness (TRU). Figure 34 shows the amended model for BIU m-government applications in Saudi context.

Table 41 Three most influential factors in ranking order

Ranking order	Independent factor	Dependent factor	Path weight Beta	Overall results	Supported
1	Attitude toward using ATU	Behavioural intention to use	0 .484	Significant	YES
3	Perceived usefulness PU	Behavioural intention to use	0 .266	Significant	YES
2	Perceived trustworthiness TRU	Behavioural intention to use	0 .247	Significant	YES
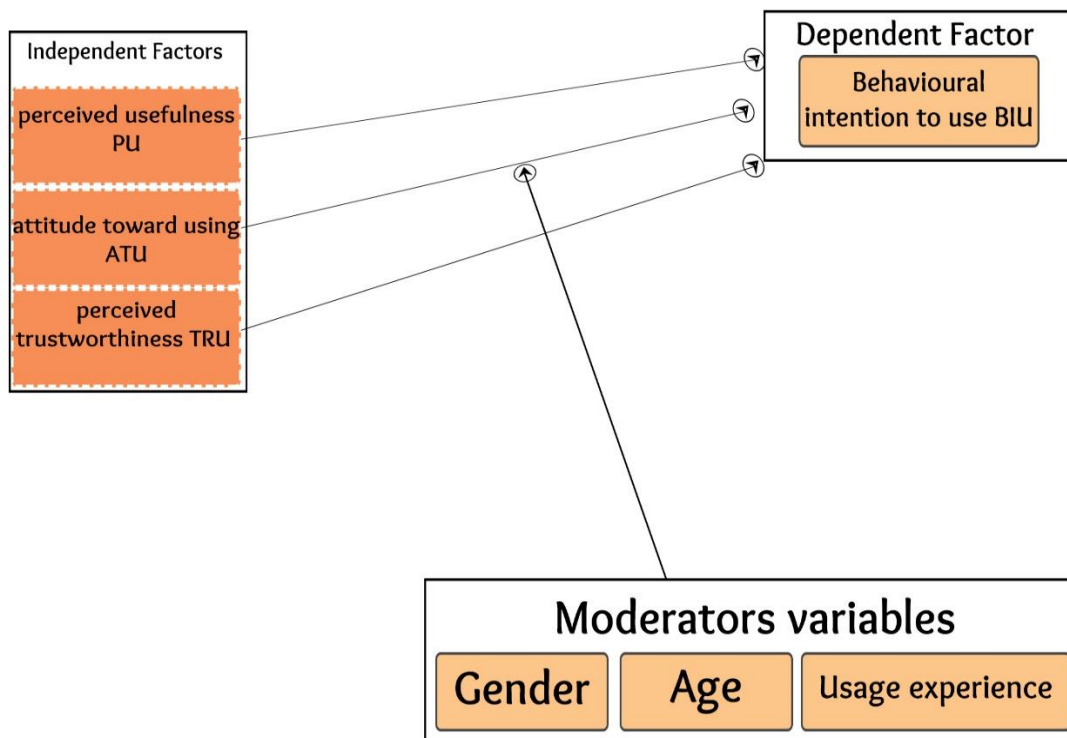
Figure 34 Amended research model

There are significant relationships between Attitude toward using (ATU) and BIU, perceived usefulness (PU) and BIU, and Perceived trustworthiness (TRU) and (BIU) (Figure 34). The relationship between ATU and BIU is moderated by gender, age, and usage experience while the moderators have no influence on the relationships between PU and BIU and TRU and BIU.

When compared with the proposed model presented in Chapter 4 (figure 24) after verification studies, it is obvious that some factors (i.e. PEU. SEC, AWAR) are not included in the amended model because they have no significant influence on BIU m-government applications in the Saudi context. The amended research model has been designed to best explain the factors that influence BIU m-government applications in the Saudi context.

8.5 Summary

Based on results of this study, only three factors (ATU, PU and TRU) have a significant influence on BIU m-government applications. Therefore, these factors are included in the amended research model. Gender, age and usage experience moderated the relationship between ATU and BIU but not those between PU and BI and TRU and BIU. The relationship between ATU and BIU is stronger for females, younger users, and users with less experience.

The amended research model for BIU m-government applications may help decision makers in the Saudi government who provide m-government applications, especially Yesser, adopt and release new m-government applications to more effectively reflect the factors that influence BIU m-government applications in the Saudi context.

Chapter 9: Conclusions

9.1 Introduction

This chapter concludes the thesis by presenting a brief summary of the study outcomes, discussing the study's contributions to practice and theory, identifying the study limitations and making recommendations for future research.

9.2 Summary of Study Outcomes

The results of the study answered the main research question and sub-research questions:

1) ATU, PU and TRU have a significant positive influence on users' intentions to use m-government applications in the Saudi context,

2) PEU, AWAR and SEC do not have a significant positive influence on users' intentions to use m-government applications in Saudi context,

3) Saudi citizens have a positive attitude toward using m-government applications.

4) The relationship between ATU→BIU is moderated by gender, age and usage experience. Relationships are stronger for females, younger and less experience users. The relationships between PU→BIU and TRU→BIU are not moderated by gender, age and usage experience.

5) ATU is the most influential factor on BIU m-government applications in Saudi Arabia followed by PU, and TRU.

6) The proposed TAM model has a good fit values and is valid in the Saudi m-government context.

Table 42 summarises the outcomes for all study questions/hypotheses, including those not supported by the results. A more detailed presentation of all results and a discussion of their

importance is found in Chapter 9 (sections 9.2, 9.3, and 9.4) and therefore, will not be repeated here.

Table 42 Summary of hypotheses results

	Hypothesis statement	**Results**
H1	PEU will have a significant positive influence on BIU m-government applications.	Not supported
H2	PU will have a significant positive influence on BIU m-government applications.	Yes supported
H3	ATU will have a significant positive influence on BIU m-government applications.	Yes supported
H4	TRU will have a significant positive influence on BIU m-government applications.	Yes supported
H5	AWAR will have a significant positive influence on BIU m-government applications.	Not supported
H6	SEC will have a significant positive influence on BIU m-government applications.	Not supported
H7	a1, a2, a3: The relationships between exogenous (ATU, PU, and TRU) and endogenous (BIU) will be moderated by gender.	a1: (ATU→BIU) moderated by gender: Yes supported a2: (PU→BIU) moderated by gender: Not supported a3: (TRU→BIU) moderated by gender: Not supported
H8	b1, b2, b3: The relationships between exogenous (ATU, PU, and TRU) and endogenous (BIU) will be moderated by age.	b1: (ATU→BIU) moderated by age: Yes supported b2: (PU→BIU) moderated by age: Not supported b3: (TRU→BIU) moderated by age: Not supported
H9	c1, c2, c3: The relationships between exogenous (ATU, PU, and TRU) and endogenous (BIU) will be moderated by usage experience.	c1: (ATU→BIU) moderated by usage experience: Yes supported. c2: (PU→BIU) moderated by usage experience: Not supported. c3: (TRU→BIU) moderated by usage experience: Not supported.

9.3 Contributions of the Study

9.3.1 Contribution to practice

Ultimately, this study may help decision makers in the Saudi government have a clearer understanding of the factors influencing users' intentions to use m-government applications, Saudi citizens' attitudes toward using m-government applications, and the influence of gender, age and usage experience on relationships between independent factors (ATU, PU, and TRU) and dependent factor (BIU). This will assist government decision makers involved in e-government and m-government initiatives, particularly Yesser, support future m-government services and their implementation.

Attitude towards using (ATU) is the most influential factor on BIU m-government applications in Saudi Arabia followed by perceived usefulness (PU), and perceived trustworthiness (TRU). Therefore, these factors need to be taken into account by Yesser and other government decision makers when trying to enable and enhance the adoption of m-government applications by Saudi citizens. The fact that females, younger users and less experienced users have the most positive ATU m-government applications is a surprising (for female, less experienced users) and useful result that can help target government awareness campaigns for improved m-government applications uptake. As Saudi citizens generally have a positive ATU m-government applications, they are more likely to try these applications—an increasingly important attitude as the government is aiming to have all services accessible online. The increasing use of mobile phones in the country will enable the government to exploit sophisticated technologies, especially applications in smart devices, to effectively provide services for its citizens.

9.3.2 Contribution to theory

This study fills a theoretical gap in the literature by examining and evaluating the applicability of the modified technology acceptance model (TAM) in the Saudi m-government context. This was done by examining the relationships between BIU m-government applications in Saudi

Arabia and other factors, either TAM constructs or external factors. It also determined whether gender, age and usage experience moderated the relationships between independent factors (ATU, PU, and TRU) and the dependent factor (BIU). The proposed TAM model was validated, as it successfully explained the factors that influence users' BIU m-government applications in Saudi Arabia.

To date, based on literature review and our knowledge, the proposed model is the first of its kind to be adopted in this field in Saudi Arabia. By combining important factors influencing BIU m-government applications from the literature with three important moderators, the model provides a better understanding of factors that influence BIU m-government applications in Saudi Arabia. The study model may be adopted in other countries to understand the factors that influence BIU m-government applications in their local contexts.

9.4 Limitations and Recommendations for Future Research

This study has some methodological, demographic and technological limitations. These limitations and measures to ameliorate them in future studies are presented below:

1. Only five experts participated in the first verification study (qualitative phase) to verify the influence of external factors identified in the literature review on m-government adoption. While within acceptable methodological limits, this is still a relatively small number of participants. Future research should include more participants, including those from other government organisations (e.g. ministries who already have offered m-government services) involved in m-government.

2. This study adopted a modified TAM model examining the influence of six factors (PEU, PU, ATU, TRU, AWAR and SEC) with three moderator variables (gender, age and usage experience) on users' BIU m-government applications in Saudi Arabia. Whilst the model was found to be applicable to the Saudi m-government context,

incorporating the TAM with other models, such as Diffusion of Innovation (DOI), or using other constructs in other models such as TAM2 constructs, could lead to the identification and measurement of other factors which were not included in this study.

3. Since a cross sectional design was adopted in this study, the data captured represented a "snapshot" of users BIU m-government applications. Future research should include longitudinal studies using the same model to validate and evaluate the model and outcomes over time. This will enable the collection of different data from the same users as they gain more experience over time, leading to a change in their perceptions (Venkatesh, Morris, et al., 2003).

4. Female participants in this study constituted 169 out of a total of 782 (22%), which is a very small proportion. Future research should focus on involving more female participants to enable generalizations to be made across the entire population.

5. This study identified and explored the factors that influence users BIU m-government applications in Saudi Arabia in general. Future research may explore a case study for one of the m-government applications that has already been released by the Saudi government, such as Absher, to identify and measure the factors that influence users' intentions to use this app.

6. This study focused on mG2C to explore and measure the factors that influence users' intentions to use m-government applications and disregarded other types of m-government such as government to businesses (mG2B), government-to-government (mG2G) and government-to-employee (mG2E). Future research may focus on one or more of these other types, (mG2B), (mG2G) and (mG2E), to determine whether the same factors influence users BIU.

7. This study focused on Mobile Application (MyApp) to identify and measure the factors that influence BIU m-government applications and disregarded other types of m-

government services, such as Multimedia Messaging Services (myMMS), mobile payment (MyPay), Short Message Service (mySMS) and Unstructured Supplementary Service Data (myUSSD). Future research may focus on one or more of these other types, (myMMS), (MyPay), (mySMS) and (myUSSD), to explore the factors influencing users BIU.

8. This study measured the moderating influence of gender, age and usage experience on relationships between exogenous (ATU, PU and TRU) and endogenous (BIU) in the research model. Future research may measure the influence of these moderators on all relationships between exogenous and endogenous (BIU) in proposed research model. In addition, future research can measure the influence of other moderators, such as income and education level, on relationships between exogenous and endogenous factors.

References

Aaron, L. (2011). Mixed methods research. *Radiologic Technology, 82*(3), 274-275.

Abad, M., Díaz, I., & Vigo, M. (2010, September 6-10). *Acceptance of mobile technology in hedonic scenarios.* Paper presented at the Proceedings of the 24th BCS Interaction Specialist Group Conference, Dundee,UK.

Abanumy, A., & Mayhew, P. (2005). *M-government implications for e-government in developing countries: The case of Saudi Arabia.* Paper presented at the EURO mGOV, Brighton, UK,.

Abaza, M., & Saif, F. (2015). The Adoption of Mobile Government Services in Developing Countries. International Journal of Computer Science Issues (IJCSI), 12(1), 137-145

Abu-Shanab, E., & Haider, S. (2015). Major factors influencing the adoption of m-government in Jordan. *Electronic Government, 11*(4), 223-240.

Abu Bakar, N., Rahman, A., & Hamed, H. (2015). The Implementation of Malaysian m-Government Services. *Advanced Science Letters, 21*(5), 1122-1126.

Abugabah, A., Alfarraj, O., & Sanzogni, L. (2009). *Research Paradigms and Information Systems: A Call for Triangulation*. Paper presented at the International Conference on Information and Communications Systems, Amman.

Abunadi, I. (2012). *Influence of Culture on e-Government Acceptance in Saudi Arabia.* (Doctoral Thesis), Griffith University, Brisbane, Australia.

Adams, D., Nelson, R., & Todd, P. (1992). Perceived usefulness, ease of use, and usage of information technology: a replication. *MIS Quarterly, 16*(2), 227-247.

Agourram, H. (2009). The quest for information systems success in Saudi Arabia: A case study. *Journal of Global Management Research*, 51-94.

Ahmad, T., Ansari, A., Akhtar, A., & Parveen, S. (2014). Current review of ICT and m-government services in Saudi Arabia. *International Journal of Computer Engineering and Applications, VII*(II), 71-77.

Ahmad, S., & Khalid, K. (2017). The adoption of M-government services from the user's perspectives: Empirical evidence from the United Arab Emirates. *International Journal of Information Management, 37*(5), 367-379.

Ahmed, F. (2012). A Hydrologic Model of Kemptville Basin—Calibration and Extended Validation. *Water Resources Management, 26*(9), 2583-2604. doi: 10.1007/s11269-012-0034-0

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. *Action control: From congnitions to behaviour* (pp. 11-39). Heidelberg, Germany: Springer.

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes, 50,* (2), 179-211.

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology, 32*, 665-683.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Al-Adwan, A., Al-Adwan, A., & Smedley, J. (2013). Exploring students acceptance of e-learning using Technology Acceptance Model in Jordanian universities. *International Journal of Education and Development using Information and Communication Technology, 9*(2), 4-18.

Al-Busaidi, H. (2012). *A model of intention to use mobile government services.* (Doctoral Thesis), Victoria University, Melbourne, Australia.

Al-Busaidi, K., & Al-Shihi, H. (2010). Instructors' Acceptance of Learning Management Systems: A Theoretical Framework. *Communications of the IBIMA.*

Al-Gahtani, S. (2001). The applicability of TAM outside North America: an empirical test in the United Kingdom. *Information Resources Management Journal, 14*(3), 37-46.

Al-Ghaith, W., Sanzogni, L., & Sandhu, K. (2010). Factors influencing the adoption and usage of online services in Saudi Arabia. *The Electronic Journal of Information Systems in Developing Countries, 40*(1), 1-32.

Al-Hadidi, A. (2010). *Exploratory study on adoption and diffusion of m-government services in the sultanate of oman.* (Doctoral Thesis), Cardiff University, UK.

Al-Hadidi, A., & Rezgui, Y. (2010). Adoption and diffusion of m-Government: Challenges and future directions for research *Collaborative Networks for a Sustainable World* (pp. 88-94). New York: Springer.

Al-Hujran, O. (2012). Toward the utilization of m-Government services in developing countries: a qualitative investigation. *International Journal of Business and Social Science, 3*(5), 155-160.

Al-Hujran, O., Al-dalahmeh, M., & Aloudat, A. (2011). The role of national culture on citizen adoption of eGovernment services: An empirical study. *Electronic Journal of e-Government, 9*(2), 93-106.

Al-Majali, M. (2012). No more traditional stock market exchange: a study of internet trading service (ITS) in Jordan. *Journal of Internet Banking and Commerce, 17*(1), 1-19.

Al-Rashid, S. (1986). *Al-Rabadhah, a portrait of early Islamic civilization in Saudi Arabia.* Riyadh: King Saud University.

Al-Shafi, S., & Weerakkody, V. (2010). *Factors affecting e-government adoption in the state of Qatar.* Paper presented at the European and Mediterranean Conference on Information Systems, Abu Dhabi, UAE.

Al-Shehry, A. (2009). *Transformation towards e-government in The Kingdom of Saudi Arabia: technological and organisational perspectives.* (Doctor of philosophy), De Monfort University, UK.

Al-Shehry, A., Rogerson, S., Fairweather, N.B., & Prior, M. (2006). *The motivations for change towards e-government adoption: Case studies from Saudi Arabia.* Paper presented at the eGovernment Workshop (eGOV06), Brunel University, West London.

Al-Solbi, A., & Mayhew, P. (2005). *Measuring e-readiness assessment in saudi organisations preliminary results from a survey study.* Paper presented at the Euro mGov, Brighton, UK.

Al-Tourki, T., El-Sofany, H., Al-Sadoon, A., & Al-Howimel, H. (2012). E-government in Saudi Arabia: Barriers, Challenges and its Role of Development. *E-government, 48*(5).

Al Imarah, A., Zwain, A., & Al-Hakim, L. (2013). The Adoption of e-government services in the Iraqi higher education context: An application of the UTAUT model in the University of Kufa. *Journal of Information Engineering and Applications, 3*(10), 77-84.

Al Alhareth, Y., Al Alhareth, Y., & Al Dighrir, I. (2015). Review of women and society in Saudi Arabia. *American Journal of Educational Research, 3*(2), 121-125.

Alanezi, M., Mahmood, A., & Basri, S. (2012). E-Government Service Quality in Saudi Arabia. *The Electronic Journal of Information Systems in Developing Countries, 54*(3), 1.

Alateyah, S., Crowder, R. M., & Wills, G. B. (2013). An exploratory study of proposed factors to adopt e-government services. *International Journal of Advanced Computer Science and Applications, 4*(11), 57-66.

Alassim, M., Alfayad, M., & Abbott-Halpin, E. (2017). Understanding Factors Influencing E-Government Implementation in Saudi Arabia from an Organizational Perspective. *International Journal of Information and Communication Engineering, 11*(7), 917-922.

AlAwadhi, S., & Morris, A. (2008). *The Use of the UTAUT Model in the Adoption of E-government Services in Kuwait.* Paper presented at the Hawaii International Conference on System Sciences, Honolulu.

Aldraehim, M. (2013). *Cultural impact on e-service use in Saudi Arabia.* (Doctoral Thesis), Queensland University of Technology, Brisbane, Australia.

Alfarraj, O. (2013). *Factors influencing the development of egovernment in Saudi Arabia: a qualitative investigation of the developers perspectives.* (Doctoral Thesis), Griffith University., Brisbane,Australia.

Alfarraj, O., & Alhussain, T. (2013). *Making Sense of E-Government development in Saudi Arabia: A Qualitative Investigation*. Paper presented at the The Eighth International Conference on Forensic Computer Science.

Alfarraj, O., Alhussain, T., & Abugabah, A. (2013). Identifying the Factors Influencing the Development of eGovernment in Saudi Arabia: The Employment of Grounded Theory Techniques. *International Journal of Information and Education Technology, 3*(3), 319. doi: 10.7763/IJIET.2013.V3.289

Alghamdi, S., & Beloff, N. (2016). Innovative Framework for e-Government adoption in Saudi Arabia: A Study from the business sector perspective. *International Journal of Advanced Computer Science and Applications, 7*(1), 655-664. doi: 10.14569/ IJACSA.2016.070189

Alharbi, S., & Drew, S. (2014). Using the technology acceptance model in understanding academics' behavioural intention to use learning management systems. *International Journal of Advanced Computer Science and Applications, 5*(1), 143-155.

Alhussain, T. (2012). *Factors Influencing the Adoption of Biometric Authentication in Mobile Government Security.* (Doctoral Thesis), Griffith University, Brisbane, Australia.

Alhussain, T., & Drew, S. (2010, 2010). *Towards Secure M-Government Applications: A survey study in the Kingdom of Saudi Arabia.* Paper presented at the 2010 International Conference on Intelligent Network and Computing (ICINC 2010), Kuala Lumpur, Malaysia.

Aljowaidi, M. (2015). *A study of e-commerce adoption using TOE framework in Saudi retailers: firm motivations, implementation and benefits.* (Doctoral Thesis), RMIT, Melbourne, Australia.

Almarabeh, T., & AbuAli, A. (2010). A general framework for e-government: definition maturity challenges, opportunities, and success. *European Journal of Scientific Research, 39*(1), 29-42.

Almarashdeh, I., & Alsmadi, M. (2017). How to make them use it? Citizens acceptance of M-government. *Applied Computing and Informatics, 13*, 194-199.

Alnatheer, M. (2012). *Understanding and measuring information security culture in developing countries: case of Saudi Arabia.* (Doctoral Thesis), Queensland University of Technology, Brisbane, Australia.

Alomari, M. (2011). *Predictors for Successful E-government Adoption in the Hashemite Kingdom of Jordan: The Deployment of an Empirical Evaluation Based on Citizen-Centric Perspectives.* (Doctoral Thesis), Griffith University, Brisbane, Australia.

Alomari, M., Elrehail, H., & Al Shibly, H. (2013). Mobile-Government: Challenges and Opportunities Jordan as a case study. *International Journal of Business and Social Science, 4*(12), 244-250.

Alomari, M., Sandhu, K., & Woods, P. (2010). Measuring Social Factors in E-government Adoption in the Hashemite Kingdom of Jordan. *International Journal of Digital Society, 1*(2), 163-172.

Alomari, M., Woods, P., & Sandhu, K. (2009). *The deployment of e-government in the Hashemite Kingdom of Jordan: factors in e-government adoption.* Paper presented at the IADIS International Conference WWW/Internet 2009, Rome, Italy.

Alomari, M., Woods, P., & Sandhu, K. (2012). Predictors for e-government adoption in Jordan: Deployment of an empirical evaluation based on a citizen-centric approach. *Information Technology & People, 25*(2), 207-234.

Alotaibi, R., Sandhu, K., & Houghton, L. (2014). A Study of Service Users' Attitudes towards E-Government Initiatives in the Kingdom Of Saudi Arabia. *International Journal of Computer Science and Information Technologies, 5*(6), 6892-6901.

Alotaibi, S., & Roussinov, D. (2015). *A conceptual model for examining mobile government adoption in Saudi Arabia.* Paper presented at the Proceedings of The 15th European Conference on eGovernment, University of Portsmouth, Barcelona, Spain.

Alotaibi, S., & Roussinov, D. (2016). *Developing and validating an instrument for measuring mobile government adoption in Saudi Arabia.* Paper presented at the 18th International Conference on e-Business and e-Government, London, UK.

Alotaibi, S., & Roussinov, D. (2017). *User Acceptance of M-Government Services in Saudi Arabia: an SEM Approach.* Paper presented at the The Proceedings of 17th European Conference on Digital Government ECDG 2017, UK.

Alrowili, T., Alotaibi, M., & Alharbi, M. (2015, 2015). *Predicting citizens' acceptance of M-government services in Saudi Arabia: An empirical investigation.* Paper presented at the 2015 Annual IEEE Systems Conference (SysCon) Proceedings.

Alsaghier, H. (2010). *An investigation of critical factors affecting citizen trust in e-government: empirical evidence fron Saudi Arabia.* (Doctoral Thesis), Griffith University, Brisbane, Australia.

Alsaghier, H., Ford, M., Nguyen, A., & Hexel, R. (2009). Conceptualising citizen's trust in e-government: Application of Q methodology. *Electronic Journal of e-Government, 7*(4), 295-310.

Alsahli, A. (2009). *E-Government in Saudi Arabia.* (Masters Thesis), City University, London, UK.

Alsamydai, M. (2014). Adaptation of the Technology Acceptance Model (TAM) to the use of Mobile Banking services. *International Review of Management and Business Research, 3*(4), 2039-2051.

Alsenaidy, A., & Ahmad, T. (2012). A review of current state m-government in Saudi Arabia. *Global Engineers & Technologists Review, 2*(5), 5-8.

Alshehri, M. (2013). *Using the UTAUT model to determine factors affecting acceptance and use of E-government services in the Kingdom of Saudi Arabia.* (Docotral Thesis), Griffith University, Brisbane, Australia.

Alshehri, M., & Drew, S. (2010). *Challenges of e-government services adoption in Saudi Arabia from an e-ready citizen perspective.* Paper presented at the World Academy of Science, Engineering and Technology, Venice, Italy.

Alshehri, M., & Drew, S. (2011). E-government principles: implementation, advantages and challenges. *International Journal of Electronic Business, 9*(3), 255-270.

Alshehri, M., Drew, S., & Alfarraj, O. (2012). A Comprehensive Analysis of E-government services adoption in Saudi Arabia: Obstacles and Challenges. *International Journal of Advanced Computer Science and Applications, 3*(2), 1-6.

Alshehri, M. A., & Drew, S. (2010). *Implementation of e-government: Advantages and challenges.* Paper presented at the IASK E-ALT2010 Conference Proceedings.

Alssbaiheen, A., & Love, S. (2015). Exploring the Challenges of m-Government Adoption in Saudi Arabia. *The Electronic Journal of e-Government, 13*(1), 18-27.

Altameem, A. (2007). *The Critical Factors of E-Government Adoption An Empirical Study in the Saudi Arabia Public Sectors.* (Doctoral Thesis), Brunel University, UK.

Althunibat, A., Alrawashdeh, T., & Muhairat, M. (2014). The acceptance of using m-government services in Jordan. *Journal of Theoretical and Applied Information Technology, 63*(3), 733-740.

Alzahrani, M., & Goodwin, R. (2012). Towards a UTAUT-based Model for the Study of EGovernment Citizen Acceptance in Saudi Arabia. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering, 6*(4), 376-382.

Anckar, B., & D'incau, D. (2002). Value creation in mobile commerce: Findings from a consumer survey. *Journal of Information Technology Theory and Application, 4*(1), 43-64.

Anderson, J., & Gerbing, D. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin, 103*(3), 411-423. doi: 10.1037/0033-2909.103.3.411

Anderson, J., & Schwager, P. (2004). *SME adoption of wireless LAN technology: applying the UTAUT model.* Paper presented at the Proceedings of the 7th Annual Conference of the Southern Association for Information Systems, Savannah, Georgia.

Antón, C., Camarero, C., & Rodríguez, J. (2013). Usefulness, Enjoyment, and Self- Image Congruence: The Adoption of e- Book Readers. *Psychology & Marketing, 30*(4), 372-384. doi: 10.1002/mar.20612

Antovski, L., & Gusev, M. (2005). *M-government framework.* Paper presented at the Euro mGov, Brighton, UK.

Assar, K. (2015). M-government in Saudi Arabia. *International Journal of Advanced Research in Computer Science and Software Engineering, 5*(1), 76-83.

Awad, N., & Ragowsky, A. (2008). Establishing Trust in Electronic Commerce Through Online Word of Mouth: An Examination Across Genders. *Journal of Management Information Systems, 24*(4), 101-121. doi: 10.2753/MIS0742-1222240404

Azam, M., Quaddus, M., & Rahim, M. (2010). *How experience affects technology acceptance: A quest for ICT development strategies in Bangladesh.* Paper presented at the in 13th International Conference on Computer and information Technology (ICCIT), Dhaka, Bangladesh.

Baabdullah, A., Nasseef, O., & Alalwan, A. (2016). *Consumer Adoption of Mobile Government in the Kingdom of Saudi Arabia: The Role of Usefulness, Ease of Use, Perceived Risk and Innovativeness.* Paper presented at the Conference on e-Business, e-Services and e-Society, Switzerland.

Babbie, E. (2004). *The practice of social research.* Belmont, CA: Thomson/Wadsworth.

Babullah, A., Dwivedi, Y., & Williams, M. (2015). *Saudi Citizens' Perceptions on Mobile Government (mGov) Adoption Factors.* Paper presented at the UK Academy for Information Systems Conference, UK.

Bagozzi, R., Yi, Y., & Phillips, L. (1991). Assessing construct validity in organizational research. *Administrative Science Quarterly, 36*(3), 421-458.

Baker, F. (2004). *Item response theory: parameter estimation techniques* (2nd Ed.). New York: Marcel Dekker.

Balnaves, M., & Caputi, P. (2001). *Introduction to Quantitative Research Methods: An Investigative Approach.* London: SAGE Publications.

Barrett, P. (2007). Structural equation modelling: Adjudging model fit. *Personality and Individual Differences, 42*(5), 815-824.

Bélanger, F., & Carter, L. (2008). Trust and risk in e-government adoption. *The Journal of Strategic Information Systems, 17*(2), 165-176.

Bhattacherjee, A. (2000). Acceptance of e-commerce services: the case of electronic brokerages. *IEEE Transactions on Systems, Man, and Cybernetics-Part A: Systems and Humans, 30*(4), 411-420.

Bhattacherjee, A., & Premkumar, G. (2004). Understanding changes in belief and attitude toward information technology usage: a theoretical model and longitudinal test. *MIS Quarterly, 28*(2), 229-254.

Bingimlas, K. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science & Technology Education, 5*(3), 235-245.

Bonoma, T. (1985). Case research in marketing: opportunities, problems, and a process. *Journal of Marketing Research, 22*(2), 199-208.

Bouwman, H., Carlsson, C., Molina-C, & Walden, P. (2007). Barriers and drivers in the adoption of current and future mobile services in Finland. *Telematics and Informatics, 24*(2), 145-160.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101.

Brdesee, H. (2013). *Exploring factors impacting e-commerce adoption in tourism industry in Saudi Arabia.* (Doctoral Thesis), RMIT University, Melbourne, Australia.

Brink, P. (1987). Editorial: On Reliability and Validity in Qualitative Research. *Western Journal of Nursing Research, 9*(2), 157-159. doi: 10.1177/019394598700900201

Brown, T. A. (2006). *Confirmatory Factor Analysis for Applied Research*. New York: Guilford Press.

Bryman, A., & Bell, E. (2007). *Business research methods*. Oxford: Oxford University Press.

Bwalya, K. (2009). Factors affecting adoption of e-government in Zambia. *The Electronic Journal of Information Systems in Developing Countries, 38*(4), 1-13.

Byrne, B. M. (2001). *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*. Mahwah, NJ: Lawrence Erlbaum Associates.

Byrne, B. M. (2010). *Structural Equation Modeling With AMOS: Basic Concepts, Applications, and Programming* (Second edition). New York: Taylor & Francis Group.

Candra, S. (2013). *Revisit Technology Acceptance Model for Internet Banking (Case Study: Public Banking in Indonesia).* Paper presented at the International Conference on Computer, Networks and Communication Engineering, Beijing, China.

Carter, L., & Bélanger, F. (2005). The utilization of e- government services: citizen trust, innovation and acceptance factors. *Information Systems Journal, 15*(1), 5-25.

Carter, L., & Weerakkody, V. (2008). E-government adoption: A cultural comparison. *Information Systems Frontiers, 10*(4), 473-482.

Cavana, R., Delahaye, B., & Sekaran, U. (2001). *Applied Business Research: Qualitative and Quantitative Methods*. Milton, Australia: John Wiley & Sons.

Çelik, H. (2011). Extending the technology acceptance model for adoption of e-shopping by consumers in Turkey. *Journal of Electronic Commerce Research, 12*(2), 152-164.

Chadwick, B., Gill, P., Stewart, K., & Treasure, E. (2008). Methods of data collection in qualitative research: interviews and focus groups. *BDJ, 204*(6), 291-295.

Chang, A., & Kannan, P. (2003). Preparing for wireless and mobile technologies in government. *E-government*, 345-393.

Chau, P. (1996). An empirical assessment of a modified technology acceptance model. *Journal of Management Information Systems, 13*(2), 185-204.

Chen, W., & Wellman, B. (2004). The global digital divide–within and between countries. *IT & Society, 1*(7), 39-45.

Chin, L., & Ahmad, Z. (2015). *Perceived Enjoyment and Malaysian Consumers' Intention to Use a Single Platform E-Payment.* Paper presented at the SHS Web of Conferences, Hanoi & Ha Long Bay, Vietnam.

Chin, W., & Todd, P. (1995). On the use, usefulness, and ease of use of structural equation modeling in MIS research: a note of caution. *MIS Quarterly, 19*(2), 237-246.

Chung, J., Park, N., Wang, H., Fulk, J., & McLaughlin, M. (2010). Age differences in perceptions of online community participation among non-users: An extension of the Technology Acceptance Model. *Computers in Human Behavior, 26*(6), 1674-1684.

Cilingir, D., & Kushchu, I. (2004). *E-Government and m-Government: Concurrent leaps by Turkey.* Paper presented at the European Conference on E-Government (ECEG 2004), Trinity College, Dublin.

CITC. (2013). *Annual report. Saudi Arabia.* Communication and Infromation Technology Commission

CITC. (2014). *Annual report. Saudi Arabia.* Communication and Infromation Technology Commission

CITC. (2015). *Annual report 2015. Saudi Arabia.* Communication and Infromation Technology Commission

CITC. (2016). *Annual report. Saudi Arabia.* Communication and Infromation Technology Commission

Clark, J., & Soliman, F. (1999). A graphical method for assessing knowledge-based systems investments. *Logistics Information Management, 12*(1/2), 63-77.

Cooper, D., & Schindler, P. (1998). *Business research methods* (Vol. 6). Boston: Irwin/McGraw-Hill.

Copeland, J., Kelleher, M., Kellett, J., Gourlay, A., Gurland, B., Fleiss, J., & Sharpe, L. (1976). A semi-structured clinical interview for the assessment of diagnosis and mental state in the elderly: the Geriatric Mental State Schedule: I. Development and reliability. *Psychological Medicine, 6*(03), 439-449.

Corbitt, B., Thanasankit, T., & Yi, H. (2003). Trust and e-commerce: a study of consumer perceptions. *Electronic Commerce Research and Applications, 2*(3), 203-215.

Creswell, J. (2003). *Research design: qualitative, quantitative, and mixed method approaches* (1st ed.). Thousand Oaks, Calif: Sage Publications.

Creswell, J. (2009). *Research design: qualitative, quantitative, and mixed method approaches* (3rd edition). Thousand Oaks, Calif: Sage Publications.

Creswell, J. (2012). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches.* Thousand Oaks, Calif: Sage Publications.

Creswell, J. (2013). *Research design: qualitative, quantitative, and mixed method approaches* (4th edition). Thousand Oaks, Calif: Sage Publications.

Creswell, J. (2014). *Research design: qualitative, quantitative, and mixed methods approaches* (4th, international student ed.). Thousand Oaks, Calif: Sage Publications.

Creswell, J., & Clark, V. (2011). *Designing and Conducting Mixed Methods Research.* Thousand Oaks, Calif: Sage Publications.

Davis, F. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and results.* (Doctoral Thesis), Massachusetts Institute of Technology, USA.

Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319-340.

Davis, F., Bagozzi, R., & Warshaw, P. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science, 35*(8), 982-1003.

Davis, F., Bagozzi, R., & Warshaw, P. (1992). Extrinsic and intrinsic motivation to use computers in the workplace1. *Journal of Applied Social Psychology, 22*(14), 1111-1132.

Dawes, J., Faulkner, M., & Sharp, B. (1998). *Business orientation scales: development and psychometric assessment.* Paper presented at the 27th EMAC Conference, Stochholm, Sweden.

de Vaus, D. (2002). *Surveys in Social Research.* St. Leonards,NSW: Allen & Unwin.

Denscombe, M. (2007). *The good research guide for small-scale social research projects* (3rd ed.). Maidenhead, England: Open University Press.

Deshpande, R. (1983). "Paradigms Lost": on theory and method in research in marketing. *The Journal of Marketing, 47*(4), 101-110.

Dey,I. (1993). *Qualitative data analysis: A user-friendly guide for social scientists,* London, Routledge.

DiCicco- Bloom, B., & Crabtree, B. (2006). The qualitative research interview. *Medical Education, 40*(4), 314-321.

Dickerson, B. (2013). *Motivation factors impacting employee acceptance of new technology.* (Doctoral Thesis), Capella University, USA.

Dik, B., Eldridge, B., Steger, M., & Duffy, R. (2012). Development and validation of the calling and vocation questionnaire (CVQ) and brief calling scale (BCS). *Journal of Career Assessment, 20*(3), 1-22.

Drost, E. (2011). Validity and reliability in social science research. *Education Research and Perspectives, 38*(1), 105.

Dworkin, S. (2012). Sample size policy for qualitative studies using in-depth interviews. *Archives of Sexual Behavior, 41*(6), 1319-1320.

Education Ministry. (2014). Educational Management System (Noor). Retrieved 23 March, 2015,   from   https://www.moe.gov.sa/Arabic/PublicAgenciesAndDepartments/ EducationalInformationCenter/About/Pages/%D9%85%D8%B4%D8%A7%D8%B1 %D9%8A%D8%B9-%D8%A7%D9%84%D8%A7%D8%AF%D8%A7%D8%B1% D8%A9.aspx

Ehteshami, A., Hachesu, P., Esfahani, M., & Rezazadeh, E. (2013). Awareness and using of medical students about mobile health technology in clinical areas. *Acta Informatica Medica, 21*(2), 109-112.

El Kiki, T., & Lawrence, E. (2006). *Government as a mobile enterprise: Real-time, ubiquitous government.* Paper presented at the Information Technology: New Generations, 2006.

Fang, X., Chan, S., Brzezinski, J., & Xu, S. (2005). Moderating effects of task type on wireless technology acceptance. *Journal of Management Information Systems, 22*(3), 123-157.

Fang, Z. (2002). E-government in digital era: concept, practice, and development. *International Journal of the Computer, the Internet and Management, 10*(2), 1-22.

Faqih, K. (2016). An empirical analysis of factors predicting the behavioral intention to adopt Internet shopping technology among non-shoppers in a developing country context: Does gender matter? *Journal of Retailing and Consumer Services, 30*, 140-164. doi: 10.1016/j.jretconser.2016.01.016

Field, A. (2005). *Discovering statistics using SPSS* (2nd ed.). London: Sage Publications.

Field, A. (2009). *Discovering Statistics using IBM SPSS Statistics* (3rd ed.). London: Sage Publications.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: an introduction to theory and research*. MA: Addison-Wesley Pub. Co.

Fraenkel, J., & Wallen, N. (2000). *How to Design and Evaluate Research in Education*. New York: McGraw-Hill.

Francisco, L., Francisco, M., Juan, S., & María, V. (2016). The moderating effect of user experience on satisfaction with electronic banking: empirical evidence from the Spanish case. *Information Systems and e-Business Management, 14*(1), 141-165. doi: 10.1007/s10257-015-0277-4.

Francisco, L., Juan, S., & Francisco, M. (2014). The moderating effect of experience in the adoption of mobile payment tools in Virtual Social Networks: The m-Payment Acceptance Model in Virtual Social Networks (MPAM-VSN). *International Journal of Information Management, 34*(2), 151-166. doi: 10.1016/j.ijinfomgt.2013.12.006.

Galliers, R. (1991). Strategic information systems planning: myths, reality and guidelines for successful implementation. *European Journal of Information Systems, 1*(1), 55-64.

Gefen, D., Karahanna, E., & Straub, D. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly, 27*(1), 51-90.

Gefen, D., & Straub, D. (2003). Managing user trust in B2C e-services. *E-service Journal, 2*(2), 7-24.

Gefen, D., Straub, D., & Boudreau, M. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association for Information Systems, 4*(7), 1-77.

Giannakos, M., Pateli, A., & Pappas, I. (2013). Identifying the Direct Effect of Experience and the Moderating Effect of Satisfaction in the Greek online market *Mobile Opportunities and Applications for E-Service Innovations* (pp. 77-97). Hershey, PA: IGI Global.

Gilbert, D., Balestrini, P., & Littleboy, D. (2004). Barriers and benefits in the adoption of e-government. *International Journal of Public Sector Management, 17*(4), 286-301.

Glanz, K., Rimer, B. K., & Viswanath, K. (2015). *Health Behavior: Theory, Research, and Practice* (5th edition). San Francisco: Wiley.

Gluud, L. (2006). Bias in clinical intervention research. *American Journal of Epidemiology, 163*(6), 493-501.

Godin, G., Valois, P., Lepage, L., & Desharnais, R. (1992). Predictors of smoking behaviour: an application of Ajzen's theory of planned behaviour. *British Journal of Addiction, 87*(9), 1335-1343.

Green, J. (1999). Qualitative methods. *Journal of Community Eye Health, 12*(31), 46-47.

Greenspoon, P., & Saklofske, D. (1998). Confirmatory factor analysis of the multidimensional students' life satisfaction scale. *Personality and Individual Differences, 25*(5), 965-971.

Hamid, A., Razak, F., Bakar, A., & Abdullah, W. (2016). The effects of perceived usefulness and perceived ease of use on continuance intention to use e-government. *Procedia Economics and Finance, 35*, 644-649.

Hair, J. F., black, B., Babin, B., & Anderson, R. E. (2010). *Multivariate data analysis: a global perspective* (7th edition). New Jersey: Pearson.

Hair, J. F., Black, B., Babin, B., Anderson, R. E., & Tatham, R. (2006). *Multivariate Data Analysis* (6th edition). Upper Sadle River: Pearson.

Hansen, T., Jensen, J., & Solgaard, H. (2004). Predicting online grocery buying intention: a comparison of the theory of reasoned action and the theory of planned behavior. *International Journal of Information Management, 24*(6), 539-550.

Harrington, D. (2009). *Confirmatory Factor Analysis*. Oxford: Oxford University Press.

Harris, P., Rettie, R., & Cheung, C. (2005). Adoption and usage of m-commerce: A cross-cultural comparison of Hong Kong and the United Kingdom. *Journal of Electronic Commerce Research, 6*(3), 210-224.

Hartwick, J., & Barki, H. (1994). Explaining the role of user participation in information system use. *Management Science, 40*(4), 440-465.

Hennink, M., Hutter, I., & Bailey, A. (2010). *Qualitative Research Methods*. Thodand Oaks, Calif: Sage Publications.

Hill, C., Loch, K., Straub, D., & El-Sheshai, K. (1998). A qualitative assessment of Arab culture and information technology transfer. *Journal of Global Information Management, 6*(3), 29-38.

Hinton, P. R., Brownlow, C., McMurray, I., & Cozens, B. (2004). *SPSS Explained*. East Sussex, UK: Routledge.

Hofstede, G. (1991). *Cultures and organizations: software of the mind*. New York: McGraw-Hill.

Hofstede, G., & Hofstede, G. J. (2004). *Cultures and Organizations: Software for the Mind*. New York: McGraw-Hill.

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *The Electronic Journal of Business Research Methods, 6*(1), 53-60.

Horst, M., Kuttschreuter, M., & Gutteling, J. (2007). Perceived usefulness, personal experiences, risk perception and trust as determinants of adoption of e-government services in The Netherlands. *Computers in Human Behavior, 23*(4), 1838-1852.

Hoyle, R. H. (1995). *Structural Equation Modeling: Concepts, Issues, and Applications*. Thousand Oaks, Calif: Sage Publications.

Igbaria, M., Iivari, J., & Maragahh, H. (1995). Why do individuals use computer technology? A Finnish case study. *Information & Management, 29*(5), 227-238.

Islam, M., Khan, M., Ramayah, T., & Hossain, M. (2011). The adoption of mobile commerce service among employed mobile phone users in Bangladesh: self-efficacy as a moderator. *International Business Research, 4*(2), 80-89.

Jaeger, P., & Matteson, M. (2009). E-government and technology acceptance: The case of the implementation of section 508 guidelines for websites. *Electronic Journal of e-Government, 7*(1), 87-98.

Jahanshahi, A., Khaksar, S., Yaghoobi, N., & Nawaser, K. (2011). Comprehensive model of mobile government in Iran. *Indian Journal of Science and Technology, 4*(9), 1188-1197.

Jambulingam, M. (2013). Behavioural intention to adopt mobile technology among tertiary students. *World Applied Sciences Journal, 22*(9), 1262-1271.

Johnson, R., Onwuegbuzie, A., & Turner, L. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research, 1*(2), 112-133.

José, F., Sánchez, J., Muñoz, F., & Francisco, M. (2014). Role of gender on acceptance of mobile payment. *Industrial Management & Data Systems, 114*(2), 220-240. doi: 10.1108/IMDS-03-2013-0137

Jupp, V. (2006). *The SAGE Dictionary of Social Research Methods*. London: Sage Publications.

Kabasakal, H., & Bodur, M. (2002). Arabic cluster: a bridge between East and West. *Journal of World Business, 37*(1), 40-54. doi: 10.1016/S1090-9516(01)00073-6

Kanaan, R. (2009). *Making sense of e-government implementation in Jordan: A qualitative investigation.* (Doctoral Thesis), De Montfort University, Leicester, UK.

Kang, H., Hahn, M., Fortin, D., Hyun, Y., & Eom, Y. (2006). Effects of perceived behavioral control on the consumer usage intention of e- coupons. *Psychology & Marketing, 23*(10), 841-864.

Karahanna, E., & Straub, D. (1999). The psychological origins of perceived usefulness and ease-of-use. *Information & Management, 35*(4), 237-250.

Kariyawasam, N., & Jayasiri, N. (2016). Awareness and usage of internet banking facilitaies in Sirlanka *International Journal of Scientific Research and Innovative Technology, 3*(6), 173-190.

Khan, M. (2016). Exploring the Push and Pull Drivers in M-Government Framework that Influence Acceptance of Services on Mobile Devices. *International Journal of Computer Science and Network Security, 16*(2), 23.

Khan, S. (2014). Qualitative Research Method - Phenomenology. *Asian Social Science, 10*(21), 298-310.

Khare, A., Dixit, S., & Chaudhary, R. (2011). Determinants of Indian customers' preference for online travel services. *International Journal of Leisure and Tourism Marketing, 2*(1), 24-38.

Khechine, H., Lakhal, S., Pascot, D., & Bytha, A. (2014). UTAUT model for blended learning: The role of gender and age in the intention to use webinars. *Interdisciplinary Journal of E-Learning and Learning Objects, 10*, 33-52.

Kim, Y., Yoon, J., Park, S., & Han, J. (2004). Architecture for implementing the mobile government services in Korea. *Conceptual modeling for advanced application domains* (pp. 601-612). New York: Springer.

Kishore, S., & Sequeira, A. (2016). An Empirical Investigation on Mobile Banking Service Adoption in Rural Karnataka. *SAGE Open, 6*(1), 1-21.

Klamo, L., Huang, W., Wang, K., & Le, T. (2006). Successfully implementing e-government: fundamental issues and a case study in the USA. *Electronic Government, 3*(2), 158-173.

Klein, H. K. & Myers, M. D. (1999). A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems. MIS Quarterly 23(1), 67 -94.

Kline, R. B. (2005). *Principles and Practice of Structural Equation Modeling* (2nd ed.). New York: Guildwood.

Koenig-Lewis, N., Marquet, M., Palmer, A., & Zhao, A. (2015). Enjoyment and social influence: predicting mobile payment adoption. *The Service Industries Journal, 35*(10), 537-554.

Krauss, S. (2005). Research paradigms and meaning making: A primer. *The Qualitative Report, 10*(4), 758-770.

Krejcie, R., & Morgan, D. (1970). Determining sample size for research activities. *Educational and Psychological Assessment, 30*(3), 607-610.

KSA. (2016). *General Information about The Kingdom of Saudi Arabia*. Retrieved 25 December, 2016, from http://www.stats.gov.sa/en/4025

Kuhn, T. (1970). *The structure of scientific revolutions* (Vol. 2, no. 2.). Chicago: University of Chicago Press.

Kulviwat, S., Bruner, I., Gordon, C., Kumar, A., Nasco, S., & Clark, T. (2007). Toward a unified theory of consumer acceptance technology. *Psychology & Marketing, 24*(12), 1059-1084.

Kumar, M., & Sinha, O. (2007). *M-government–mobile technology for e-government.* Paper presented at the International Conference on e-government, India.

Kumar , S., & Madhumohan , S. (2014). Internet banking adoption in India. *Journal of Indian Business Research, 6*(2), 155-169. doi: 10.1108/JIBR-02-2013-0013

Kushchu, I. (2007). *Mobile government: an emerging direction in e-government*. Hershey, PA: IGI Pub.

Lallmahamood, M. (2007). An Examination of Individual's Perceived Security and Privacy of the Internet in Malaysia and the Influence of this on their Intention to Use E-commerce: Using an Extension of the Technology Acceptance Model. *Journal of Internet Banking and Commerce, 12*(3), 1-26.

Lee, J., Kim, H., & Ahn, M. (2011). The willingness of e-Government service adoption by business users: The role of offline service quality and trust in technology. *Government Information Quarterly, 28*(2), 222-230.

Lee, Y. (2006). An empirical investigation into factors influencing the adoption of an e-learning system. *Online Information Review, 30*(5), 517-541.

Levy, Y. (2006). *Assessing the Value of E-learning Systems*. Hershey, PA: Information Science Publishing.

Li, H., & Lai, M. (2011). Demographic differences and internet banking acceptance. *MIS Review, 16*(2), 55-92.

Liébana-Cabanillas, F., Sánchez-Fernández, J., & Muñoz-Leiva, F. (2014). The moderating effect of experience in the adoption of mobile payment tools in Virtual Social Networks: The m-Payment Acceptance Model in Virtual Social Networks (MPAM-VSN). *International Journal of Information Management, 34*(2), 151-166.

Liker, J., & Sindi, A. (1997). User acceptance of expert systems: a test of the theory of reasoned action. *Journal of Engineering and Technology management, 14*(2), 147-173.

Lin, K. (2011). e-Learning continuance intention: Moderating effects of user e-learning experience. *Computers & Education, 56*(2), 515-526.

Liu, C., Marchewka, J., Lu, J., & Yu, C. (2005). Beyond concern—a privacy-trust-behavioral intention model of electronic commerce. *Information & Management, 42*(2), 289-304.

Liu, S., Liao, H., & Pratt, J. (2009). Impact of media richness and flow on e-learning technology acceptance. *Computers & Education, 52*(3), 599-607.

Liu, Y., & Bing, W. (2017). The key factors influencing e-government acceptance: case of Veitnam. *European Journal of Research in Social Sciences Vol, 5*(4), 41-57.

Lloyd, M. (2005). Towards a definition of the integration of ICT in the classroom. Retrieved from http://eprints.qut.edu.au/3553/1/3553.pdf

Louise, K., & While, A. (1994). Collecting data using a semi- structured interview: a discussion paper. *Journal of Advanced Nursing, 19*(2), 328-335.

Lu, C., Lai, K., & Cheng, T. (2007). Application of structural equation modeling to evaluate the intention of shippers to use Internet services in liner shipping. *European Journal of Operational Research, 180*(2), 845-867.

Luthfihadi, M., & Dhewanto, W. (2013). Technology Acceptance of E-commerce in Indonesia. *International Journal of Engineering Innovation and Management, 3*, 9-18.

Ma, Q., & Liu, L. (2004). The technology acceptance model: A meta-analysis of empirical findings. *Journal of Organizational and End User Computing, 16*(1), 59-72.

MacGregor, R., & Vrazalic, L. (2006). E-commerce adoption barriers in small businesses and the differential effects of gender. *Journal of Electronic Commerce in Organizations, 4*(2), 1-24.

Madden, T., Ellen, P., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. *Personality and Social Psychology Bulletin, 18*(1), 3-9.

Maditinos, D. (2007). *Predicting e-commerce purchasing intention in Greece: An extended TAM approach*. Paper presented at the 5th International Conference on Acounting and Finance in Transition (ICAFT), Greenwich, London.

Mahad, M., Mohtar, S., Yusoff, R., & Othman, A. (2015). Factors Affecting Mobile Adoption Companies in Malaysia. *International Journal of Economics and Financial* (5), 84-91.

Malik, A., Hiekkanen, K., & Nieminen, M. (2016). Privacy and trust in Facebook photo sharing: age and gender differences. *Program-Electronic Library and Information Systems, 50*(4), 462-480. doi: 10.1108/PROG-02-2016-0012

Martínez-Torres, M., Díaz-Fernández, M., Toral, S., & Barrero, F. (2015). The moderating role of prior experience in technological acceptance models for ubiquitous computing services in urban environments. *Technological Forecasting and Social Change, 91*, 146-160.

McCoy, S., Galletta, D., & King, W. (2007). Applying TAM across cultures: the need for caution. *European Journal of Information Systems, 16*(1), 81-90.

Meftah, M., Gharleghi, B., & Samadi, B. (2015). Adoption of E-Government among Bahraini Citizens. *Asian Social Science, 11*(4), 141-149.

Mengistu, D., Zo, H., & Rho, J. (2009). *M-Government: Opportunities and challenges to deliver mobile government services in developing countries.* Paper presented at the Fourth International Conference on Computer Sciences and Convergence Information Technology.

Mertens, D. (2010). Transformative Mixed Methods Research. *Qualitative Inquiry, 16*(6), 469-474.

Meyer, J. (2007). Older workers and the adoption of new technologies. *ZEW-Centre for European Economic Research Discussion Paper* (07-050). Mannheim, Germany.

Mishra, S. (2014). Adoption of M-commerce in India: Applying Theory of Planned Behaviour Model. *Journal of Internet Banking and Commerce, 19*(1), 1-17.

Misra, D. (2009). Make M-Government an Integral Part of E-Government: An Agenda for Action. *Compendium*, 78-86.

Mohammed, R., Nor, K., & Norshidah, M. (2014). Gender Difference Effects on Contributing Factors of Intention to Be Involved In Knowledge Creation and Sharing. *Asian Economic and Financial Review, 4*(7), 893-907.

Moon, J. (2004). *From E-Government to M-Government?: Emerging Practices in the Use of Mobile Technology by State Governments*. E-Government Series, Texas, USA: IBM Center for The Business of Government.

Moon, J., & Kim, Y. (2001). Extending the TAM for a World-Wide-Web context. *Information & Management, 38*(4), 217-230.

Mulero, S. (2012). *Acceptance and impact of social networks marketing using extended technology acceptance model.* (Masters Thesis), Cape Peninsula University of Technology, Cape Town.

Murray, J. (1998). Qualitative methods. *International Review of Psychiatry, 10*(4), 312-316.

Muthuviknesh, R., & Kumar, K. (2014). The Effect of Occupational Health and Safety Management on Work Environment: A Prospective Study. *International Journal of Advanced Research in Computer Science and Management Studies, 2*(6), 63-70.

Myers, M., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and Organization, 17*(1), 2-26.

Nasser, A., & Jasimuddin, S. (2017). Factors that Influence End-Users' Adoption of Smart Government Services in the UAE: A Conceptual Framework. *Electronic Journal of Information Systems Evaluation, 20*(1), 11-23.

Nava, A., & Dávila, I. (2005). *M-Government for Digital Cities: Value Added Public Services.* Paper presented at the The Proceedings of the 1st European Mobile Government Conference, UK.

Ndou, V. (2004). E-government for developing countries: opportunities and challenges. *The Electronic Journal of Information Systems in Developing Countries, 18*(1), 1-24.

Netemeyer, R. G., Bearden, W. O., & Sharma, S. (2003). *Scaling Procedures: Issues and Applications*. Thousnad Oaks, Calif.: Sage Publications.

Neuman, W. (1997). *Social Research Methods: Qualitative and Quantitative Approaches*. USA: Allyn and Bacon.

Neuman, W. (2006). *Social Research Methods: Qualitative and Quantitative Approaches*. Boston: Pearson.

Ng, S. (2013). Validation of the 10-item Chinese perceived stress scale in elderly service workers: one-factor versus two-factor structure. *BMC Psychology, 1*(9), 1-8.

Norm O'Rourke, P., & Hatcher, L. (2013). *A Step-by-Step Approach to Using SAS for Factor Analysis and Structural Equation Modeling, Second Edition* (2nd ed.). North Carolina, USA: SAS Institute.

Ntaliani, M., Costopoulou, C., & Karetsos, S. (2008). Mobile government: A challenge for agriculture. *Government Information Quarterly, 25*(4), 699-716.

Nyakwende, E., & Al Mazari, A. (2012). Factors affecting the development of e-government in Saudi Arabia *Advancing Democracy, Government and Governance* (pp. 19-28). New York: Springer.

Oluwatayo, J. (2012). Validity and reliability issues in educational research. *Journal of Educational and Social Research 2*(2), 391-400.

Ong, C., & Lai, J. (2006). Gender differences in perceptions and relationships among dominants of e-learning acceptance. *Computers in Human Behavior, 22*(5), 816-829.

Ong, C., Lai, J., & Wang, Y. (2004). Factors affecting engineers' acceptance of asynchronous e-learning systems in high-tech companies. *Information & Management, 41*(6), 795-804.

OPEC. (2016). Annual Statistical Bulletin - Organization of the Petroleum Exporting Countries. Retrieved December 25, 2016, from http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2016.pdf

Orlikowski, W., & Baroudi, J. (1991). Studying information technology in organizations: Research approaches and assumptions. *Information Systems Research, 2*(1), 1-28.

Osborne, J., & Costello, A. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation, 10*(7), 1-9.

Östberg, O. (2003). *A Swedish View on 'Mobile Government''.* Paper presented at the International Symposium on E & M-Government, Seoul, Korea.

Pallant, J. (2005). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS* (2nd ed.). Crows Nest, NSW: Allen & Unwin.

Palvia, P. (2009). The role of trust in e-commerce relational exchange: A unified model. *Information & Management, 46*(4), 213-220.

Park, S. (2009). An Analysis of the Technology Acceptance Model in Understanding University Students' Behavioral Intention to Use e-Learning. *Educational Technology & Society, 12*(3), 150-162.

Peng, R., Xiong, L., & Yang, Z. (2012). Exploring tourist adoption of tourism mobile payment: An empirical analysis. *Journal of Theoretical and Applied Electronic Commerce Research, 7*(1), 21-33. doi: 10.4067/S0718-18762012000100003

Pervan, G. (1994). *A case for more case study research in group support systems.* Paper presented at the Proceedings of the IFIP TC8 Open Conference on Business Process Re-engineering: Information Systems Opportunities and Challenges, Gold Coast, Australia.

Phillips, D., & Burbules, N. (2000). *Postpositivism and Educational Research*. Maryland, USA: Rowman & Littlefield Publishers.

Porter, C., & Donthu, N. (2006). Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics. *Journal of Business Research, 59*(9), 999-1007. doi: 10.1016/j.jbusres.2006.06.003

Punch, K. (2005). *Introduction to social research: quantitative and qualitative approaches* (2nd ed.). London: SAGE Publications.

Rabionet, S. (2011). How I Learned to Design and Conduct Semi-Structured Interviews: An Ongoing and Continuous Journey. *Qualitative Report, 16*(2), 563-566.

Ramavhona, T., & Mokwena, S. (2016). Factors influencing Internet banking adoption in South African rural areas. *South African Journal of Information Management, 18*(2), 1-8.

Ramayah, T., & Ignatius, J. (2005). Impact of perceived usefulness, perceived ease of use and perceived enjoyment on intention to shop online. *ICFAI Journal of Systems Management, 3*(3), 36-51.

Ramírez-Correa, P., Arenas-Gaitán, J., & Rondán-Cataluña, F. (2015). Gender and acceptance of E-learning: a multi-group analysis based on a structural equation model among college students in Chile and Spain. *PloS One, 10*(10), e0140460. doi: doi:10.1371/journal.pone.0140460

Ratten, V. (2014). Indian and US consumer purchase intentions of cloud computing services. *Journal of Indian Business Research, 6*(2), 170-188. doi: 10.1108/JIBR-07-2013-0068

Ratten, V. (2015). International consumer attitudes toward cloud computing: A social cognitive theory and technology acceptance model perspective. *Thunderbird International Business Review, 57*(3), 217-228.

Roca, J., Chiu, C., & Martínez, F. (2006). Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. *International Journal of Human-Computer Studies, 64*(8), 683-696.

Rogers, E. (1962). *Diffusion of innovations* (3rd edition). New York: Free Press.

Rogers, E. (2003). *Diffusion of innovations* (5th edition). New York: Free Press.

Rouibah, K., Lowry, P. B., & Hwang, Y. (2016). The effects of perceived enjoyment and perceived risks on trust formation and intentions to use online payment systems: New perspectives from an Arab country. *Electronic commerce research and applications, 19*, 33-43. doi: 10.1016/j.elerap.2016.07.001.

Ryan, B., & Gross, N. (1943). The diffusion of hybrid seed corn in two Iowa communities. *Rural Sociology, 8*(1), 15-24.

Safeena, R., Hundewale, N., & Kamani, A. (2011). Customer's Adoption of Mobile-Commerce A Study on Emerging Economy. *International Journal of e-Education, e-Business, e-Management and e-Learning, 1*(3), 228-233.

Salam, A., Iyer, L., Palvia, P., & Singh, R. (2005). Trust in e-commerce. *Communications of the ACM, 48*(2), 72-77.

Sandelowski, M. (2000). Combining Qualitative and Quantitative Sampling, Data Collection, and Analysis Techniques in Mixed-Method Studies. *Research in Nursing & Health, 23*(3), 246-255.

Sandy, G., & McMillan, S. (2005). *A Success Factors Model For M-Government'.* Paper presented at the EURO mGOV 2005, Brighton, UK.

Sang, S., & Lee, J. (2009). *A conceptual model of e-government acceptance in public sector.* Paper presented at the Third International Conference on Digital Society, Cancun, Mexico.

Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research Methods for Business Students* (4th edition). Essex: Financial Times/Prentice Hall.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students* (5th edition).Essex: Financial Times/Prentice Hall.

Scholl, H. (2005). *The mobility paradigm in government theory and practice: A strategic framework.* Paper presented at the Euro mGov 2005, Brighton, UK.

Sekaran, U. (2003). *Research methods for business: a skill-building approach* (4th edition). New York: Wiley.

Sharma, S., & Chandel, J. (2013). Technology Acceptance Model for the Use of Learning Through Websites Among Students in Oman. *International Arab Journal of e-Technology, 3*(1), 44-49.

Sheng, H., & Trimi, S. (2008). M-government: technologies, applications and challenges. *Electronic Government, 5*(1), 1-18.

Sheppard, B., Hartwick, J., & Warshaw, P. (1988). The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research. *Journal of Consumer Research, 15*(3), 325-343. doi: 10.1086/209170

Shih, H. (2004). Extended technology acceptance model of Internet utilization behavior. *Information & Management, 41*(6), 719-729.

Siau, K., & Long, Y. (2009). Facotrs impacting e-government development. *Journal of Computer Information Systems, 50*(1), 98-107.

Siddiqui, H. N. (2008). *Investigation of intention to use e-commerce in the Arab countries: A comparison of self-efficacy, usefulness, culture, gender, and socioeconomic status in Saudi Arabia and the United Arab Emirates.* (Doctoral Thesis), Nova Southeastern University, USA.

Simon, S. (2001). The impact of culture and gender on web sites: an empirical study. *The Database for Advances in Information Systems, 32*(1), 18-37.

Smith, S., & Jamieson, R. (2006). Determining key factors in e-government information system security. *Information Systems Management,, 23*(2), 23-32.

Snellen, I., & Thaens, M. (2008). *From e-government to m-government: towards a new paradigm in public administration.* Working Document, Erasmus University, Rotterdam.

Sofaer, S. (1999). Qualitative methods: What are they and why use them? *Health Services Research, 34*(5), 1101-1118.

Sparks, P., & Shepherd, R. (1992). Self-identity and the theory of planned behavior: Assesing the role of identification with "green consumerism." *Social Psychology Quarterly, 55*, 388-399.

Straub, D. (1989). Validating instruments in MIS research. *MIS Quarterly*, 147-169.

Straub, D., Boudreau, M., & Gefen, D. (2004). Validation guidelines for IS positivist research. *The Communications of the Association for Information Systems, 13*(24), 380-427.

Suki, N., & Suki, N. (2011). Exploring the relationship between perceived usefulness, perceived ease of use, perceived enjoyment, attitude and subscribers' intention towards using 3G mobile services. *Journal of Information Technology Management, 22*(1), 1-7.

Sun, H., & Zhang, P. (2006a). Causal relationships between perceived enjoyment and perceived ease of use: An alternative approach. *Journal of the Association for Information Systems, 7*(9), 618-645.

Sun, H., & Zhang, P. (2006b). The role of moderating factors in user technology acceptance. *International Journal of Human-Computer Studies, 64*(2), 53-78. doi: 10.1016/j.ijhcs.2005.04.013

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics* (5th edition). Boston: Pearson.

Tacken, M., Marcellini, F., Mollenkopf, H., Ruoppila, I., & Szeman, Z. (2005). Use and acceptance of new technology by older people. Findings of the international MOBILATE survey: 'Enhancing mobility in later life.' *Gerontechnology, 3*(3), 126-137.

Tarhini, A., Hone, K., & Liu, X. (2014a). The effects of individual differences on e-learning users' behaviour in developing countries: A structural equation model. *Computers in Human Behavior, 41*, 153-163.

Tarhini, A., Hone, K., & Liu, X. (2014b). Measuring the moderating effect of gender and age on e-learning acceptance in England: A structural equation modeling approach for an extended technology acceptance model. *Journal of Educational Computing Research, 51*(2), 163-184.

Teddlie, C., & Yu, F. (2007). Mixed methods sampling a typology with examples. *Journal of Mixed Methods Research, 1*(1), 77-100.

Teijlingen, E., Rennie, A., Hundley, V., & Graham, W. (2001). The importance of conducting and reporting pilot studies: the example of the Scottish Births Survey. *Journal of Advanced Nursing, 34*(3), 289-295.

Teo, T. (2012). Examining the intention to use technology among pre-service teachers: an integration of the Technology Acceptance Model and Theory of Planned Behavior. *Interactive Learning Environments, 20*(1), 3-18. doi: 10.1080/10494821003714632

Teo, T., Lim, V., & Lai, R. (1999). Intrinsic and extrinsic motivation in Internet usage. *Omega, 27*(1), 25-37.

Teo, T., Srivastava, S., & Jiang, L. (2008). Trust and electronic government success: An empirical study. *Journal of Management Information Systems, 25*(3), 99-132.

Terrell, S. (2012). *Mixed-Methods Research Methodologies* (pp. 254-280). Fort Lauderdale: The Qualitative Report.

Thomas, T., Singh, L., & Gaffar, K. (2013). The utility of the UTAUT model in explaining mobile learning adoption in higher education in Guyana. *International Journal of Education and Development using Information and Communication Technology, 9*(3), 71-85.

Thorne, S. (2000). Data analysis in qualitative research. *Evidence-Based Nursing, 3*(3), 68-70. doi: 10.1136/ebn.3.3.68

Trappey, R. J., & Woodside, A. (2005). Consumer responses to interactive advertising campaigns coupling short-message-service direct marketing and TV commercials. *Journal of Advertising Research, 45*(04), 382-401.

Tsu Wei, T., Marthandan, G., Yee-Loong, A., Ooi, K., & Arumugam, S. (2009). What drives Malaysian m-commerce adoption? An empirical analysis. *Industrial Management & Data Systems, 109*(3), 370-388.

Turocy, P. S. (2002). Survey research in athletic training: the scientific method of development and implementation. *Journal of Athletic Training, 37*(suppl 4), 174-179.

United Nations. (2016). *E-government survey 2016*. New York: United Nations.

United Nations. (2014). *E-government survey 2014*. New York: United Nations.

Van Ittersum, K., Rogers, W., Capar, M., Caine, K., O'Brien, M., Parsons, L., & Fisk, A. (2006). *Understanding technology acceptance: Phase 1 – literature review and qualitative model development.* Atlanta, GA: Georgia Institute of Technology

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research, 11*(4), 342-365.

Venkatesh, V., & Davis, F. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186-204.

Venkatesh, V., & Morris, M. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly, 24*(1), 115-139.

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly, 27*(3), 425-478.

Venkatesh, V., Ramesh, V., & Massey, A. (2003). Understanding usability in mobile commerce. *Communications of the ACM, 46*(12), 53-56.

Venkatesh, V., Thong, J., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly, 36*(1), 157-178.

Vision 2030. (2016). Vision 2030. Retrieved 28 Decmber, 2016, from http://vision2030.gov.sa/en

Wang, H., & Yang, H. (2005). The role of personality traits in UTAUT model under online stocking. *Contemporary Management Research, 1*(1), 69-82.

Wangpipatwong, S., Chutimaskul, W., & Papasratorn, B. (2008). Understanding citizen's continuance intention to use e-government website: A composite view of technology acceptance model and computer self-efficacy. *The Electronic Journal of E-government, 6*(1), 55-64.

Warkentin, M., Gefen, D., Pavlou, P., & Rose, G. (2002). Encouraging citizen adoption of e-government by building trust. *Electronic Markets, 12*(3), 157-162.

WEF. (2013). *The Global Information Technology Report 2013.* USA: Conell University.

WEF. (2014). *The Global Information Technology Report 2014*. USA: Cornell University.

WEF. (2015). *The Global Information Technology Report 2015*. USA: Cornell university.

WEF. (2016). *The Global Information Technology Report 2016*. USA: Conell University.

Weitzner, M., Meyers, C., Steinbruecker, S., Saleeba, A., & Sandifer, S. (1996). Developing a care giver quality-of-life instrument. Preliminary steps. *Cancer Practice, 5*(1), 25-31.

West, D. (2008). *Improving technology utilization in electronic government around the world*. Washington, DC: Brookings Institution, Governance Studies.

Whittemore, R., Chase, S., & Mandle, C. (2001). Validity in qualitative research. *Qualitative Health Research, 11*(4), 522-537.

Witzel, A. (2000). *The problem-centered interview*. Paper presented at the Forum Qualitative Sozialforschung/Forum: Qualitative Social Research.

Wong, C., & Hiew, P. (2005). *Diffusion of mobile entertainment in Malaysia: Drivers and barriers*. Paper presented at the Proceedings of the World Academy of Science, ENgineering and Technology.

World Bank. (2011). *E-government*. Retrieved 15 April, 2015 from http://www.worldbank.org/en/topic/ict/brief/e-government

Wu, J., & Wang, S. (2005). What drives mobile commerce?: An empirical evaluation of the revised technology acceptance model. *Information & Management, 42*(5), 719-729.

Wu, M., Chou, H., Weng, Y., & Huang, Y. (2008). *A Study of Web 2.0 Website Usage Behavior Using TAM 2*. Paper presented at the Asia-Pacific Services Computing Conference, Yilan,Taiwan.

Yesser. (2015). Yesser overview. Retrieved 15 April, 2015, from http://www.yesser.gov.sa/en/ProgramDefinition/Pages/Overview.aspx

Yfantis, V., Vassilopoulou, K., Pateli, A., & Usoro, A. (2013). The influential factors of m-government's adoption in the developing countries. Paper presented at the International Conference on Mobile Web and Information Systems.

Yoh, E., Damhorst, M., Sapp, S., & Laczniak, R. (2003). Consumer adoption of the Internet: The case of apparel shopping. Psychology & Marketing, 20(12), 1095-1118.

Yol, S., Serenko, A., & Turel, O. (2006). Moderating roles of user demographics in the American customer satisfaction model within the context of mobile services. Paper presented at the 12th AMCIS Proceedings, Acapulco, Mexico.

Zafiropoulos, K., Karavasilis, I., & Vrana, V. (2012). Assessing the Adoption of e-Government Services by Teachers in Greece. *Future Internet, 4*(2), 528-544.

Zikmund, W. (2003). *Business Research Methods*. Ohio, USA: Thomson/South-Western.

Appendix A Yesser Program Participants

Figure A1. Official members of the Yesser Program in Saudi Arabia, from Alfarraj (2013)

Appendix B E-Government Portfolios

G2C
Objectives:
   (i) To provide satisfactory service to citizens in order to improve the government-citizen relationship.
Activities:
   (i) Providing information access such as benefits, policies, loans, and educational materials;
   (ii) Providing individual business transactions such as social services, grants/loans, taxes.

G2B
Objectives:
   (i) To provide better service to businesses (e.g., eliminating redundant data collection);
   (ii) To reduce the purchasing cost of government by using e-business technology.
Activities:
   (i) Providing a single portal and an integrated database;
   (ii) Entering the e-market to gain cost efficient benefits.

G2E
Objective:
   (i) To improve efficiency and effectiveness of government administration.
Activities:
   (i) Reorganizing internal operations and adopting the best commercial practices;
   (ii) Providing services to government employees such as training, payroll, travel, and reimbursement.

G2G
Objective:
   (i) To enhance cooperation and collaboration between governments of different levels and at various locations.
Activities:
   (i) Sharing or integrating federal, state, and local government databases, as well as integrating separate systems;
   (ii) Enhancing collaboration and cooperation such as grants, law enforcement, public safety, and emergency management.

Axes: External / Internal (vertical), Individual / Organization (horizontal)

Figure B1 E-government portfolios, from Siau and Long (2009)

Appendix C E-Government Development of GCC

Table C1 E-government development of Gulf Cooperation Council (GCC), from United Nations (2014)

Country Name	Organization	EGDI 2014	2014 Rank	2012 Rank	Change in Rank
Very High EGDI					
Bahrain	GCC Member	0.8089	18	36	↑ 18
High EGDI					
United Arab Emirates	GCC Member	0.7136	32	28	↓ 4
Saudi Arabia	GCC Member	0.6900	36	41	↑ 5
Qatar	GCC Member	0.6362	44	48	↑ 4
Oman	GCC Member	0.6273	48	64	↑ 16
Kuwait	GCC Member	0.6268	49	63	↑ 14
Regional Average		0.6838			
World Average		0.4712			

Appendix D Top 10 Countries for E-government in Asia

Table D1 Top 10 countries for e-government in Asia, from United Nations (2016)

Country	Region	Sub-Region	OSI	HCI	TII	EGDI	EGDI Level	2016 Rank	
Republic of Korea	Asia	Eastern Asia	0.9420	0.8795	0.8530	0.8915	Very High	3	
Singapore	Asia	South-Eastern Asia	0.9710	0.8360	0.8414	0.8828	Very High	4	
Japan	Asia	Eastern Asia	0.8768	0.8274	0.8277	0.8440	Very High	11	
Israel	Asia	Western Asia	0.8623	0.8619	0.6175	0.7806	Very High	20	
Bahrain	Asia	Western Asia	0.8261	0.7178	0.7762	0.7734	Very High	24	
United Arab Emirates	Asia	Western Asia	0.8913	0.6752	0.6881	0.7515	Very High	29	
Kazakhstan	Asia	Central Asia	0.7681	0.8401	0.5668	0.7250	High	33	
Kuwait	Asia	Western Asia	0.6522	0.7287	0.7430	0.7080	High	40	
Saudi Arabia	Asia	Western Asia	0.6739	0.7995	0.5733	0.6822	High	44	
Qatar	Asia	Western Asia	0.6739	0.7317	0.6041	0.6699	High	48	

*Note: The Ranking Trend lines display the country rankings, with 1 being the top ranked and appearing at the bottom of the vertical axis, and 193 being the lowest ranked and appearing at the top of the vertical axis. Therefore, the lower is the graphical point, the higher is the ranking. The horizontal axis represents the survey periods of the UN E-Government Survey, i.e. 2003, 2004, 2005, 2008, 2010, 2012, 2014 and 2016.

Appendix E M-government as Integral Part of E-government
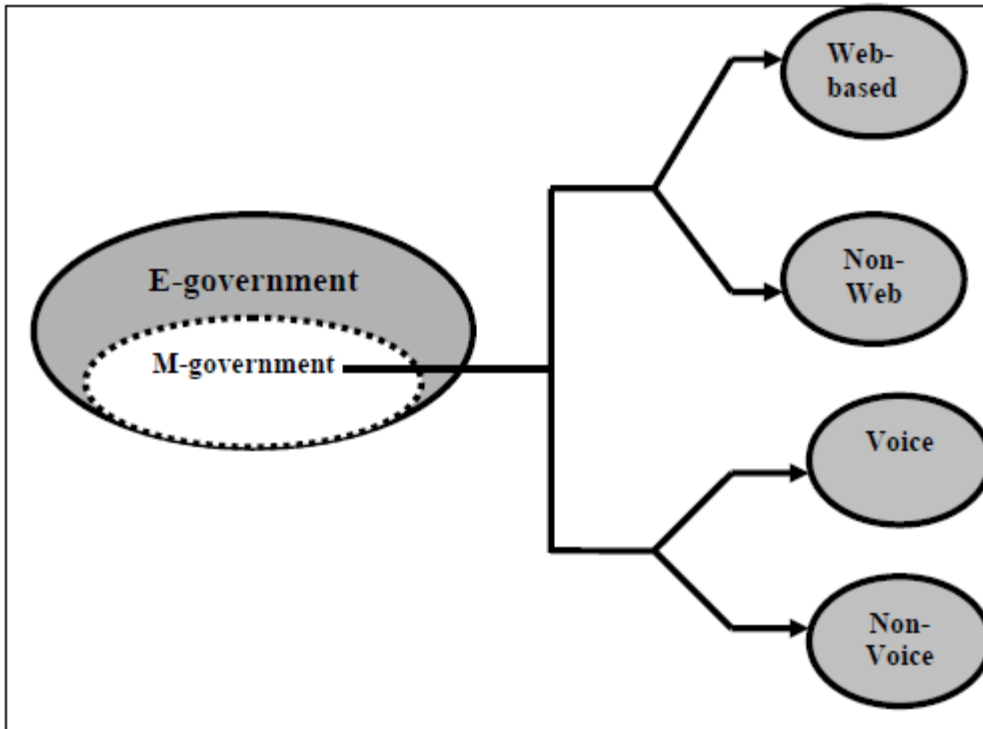
Figure E1 M-government as an integral part of e-government, from Misra (2009)

Appendix F English Version of Questionnaire

Dear Participant,

This research is part of a PhD program studying the factors that influence users' intentions to use m-government applications in Saudi Arabia. Therefore, this research aims to identify and measure factors influencing users' intentions to use m-government applications in Saudi Arabia. The results of this research will help decision makers in the Saudi government make m-government applications effectively and rapidly used by citizens.

Please participate in this survey and your answers will help the researchers analyse the data and will assist researchers to serve the Saudi society. I highly appreciate your time answering all the questions. Completion of this questionnaire will be take around 35-40 minutes. Please read the instructions and complete the questionnaire.

This questionnaire is completely anonymous. Your participation in this study is not-compulsory and you may discontinue your participation any time without explanations or fear of reprisal. Your information will be protected and only used to achieve the research requirements. The researcher has applied for ethical clearance from Griffith University (GU Human Research ethics reference number is IBA/21/14/HREC) to make sure that this research will be conducted in the right way. Your consent to participate in this research will be implied by reading the information, completing and returning the questionnaire.

This research is conducted under the supervision of:

1. Name: Dr Kuldeep Sandhu,
   School: Griffith Business School,
   Email: k.sandhu@griffith.edu.au.
   Phone: (07) 373 57718

2. Name: Dr Luke Houghton,
   School: Griffith Business School,
   Email: l.houghton@griffith.edu.au.
   Phone: (07) 373 57721 Ext. 57721

Please do not hesitate to contact me if you have any questions and thank you so much in advance for your participation.

Regards

Raed Alotaibi

PhD candidate and student researcher, Griffith Business School (Information Systems), Griffith University.

Email: raed shuuja.alotaibi@griffithuni.edu.au

English version of Questionnaire – Section I

Demographic Characteristics Information

-Gender:
- Male
- Female.

-Age
Please write your age

- where are you living:
1.	City
2.	Village

-Qualifications:
1.	Primary
2.	High school.
3.	Diploma.
4.	Bachelor
5.	Postgraduate.

-Occupation:
1.	I am Student
2.	I am Working in government organization
3.	I am Working in private sector
4.	I am Business man
5.	Others.

- How long have you used, or have been using m-government applications?
1.	Never used m-government applications
2.	Less than a year
3.	1 to less than 2 years
4.	2 to less than 3 years
5.	3 years or more.

Questionnaire- Section II

Perceived Ease of Use (PEU)	
I feel that using an m-government applications would be easy for me	PEU1
I feel that my interaction with m-government applications would be clear and understandable	PEU2
I feel that it would be easy to become skilful at using m-government applications	PEU3
I would find m-government applications to be flexible to interact with	PEU4
Learning to operate m-government applications would be easy for me	PEU5
It would be easy for me to get m-government applications to do what I want to do	PEU6
Perceived Usefulness (PU)	
Using m-government applications in my job would enable me to accomplish tasks more quickly	PU1
Using m-government applications would improve my job performance.	PU2
Using m-government applications in my job would increase my productivity	PU3
Using m-government applications would enhance my effectiveness on the job.	PU4
Using m-government applications would make it easier to do my job	PU5

I would find m-government applications useful in my job	PU6

Attitude Toward Usage (ATU)	
I believe it is a good idea to use m-government applications	ATU1
I like the idea of using m-government applications	ATU2
Using m-government applications is a positive idea	ATU3
Behavioural Intention to Use (BIU)	
I plan to use m-government applications in the future	BIU1
Assuming that I have access to m-government applications, I intend to use it.	BIU2
I feel that my experience in using m-government applications would increase my intention to use these apps in future	BIU3

Questionnaire – Section III

Perceived trustworthiness (TRU)	
The uses of m-government applications are trustworthy.	TRU1
I trust in the benefits of using m-government applications.	TRU2
The use of m-government applications keeps its promises and commitments.	TRU3
The use of m-government applications keeps the users interests into consideration.	TRU4
I trust the use of m-government applications.	TRU5
Awareness (AWAR)	
I receive enough information about m-government applications.	AWAR1
I receive enough information about the benefits of m-government applications.	AWAR2
I receive enough information of using m-government applications.	AWAR3
Perceived Security (SEC)	

I believe using m-government applications are secure	SEC1
I believe I trust the ability of a mobile to protect my privacy when using m-government applications	SEC2
I believe the mobile has enough safeguards to make me feel comfortable using it to interact with the m-government applications.	SEC3
I believe that I'm adequately protected by law in Saudi Arabia from problems that could be caused when using m-government applications.	SEC4
I believe I'm not worried about the security when using m-government applications.	SEC5

Appendix G Arabic Version of Questionnaire

عزيزي المشارك

هذا البحث جزء من دراسة الدكتوراه للباحث، والتي حول دراسة العوامل المؤثرة على نيات المستخدمين لاستخدام تطبيقات الحكومة المتنقلة.

هذا البحث يهدف الى دراسة وقياس العوامل المؤثرة في نيات المستخدمين لاستخدام تطبيقات الحكومة المتنقلة. نتائج هذا البحث سوف تساعد متخذي القرار في الحكومة السعودية لمساعدتهم في توفير الخدمات الحكومية عبر التطبيقات المتنقلة وجعلها مستخدمه بشكل فعّال من قبل المستفيدين.

الرجاء المشاركة في هذا البحث الذي قد يستغرق بين ٣٥ إلى ٤٠ دقيقه، وإجاباتك سوف تساعد الباحث لخدمة المجتمع السعودي. شاكرا لك مشاركتك في هذا البحث. المرجو قراءة الإرشادات ومن ثم تعبئة الاستبيان.

المشاركة في هذا الاستبيان تطوعية تماما، وبالإمكان التوقف في أي وقت دون إبداء سبب لذلك. هذا الاستبيان تم تصميمه بطريقه تحافظ على خصوصية بياناتك من الباحثين أنفسهم، أو من أي جهه أخرى. وسيتم استخدام البيانات فقط لاغراض البحث وسيتم التخلص منها بعد ذلك.

يتم إجراء هذه الدراسة وفقا لشروط جامعة قريفث، والتي تقدم بحوثها من خلال المعايير الأسترالية في البحوث. استكمال وإرسال الاستبيان يعني أنك قرأت وفهمت المعلومات المذكوره سابقا، وأنك موافق على أن يتم استخدام البيانات على الطريقه الموضحه أعلاه.

هذا البحث تحت إشراف :

الاسم: د. كولديب ساندي
الكليه: قسم الإدارة، كلية قريفث للأعمال.
الهاتف: 57718 373 (07)

البريد الالكتروني : k.sandhu@griffith.edu.au

الاسم د. لوك هوقتن
الكليه: قسم الادارة، كلية قريفث للأعمال
الهاتف:57721 373 (07) Ext. 57721
البريد الالكتروني: l.houghton@griffith.edu.au.

اذا لديك أسئله حول هذا البحث ، يمكنك الاتصال ب:
الباحث رائد العتيبي ، طالب دكتوراه في قسم نظم المعلومات، كلية قريفث للأعمال
البريد الالكتروني: raed-shujaa.alotaibi@griffithuni.edu.au

Arabic version of questionnaire – Section I

Demographic Characteristics Information **خصائص المشارك**

-الجنس:
1. ذكر
2. انثى.

ـ العمر
من فضلك اكتب إجابتك هنا:

┌──────────────┐
│   │
└──────────────┘

ـ مكان الاقامة او المعيشة:
1. مدينة
2. قرية

-المؤهل العلمي:
1. ابتدائي
2. ثانوي.
3. دبلوم.
4. بكالوريوس
5. دراسات عليا.

ـالوظيفة او المهنة:
1. طالب
2. موظف في القطاع الحكومي
3. موظف في القطاع الخاص
4. رجل اعمال
5. اخرى.

ـ الخبرة في استخدام تطبيقات الحكومة المتنقلة
1. لم استخدمها مطلقاً
2. اقل من سنة
3. من سنه إلى أقل من سنتين
4. من سنتين إلى أقل من ثلاث سنوات
5. من ثلاث سنوات فأكثر

Questionnaire – Section II

Perceived Ease of Use (PEU) التصور حول سهولة الاستخدام	
أشعر بان استخدام تطبيقات الحكومة المتنقلة ستكون سهلة بالنسبة لي	PEU1
أشعر بان تعاملي مع تطبيقات الحكومة المتنقلة سيكون واضحاً ومفهوماً	PEU2
أشعر بانه من السهوله أن أتقن التعامل مع تطبيقات الحكومة المتنقلة	PEU3
قد أجد مرونة في التعامل مع تطبيقات الحكومة المتنقلة	PEU4
تعلم استخدام تطبيقات الحكومة المتنقلة سيكون سهلاً بالنسبة لي	PEU5
قد يكون من السهل أن أجعل تطبيقات الحكومة المتنقلة تقوم بما أريد القيام به	PEU6
Perceived Usefulness (PU) التصور حول فائدة الإستخدام	
استخدام تطبيقات الحكومة المتنقلة قد يساعدني على إنجاز الأعمال بشكل أسرع	PU1
استخدام تطبيقات الحكومة المتنقلة قد يحسن أداء اعمالي الى الافضل	PU2
استخدام تطبيقات الحكومة المتنقلة قد يزيد من إنتاجيتي	PU3
استخدام تطبيقات الحكومة المتنقلة قد يزيد من فعاليتي لأداء الأعمال	PU4
استخدام تطبيقات الحكومة المتنقلة قد يسهل علي أداء أعمالي	PU5
اعتقد أن استخدام تطبيقات الحكومة المتنقلة قد يكون مفيد في أعمالي	PU6
Attitude Toward Usage (ATU) الموقف تجاه الإستخدام	
اعتقد أن استخدام تطبيقات الحكومة المتنقلة فكرة جيدة	ATU1
أبدي اعجابي بفكرة استخدام تطبيقات الحكومة المتنقلة	ATU2
استخدام تطبيقات الحكومة المتنقلة هي فكرة إيجابية	ATU3
Behavioural Intention to Use (BIU) النية السلوكية للاستخدام	
اخطط لأستخدام تطبيقات الحكومة المتنقلة في المستقبل	BIU1
انوي أن استخدم تطبيقات الحكومة المتنقلة في حالة توفرها لي	BIU2
أشعر بان خبرتي بتطبيقات الحكومة المتنقلة قد تزيد من نيتي لإستخدام هذه التطبيقات في المستقبل	BIU3

Questionnaire – Section III

Perceived trustworthiness (TRU) **التصور حول الثقه**	
تجدر الثقة باستخدامات تطبيقات الحكومة المتنقلة	TRU1
اثق بوجود فائدة من استخدام تطبيقات الحكومة المتنقلة	TRU2
تطبيقات الحكومة المتنقلة تلتزم بوعودها والتزاماتها مع المستخدمين	TRU3
استخدام تطبيقات الحكومة المتنقلة تأخذ مصالح المستخدمين بعين الاعتبار	TRU4
لدي الثقة في استخدام تطبيقات الحكومة المتنقلة	TRU5
Awareness (AWAR) **الوعي**	
تصلني معلومات كافيه عن تطبيقات الحكومة المتنقلة	AWAR1
تصلني معلومات كافيه عن فوائد تطبيقات الحكومة المتنقلة	AWAR2
تصلني معلومات كافيه عن كيفية استخدام تطبيقات الحكومة المتنقلة	AWAR3
Perceived Security (SEC) **التصور حول الامن والحمايه**	
اعتقد ان استخدام تطبيقات الحكومة المتنقلة آمن	SEC1
أثق في قدرة الهاتف المتنقل على حماية خصوصيتي عند استخدام تطبيقات الحكومة المتنقلة	SEC2
أعتقد بأن الهاتف المتنقل يمتلك تقنيات وقاية وحماية كافية تجعلني في طمأنينة عند استخدام تطبيقات الحكومة المتنقلة	SEC3
أعتقد أنني محمي بشكل مناسب من قبل القانون في السعودية من اي مشاكل قد يسببها لي استخدام تطبيقات الحكومة المتنقلة	SEC4
أعتقد بأني لست قلقا بشأن النواحي الأمنية المتعلقة بالهاتف المتنقل عند استخدام تطبيقات الحكومة المتنقلة	SEC5

Appendix H Interviews With Citizens

English Version:

Demographic data

- Years of experience in using m-government applications
- Age and gender

Questions regarding moderator variables

1. In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitudes toward using m-government applications? Why?
2. In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?
3. In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?

Asking about factors influence on users' intentions to use m-government applications

1. Does perceived usefulness influence your intention to use m-government applications? Why?
2. Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?
3. Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?
4. Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?
5. Does your awareness of m-government applications influence your intention to use m-government applications? Why?
6. Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?

Thank you so much for your participation in this research

Arabic version:

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البيانات السكانية:

١-عدد سنوات الخبرة في استخدام تطبيقات الحكومة المتنقلة.

٢- العمر والجنس

ـ أسئلة عامة حول البحث:

١- من وجهة نظرك، هل هناك أي اختلافات بين المستخدمين الأقل خبرة والمستخدمين الأكثر خبرة فيما يتعلق بمواقفهم من استخدام تطبيقات الحكومة المتنقلة؟ لماذا؟

٢- من وجهة نظرك، هل هناك أي اختلافات بين الشباب و كبار السن فيما يتعلق بمواقفهم من استخدام تطبيقات الحكومة المتنقلة؟ لماذا؟

٣- من وجهة نظرك، هل هناك أي اختلافات بين الذكور والإناث فيما يتعلق بمواقفهم من استخدام تطبيقات الحكومة المتنقلة؟ لماذا؟

٤- هل تؤثر فائدة الاستخدام لتطبيقات الحكومة المتنقلة على نيتك في استخدامها؟ لماذا؟

٥- هل يؤثر موقفك من استخدام تطبيقات الحكومة المتنقلة على نيتك في استخدامها؟ لماذا؟

٦- هل يؤثر تصورك لسهولة استخدام تطبيقات الحكومة المتنقلة على نيتك في استخدامها؟ لماذا؟

٧- هل يؤثر تصورك في موثوقية تطبيقات الحكومة المتنقلة على نيتك في استخدامها؟ لماذا؟

٨- هل يؤثر وعيك بتطبيقات الحكومة المتنقلة على نيتك في استخدامها؟ لماذا؟

٩- هل يؤثر تصورك في أمن تطبيقات الحكومة المتنقلة على نيتك في استخدامها؟ لماذا؟

شكرآ جزيلآ لمشاركتك في هذا البحث

</div>

Appendix J Interviews With Experts

English version:

Demographic data

- Nationality
- Qualification
- Work experience
- Position

Asking about the e-government project

1. What is the e-government project?
2. When was the e-government project launched?
3. In your opinion, has the project been implemented successfully? Why or why not?
4. If yes, how many e-services does the e-government program (Yesser) provide?

Asking about factors influencing on m-government adoption

1. Do you think m-government is the best option for implementing government services?
2. Do you provide services through mobile devices? Which services?
3. Does perceived trustworthiness have effect on m-government adoption?
4. Does enjoyment have effect on m-government adoption?
5. In your opinion, and in detail, what are the factors that influence the adoption of m-government in Saudi Arabia?

Thank you so much for your participation in this research

Arabic version:

البيانات السكانية

١-عدد سنوات الخبرة في العمل

٢- الجنسية

٣- المستوى التعليمي

٤- مُسمّى الوظيفه.

ـ أسئلة عامه حول البحث :

١- ماهو مشروع الحكومة الالكترونية ؟

٢- متى تم إطلاق مشروع الحكومة الالكترونية ؟

٣- من وجهة نظرك ، هل هذا المشروع نُفِّذ بنجاح ؟ لماذا؟

٤- إذا كانت الإجابة بنعم، فكم عدد الخدمات الالكترونية التي نفذّها هذا المشروع؟

٥- هل تعتقد أن الحكومة المتنقلة هي أفضل خيار لتنفيذ الخدمات الحكومية؟

٦- هل تقومون حاليا بتنفيذ الخدمات الحكومية عن طريق الأجهزة المتنقلة؟ ماهي هذه الخدمات؟

٧- هل تعتقد أن الموثوقية في الحكومة المتنقلة لها تأثير في تبنيها ؟

٨- هل تعتقد ان متعة تجربة وإستخدام الحكومة المتنقلة لديها تأثير في تبنيها ؟

٩- من وجهة نظرك و مع التفاصيل، ماهي العوامل التى تؤثر على تبني الحكومة المتنقلة في المملكة العربية السعودية؟

شكراً جزيلاً لمشاركتك في هذا البحث

Appendix K Griffith University Ethics Clearance

HUMAN RESEARCH ETHICS COMMITTEE

ETHICAL CLEARANCE CERTIFICATE

This certificate generated on 14-09-2015.

This certificate comfirms that protocol 'NR: Factors influencing adoption of m-government services in Saudi Arabia.' (GU Protocol Number IBA/18/15/HREC) has ethical clearance from the Griffith University Human Research Ethics Commitee (HREC) and has been issued with authorisation to be commenced.

The ethical clearance for this protocol runs from 25-08-2015 to 29-08-2018.

The named members of the research team for this protocol are:
Dr Kuldeep Sandhu
Dr Luke Houghton
Mr Raed Shujaa Alotaibi

The research team has been sent correspondence that lists the standard conditions of ethical clearance that apply to Griffith University protocols.

The HREC is established in accordance with the *National Statement on Ethical Conduct on Research Involving Humans*. The operation of this Committee is outlined in the HREC Standard Operating Procedure, which is available from www.gu.edu.au/or/ethics.

Please do not hesitate to contact me if you have any further queries about this matter.

Rick Williams
Manager, Research Ethics
Office for Research
Bray Centre, N54 Room 0.15 Nathan Campus
Griffith University
Phone: 07 3735 4375
Facsimile: 07 373 57994
Email: rick.williams@griffith.edu.au

Appendix L Expert Demographic Data

Demographic Data about Experts and Interviews (note: all experts are Saudi citizens)

Qualification	Work experience	Position	Length of interview	Comments about interview
Bachelor in Information Systems (King Saud University)	> 3 years	Specialist in performance indicator measures	34 min.	No comments
Masters in Business Process Management (Queensland University of Technology)	> 10 years	Business requirement and architecture manager	40 min	Rich information about e-government and m-government.
Masters (King Saud University)	> 3 years	Product manager for m-government	30 min	He was truthful and enthusiastic. He stressed about awareness in governmental sectors.
Masters in Information Technology (Queensland University of Technology)	> 7 years	Solution architecture specialist	35 min	No comments
Bachelor degree	> 13 years	Initiatives manger	40 min	Interview interrupted by a person who came in. Rich information about m-government.

Background about E-government (Yesser)

Participant 1: Specialist in performance indicator measures in the measure transformation department	
What is the e-government project (Yesser)?	e-government program was created by Royal Decree (7/B/2427) dated 2005 to transform to e-Government in Kingdom of Saudi Arabia. This Decree let Ministry of Communication and Information Technology proceed with establishing an e-Government program. From this Decree, the e-government program Yesser was created on the same date to create plans and strategies mentioned in the Decree and measure the transformation of the services provided by governmental organizations to electronic services.
When was the e-government project launched?	2005
In your opinion, has the project been implemented successfully? Why or why not?	Firstly, I want to talk about plans. There are two plans. First plan was over a period of 5 years for e-government services and it has been implemented successfully with governmental organizations. Now Yesser is in the second plan which includes several roles, one of them is initiatives which include 46 initiatives implemented with governmental organizations.
If yes, how many e-services do the e-government programs (Yesser) provide it?	Now, Yesser provides 14 services for governmental organizations.

Participant 2: Business requirement and architecture manager in software engineering department	
What is the e-government project (Yesser)?	Main role of e-government program (Yesser) is to encourage governmental organizations to adopt electronic services. This role includes some sub roles: 1-Support and fund governmental organizations to create electronic systems to serve citizens or other organizations. Absolutely, fund is not easy to get it but there are some steps and requirements. 2-Distribute international standards and guidelines between government organizations and assist them in implementing them either in internal sections such as IT or in how to create electronic systems. 3-Create national electronic systems where all governmental organizations benefit from them such as GRP. In the other words, create a system used by all governmental organizations.
When was the e-government project launched?	In the end of 2005, royal decree has been released to establish Yesser.

In your opinion, has the project been implemented successfully? Why or why not?	Not yet, because Yesser has not implemented its plans completely yet and Yesser in first phase has faced some problems.
If yes, how many e-services do the e-government programs (Yesser) provide it?	--------------

Participant 3: Product manager for m-government in Yesser	
What is the e-government project (Yesser)?	Yesser started in a good time with the beginning of e-government concept in the world. Yesser started between 2004 and 2005. Yesser has all the initiatives in government. In other words, Yesser is as a controller. In fact, Yesser has some roles such as increasing awareness in governmental organizations, measuring performance of governmental organizations. Yesser has also created rewards to encourage governmental organization to adopt e-government. Moreover, Yesser supports and funds governmental organizations that want to adopt e-government.
When was the e-government project launched?	Between "2004-2005".
In your opinion, has the project been implemented successfully? Why or why not?	I do not have ideas about this question because my experience about m-government but you can ask from strategies department in Yesser to get the answer this question.
If yes, how many e-services do the e-government programs (Yesser) provide it?	---------

Participant 4: Solution architecture specialist	
What is the e-government project (Yesser)?	Yesser started 9 to 10 years ago to assist governmental organizations to adopt electronic services. Yesser has some roles which are providing consultation and funds to governmental organizations. Also, Yesser has some roles that are to integrate governmental organizations and provide training courses for employees.
When was the e-government project launched?	2005
In your opinion, has the project been implemented successfully? Why or why not?	Not yet because there are some plans has been delayed and some of them still under process.
If yes, how many e-services do the e-government programs (Yesser) provide it?	----------------------

Participant 5: initiatives manger	
What is the e-government project (Yesser)?	Yesser program follows Communications and IT ministry. It has been created between 2004 and 2005, and the main goal of Yesser is provide services to citizens and beneficiaries in general through several channels that suit with their needs. Yesser has been working for more than 10 years now, it has started to implement its first plan and then it started to implement second plan which will be finished at the end of 2016.
When was the e-government project launched?	Between 2004 and 2005
In your opinion, has the project been implemented successfully? Why or why not?	No, because Yesser is not a project, it is a continual process. We cannot say that Yesser has implemented all plans successfully and finished its work. By the way, Kingdom of Saudi Arabia achieved a good position in this matter, especially in the last ranking by the United Nations in 2014, where it got 36 in the world.
If yes, how many e-services do the e-government programs (Yesser) provide it?	---------------------

Appendix M Main Themes and Sub-Themes

This appendix presents the five main themes and nine sub-themes developed after producing

the initial codes in Appendix N.

Grouping Codes	Sub-Themes	Themes
M-government is best option for governmental organizations. M-government is not optional, it is very necessary. M-government is better while there are no any security reasons.	M-government is best option.	M-government adoption in Saudi Arabia.
There are some services provided through mobile devices such as Absher. More than 30 applications have been released. Yesser assists organizations to provide their services through apps such as Safeer.	Some services have been implemented through mobile devices.	
Perceived trustworthiness has an effect on m-government adoption. Citizens' trust in Apps and in their source is a crucial factor in m-government adoption. Trust in service and its work on mobile.	Trust in App and its work. Trust in provider.	Perceived trustworthiness
Enjoyment has effect on m-government adoption. Enjoyment has no effect on m-government adoption.	Enjoyment in the adoption of m-government	Enjoyment
Awareness is the more important than trust. Organizations should pay more attention to privacy because it is very crucial in m-government adoption. Service integration between governmental organizations has an effect on m-government adoption. Errors and flaws in some apps. Marketing (advertising for apps).	Service integration. Trust in App and its work. Awareness of governmental sectors and citizens. Privacy in work Apps.	Awareness. Perceived security.

Appendix N List of Codes

This section presents the codes extracted from expert answers. These are initial codes and each code reflects answers to each question from the expert participants.

Participant 1: Specialist in performance indicator measures Codes	Example from: Interview transcript
M-government is now the best option for governmental organizations.	**Do you think m-government is the best option for implementing government services?** Yes, based on our situation with governmental organizations, definitely m-government is the best option.
Some services have been provided through mobile devices such as Absher.	**Do you provide services through mobile devices? Which services?** Yes, for example Abshar services through mobile phones.
Perceived trustworthiness has an effect on m-government adoption.	**Does perceived trustworthiness have effect on m-government adoption?** Yes, I strongly support including this factor. This factor is very important
Enjoyment has effect on m-government adoption.	**Does enjoyment have effect on m-government adoption?** Yes, if the user enjoys using services that means the user is happy and satisfied with these services and that affects the adoption of m-government. So enjoyment is important factor.
Awareness is more important than trust. Organizations should pay more attention to privacy because it is crucial in m-government adoption.	**In your opinion, and in detail, what are the factors that influence the adoption of m-government in Saudi Arabia?** We talked about trust but there are other factors that should be prioritized. One is awareness about government services. Awareness is an important factor where raising awareness among users leads to increased usage and that leads to increased trust in services. Privacy is an important factor, and it needs more attention from organizations that provide services.

Participant 2: Business requirement and architecture manager Codes	Example from: Interview transcript
M-government is now the best option for implementing government services.	**Do you think m-government is the best option for implementing government services?** Yes without any doubt but there are difficulties in transferring some services to m-government
More than 30 applications have been released.	**Do you provide services through mobile devices? Which services?** Yes, I think there are more than 30 applications from governmental organizations. Every three months there are about two to three applications released from governmental organizations such as Abshar.
Citizens trust in Apps and their source is a crucial factor in m-government adoption.	**Does perceived trustworthiness have effect on m-government adoption?** Yes without any doubt. I think in Saudi Arabia, citizens trust apps that have been released from a trusted source like governmental organizations. So if trust increases, that leads to increases in the adoption of m-government services. So, trust is a crucial factor in the adoption of m-government.
Enjoyment has no effect on m-government adoption	**Does enjoyment have effect on m-government adoption?** No I think it does not have a role in this matter because I think a citizen uses apps from governmental organizations for a specific objective, not for enjoyment. I do not think enjoyment will assist and encourage citizens to use apps because there are many other entertaining apps in mobile phones. Therefore, I think citizens use governmental apps for specific goals. To conclude, enjoyment does not affect the adoption of m-government.
Service integration between governmental organizations has an effect on m-government adoption. Errors and flaws in some Apps. Marketing (advertising for Apps). Privacy is very important in this matter.	**In your opinion, and in detail, what are the factors that influence the adoption of m-government in Saudi Arabia?** I think there are some factors such as: 1) Integration between governmental organizations. I think creating integration of services between organizations will make citizens more relaxed, which will lead them to adopt Apps. I think integration has a big influence on the adoption of m-government. 2) Errors and flaws in Apps, including design issues, usability of the App and so on, which may affect citizens' decision to adopt m-government. 3) Privacy is very important in this matter. When the citizen knows that some other persons will read his personal data in Apps, that will lead to abandonment of these Apps. In other words, if privacy increases in

Apps, it will lead to citizens adopting them, and the opposite is correct. 4) Marketing (advertising for apps). If the App does not have a good advertisement, it will not be adopted successfully. In other words, awareness has a positive effect on the adoption of Apps.

Participant 3: Product manager for m-government Codes	**Example from: Interview transcript**
M-government is not optional, it is very necessary.	**Do you think m-government is the best option for implementing government services?** Yes, m-government is not optional; it is very necessary. M-government is compulsory development these days. M-government is considered as compulsory development these days, and organizations must follow these developments to provide their services through these developments. For example, in the beginning the mobile phone was entertaining, now mobile phone become very necessary these days.
Yesser assists organizations to provide their services through Apps such as Safeer.	**Do you provide services through mobile devices? Which services?** Yes, but Yesser does not have services provided to citizens, Yesser assists organizations to provide their services. For example, the Apps that are provided by government organizations are Safeer.
Trust in Apps' reliability plays a vital role in m-government adoption. Citizen' trust in source of App.	**Does perceived trustworthiness have an effect on m-government adoption?** Yes definitely and the simple mistakes that happen when organizations create Apps, such as when they want to upload it on the store, it is uploaded under the developer's name. Citizens will not use this App because they do not know if this App is for a governmental organization or not. So simple mistakes destroy trust. To conclude that, trust has an influence on the adoption of m-government. Also, citizens' trust in the source of the App and the App's reliability will affect the adoption of m-government.
Enjoyment does not influence m-government adoption.	**Does enjoyment have effect on m-government adoption?** No, it does not have an influence on the adoption of m-government. For example, I downloaded Abshar not for enjoyment but to use services. These days in Saudi Arabia, enjoyment is not considered a factor in the adoption of m-government.
Awareness is the most important factor in m-government especially for governmental sectors.	**In your opinion, and in detail, what are the factors that influence the adoption of m-government in Saudi Arabia?**

Participant 4: Solution architecture specialist Codes	Example from: Interview transcript
M-government is better as there are no security reasons.	**Do you think m-government is the best option for implementing government services?** This is a big question because that depends on the service but absolutely yes m-government is better while there are no security reasons.
A few services have been provided through mobile devices such as Absher.	**Do you provide services through mobile devices? Which services?** Yes, a few, such as Absher and Safeer.
Trust in service and its work on mobile.	**Does perceived trustworthiness have effect on m-government adoption?** Yes absolutely. Trust has a positive effect on the adoption of m-government. Sometimes the user thinks this service does not work on a mobile, and that leads to abandoning the App.
Enjoyment does not influence m-government adoption.	**Does enjoyment have effect on m-government adoption?** No, I think it does not have an effect on the adoption of m-government because mobile phones have many other entertaining Apps.
Privacy is very important for users especially in our culture.	**In your opinion, and in detail, what are the factors that influence the adoption of m-government in Saudi Arabia?** I think privacy is very important for users, especially in our culture. So I think privacy is vital factor in m-government.

Participant 5: initiatives manger Codes	Example from: Interview transcript
M-government is the best option to implement government services.	**Do you think m-government is the best option for implementing government services?** Yes absolutely. As I said before, there are initiatives about m-government infrastructure and we are concerned about that because we are convinced that m-government is best option for implementing government services. Also, there are reports found that percentage of using mobile phone in Kingdom of Saudi Arabia is

	almost 190%. So, m-government is very important to adopt as the main channel to provide services.
Some services have been released through mobile devices such as Absher.	**Do you provide services through mobile devices? Which services?** Yes for example Absher and Apps that have been released by the commerce ministry.
Trust is considered the main factor in m-government adoption.	**Does prceived trustworthiness have effect on m-government adoption?** Yes, trust is considered as the main factor in this matter. Trust is very important in m-government adoption and we care about and are aware of that. If there is a lack of trust, the App will not be used.
Enjoyment is a crucial factor in m-government adoption	**Does enjoyment have effect on m-government adoption?** Yes, enjoyment is a crucial factor in the adoption of m-government.
Awareness is the main important factor in m-government adoption. Privacy is the main important factor in m-government adoption.	**In your opinion, and in detail, what are the factors that influence the adoption of m-government in Saudi Arabia?** I think there are two main important factors in the adoption of m-government, which are awareness and privacy.

Appendix O Citizen Responses to Interview Questions

Participant 1	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes, there is a difference between users who have less experience and users who have more experience regarding their attitude toward using m-government applications. The attitude is stronger for less experienced because users who have less experience want to learn and use new technologies such as m-government applications to gain the benefits of the government services provided by these applications. Also, most ministries now ask citizens to access all government services through systems and applications, and this encourages users who have less experience to use these applications.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, I think there is a difference between younger and older people regarding their attitude toward using m-government applications. The attitude is stronger for younger because younger people are usually more educated than older people and younger people have also grown up with these technologies so they are more familiar with them than older people. Also, older people are more familiar with and prefer the traditional process to get government services than by technological processes.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, I think there is difference between males and females regarding their attitude toward using m-government applications. The attitude is stronger for females because females can use these applications to get government services from their homes while males can get government services by going to a ministry and getting services from there. I mean that, in Saudi society, it is difficult for females to go to ministries to get services but it is easy for them to get government services by using these applications from home.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, because I think the usefulness of applications is the most important factor encouraging citizens to use these applications. Also, if the applications are not useful I will not use them because that will waste my time and efforts.
Does your attitude toward using m-government applications influence	Yes, I think my attitude toward using m-government applications has an influence on my intention because I have a positive attitude towards using these

your intention to use m-government applications? Why?	applications. I want to get the benefits from these applications.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, absolutely. The ease of use of applications has an influence on my intention to use m-government applications because when the applications are easy to use, that encourages me to use them and get the benefits from applications easily. However, I think the usefulness of applications is more important than their ease of use. But it is better to combine these two characteristics to encourage citizens to use these applications.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, trustworthiness has a big influence on my intention to use m-government applications because if I do not trust these applications I will not use them. Because these applications have been provided by the government, I trust them and use them.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, I think awareness has an influence on my intention to use m-government applications but I think the level of awareness is low between citizens. Some citizens do not care about these applications and their use, and government sectors do not spread awareness between citizens very well.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes, perceived security definitely has an influence on my intention to use m-government applications. But I think that while these applications have been provided by the government, I am not concerned very much about security because I already trust the government to protect my data. However, if we want to talk about other applications, such as mobile banking applications, security is a very important factor because I do not trust the providers very much.

Participant 2	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes, there is a difference between them in their attitude toward using m-government applications. It is stronger for users who have less experience because they want to improve and develop themselves by using new technologies more than users who have more experience. Also, they want to get government services and gain the benefits of these applications.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, there is a difference between them regarding their attitude toward using m-government applications. It is stronger for younger people because the young generation has learned to use new technologies more than the older generation. So, we can say that this generation is the technological generation. Also, I think younger people have more

	experience in using technology and getting the benefit of these applications than older people.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, there is a difference between them regarding their attitude toward using m-government applications. It is stronger for females because I think it is a female characteristic to want to learn to discover and use new things, including new technologies.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Absolutely. Yes. The usefulness of the applications will encourage me to use m-government applications and that will increase my desire to use these applications.
Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, because these applications will serve me well and facilitate my efforts to obtain many things that I need.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, I think the ease of use of applications is very important but, at this time, providing beneficial services to citizens via m-government applications is more important than the ease of using these applications.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, because my trust in these applications will encourage me to use them. Because these applications have been provided by the government and not individuals, my trust in these applications is very high and that will encourage me to use them.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, because I think if the awareness increases, that will increase the use of m-government applications. However, I think, at this time, Saudi society is not very technologically aware so there is a lack of awareness of these applications. So, I think the government should provide workshops and training courses for citizens who want to use these applications, and also the government should increase awareness among citizens via media to encourage them to use these applications.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Strongly. Yes. Security is very important in using m-government applications, especially for females, but while these applications have been provided by government, citizens are very trustful of the government to protect their data. Therefore, citizens do not worry very much about security when they use m-government applications.

Participant 3	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes, there is difference in their attitudes between them which is stronger for less experienced users, because I think users who have less experience have the desire and are keen to use new technologies, including m-government applications, and benefit more from these applications than users who have more experience.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, there is a difference in attitudes between them which is stronger for younger people because I think they usually have a better understanding of the use of technologies than older people. So, they are more likely to use m-government applications than older people.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, I think there is difference between them regarding their attitude toward using m-government applications. It is stronger for males because males in Saudi society are responsible for females and this includes attending to all government services for them. Therefore, they have a greater intention to use m-government applications than females.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, because I do not want to waste my time in using applications that are not beneficial. So, the usefulness of using applications will encourage me to use them.
Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, because using these applications will facilitate many things in my life, such as increased productivity, saving time and convenience.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, because I think if m-government applications are easy to use, that will increase the number of users because most users do not like using difficult applications.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, because I think if the applications are trustworthy, that will increase the number of users. In other words, If I trust the application to get me the benefits of government services and also to protect my data, that will increase my intention to use it.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, because increasing awareness about these applications will increase the use of these applications.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes. When the security of applications increases, that will increase the number of users, because that will safeguard all my rights, including my data. However, I am very confident that when the government releases applications, they ensure that the applications will protect my data because I trust them.

Participant 4	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes, I think there is difference between users who have less experience and users who have more experience regarding their attitude toward using m-government applications. It is stronger for less experienced users because they want to use government services via these applications to gain the benefits.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, I think there is difference between younger and older people regarding their attitude toward using m-government applications. The attitude is stronger for younger people because they have more experience and are familiar with using technology than older people and because these applications will fulfil their needs.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, I think there is a difference between males and females regarding their attitude toward using m-government applications. The attitude is stronger for females because females usually more experienced and dependent on using technology than males. Also, females want to get the benefits of using applications that allow them to access government services from home.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, because if m-government applications are useful, they will fulfil my needs and encourage me to use them.
Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	No, I have a negative attitude towards using these applications because I prefer the traditional process to get government services.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, because I think the ease of use these applications is most important to encourage people to use them. Next in importance is the usefulness of these applications.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, because trust is a very important factor that would encourage me to use these applications. Also, if these applications are released by the government, trust is very high. However, personally I prefer traditional processes to get government services.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	No, because I think it is not necessary to know and use these applications because I can get government services via traditional processes.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes, because security is very important for users. However, because these applications have been released by the government, users are very confident and do not care about this point.

Participant 5	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes, I think users who have less experience have a greater attitude toward using m-government applications than users who have more experience because those with less experience have not got the benefits of these applications. So, in order to get these benefits, they are more likely to intend to use these applications than users who have more experience.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, I think younger people have a greater attitude toward using m-government applications than older people because younger people have a greater ability to adapt to and use new technologies than older people.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, I think females have a greater attitude than males to use m-government applications because females sometimes are in circumstances such as being divorced or widowed and do not have a breadwinner. Therefore, these applications are very useful for them to use from their homes.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, I think the usefulness of m-government applications has a positive influence on my intention to use them, because these applications will save me time and effort.
Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, because these applications provide services to users very quickly.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	No, I think the ease of using m-government applications has not positively influenced my intention to use them, because most government applications are used in the same way and personally I do not care very much about their ease of use because I just want to get the services.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, I think trustworthiness in using m-government applications has a positive influence on my intention to use them because these applications have been released and monitored by the government. If there are problems with the application that result in the person not receiving their entitlements or lost my data, which the government will address the problems.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, I think awareness has a positive influence on my intention to use m-government applications, because if I am not very aware of these applications and the extent of their benefits, I will not use them. However, I think there is a lack in awareness among citizens due to, I think, some citizens still preferring a traditional

	process to get government services. So, they do not care about these applications.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes, I think security has a positive influence on my intention to use m-government applications because I will not use these applications if they are not secure. However, because these applications have been released by government, they will definitely be secure and I will not hesitate to use them.

Participant 6	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes, I think users who have less experience have a greater attitude toward using m-government applications than users who have more experience, because users who have less experience consider that using these applications will save their time and effort. Also, I think they want to access government services by themselves.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, absolutely. Younger people have a greater attitude toward using m-government applications than older people because younger people like to use and discover new technologies more than older people.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, I think females have a greater attitude toward using m-government applications than males, because these applications provide government services for females without the need to go outside. Also, in Saudi Arabia, it is natural that females like to discover and use new technologies more than males because males usually are very busy with their work and they are not very interested in discovering new technologies.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, the usefulness of applications will increase my intention to use them because these applications will assist me to easily accomplish my work.
Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, because these applications will assist me to accomplish my work easily in my home, save my time and effort, and do not require me to travel to government sectors to accomplish my work.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, I think ease of use will increase my intention to use these applications because when applications are easy to use, that will encourage all segments of society to use them. However, at this time in Saudi Arabia, I think m-government applications are not popular among citizens because some government sectors have not provided their services via mobile applications. So I do not care about ease of use but I focus on getting government services via applications. But it would be better if the services

	could be provided via mobile applications that were easy to use.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, trust will increase my intention to use m-government applications and it is natural that I trust m-government applications because these applications have been provided by the government.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, awareness will increase my intention to use m-government applications because when I use these applications I must be aware of them. Nevertheless, I think there is a lack by government sectors in spreading awareness about their service among citizens. So, government sectors should use media and social media to spread awareness of their services among citizens to encourage them to use them.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes, security is very important for me and if the application is secure, that leads to increase my intention to use it. However, I do not care much about security in m- government applications because they have been provided by the government and I trust the government to protect my data.

Participant 7	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes, I think there is a difference between them. Less experienced users have a stronger attitude toward using, because they want to change from tradition processes to technological processes to gain their benefits by using these applications.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, I think there is a difference between them, which is stronger for younger people because Saudi culture encourages younger people to serve older people. So, younger people want to know about and use these applications, not for themselves, but to help their elders such as neighbours, fathers, mothers or other relatives.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, because I think Saudi culture prefers that females access government services online rather than in traditional ways, because females usually have some obligations such as care for their kids and husbands. Therefore, females in Saudi Arabia have positive attitude toward using m-government applications more than males.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, absolutely, because if an application is not useful, it will waste my time.

Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, because government services via applications will save my time and effort.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, I think ease of use will have a positive influence on my intention to use m-government applications. However, I think most m-government applications are very complex for users, especially those who do not have experience with technology. Actually, I think the complexity in these applications is due to security reasons such as received SMSs in mobile phones and also the interfaces of some applications are not enjoyable. So, users face some difficulties in using these applications.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, absolutely. I think trust will have a positive influence on my intention to use m-government applications because if I do not trust these applications, I will not use them, especially these days in hackers' attacks as we hear on the news, because my data is very important for me. For example, if I do not trust the Absher application to accomplish this service and protect my data, I would not use it to renew my passport.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes. If I am not aware of m-government applications, it is impossible for to me to use them. However, I think awareness is not a crucial factor to increase my intention to use m-government applications, because I already trust the government sectors (providers). In short, while all these applications provide government services and are provided by the government, awareness is not very important for users because users already trust the government. Also, now when I go to the government sector to get government services via the traditional way, they will ask me to get these services via their systems. I mean that it will become compulsory for citizens to get government services in that way.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	No. I think security has not influenced my intention to use m-government applications because I already trust these applications and I already trust the providers.

Participant 8	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their	Yes. I think users who have less experience have a greater attitude toward using m-government applications than users who have more experience. For example, two years ago, when I had not used m-government applications, when I wanted to renew my

attitude toward using m-government applications? Why?	passport, the passport general department said to me 'you can use the Absher application and renew your passport easily and without any efforts'. So, that encouraged me to use the Absher application to gain the benefits of government applications and get government services easily and effectively from my home.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, I think younger people have a greater attitude than older people to use m-government applications, because younger people usually tend to use sophisticated things, including new technologies, more than older people. Also, some new technologies need skills such as the English language and younger people are better in those skills than older people. Also, in Saudi society, younger people should usually serve their elders so that younger people should learn about and use these applications to assist elders such as fathers and mothers.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, females have a greater attitude than males to use m-government applications because females usually like to learn and use new things, including new technologies. Also, females are more patient than males. Also, as our society is conservative, it is the biggest reason to encourage females to learn and use m-government applications from home.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes. When usefulness increases, that leads to an increase in the use of these applications because using these applications will increase productivity for the government and citizens.
Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes. My attitude towards using m-government applications will influence my intention to use these applications because I want to gain benefits from these applications.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, if the application is easy to use it will increase my intention to use it because if the application is complex that will waste my time in getting government services. However, I think applications should be useful and easy because if it is easy and not useful, I do not need it. However, if the application is useful I will use it even it is complex. I will keep trying till I get the government services I want.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, trust will increase my intention to use m-government applications. In fact, I absolutely trust m-government applications and when I used the Absher application to renew my passport, I found that this application was very efficient in providing benefits and protecting my data. So, that encouraged me to use other m-government applications.

Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes. When awareness increases, that leads to increasing use of these applications. However, I think there are not enough advertisements for m-government applications from government sectors. For example, yesterday my friend told me about a new m-government application from the Saudi commission for tourism and national heritage. If he did not tell me about that, I will not know about this application and not use it. So, I think some citizens do not know about some m-government applications, because if they did, they will use them to get government services.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes, when security increases, that leads to increased use of these applications. While these applications are provided by the government, citizens are confident in the government to protect their data because that is its responsibility.

Participant 9	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes, I think there is a difference between them. The attitude of those with less experience of using m-government applications is stronger because more experienced users already use these applications and received benefits from them. So, they do not have a strong desire to use these applications. However, it is opposite for users who have less experience - they have a strong desire discover and to use these applications to gain benefits because they have not used them.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, I think younger people have more attitude toward using these applications than older people because younger people need to use government services more than older people. Also, younger people usually more interested than older people in discovering and using new technologies. Also, based on the latest reports, the majority of Saudi citizens are younger, so it is expected that younger people have a greater intention to use m-government applications than older people.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, males have a greater attitude toward using m-government applications than females. Because males are responsible for females in Saudi culture, it is natural that males have a greater intention to use these applications than females.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, without any doubt, because if I as a user see the usefulness of this application, it is natural that I will download this application and my intention to use will

	increase. For example, there is a useful application that has been released by the public security department called "All citizens are security men". It allows citizens to submit incidents electronically (traffic, criminal and road security incident) without dialling the operation centre's phone number. This application has been downloaded many times because citizens consider this application is useful.
Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, if I feel those applications are useful and will serve me, definitely I will have a positive attitude toward using them.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, I think if I see that an application is easy to use, that will increase my intention to use it. For example, there is a government application for regions that is considered complex to use, so users do not use it and they use the traditional way of going to the Emirate region and submitting their papers by hand instead of using the application in order to get government services. However, if I feel the application is complex but useful, I will ask someone help me or I will try till I know how to use it in order to get its benefits.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, because If I trust the application, that will encourage me to use it and to upload my data because I trust the provider to serve me and to protect my data.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, but it does not have a big influence on my intention to use m-government applications because I already trust the government and users already know about these applications and their benefits. So, it does not influence me very much.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes, but it might decrease its importance because these applications have been provided by government, not by the private sector or individuals.

Participant 10	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes, I think users who have less experience have more attitude toward using m-government applications than users who have more experience, because users who have less experience are more curious to discover and use new technologies than users who have more experience, because they want to gain the benefits of the technological revolution.
In your opinion, are there any differences between younger and older people regarding their attitude	Yes, I think younger people have a greater attitude toward using m-government applications than older

toward using m-government applications? Why?	people because younger people have a strong interest in using new technologies than older people.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, I think females have a greater attitude toward using m-government applications than males because I think females feel a great freedom in using m-government applications, due to the fact that our society is conservative and it is difficult for them to go out to get government services, so they are keen to use these applications in their home.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, because if this application is useful for me and I get benefits, it is natural that I will use it and will recommend that my friends use it.
Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, strongly, because if the application is useful, has a good presentation and is easy to use, that will make my attitude toward using these applications positive, which encourages me to use these applications. So, my attitude toward using m-government applications has an influence on my intention to use m-government applications.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, strongly, because if the application easy to use, that will encourage me to use it. So, I think if the application is not easy to use and not effective to complete my work, I will not use it.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, because I think if I do not trust the application and its provider, I will not use it to upload my personal data such as bank details, but if these applications are provided by the government, that leads to increased trust.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, because I think increasing the awareness among citizens will increase the use of m-government applications. I think awareness in our society is low due to the absence of workshops by government sectors to encourage citizens to use these applications. Also, there is no educational system compatible with the technological revolution these days. Also, I think the media does not adopt a good role in increasing awareness among citizens.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes, because I think the most important factor is security when I am using m-government applications. Also, I think security is the fundamental thing when the government develops new applications. However, I think the majority of citizens trust the government, so they do not care about security. Personally, I think that is wrong because anyone should verify any application whether from the government or not because in technology science, there is no secure system. These days there are many hacker attacks, so maybe a government application has already been hacked and this application is being used for fishing.

	So, users should verify applications before using them.

Participant 11	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes, I think attitude toward using m-government applications is greater for users who have less experience than users who have more experience. They regret not using these applications when they hear from users how useful the applications are in completing their work. Therefore, users who have less experience are more enthusiastic than others to use these applications.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, I think attitude toward using m-government applications is greater for younger than older people because younger people are more familiar with using new technologies. For example, younger teachers use educational technology in schools more than older teachers.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes, I think attitude toward using m-government applications is greater for females than males because I think these days females want to use new technologies more than males. They like to use these applications to get government services because in Saudi society, the traditional way required males to access those services.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, without any doubt, because when I use these applications, I will get many benefits because I think most m-government applications are useful. For example, when I want to renew my passport I can do it by using the Absher application from home without the need to go to the passport department.
Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, because I think m-government applications are useful for me because these applications save my time and effort.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, without a doubt, because if the application is easy to use it will have a positive influence on users to use it and if it is difficult to use, the users will not use it. However, I think some users do not care about ease of use because they just need the services. To summarize that, I think ease of use is a very important factor in using mobile applications, because I think most users read the rating about the application's ease of use and if they do not find a positive rating regarding this factor, they will not use it.
Does your perception of the trustworthiness of m-government	Yes, because I feel m-government applications are trustworthy because I trust the government sectors to

applications influence your intention to use m-government applications? Why?	allow me to accomplish my tasks and protect my data, which encourages me to use these applications.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, I think awareness encourages users to have a clear picture about these applications, which encourages them to use these applications. However, personally I think the awareness level among citizens is not high due reasons such as the lack of media promoting these applications and the lack of users who share their experiences to encourage others to use these applications. For example, I encouraged my friend to renew his passport via the Absher application. At first he was not confident about that, but when he used the Absher application and accomplished the task effectively, he said that he did not expect that from the application. So, I think citizens still need to be encouraged to use these applications.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes, without a doubt, because if I know that my data will be protected by the government and no one else can access my data, it will encourage me to use these applications. However, personally I do not feel afraid about security for my data because I already trust the government to protect my data.

Participant 12	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	No I think there is no big differences between them as both are eager to get their government paper work done in the most convenient and quickest possible way. Because the traditional way of doing them was a painful and lengthy process. So, any other way that will provide a shortcut for citizens will certainly be considered and used.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	No there is no difference between them regarding their attitude toward using these applications because they both prefer to use simple ways to get government services via new technologies, including m-government applications. So, they have the same attitude toward using these applications.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	No, because both would like to get things done in the most convenient and quickest possible way. Especially females.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, because if the application will get the job done, it will be more useful to use it, especially if it has extra features like tracking, enquiring.

Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, because I prefer to use technology in my daily activities.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, I think It is preferable but not a must because I will use it anyway.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, because the m-government applications are considered trustworthy.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, because to inform me of newly launched m-government applications is to encourage me to use these applications. In fact, now I think most Saudi citizens are aware and familiar with technology, especially m-government applications which make it easier from them to start using newly released government services.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	No, not really, because the m-government applications are already considered to be secure and trustworthy.

Participant 13	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	Yes. Attitude toward using these applications is stronger for those with more experience, because people with less experience have doubts about the privacy of their data because they think that this might expose their information to be revealed.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, For younger because younger people prefer to use m-government applications because they are familiar with the technology, while aged people might find it difficult to use these applications.
In your opinion, are there any differences between males and females regarding their attitude toward using m-government applications? Why?	Yes. For females because I think the number of females is greater than males in terms of using m-government applications. This is because in Saudi Arabia, females can't drive cars. Therefore, it is easier for them to use m-government applications instead.
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, because if these apps can save people time, then this can encourage them.

Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, I have a positive attitude because there are some advantages to be gained from using these applications.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, the government service and application should be easy to use to encourage individuals to use them. Because government services are not provided professionally and effectively in Saudi Arabia, users may not care much about ease of use. Also, I think users cannot give precise answers regarding the ease of use because m-government applications have not been adopted completely in Saudi Arabia.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, the government should run advertising campaigns to increase the trust of people in these applications. I think this the most important factor.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, because more educated people can use these applications. Also, I think there is a lack of awareness because schools and governments do not encourage people to use these applications.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes, it is the responsibility of the government to ensure data collected are secure and safe from third parties. If the government fails to ensure security, this might discourage people from using these apps. However, I think in Saudi Arabia users do not care about security because they want to accomplish their works via m-government applications as fast as possible without thinking of any security issues.

Participant 14	
Questions regarding moderator variables	
In your opinion, are there any differences between users who have less experience and users who have more experience regarding their attitude toward using m-government applications? Why?	No, I think there are no differences between them because I think they have same their attitude toward using these applications because they want to get advantages, such as saving time and effort.
In your opinion, are there any differences between younger and older people regarding their attitude toward using m-government applications? Why?	Yes, I think there is difference between younger and older people in terms of their attitude toward using these applications. The attitudes are stronger for younger people who, more than older people, like to discover and use everything new and beneficial.
In your opinion, are there any differences between males and females regarding their attitude	No, I think there is no difference between females and males regarding their attitude toward using these applications because they need to use them to get government services.

toward using m-government applications? Why?	
Questions about factors influencing users' intentions to use m-government applications	
Does perceived usefulness influence your intention to use m-government applications? Why?	Yes, because if the application is beneficial, that will increase my intention to use it and that will save me time and effort instead of travelling to get government services.
Does your attitude toward using m-government applications influence your intention to use m-government applications? Why?	Yes, I have a positive attitude toward using these applications because they will save me time and effort, as I said before.
Does your perception of the ease of use of applications influence your intention to use m-government applications? Why?	Yes, I think if the application is easy to use that will encourage me to use it. However, I think some m-government applications are not easy to use because they do not have clear instructions to describe how to use them.
Does your perception of the trustworthiness of m-government applications influence your intention to use m-government applications? Why?	Yes, because I think if the application is trustworthy, I will surely be encouraged to use it.
Does your awareness of m-government applications influence your intention to use m-government applications? Why?	Yes, because I think if I am aware of the benefits of these applications that will encourage me to use them. Anyway, I think awareness among citizens about these applications is still not widespread and some citizens have resistance to change because they prefer nepotism to get government services and they know if they use applications they will nepotism will not be possible.
Does your perception of the security of m-government applications influence your intention to use m-government applications? Why?	Yes, because I think security is crucial for users, especially for females. If the application is secure, it will encourage me to use it. However, in Saudi Arabia m-government applications are trustworthy and I know that the government seeks to protect my data, so I am very confident that my data will be protected and I am therefore not scared to use m-government applications.