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# **MGAUM: a new framework for the mobile government service adoption in Saudi Arabia**

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### **Declaration**

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another University for the award of any other degree.

Signature: Mohammed Alonazi

## **Abstract**

Many governments are now taking advantage of the latest developments in mobile technology to take the digital delivery of government information and services (e-government) to their citizens, companies and other government agencies a stage further. Accessing government information and services via a mobile device (m-government) also has unique advantages over e-government, not least enabling users to access government services at any time and from any location. Nevertheless, many Arab countries including Saudi Arabia, are experiencing a low adoption rate of these services, and face a number of issues related to adoption, implementation and use. In spite of this, a review of the literature shows that little research into identifying and understanding the factors that influence adoption of m-government services by citizens from citizens' and providers' perspectives in these countries has been conducted. Thus, this research aims to investigate and analyze factors that can impact Saudi citizens' intention to adopt and use m-government services in Saudi Arabia; and to provide the knowledge needed to ensure a high level of success when implementing m-government services in this context.

This research has developed a model called the Mobile Government Adoption and Utilization Model (MGAUM) based on a critical analysis of the literature that relates to acceptance of technology, along with insights from several models and theories commonly used to analyze acceptance and usage of technologies. The MGAUM focuses on understanding and analysing factors that could influence citizens' adoption and use of Saudi m-government services from two different perspectives: that of Saudi citizens, and that of key officials responsible for implementing e-government and m-government services in Saudi ministries. A 'quantitative dominant' mixed method was used, with a quantitative primary method and additional qualitative method as complementary.

A survey was used to collect quantitative data, and the final sample consisted of 1,286 valid responses. The survey revealed that Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Mobility (PM), Social Influence (SI) and Perceived Compatibility (PCOM), Perceived Trust (PT), Culture (CULT), Citizen Service Quality (CSQ) and System Quality (SQ) were the most significant factors affecting citizens' intention to adopt and use m-government services. Semi-structured interviews with key officials responsible for e-government and m-government in eight Saudi ministries were conducted to obtain qualitative data. From these managers' perspectives, all the factors were considered significant apart from Culture.

This study provides several recommendations based on the result of the quantitative and qualitative investigations into the field of m-government services for government agencies, m-services providers and practitioners.

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In the name of Allah, the Most Gracious, the Most Merciful

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### Abbreviations

E-government	Electronic Government
M-Government	Mobile Government
ICT	Information and Communication Technology
IS	Information System
IT	Information Technology
SA	Saudi Arabia
KSA	Kingdom of Saudi Arabia
MGAUM	Mobile Government Adoption and Utilization Model
ITU	Intention to Use Mobile Government Service
PF	Practical factor
HF	Human Factor
TF	Technical Factor
PU	Perceived Usefulness
PEOU	Perceived Ease of Use
CULT	Culture
SI	Social Influence
PCOM	Perceived Compatibility
AW	Awareness
PT	Perceived Trust
CSQ	Citizen Service Quality
PM	Perceived Mobility
SQ	System Quality
CITC	Communication and Information Technology Commission
GCC	Gulf Cooperation Council
TAM	Technology Acceptance Model
UTAUT	Unified Technology Acceptance and Use of Technology
DOI	Diffusion of Innovation
UN	United Nation
MCIT	Ministry of Communications and Information Technology
G2C	Government to Citizen
G2B	Government to Business
G2G	Government to Government
G2E	Government to Employees
MG2G	Mobile Government to Government
MG2C	Mobile Government to Citizens
MG2B	Mobile Government to Business
MG2E	Mobile Government to Employees
SMS	Short Message Service
3G	Third Generation
PDA	Personal Digital Assistant
GPS	Global Positioning System
PC	Personal Computer
US	United States

CSC	Civil Service Commission
TVTC	Technical and Vocational Training Corporation
PLS	Partial Least Squares
SMS-MIIAS	Indonesian Muslim community in South Australia
SMS-OBM	October Business Month
TPB	Theory of Planned Behaviour
SEM	Structural Equation Modeling
TRA	Theory of Reason Action
UAE	United Arab Emirates
SAMBA	Saudi American Bank
CNB	National Commercial Bank
IDT	Innovation Diffusion Theory
MOH	Ministry of Housing
MOCS	Ministry of Civil Service
MOJ	Ministry of Justice
MOE	Ministry of Education
MOCI	Ministry of Commerce and Investment
MOI	Ministry of the Interior
MOLSD	Ministry of Labour and Social Development
MOCIT	Ministry of Communications and Information Technology
Apps	Applications
SEO	Search Engine Optimization
SAR	Saudi Arabian Riyal
SWOT	Strengths, Weaknesses, Opportunities and Threats



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# **1 Chapter One: Introduction**

## **1.1 Introduction**

Due to the current revolution in information and communication technologies (ICT), governments throughout the world are going through an era of digital transformation. E-government employs ICT tools such as the internet and mobile technologies in order to improve government transparency, accountability and communication between the government and public by providing better access to information and services, public services delivery and public governance (Alghamdi and Beloff, 2014; Al-Hujran et al., 2015). In recent years, many governments have utilized mobile and wireless technologies to develop new and innovative service delivery channels, which is also referred to as mobile government (m-government) (Kushchu and Kuscu 2003; Scholl, 2005). One advantage of adding the m-government channel to government services is that it offers unique opportunities for real-time and personalized access to government information and services through the advantage of wireless technology (Alsenaidy and Ahmad 2012). However, it has seen mixed results; some governments have successfully implemented this aspect of E-government, whereas others have failed to satisfy expectations (Alotaibi, Houghton and Sandhu, 2016b).

In 2005, the government of Saudi Arabia initiated an E-government project called YESSER. The aim of this program was to provide every citizen of Saudi Arabia with online access to government services by the end of 2010 (Al-Nuaim, 2011). Nevertheless, because of various difficulties, Saudi E-government projects were either delayed in their implementation or failed (Basamh, Qudaih and Suhaimi, 2014). Similarly, m-government has also been adopted by several governments for effective delivery of services such as providing weather and traffic updates, tracking lost vehicles, emergency assistance and giving notification of bills and taxes (Althunibat, Alrawashdeh and Muhairat, 2014; Alotaibi et al., 2016). However, the adoption of E-government services in Saudi Arabia remains low despite the best efforts of the Saudi government. This problem is shared by other governments worldwide (Al-Hujran et al., 2015; Alghamdi and Beloff, 2014; Alsenaidy and Ahmad, 2012a; Nripendra and Dwivedi, 2015). Accordingly, the main aim of this research is to examine the adoption and usage of m-government services by citizens in developing countries, particularly Saudi Arabia.

## **1.2 ICT background in Saudi Arabia**

Saudi Arabia has for many decades been considered as the religious leader of Arab and Muslim countries, as well as having the economic power to support most of them. Covering an area of 2,149,690 square kilometres, Saudi Arabia has a population of around 33.5 million, according to

the General Authority of Statistics (General Authority for Statistics (GASTAT) Saudi Arabia, 2018b). Saudi Arabia has the largest economy in the Middle East, and ranks 19<sup>th</sup> in the world (Al-Kibsi et al., 2015; CITC. 2015a). Saudi Arabia has 25% of the world's oil and is considered as one of the fastest-growing economies worldwide, due to its strong economy, stable political system, young population and policies that emphasize economic diversification (CITC, 2015b). Saudi Arabia invests in all domains, and one of these domains is information and communication technology.

The adoption and use of ICT in Saudi Arabia is increasing; and in 2014, Saudi consumers, government and public or private organizations spent a total of SAR111.98 billion (CITC, 2014), this amount included ICT packaged software, hardware, IT services and telecommunications. This amount makes Saudi Arabia the country that spent the most on ICT among the nations of the Gulf Cooperation Council (GCC). Moreover, this amount was larger than that of all other GCC countries combined (CITC, 2015b).

The use of mobile technology is rapidly increasing in Saudi Arabia (Alotaibi et al., 2016b). The data provided by the Communications and Information Technology Commission of Saudi Arabia shows that by the end of first quarter of 2019, mobile penetration was about 124.6% of the population; with a total of 41.63 million mobile subscriptions in mobile voice telecommunications services. Prepaid subscriptions were the most popular, accounting for almost 65.8%, and the post-paid subscription rate was 34.2% of the mobile voice services penetration (See Figure 1-1). There were about 3.12 million fixed line phones by the end of the first quarter of 2019 (Q1-2019); and fixed broadband services including DSL, FTTx, fixed wireless (WiMax) and other fixed lines accounted for 1.96million, with a penetration rate of 32.98% of households. The total number of mobile subscriptions reached 29.45 million, with a high penetration rate of about 88.1% by the end of Q1-2019; and this percentage continues to increase (CITC, 2019). At the end of Q3-2017, the total number of internet users had reached 24.5 million, with a high penetration rate of about 77% (CITC, 2017). The statistics show that the rate of adoption of mobile broadband services in Saudi Arabia is rapidly growing and had increased significantly from 42.1 % in 2012, 94.5 % in 2014, 105.9% in 2015 to 88.8% at the end of Q3-2017. The internet penetration rate in Saudi Arabia is also rapidly growing and has increased significantly from 54.1% in 2012, 63.7% in 2014, 74.88% in 2016 to 77% at the end of Q3-2017 (CITC, 2017). These statistics reveal the high penetration rates of mobiles and the internet in Saudi Arabia (See Figure 1-2).

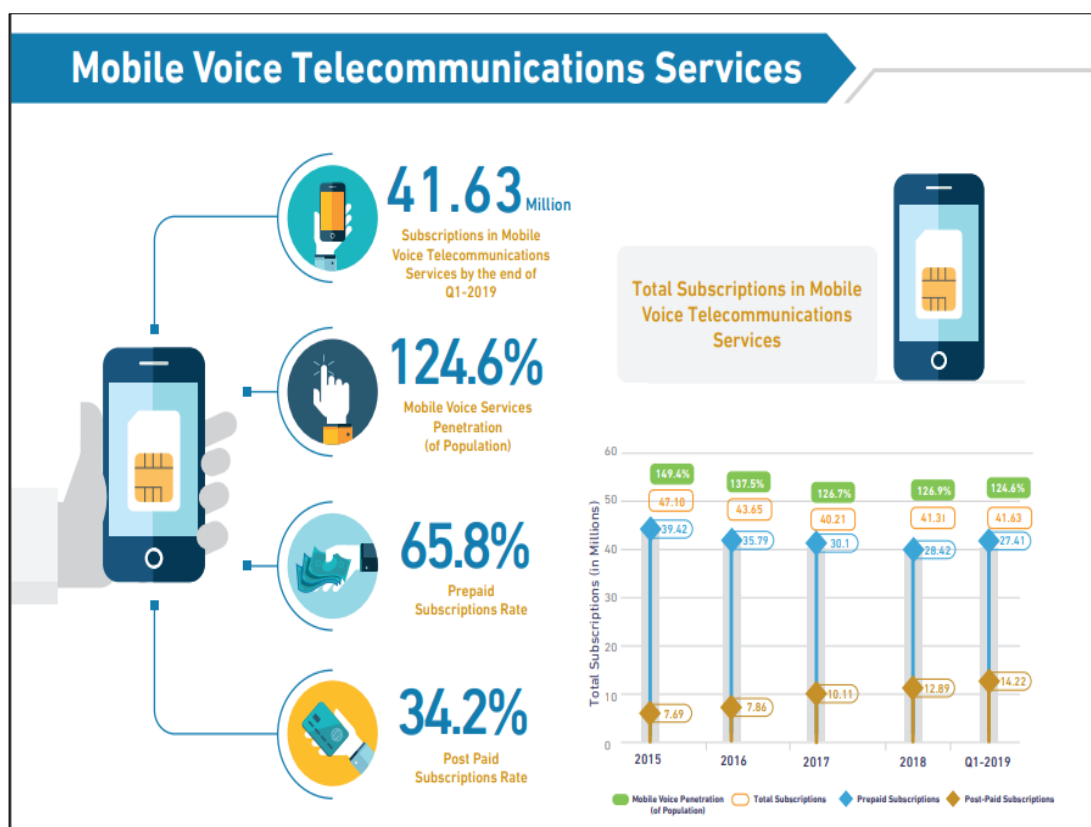


Figure 1-1: Mobile Voice Telecommunications Service (CITC 2019)

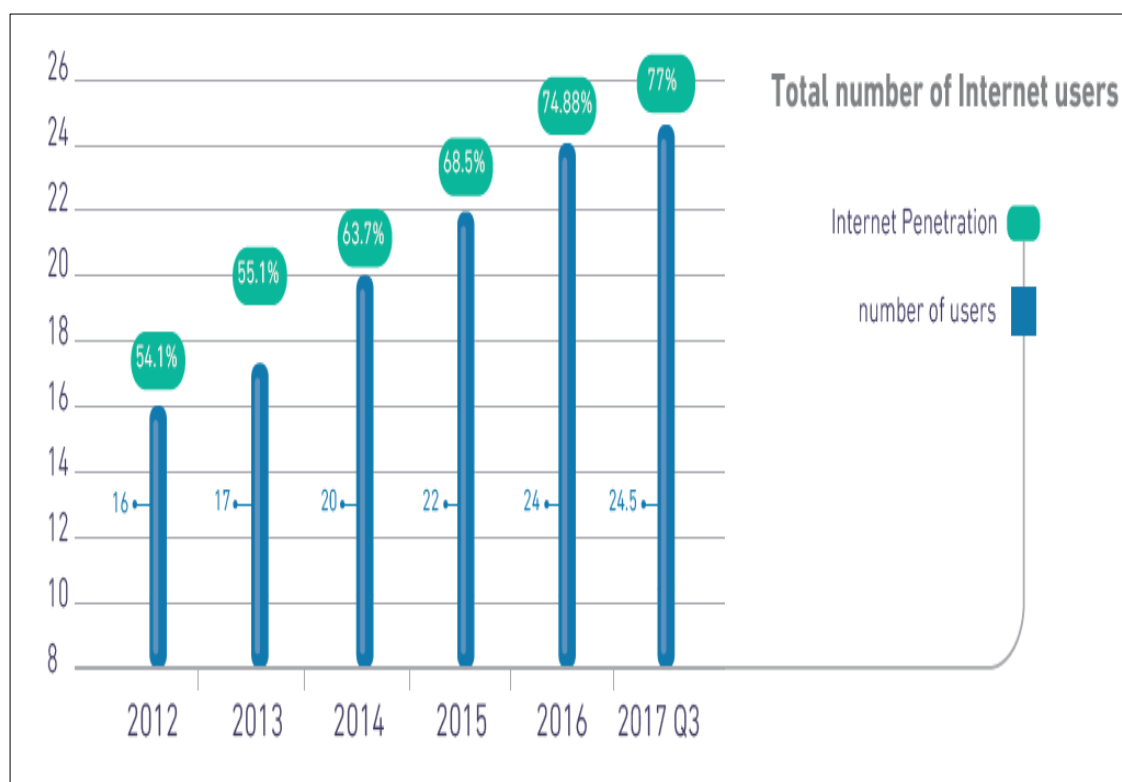


Figure 1-2: Total number of Internet users (CITC 2017)

### **1.3 M-government in Saudi Arabia**

According to Kushchu and Kuscü (2003), m-government is considered as an extension or complementary service rather than a replacement of E-government services. It advances E-government service delivery by offering the public an extra channel to access government information and services using mobile wireless communication technology (Scholl, 2005). M-government has gained popularity in several countries for supporting the efficient provision of services to the people. The most popular m-government applications are for weather and traffic updates, emergency assistance, the tracking of lost vehicles and giving notification of taxes and bills (Althunibat, Alrawashdeh and Muhairat, 2014). Saudi Arabia has seen an immense growth of mobile phone usage among citizens. As mentioned in the previous section, statistics provided by the Communications and Information Technology Commission of Saudi Arabia shows that by the end of first quarter, 2019 mobile penetration was about 124.6%; with a total of 41.63 million mobile subscriptions in mobile voice telecommunications services reached by the end of Q1-2019. Therefore, it is prudent for government to provide services through mobile phones in order to reach the largest number of people in the shortest time (Assar, 2015). The government of Saudi Arabia provides m-government services like mobile health, tracking information about higher education, tracking appointments, traffic offences and others (Alotaibi et al., 2016b), (Alsenaidy and Ahmad, 2012b).

However, m-government in most developing countries including Saudi Arabia is at an early stage and faces a number of issues related to adoption, implementation and use (Alotaibi and Roussinov, 2015; Assar, 2015). Although the situation in Saudi Arabia is improving all the time, there are still limitations and a disappointing adoption rate. The maturity or the success of m-government differs between governments around the world and is dependent on various factors including a country's ICT infrastructure, user adoption, mobile device and internet penetration rates, reliability, security, privacy and effectiveness (Alsenaidy and Ahmad, 2012b).

### **1.4 Background to the research problem, significance and motivation**

As already noted, Saudi Arabia is one of the top twenty economies in the world (Al-Kibsi et al., 2015; Al-Somali and Clegg, 2015). Moreover, Saudi Arabia enjoys one of the largest and fastest-growing ICT sectors in the Middle East region with a likelihood of significant progress in the next few years. With the aim of transforming the country into a digital economy and a knowledge-based society, this country has developed several ICT national strategies, plans and initiatives (Al-Gahtani, 2011) including those required for the public sector. However, notwithstanding the rapid growth in the Saudi ICT market, the adoption of E-government services in general and m-government services in particular is still below expectations (Al-Hujran et al., 2015; Alghamdi and Beloff, 2014; Alotaibi et al., 2016b; Nripendra P. Rana and

Dwivedi 2015). Therefore, identifying the main factors affecting citizens' adoption of m-government services in Saudi Arabia is the focus for conducting this research.

In addition, although a careful review of the literature revealed that there are some empirical studies on m-government services adoption conducted in the developed countries; there is very little empirical research which focuses on m-government services adoption in Middle East Arab countries, including Saudi Arabia. The findings on adoption and usage of ICT-based solutions in developed nations are not always valid for other populations such as those in the Arab region (Baker, Al-Gahtani and Hubona, 2010). The social and cultural characteristics of Arab nations differ from those of the West and the Asian-Pacific regions. Owing to these differences, it is reasonable to expect that the factors which impact on an individual's adoption of m-government services in Arab countries, such as Saudi Arabia, might differ fundamentally from those in industrialized Western societies, such as countries in Western Europe and North America (Baker et al., 2010). This observation is supported in the literature with technology acceptance determinants in Saudi Arabia reported to be different from those in developed countries (Al-Gahtani, 2004). This suggests further research into m-government adoption factors in the Arab region, especially Saudi Arabia is required.

Despite m-government systems being available for several years, citizens' adoption of E-government services in general and m-government services in particular still falls below expectations (Alghamdi and Beloff, 2014; Al-Hujran et al., 2015; Alotaibi, Houghton and Sandhu, 2016a; Rana and Dwivedi, 2015). Furthermore, in Saudi Arabia, like in most developing countries, m-government implementation is still in its infancy and there are many challenges related to implementation, adoption and use (Alotaibi and Roussinov, 2015; Assar, 2015). Factors such as the rate of mobile device and Internet penetration and their security, reliability and effectiveness affect how successful a government will be at implementing m-government and user adoption, and accounts for global variation (Alsenaidy and Ahmad, 2012). However, there is a lack of research that allows a clear understanding of how factors such as these might impact the adoption and use of m-government services. This study rectifies this problem by providing a theoretical model purposely developed to carry out empirical research in this area. The results of this research will yield new insights about the key factors influencing the adoption of Saudi m-government, which will be invaluable to policy makers who require strategies that will result in faster and more efficient adoption of m-government services; as well as providing new information for researchers in the field and the ICT industry.

Research carried out in a number of different areas such as Malaysia and rural China (Liu et al., 2014; Faziharudean and Li-Ly, 2011) have made use of adaptations of the Technology Acceptance Model (TAM) and provided examples of how a number of social, cultural and technical factors can usefully be included in the TAM to provide insights into the influences on

citizens' intention to utilize m-government systems to access services and information. Cultural and technological factors like culture, trust and lack of necessary infrastructure have been demonstrated to be significant by comparative studies of m-government adoption in developing and developed countries (Al-Hadidi and Rezgui, 2010; Shareef et al., 2016).

The adoption of m-government in Arab countries, however, still requires further research. Studies conducted in these areas (Almuraqab 2017; Almuraqab and Jasimuddin, 2017a; Shareef Shareef et al, 2011; Shareef et al., 2016, Davis, Bagozzi and Warshaw, 1989) have revealed that factors such as trust, citizens' perceptions of the compatibility of m-government with their lifestyles, culture, awareness and the quality of the system are significant. Further, these studies show that there have been no empirical studies of m-government adoption in Saudi Arabia that includes factors like compatibility or culture. Similarly, there are no studies that take the quality of both technical and human factors into account or that investigate the issues from the viewpoint of the providers in addition to the intended users. There is clearly a need to carry out further research into Saudi m-government adoption.

So, this research fulfils a critical knowledge gap and provides a valuable insight into the main factors that influence citizens' intention to adopt and use m-Government services in Saudi Arabia; which will be useful for researchers, the ICT industry and for policymakers who are keen to find strategies that result in quicker and more efficient take-up of such services.

## **1.5 Research questions**

This research aims at addressing the following questions:

- 1. What is the appropriate theoretical framework that can be used to analyse factors that can impact user's intention to adopt and use m-government services from citizens' perspectives, particularly in Saudi Arabia?*
- 2. What are the key factors that could influence the adoption and utilization of m-government services in Saudi Arabia from citizens' perspectives?*
- 3. What are the key factors that could influence the adoption and utilization of m-government services in Saudi Arabia from managerial perspectives?*
- 4. How can the results of this research from different perspectives that of Saudi citizens and that of key officials responsible for implementing E-government and m-government services in different Saudi ministries assist government agencies in Saudi Arabia and other Arab countries in similar circumstances to enhance, increase and influence citizens adoption and utilization of m-government services?*

## **1.6 Research aim and objectives**

The main aim of this study is to examine the adoption and usage of m-government services by



citizens in developing countries, particularly Saudi Arabia. However, the specific objectives of this research are:

1. Reviewing various critical technology adoption theories and models that have been developed that aim to analyze, investigate and understand factors that affect the use of technology in specific contexts.
2. Developing a comprehensive model to analyze factors that affect users' intention to adopt and use m-government services, based on a critical analysis of the literature that relates to acceptance of technology social, cultural and technological factors, in conjunction with insights from several models and theories that are commonly used to analyze acceptance and usage of technologies.
3. Using the developed model to understand and analyze factors that could influence citizens' adoption and utilization of m-government services in Saudi Arabia from two different perspectives:
  - 3.1. From Saudi citizens' perspectives.
  - 3.2. From a managerial perspective, with key officials responsible for implementing E-government and m-government services in different Saudi ministries.
4. To evaluate the findings and provide recommendations in order to implement and provide successful m-government services.

These will provide valuable information about the key factors affecting the adoption and utilization of m-government services which will be useful for policymakers who wish to employ strategies that would make for faster and more efficient adoption of such services, as well as providing useful information for researchers and the ICT industry.

## **1.7 Research methodology**

Both quantitative (survey) and qualitative (semi-structured interviews) methods are applied in this thesis in a complementary manner. In the field of IT/IS research, a combined methodology of both quantitative and qualitative analysis has become common and has received more attention compared to the utilization of only one of the two approaches (Myers, 1997).

## **1.8 Research contributions**

This research added several contributions to theory and practice in the field of m-government adoption and use. In this section, several new contributions to the field of m-government adoption and utilization can be summarized as follows:

### **1.8.1 Theoretical contributions**

This contribution is presented in Chapter 7.

- This research provides a comprehensive literature review on E-government and m-government; covering several aspects such as: E-government, E-government in the context of Saudi Arabia, E-government applications and classification, mobile government, mobile government applications and classification and enabling technologies. It also reviews the implementation of E-government and m-government in both developing countries and as well as developed countries. Moreover, this research represents various technology adoption theories and models that have been developed and aim to analyse, investigate and understand factors that affect the use of technology in specific contexts.
- This research has developed a model called the Mobile Government Adoption and Utilization Model (MGAUM), In order to analyze factors that affect users' adoption and use of m-government. The MGAUM has been developed based on a critical analysis of the literature that relates to acceptance of technology, in conjunction with insights from several models and theories that are commonly used to analyze acceptance and use of technologies. The MGAUM integrates the Technology Acceptance Model with a number of social, cultural and technological factors, taken from other recognized theoretical acceptance models that have been identified as key factors in the literature.
- In this research, the MGAUM model is empirically tested and validated by collecting and analysing primary data from the citizens' perspectives.
- In this research, the MGAUM model is also empirically tested by a qualitative approach; namely, semi-structured interviews with key officials who have the responsibility for implementing E-government and m-government services in eight Saudi ministries.
- The methodology (mixed methods) employed in this study can be usefully applied to the study of technology acceptance in other contexts.

### **1.8.2 Practical implications**

This study reveals the most significant factors that influence citizens' adoption and utilization of m-government services in Saudi Arabia from two different perspectives: that of Saudi citizens and that of key officials responsible for implementing E-government and m-government services in different Saudi ministries. This research represents two practical contributions, which are as follows:

- From the citizens' perspectives, the research revealed that Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Mobility (PM), Social Influence (SI) and Perceived Compatibility (PCOM), Perceived Trust (PT), Culture (CULT), Citizen

Service Quality (CSQ) and System Quality (SQ) were the most significant factors that affect citizens' intention to adopt and use m-government services.

- From the managers' perspectives, the research revealed that Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Mobility (PM), Social Influence (SI) and Perceived Compatibility (PCOM), Perceived Trust (PT), Awareness (AW), Citizen Service Quality (CSQ) and System Quality (SQ) were the most significant factors that effect on citizens' intention to adopt and use m-government services.
- Achieving a high rate of adoption and acceptance of m-Government services is considered as a challenge to a government because it faces several issues related to adoption, implementation and use; hence this research. This study has provided several recommendations based on the result of the quantitative and qualitative investigations into the field of m-government services for government agencies, m-services providers and practitioners. These recommendations provide a valuable insight into the main factors that influence citizen intention to adopt and use m-Government services in Saudi Arabia; which will be useful for government agencies, stakeholders in the field of m-government, researchers, the ICT industry, and for policymakers who are keen to find strategies that result in quicker and more efficient take-up of such services.

## **1.9 Outline of the Thesis**

This thesis is divided into seven chapters as follows:

Chapter One presents the research problem and research questions, as well as the aims and objectives of this research. Chapter Two presents a review of literature about E-government and m-government. In Chapter Three, the model developed to analyze factors that affect users' adoption and use of m-government-the Mobile Government Adoption and Utilization Model (MGAUM) is described. The chapter also outlines the research hypotheses about the proposed relationships between factors in the MGAUM and users' intention to adopt and use. Chapter Four discusses the research methodology adopted in this research to collect quantitative and qualitative data. Chapter Five provides an overview of respondents' demographic characteristics; and a descriptive analysis for each factor proposed in the MGAUM is given in order to explain its impact on citizens' intention to adopt and use m-Government services in Saudi Arabia. Moreover, this chapter provides a discussion of the statistical analysis of the findings and an evaluation of the hypotheses about the relationship between the dependent factor (Intention to use m-government service), and independent variables (factors), to determine which of the hypotheses will be accepted or rejected. Chapter Six presents a qualitative analysis of the data collected by the researcher; and Chapter Seven provides the recommendations, contributions, limitations and suggestions for future work.

## **2 Chapter Two: E-government and M-Government Literature Review**

### **2.1 Introduction**

This chapter presents a review of literature about E-government and m-government. The literature review in this chapter is divided into six main sections: E-government, E-government in the Context of Saudi Arabia, E-government Applications and Classification, Mobile government, Mobile government Applications and Classification and Enabling Technologies. It also reviews the implementation of E-government and m-government in both developing countries and as well as developed countries; and discusses previous studies conducted to understand and analyze factors in such E-government and m-government adoption and utilization literature.

### **2.2 E-government**

The following sections describe the concept of E-government, its application and classification in more detail; as well as focusing on E-government in Saudi Arabia.

#### **2.2.1 Definition of E-government**

The concept of E-government emerged at the start of 1990, and is also called electronic governance or online government (Anttiroiko and Mälkiä, 2007). Since that time, the field of E-government has provided an excellent opportunity for research and development and created a sound scientific content; as a result of which E-government has grown and developed very dramatically (Grönlund and Horan, 2005).

A review of previous studies reveals that there is no specific universally agreed definition describing the concept of E-government (Halchin, 2004) ; instead, several definitions of the concept of E-government are to be found. Most definitions of E-government, if not all of them, focus on two important aspects: Firstly, as a new way that governments can use ICT to deliver and provide new services; and secondly, how they provide information to their citizens (Al-Nuaim, 2011). For instance, the United Nations (UN) has defined E-government as “utilizing the internet and the world-wide-web for delivering government information and services to citizens” (United Nations and American Society for Public Administration (ASPA), 2002). Similarly, Heeks, 2003 defined E-government as “... the use of information and communication technologies (ICTs) to improve the activities of public sector organizations – which brings with it the promise of greater efficiency and effectiveness of public sector operations”. This is similar to the World Bank’s definition (2015): “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”.

However, some definitions do not fully and comprehensively describe the meaning of E-government; and these definitions just indicate how online services (e-services) are provided to citizens; although the meaning of E-government is broader, more comprehensive and far beyond such descriptions (Alghamdi, 2017).

### **2.2.2 E-government in the Context of Saudi Arabia**

Governments around the world aim to provide a better delivery of E-government services through the adoption of new technologies (Alotaibi, Houghton and Sandhu, 2016b). Saudi Arabia is improving and developing continuously, and one of its recent major developments is the introduction of E-government. This significant development has involved many stages and steps (Kurdi, Nyakwende, and Al-Jumeily, 2016). Saudi Arabia is a developing country that has faced many obstacles in the implementation, adoption and utilization of E-government. In both developing and developed countries worldwide, governments aim to deliver government services to citizens, which serves to strengthen the relationship between the government and its citizens and to make sure that citizens have the advantages and benefits of these services (Alghamdi and Beloff, 2014).

In most developing countries, particularly in Saudi Arabia, citizens, foreigners and business people who have paperwork due at any government agency, must sometimes visit the government service provider in person to finish it. However, working hours for government service providers are the same as in educational institutions, government agencies and private companies; which is approximately from 7 a.m. to 3 p.m. This can make it difficult for stakeholders to conduct their business with the government service providers; not least because the office will be very crowded, and the individual may have to wait many hours or even days to finish their paperwork. Because of overcrowding at the offices of government service providers, some people have to take a leave of absence from their work in order to arrive early at the government service providers' offices and finish their paperwork. Furthermore, transportation options in Saudi Arabia are inadequate and suffer from shortages; which increases the problem further. Furthermore, government services providers are not available in every town, only in the main cities. As a result, people travel from one location to another in order to complete their paperwork, which costs them both time and money (Al-Nuaim, 2011).

One of the top priorities of the government of Saudi Arabia is serving its citizens and facilitating the use of their services. In 2003, the Government of the Kingdom issued a Royal Decree to establish the Ministry of Communications and Information Technology (MCIT)

(Yesser, 2005); and in 2005, the MCIT established a huge E-government program called YESSER, together with two other ministries; namely, the Communication and Information Technology Commission (CITC) and the Ministry of Finance. ‘Yesser’ is Arabic for ‘make it easy’; and the goal of this program was to provide every citizen of Saudi Arabia access to government services online by the end of 2010 (YesserA and Program, 2010). Yesser is considered a tool that allows and facilitates the transformation to E-government based on coordination between the infrastructural projects of Yesser and other government agencies, whereby each government agency is responsible for implementing its own government services (YesserA and Program, 2010).

The first Saudi E-government action plan document was for the period 2006-2010; and its vision and plan were to provide excellent services to all stakeholders: i.e. government to citizens (G2C), businesses (G2B) and other government agencies (G2G). The Saudi government summarized this vision thus: “By the end of 2010, everyone in the Kingdom will be able to enjoy – from anywhere and at any time – world-class government services offered in a seamless, user-friendly and secure way by utilizing a variety of electronic means” (YesserA and Program, 2010). The Saudi government identified 150 E-government services as the top priority in achieving their goals and aims; and for these services to be available 24/7 for citizens and residents. Also, the government aimed through the implementation of E-government to end reduced productivity, frustration and the waste of time, effort and money (YesserA and Program, 2010).

Al-Nuaim (2011) studied and evaluated nine Saudi ministries’ websites as government service providers and found that some ministries were not implementing websites that could properly be described as true E-government. This applied to 41% of websites of the nine ministries. Also, Al-Nuaim found in his study that some important web elements did not work effectively or were missing an essential element such as a sitemap and contact links, and that there were inactive links and pages under construction. Similarly, research into Saudi Arabian E-government concluded that the Saudi E-government’s vision established in 2010 had not achieved its goals (Alghamdi and Beloff, 2014).

### **2.2.3 E-government Applications and Classification**

“E-government offers services to those within its jurisdiction to transact electronically with the government”(Al-Hadidi,2010).Many researchers have attempted to provide different classification schemes and approaches for E-government services. Some researchers have classified E-government into three main categories: Government to Citizen (G2C), Government to Business (G2B) and Government to Government (G2G) (Sang and Lee, 2009a; Seifert, 2003); and other researchers have identified and added another fourth category, which is

Government to Employees (G2E) (Alshihi, 2006; Ndou, 2004; Siau and Long, 2005).

These categories are as follows:

1. Government to Citizens (G2C) describes the relationship and interaction between a government and its citizens.
2. Government to Business (G2B) describes the relationship and interaction between a government and the private sector.
3. Government to Government (G2G) describes the relationship and interaction between government agencies.
4. Government to Employees (G2E) describes the relationship and interaction between a government and its employees (Alshihi, 2006; Ndou, 2004; Siau and Long, 2005).

Siau and Long (2005) have outlined the categories of E-government (See Figure 2-1). Moreover, they showed the objectives and activities for each of these four categories (See Figure 2-2) (Siau, K & Long, 2005).

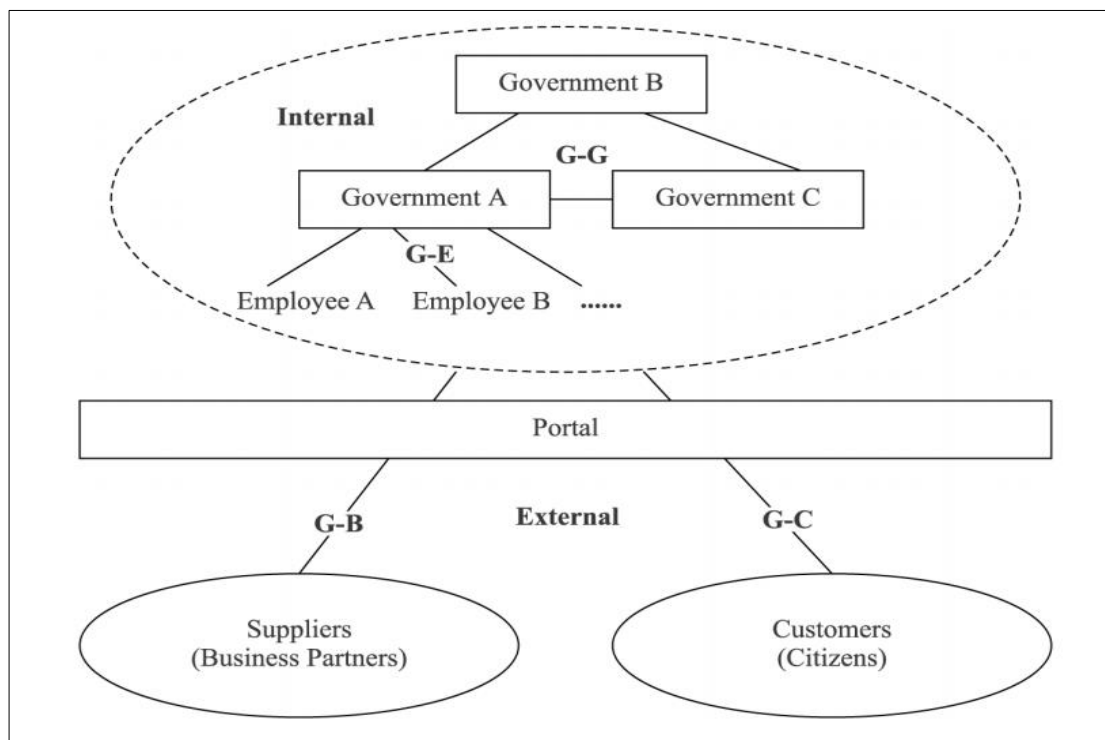


Figure 2-1: E-government (Framework) four categories (Siau and Long 2005)

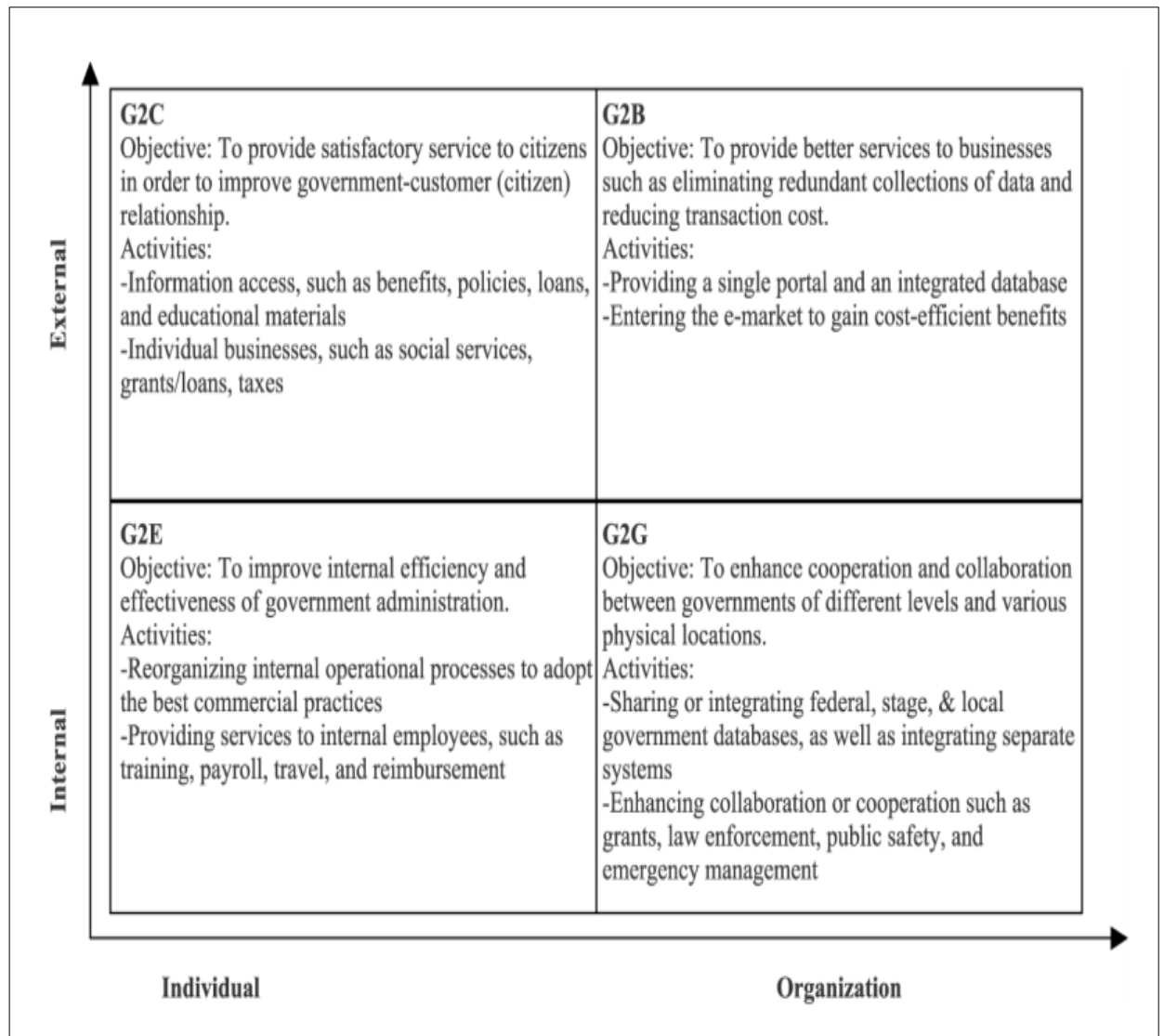


Figure 2-2: E-government objectives and activities of each of the four categories (Siau and Long 2005)

## 2.3 Mobile Government

The following sections describe the concept of m-government, its application, classification and its benefits in more detail.

M-government can broadly be defined as how mobile technology is used to improve the way services are delivered to stakeholders, for instance; citizens, businesses and all government agencies (Alotaibi and Roussinov, 2016). However, in this study, m-government is defined as the use of mobile technology to deliver and improve E-government services and information to citizens, businesses and all government agencies.



### **2.3.1 Benefits of m-government**

According to Kushchu and Kusc (2003), m-government, rather than being a replacement for E-government services, is considered as a complement or extension of them. It advances the E-government service delivery by offering the public an extra channel to access government information and services using mobile wireless communication technology (Scholl, 2005). Although the same principles are common to E-government and m-government, the latter is distinguished by features that are particular to it:

- The main advantage for citizens of m-government is its mobility, giving citizens access to the network at any time and from anywhere (M Ntaliani, Costopoulou and Karetsos, 2008). Adding mobility to E-government services is very useful not only for developed countries but also for developing countries. Countries can save time, cost and avoid a building huge infrastructure that required to access regular internet by adopting wireless internet technologies (Zmijewska and Elaine, 2004). For instance, some governments are still having difficulty in communicating continuously with citizens, especially with people in rural areas and remote areas and with homebound users or those with low computer literacy computer or chronic illnesses, which make it difficult to use E-government (Editor and Becker, 2002).
- As mobile phones can be used easily, citizens can instantly receive messages from government service providers (Almarashdeh and Alsmadi, 2017).
- In many countries, the mobile phone has recently become the primary way people communicate over distance; and has thus arguably become a part of everyday life for many people (Serra et al., 2015; Lallana, 2004). For this reason, being able to access government services via mobile devices might be the best route for citizens.
- More and more people are using their mobiles to access the web. For citizens, this means they neither have to visit the service provider in person nor go home to use their computer when they want to access government services and information (Almarashdeh and Alsmadi, 2017; Lallana, 2004).
- Access to the internet may depend on a country's economy in terms of the extent of internet access and how many citizens have access to computers, (Kushchu and Kusc, 2003; Lallana, 2004); these limitations can be overcome by providing mobile services.

Therefore, by using an m-government system provided by wireless technology, citizens will acquire opportunities for personalized, real-time access to government services and information (Alsenaidy and Ahmad, 2012; Ntaliani et al., 2008). Users in remote areas will especially benefit from being able to access government services and information as m-services have the advantage of being affordable, easy and immediate to access and require a relatively low level

of digital literacy to operate successfully (Liu et al. 2014; Ntaliani et al., 2008). Given these characteristics, the adoption of an m-government system has benefits for citizens and government alike.

### **2.3.2 Mobile Government Applications and Classification**

Many researchers have tried to establish different classification schemes and approaches for mobile government services. Generally, researchers have classified m-government services according to two criteria, namely, the parties involved and the type of transaction performed (Salkute, Kolhe and Veedhi, 2011; Sheng and Trimi, 2008).

#### **a) Type of Transaction Classification**

Based on type of transaction, researchers have classified mobile services into three categories:

##### **1. Informational:**

This function includes publishing, updating information and alert messages; also, the government can use the internet to publish and broadcast general information. Through the use of e-mails or SMS, a government can send notifications or alerts proactively or automatically to end users.

##### **2. Transactional:**

This function allows users to make transactions and interact with government services such as making procurements and payments online, renewing their permit/licenses, registration of property and for voting.

##### **3. Operational Functions:**

This function refers to all internal government operations; and enables government employees to access important information immediately in different locations and to coordinate among government agencies in an effective way. For instance, using a laptop which is connected to a remote database wirelessly, a police officer can search for and through a suspect's criminal records (Salkute et al., 2011; Sheng and Trimi, 2008).

#### **b) Classification by Parties Involved:**

Based on type of parties involved, other researchers have classified mobile services into four categories (Ntaliani, Costopoulou and Karetsos, 2008; Salkute et al., 2011; Sheng and Trimi, 2008). These categories are as follows:

1. Mobile Government to Government (MG2G) describes the relationship and interaction between government agencies.
2. Mobile Government to Citizens (MG2C) describes the relationship and interaction between a government and its citizens.

3. Mobile Government to Business (MG2B) describes the relationship and interaction between a government and the private sector.
4. Mobile Government to Employees (MG2E), describes the relationship and interaction between a government and its employees (Ntaliani et al., 2008; Salkute et al., 2011; Sheng and Trimi, 2008).

### 2.3.3 Enabling Technologies

There is a great range of enabling technologies' (Al-Busaidi, 2012). According to Sheng and Trimi (2008), "a mobile device can be any small and portable device that can be handled everywhere and at any time". Mobile devices enable mobility which, as the name suggests, is the central feature of a mobile and allows the user to receive and handle information on the move (Shin Yuan Hung, Chang and Kuo, 2013). Mobility is thus the biggest advantage of mobile devices over static devices such as computers or landlines.

Accordingly, mobility is the main advantage of m-government for citizens, as it allows citizens to access the network at anywhere and anytime. As a result, 'mobility' is the golden key to implementing mobile government applications. (Sheng and Trimi, 2008) have classified the enabling technologies for m-Government services as follows:

1. **Mobile phone:** In the past, using a mobile phone was very limited, because it had functionalities that were limited; for instance, voice call and Short Message Service (SMS). However, nowadays a mobile phone has developed very dramatically, and has more advanced functionalities; for instance, third generation (3G) and network connectivity which allow a user to connect to the internet, browse and send an email.
2. **Smartphone:** This device combines the Personal Digital Assistant (PDA) and a mobile phone together; having the great advantage of functionality in one device. This device enables a user to send a message and email, call, download videos and music, surf the web and access map services and Global Positioning System (GPS).
3. **Tablet or Slates:** These are wireless personal computers. A Tablet is like a notepad in its dimensions and has a touch screen which allows a user to take notes using a digital pen.

### 2.3.4 M-Government Worldwide

This section reviews the implementation of E-government and m-government in both developing countries and developed countries. It also discusses previous studies conducted to understand and analyze factors in this E-government and m-government adoption and utilization literature.

#### **2.3.4.1 Developed Countries**

In 2017, a survey investigated health organizations' adoption and use of mobile technology in three developed countries, which were the UK, the USA and France. The study revealed that access to all types of health organizations and health professionals are increased by using computers and mobile applications; and that the accessing these services from anywhere and anytime were the most beneficial for all three countries with low cost (Currie, 2016).

In June 2019, the federal government of Canada established a mobile application called Canada business, an app for Canadian small business owners. The main aim of this app was to allow small business to access government programs and services in an easy and faster way. Canadians could access all programs and services for business from one access point. The application facilitated owners of small businesses to know when to file taxes, receive recommendations on services such as funding that were tailored to their business and to access information about issues such as starting and financing a company, intellectual property, engaging staff, imports and exports and engaging with the government regarding licenses and permits (KIRKWOOD, 2019).

There was also a weather app launched by the government of Canada in 2018, for citizens to be updated about the status of the weather and its variations. Canadian could use this government app to check the daily weather forecast at no cost (Desjardins, 2019).

Moreover, in 2018, the government of Canada launched their Job Bank application which was implemented by the Minister of Employment, Workforce Development and Labour. This free, bilingual app allows Canadian to search more easily through thousands of jobs across the country; and has various features such as personalized and tailored services (Development, 2018).

In 2015, the government state of Nebraska launched an application called Gov2Go (Your Personal Assistant for Government), which is a simple and smart government service. This application was initially available only in the state of Nebraska; however, due to its immediate popularity it was later available in all 50 states of the US. This application allows citizens to conduct all level of government services and transactions from one point; such as paying car taxes and property taxes and registering to vote. The app sends users reminders so that they do not miss deadlines (Martin, 2015; Proudfit, 2019).

#### **2.3.4.2 Developing Countries**

Gang (2005) studied m-government initiatives in a district of Beijing in China, and investigated the shift from traditional E-government services to m-government services. This project was under the leadership of the head of the district. The result of the study showed that reliable

interaction between the citizens and their government, as well as the more effective and efficient services provided by m-government, had rebuilt trust between them. The study also showed that m-government had provided services to its citizens that were localized, personalized and context-aware; and that the key success factor of this initiative was the involvement and complete support of those in positions of leadership (Gang, 2005).

Ghayasi and Kushchu (2004) investigated the status of m-government services in the Philippines; where the government had launched different m-government services such as G2C, which was considered a simple application and C2G, considered as the more interactive application. Some specific m-government services offered in the Philippines were as follows:

**1. TXT CSC:**

TXT CSC is an SMS service launched in 2004 by the Civil Service Commission (CSC). The purpose of that service was to achieve the government target of making service delivery more efficient and speedy (Lallana, 2004). This service allowed citizens to send their complaints simply and cheaply to government agencies, particularly to the CSC. This service received between 1000 to 1500 messages every month at the start, the cost of services, at \$0.02 per message, being extremely cheap.

**2. Reporting Criminal Offences.**

SMS services launched in 2002 by the Philippines National Police had the aim of increasing transparency between the government and its citizens. This service allowed citizens as well as police officers to report criminal activities by sending SMS to the relevant authorities enabling them to take action. This service was accessible by 16 million mobile phone users across the country; and indeed the numbers using this service reached 16 million country-wide. Another of the SMS services applied in the Philippines for citizens allowed them to seek emergency assistance (Ghayasi and Kushchu, 2004).

Alsenaidy and Ahamad (2012) explored the recent state of information communication technology (ICT) and evaluated mobile government implementation in Saudi Arabia. This study highlighted the needs to transfer from E-government to m-government as another channel to improve services and increase government accountability, transparency and communication between the government and the public. In 2012, the use of the internet in Saudi Arabia was large, with a high internet penetration rate. The number of internet subscribers increased significantly with a concomitant decrease in the number of fixed phones; and the number of mobile subscriptions was increasing every day. This meant that using m-government was becoming more popular than E-government for many reasons, including the advantage of using mobiles at anytime and anywhere. The government of Saudi Arabia realised the significance of

mobile government and some government ministries and agencies moved towards m-government, to improve services and increase government accountability, transparency and communication between the government and the public. The government of Saudi Arabia has launched m-government services; these include the Ministry of Health providing the Health Mobile service; the Ministry of Higher Education providing tracking of higher education information and King Saud University's SMS Service; ITVTC services provided by the Technical and Vocational Training Corporation and the Ministry of Labour's Appointments and Document Tracking, established by the Supreme Council of Justice and Employee inquiry.

The authors noted that m-government in Saudi Arabia is an extension of e-governance and it has three types:

1. Mobile Government to Government (MG2G), describes the relationship and interaction between government agencies.
2. Mobile Government to Citizens (MG2C), describe the relationship and interaction between government and citizens.
3. Mobile Government to Business (MG2B), describe the relationship and interaction between government and the private sector.

Finally, they found that the current services provided through m-government are both excellent and convenient. Although these services are provided by m-government, they have very clear benefits to all sectors, citizens and residents as well as government. In spite of this m-government has faced many challenges in implementation, gaining users' trust, infrastructure and cost. All of these issues put m-government in Saudi Arabia at the first stage. The authors concluded that more investigation was needed to explore that factors could affect the adoption and successful implementation of m-government in Saudi Arabia (Alsenaidy and Ahmad, 2012).

Although the study reviewed the state m-government in Saudi Arabia; it can be criticized for several reasons. Firstly, the authors talked in general about some government agencies that established m-government services; and all of the m-government services in this study only focused on sending and receiving SMS text messages to and from government agencies through mobile devices. Moreover, the authors did not discuss the status of m-government apps as a program to download onto a mobile, and whether these apps existed or not. In addition, the authors did not discuss any factors that might encourage users to actually use m-government services. Finally, they did not address the problems that faced government agencies during implementation or after implementation either in terms of technical or non-technical problems.

Similarly, Alrowili, Alotaibi and Alharbi (2015) developed a conceptual model based on the technology acceptance model (TAM). They only added three external factors to the TAM

model; namely Trust, Time and Experience; these factors all being mentioned in different previous studies. However, there was no research conducted before which combined all of these three factors in one study, as in this study. This research relied on quantitative research, and used a questionnaire survey to collect data from 451 participants. The questionnaire survey was done online and published by sending a link through different channels such as e-mail, social media and forums. The result of the study revealed that Trust, Time and Experience have a significant effect on the acceptance of m-government services.

The researchers mentioned some key factors which influence the user to accept m-government services. These were as follows: the limitations of mobile phones; the lack of coordination among all government levels which is important before the services are offered; and Privacy, Security and Trust. The researchers highly recommended that citizens' trust in m-government services should be increased in order to achieve a high rate of acceptance and adoption of m-government (Alrowili et al., 2015).

Although the paper focused on acceptance of m-government in Saudi Arabia from the users' perspective, it could be criticized for several reasons. Firstly, the number of factors added to the TAM was too low. Furthermore, the TAM was extended by adding Trust, Time and Experience, without clarifying the rationale for choosing these factors. The authors also cited two limitations of their study that needed to be considered; namely, that the sample was not representative of the whole population and that the complexity of government service usage through mobile devices was not explored.

Another study conducted in Saudi Arabia by Alqahtani et al. (2014) aimed to firstly, to understand factors that influence citizens to accept a mobile transaction, and secondly, to build a conceptual framework from these factors to show how they influenced citizens' intentions to use mobile transactions. This study applied a qualitative approach, based on focus group interviews with eight mobile experts who had experience of making online purchases from mobiles. The study discussed many factors; and the results highlighted that there were eleven factors which were significant in influencing citizens to accept and adopt m-transactions in Saudi Arabia. These factors were Usefulness, Ease of Use, Culture, ICT Infrastructure, Government m-readiness, Trust, Visual Appeal, Security, Navigational Structure, Cost and Social Influence. However, Awareness, Resistance to Change, Privacy, Experience, Cyber-Law, Tangibility, Payment Gateway, Arabic Language, E-commerce Presence, Warranty, Trial and Postal Services were considered to be non-significant factors.

Although the paper shed light on understanding the factors that influence citizens to accept a mobile transaction in Saudi Arabia, it could be criticized for several reasons. Firstly, only eight people were used and all of them already had a high level of experience in using mobiles,

commercial websites and purchasing online. From my perspective, this study is insufficient as it did not include any users with less experience of using mobiles and who were not specialists in technology. Also, the authors did not test the conceptual framework to investigate the relationship between the factors.

Abdelghaffar and Magdy (2012) empirically investigated factors that might affect the adoption of m-government services in developing countries, especially in Egypt, another Arab nation. A conceptual model was developed by integrating the TAM and the Unified Theory of Acceptance and Use of Technology model (UTAUT). Other factors were also added to the model; namely: Internet Experience, Awareness, Compatibility, Trust, Face-to-face Interactions and Personal Connections; and relevant hypotheses were accordingly developed. To empirically test these hypotheses, the paper utilized a questionnaire-based survey to collect data from 100 young Egyptian participants. A multiple regression analysis technique was used to analyze the data and test the research hypotheses. The result of this study found that Compatibility, Social Influence, Perceived Usefulness, Awareness and Face-to-face Interactions were significant factors in predicting the participants' intention to use m-government; while Trust, Perceived Ease of Use, Personal Connections and Internet Experience were not significant factors.

Although the paper provides some insight into the factors that might impact the adoption of m-government in a country with a similar cultural context to Saudi Arabia, it could be criticized on several counts. Firstly, the developed model included many factors without clarifying the rationale for choosing these factors. In addition, the paper stated that it utilized the UTAUT framework, but it only included only one factor, i.e. Social Influence. Moreover, the sample size was too small (i.e. 100 responses) to test the developed model, which definitely limited the generalizability of its findings. Finally, the paper limited the scope of the Culture construct to only Face-to-face Interactions and Personal Connections.

A similar study conducted in China examined the adoption of m-government in this area, based on testing some interdependency between attributes such as rural inhabitants' demographic traits, their perception of m-government and how they could access services; also how the technology, social factors and trust influenced the intention of people to adopt and use m-government (Liu et al., 2014). Based on the TAM, a conceptual model combining three types of diffusion factors was developed. These were Perceived Ease of Use and Perceived Usefulness (technological attributes); Integrity and Benevolence (trust toward government) and Social Influence and Image (social environmental attributes).

The model was made up of seven factors: Perceived Ease of Use, Short-term Usefulness, Long-term Usefulness, Integrity, Benevolence, Image and Social Influence. To test the hypotheses, this study used a questionnaire survey and collected data from 409 people. The sample size



consists of 173 females and 236 males; and the technique used to analyze data and test validity was AMOS 21.

The results of this study found that Long-term Usefulness, Perceived Ease of Use and Social Influence directly influenced intention to use m-government, while Integrity, Perceived Short-term Usefulness, Image and Benevolence indirectly influenced using m-government. Also, the study indicated that trust in m-government was significantly affected by users' social environment (Social Influence) and the ease with which the technology could be used (Perceive Ease of Use). The study also mentioned that males and young people who lived close to the village centre and had some knowledge about current government policies and activities, had a positive view of m-government services, and were most likely to adopt them.

The paper sheds light on the factors that might impact the adoption of m-government in rural populations in developing economies particularly in the rural areas of China; and the final sample size was valid and contained both men and women. However, one of the limitations cited by the authors in their study was that, because of the variations between the different provinces and villages, the results of the study could not be generalized, also because the sample size was relatively small. Another limitation cited by the authors was that this study only focused on the TAM; and maybe using different theoretical models such as the IS success model, would be very useful to provide different understanding on this topic.

Li and Yeh (2009) studied the third generation of mobile technology (3G) for service quality, and tested how users' perceptions influenced their satisfaction when using 3G services. The study applied the TAM with a combination of specific quality of service factors that influenced users' satisfaction, to build a proposed conceptual framework. The proposed model examined seven factors influencing users' intention to adopt 3G services; namely: Satisfaction, Trust and Quality factors including Interactivity, Customization, Responsiveness, Usefulness and Ease-of-Use. They tested their conceptual model by collecting data from an online survey of 212 3G users. The technique used in this study to analyse data and test was structural equation modelling (SEM).

The result of this study found that Interactivity, Responsiveness, Customization, Usefulness and Ease-of-Use affected user satisfaction directly; with the last three of these significantly able to predict the satisfaction of 3G users. While Trust and Satisfaction directly influenced users' intention to use 3G services.

Another study, conducted in Malaysia, focused on the degree to which different factors affect consumers' behavioural intention to adopt and use a mobile data service. The model used in this study examined seven factors: Perceived Usefulness Perceived Ease of Use, Perceived Enjoyment, Social Influence, Media Influence, Perceived Mobility and Perceived Monetary

Value. A questionnaire survey was used to collect data from 404 participants in Klang Valley, Malaysia; the sample used was made up of the working population and graduate students.

The findings of this study revealed that Perceived Usefulness, Perceived Enjoyment, Perceived Mobility, Social Influence and Perceived Ease of Use had a significant positive effect on consumers' behavioural intention to use the mobile data service; whereas Media Influence and Perceived Monetary Value were not significant factors (Faziharudean and Li-Ly, 2011).

Although the paper identified the factors that could affect consumers' behaviour to use mobile data services; it could be criticized for several reasons. Notably, the sample was very limited because it only focused on the working population and graduate students and did not cover a large proportion of people in various fields. However, the authors themselves noted a major limitation of this study, which was that the sample was taken only in a metropolitan area in Malaysia; furthermore, that most of the respondents were young adults.

El-Kiki and Lawrence (2007) developed a conceptual model which measured user satisfaction and the use of m-government services. The authors concluded that customer satisfaction is the key to increasing the use of m-services, particularly in m-government. The methods used to test the conceptual model were structured interviews and online surveys. The authors identified many factors that could influence satisfaction as well as use; and their conceptual framework had four basic components, each containing a set of factors. These factors were: (1) Value for Money; Price, Content and Quality of service; (2) Awareness, Accessibility, Availability, Reliability, Accuracy, Responsiveness, Courtesy, Helpfulness and Efficient Transaction; (3) Usability, Timeliness, Trust, Privacy, Security and Strategic Date and (4) Accountability and Transparency. The authors did not test the conceptual framework to investigate the relationship between these factors (El-Kiki and Lawrence, 2007).

Al-Hadidi and Rezgui (2010) reviewed obstacles that affect mobile government adoption and diffusion factors in developed and developing economies. In this study, the authors divided the barriers that affect the adoption of m-government into technical barriers and non-technical barriers. They identified that the foremost technical barriers to successful implementation of E-government or m-government in both developed and developing countries was lack of infrastructure, and that this problem is increasing particularly in developing countries. Security was another technical barrier not only in developing countries but also in developed countries; as well as the lack of compatibility between existing mobile systems and E-government systems .

The main non-technical barrier affecting the adoption of E-government and m-government was identified as culture, which includes aspects such as language, trust, resistance to change, management support and user expectation. Furthermore, lack of IT skills was a barrier that

significantly affected the ability of governments to provide E-government or m-government.

The authors also identified demographic factors that would affect citizens' attitudes towards m-Government initiatives; these demographics factors were gender, age, income, language differences and educational level. The authors highlighted that cost issues, such as the cost of owning mobile devices or the cost accessing of service existed in all countries; and concluded that implementation of E-government or m-government has many advantages for government and in particular for citizens; namely, reducing costs, saving time, decreasing corruption and increasing transparency and accountability (Al-Hadidi and Rezgui, 2010).

Although the study pinpoints obstacles that affect mobile m-government adoption in developed and developing economies; it could be criticized for several reasons. Firstly, there was no comparison between developed and developing countries in economic and cultural terms, when such differences may affect adoption of m-government in direct or indirect ways. Moreover, the researchers needed to focus on technical barriers or non-technical barriers for both developed and developing countries, not just in general but in more detail, especially for the developing countries. Finally, the researchers needed to focus more on non-technical barriers, especially human factors, because these are critical.

Susanto and Goodwin (2010) conducted an experiment in Australia; the aim of which was to investigate factors which affected the adoption of SMS channel-based E-government services through mobiles. They implemented two different m-government systems: SMS-MIIAS (Indonesian Muslim community in South Australia) and SMS-OBM (October Business Month). The former was implemented in a mainly Muslim community in South Australia; as SMS-MIIAS is a system that provides information about any events in the Indonesian Muslim community. The service was introduced in the holy month of Ramadan for Muslims, and provided daily information about prayer times, fasting times and when to stop fasting during the month of Ramadan by sending an SMS. Also, the system sent notifications to all Muslims who had registered about any upcoming event in the Indonesian Muslim community.

SMS-OBM was implemented and developed for the Northern Territory government in Australia and designed for business people. SMS-OBM is an SMS system that provides information for business people about any business events held during the month of October by sending an SMS.

The results of the study showed that Interpersonal Influence plays was an important factor and significantly affected the adoption of decision processes at every stage. Moreover, the factors of Perceived Usefulness, Perceived Convenience, Perceived Relevance, Perceived Value, Quality and Reliability of Information influenced use behaviour.

Wang (2014) empirically investigated the impact of Perceived Value in the continued use of m-

government in China. The key purpose of the study was to understand continued use of m-government. Based on the TAM, a conceptual model was developed and comprised the following factors: Perceived Usefulness, Perceived Ease of Use, Mobility, Perceived Security, Perceived Value, Satisfaction as well as Trust in Government, Trust in Agent and Trust in Technology. In this study, the author used Perceived Value as a dependent variable instead of Intention to Use. Accordingly, relevant hypotheses were developed and tested using a questionnaire-based survey to collect data in a field survey of 528 companies in China. A valid sample of 351 was obtained; and a partial least squares (PLS) (Smart PLS 2.0) technique was used to analyze the data and test the research hypotheses.

The results of study illustrated that Perceived Value is strongly influenced by three factors, i.e. Perceived Usefulness, Mobility and Perceived Security; and that Perceived Value has a significant impact on user satisfaction and their trust in government, agents and technology (Wang, 2014).

Although the paper produced evidence about the importance of Perceived Value in users' continued use of m-government; it could be criticized for several reasons. Firstly, the developed model included many factors without clarifying the rationale for choosing these factors. Secondly, the study did not mention important factors that can add value and influence citizens to the use of mobile government services, such as personalization and individual characteristics. Finally, according to the authors themselves, the findings cannot be generalized because they are very specific and limited to the Chinese context which has very different cultural characteristics from those of other nations; also the people who participated in the survey were homogenous as they worked in accounting and all came from Henan Province in China.

Hung et al. (2013) studied factors that might determine user acceptance of mobile government in developing countries, specifically in Taiwan. A conceptual model was developed by integrating the theory of planned behaviour (TPB) augmented by a mobile communication perspective, which the authors felt gave them a greater insight into critical mobile communication factors that could improve users' acceptance of m-government services. The model examined many factors; i.e. Perceived Usefulness, Perceived Ease of Use, Compatibility, Trust, Interactivity, External Influence, Interpersonal Influence, Self-Efficacy and Facilitating Conditions. Accordingly, relevant hypotheses were developed in this study, and tested empirically and quantitatively by a web-based survey questionnaire that collected data from a valid sample of 331 m-government users.

With the help of a public affairs forum administrator, a link to the survey questionnaire was posted on the Taiwanese E-government website and available online for one month. To increase the rate of response, the participants who filled in all items were given a lottery entry as a

reward. The technique used in this study to analyze data and test was AMOS 7.0 structural equation modelling (SEM) software.

The results of this study found the factors of Perceived Usefulness, Perceived Ease of Use, Interactivity, Trust, External Influence, Interpersonal Influence, Self-efficacy, and Facilitating Conditions were critical factors; with the first four factors considered as the main determiners of attitude toward mobile government services. The results also showed that Compatibility was not significant and did not influence attitudes toward m-government services (S Y Hung, Chang and Kuo, 2013).

The study throws light on factors that determine user acceptance of mobile government in developing countries, particularly in Taiwan; and the sample size of 331 was relatively good. However, this study could be criticized for several reasons. Firstly, the study only conducted the survey with users who had already used m-government services. It would have been more comprehensive if it had compared users and non-users of the mobile government services, to evaluate their attitudes toward m-government and which factors could encourage non-users to adopt m-government services.

Shareef et al (2012) examined the adoption of mobile government among Indians. A conceptual model was developed by integrating the TAM and the TRA with the Diffusion of Innovation theory (DOI) and service quality models. The model consisted of the following factors: Perceived Usefulness, Perceived Ease of Use, Compatibility, Perceived Security, Perceived Empathy, Perceived Reliability and Relative Advantage. Accordingly, relevant hypotheses were developed and tested using a survey in which the questionnaire was printed out in both Hindi and English. The survey was conducted in Mumbai and the suburban and rural areas nearby with a target population of 2000 citizens; and 50% of the survey was distributed and returned by mail, and the rest of the questionnaires were distributed manually with the help of a group of volunteer students. The author's incentive to poor people who were living as slum dwellers in these areas to participate in this survey was in the form of gift items given through coupon draws. The valid sample for the survey was 351 respondents. The LISREL test was used in this study to analyze and test data.

The result of this study found that Perceived Ease of Use, Relative Advantage, Perceived Empathy and Perceived Security were significant factors for citizens to adopt m-government services, and especially that Perceived Empathy was the strongest factor in this model to predict citizens' adoption of m-government; while Perceived Usefulness and Compatibility were not considered as significant factors. In addition, Perceived Reliability was a weak predictor in m-government adoption (Shareef, Archer and Dwivedi, 2012).

Another study that made use of the UTAUT model was that of Alalwana et al. (2017) which

empirically investigated factors that might affect behavioural intention and adoption of mobile banking by the customers of Jordanian banks. This study was conducted only in two cities in Jordan, which were Amman and Al-Balqa. The model used in the study was based on the UTAUT2 (Venkatesh, Thong and Xu, 2012), but extended with Trust, which was considered as an essential factor. Thus, eight factors were examined: i.e. Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, and Price Value, Behavioural Intention and Trust. To empirically test hypotheses based on these factors, a questionnaire-based survey collected data from 343 mobile banking customers, which was analyzed and tested by structural equation modelling (SEM).

The results showed that Effort Expectancy, Performance Expectancy, Hedonic Motivation, Price Value and Trust were significant and positively affected customers' intention to use m-banking; in addition, Behavioural Intention and Facilitating Conditions were significant factors in predicting the actual adoption of mobile banking (Alalwan, Dwivedi and Rana, 2017).

Almuraqab (2017) empirically investigated factors that might affect the adoption of m-government platform services in developing countries, in particular the United Arab Emirates (UAE). A conceptual model was developed by integrating the TAM, UTAUT and Trust model and examined six primary factors considered significant predictors of intention to use m-government: i.e. Perceived Ease of Use, Perceived Usefulness, Social Influence, Compatibility, Trust in Government and Trust in Technology. This study was conducted at the University of Dubai by sending an e-mail to Masters students with a link to an online survey. In addition, the researcher distributed the survey link through social network messaging. Data was collected from 83 m-government users and analyzed and tested by structural equation modelling (SEM) with partial least-squares (PLS). The result of the study revealed that Compatibility, Perceived Ease of Use, Social Influence, and Trust in Technology significantly supported the adoption of m-government services; whereas Perceived Usefulness and Trust in Government did not support the adoption of m-government services (Almuraqab, 2017).

Abu-Shanab and Haider (2015) studied m-government services in Jordan and explored Jordanian citizens' perceptions about using m-government. The aim of their study was to explore factors that might affect adoption of m-government services in Jordan through SMS-based E-government services. A conceptual model was developed by combining the TAM and the TRA and adding two factors: Perceived Compatibility and Perceived Responsiveness. The conceptual model examined six factors to test the behavioural intention to use SMS mobile services; i.e. Perceived Usefulness, Social Influence, Perceived Ease of Use, Perceived Compatibility, Perceived Responsiveness and Perceived Cost of Services. Accordingly, relevant hypotheses were developed in this study; and to empirically test these hypotheses this study relied on quantitative research.

The study used a paper questionnaire survey distributed in many places, such as universities, schools, businesses and shopping malls to collect data from 500 participants. The authors took a good step towards making the survey more accurate and avoiding bias by asking participants first if they were familiar with E-government, to make the sample more concentrated on m-government; if they answered 'yes', the participant could fill out and complete the survey. Multiple regression analysis techniques were utilized to analyze the data and test the research hypotheses .

The result of the study highlighted Social Influence, Perceived Usefulness, Perceived Ease of Use, Perceived Compatibility and Perceived Responsiveness as significant factors in the prediction of intention to use m-government; whereas, Perceived Cost of Services was not a significant factor (Shanab and Haider, 2015).

Naqvi and Al-Shihi (2009) evaluated the ICT sector and current state of the m-government services initiative in Oman, with the objective of determining key factors that affected the adoption of m-government services. This study applied a qualitative approach, based on interviews conducted with staff in several government organizations. These government organizations had already experienced m-government and interviewees were already active adopters of m-government .After collecting data, authors used a SWOT technique to analyze it.

The result of the study showed that in regard to the adoption of m-government, Oman has more cultural issues than technical issues. Also, the authors concluded that certain factors were the key to successful implementation of m-government, as follows:

1. Reliable mobile infrastructure.
2. 3G Network.
3. Solid marketing campaigns.
4. Security and Privacy (Naqvi and Al-shihi, 2009).

Al Thunibat and Zin (2011) identified and examined user requirements of the Malaysian government's m-government services. This study aimed to investigate challenges facing m-government implementation in Malaysia using both a qualitative and quantitative research approach. The former involved a focus group and the latter a questionnaire survey.

The study findings showed that although citizens realised that m-government could be useful, easy to use and had many benefit and that awareness of mobile government services was fairly high, the usage of m-government services continued to be low. The authors concluded that challenges facing m-government in Malaysia were privacy, security, cost and quality of services, access speed, interoperability (roaming, multi-platforms), interface design, usability issues and information updating (Thunibat et al., 2011).

Alkhaldi (2016) empirically investigated the adoption of m-banking services in Saudi Arabia; the aims of this study being to determine the challenges facing adoption of m-banking services based on the existence of a sufficient infrastructure. Using a questionnaire survey, the study was done in the largest banks in Saudi Arabia, namely, the Saudi American Bank (abbreviated as SAMBA), the Al-Rajhi Bank, the Al-Ahli Bank (abbreviated as CNB), and the Al-Riyadh Bank. The survey was conducted only with staff who worked in the related IT departments, who had experience in the field of mobile banking services. Ninety questionnaires were distributed to participants, and 31 were returned which was a valid response rate. Alpha tests and Chi-Square tests were used to analyze data.

The researcher found that there was a significant lack of awareness about when any bank was offering m-banking application, which negatively affected wide adoption and acceptance of m-banking services; also, privacy and security issues were considered as obstacles in adopting m-banking; furthermore, that the cooperation between parties involved in these services was limited in scope and not extensive. The researcher recommended that the decision-makers in Saudi banks re-evaluated their strategic plans for their banks; and that governing regulations and policies were clarified (Alkhaldi, 2016).

Shareef et al (2016) empirically studied factors affecting consumers' behavioural intention to adopt m-government in different countries as one of the aims of this study was to explore how cultural dimensions impacted on factors driving mobile government adoption. This study was conducted in three countries, namely Bangladesh, Canada and Germany. Based on the TAM, the conceptual model was developed by adding factors and was ultimately comprised of: Perceived Ease of Use, Perceived Usefulness, Perceived Compatibility, Perceived Empathy, Perceived Security and Perceived Reliability (Shareef et al., 2016).

This study relied on quantitative research and used a questionnaire survey to collect data from participants in all three countries; as well as organizing a focus group to review, modify and reformulate the table items. The focus group consisted of three doctors at Canadian universities, three members of the University of Bangladesh and two members of a German university. Data was collected in all three countries during the period January to March 2012.

In Bangladesh, a survey was conducted among citizens in the city of Dhaka and nearby suburban and rural areas. Three hundred questionnaires were distributed personally with questionnaires returned by mail and a valid sample of 243 was obtained.

In Canada, a survey was conducted among citizens in Ottawa and its adjacent suburban areas. The questionnaires were distributed personally and only to people willing to respond who had prior experience of m-government services or had sought m-government services in the last six months. The number of questionnaires distributed was 283 with a return of 162 which made the



sample valid.

In Germany, a survey was conducted online with citizens who were selected from a database of general consumers' emails and sent an email. The researcher requested that they only answered the questionnaires if they had experience of using m-government services. A valid sample of 172 was obtained from the 230 emails sent out. The data was analyzed and the validity tested by means of the structure equation model (SEM).

The results highlighted that, in regard to the impact of culture, there were significant differences between citizens in Bangladesh, Canada, and Germany. Canadian and German citizens were similar to each other in different aspects of beliefs and perceptions about m-government adoption but differed from Bangladeshi citizens in this respect. However, the results from samples from all three countries indicated that Perceived Usefulness, Perceived Ease of Use, Perceived Reliability and Perceived Security positively affected citizens' attitudes to adopting m-government; and that Perceived Ease of Use affected Perceived Usefulness, Perceived Security and Perceived Reliability .

Both Perceived Empathy and Perceived Reliability positively affected Bangladeshi citizens' adoption of m-government services, whereas they did not affect Canadian and German consumers . On the other hand, Perceived Compatibility influenced Canadian and German consumers to use m-government services but not Bangladeshi citizens (Shareef *et al.*, 2016).

Sellitto and Fong investigated factors that might influence Thai consumers' intention to adopt mobile payment services. A conceptual model was developed by integrating the TAM and the Innovation Diffusion Theory (IDT) and consisted of seven factors: Perceived Usefulness, Perceived Ease of Use, Subjective Norm, Compatibility, Perceived Risk, Perceived Trust and Perceived Cost. Accordingly, relevant hypotheses were developed and tested using a qualitative and a quantitative approach (interview and survey). Data was collected from various mobile phone shops in Thailand, from eight different locations, and responses were collected from 529 mobile phone users who already knew about mobile payment services, but had not yet adopted such a service .In order to analyze data and test validity, the structure equation model (SEM) was utilized.

The results of the study revealed that Compatibility, Subjective Norm, Perceived Trust and Perceived Risk were the four factors that significantly influenced consumers to adopt mobile - payment services. The researchers highlighted that Compatibility was the most significant factor affecting the behavioural intention of Thai consumers to adopt mobile payment service; whereas Perceived Usefulness, Perceived Ease of Use, and Perceived Cost were not found to be significant (Sellitto and Fong, 2015).

Ahmad and Khalid (2017) studied the adoption of m-banking services in the United Arab Emirates, a Gulf country like Saudi Arabia. The aim of the study was to determine factors that could predict end users' adoption of m-government in the context of the United Arab Emirates. The study applied the TAM, with the integration of some external factors, namely, Cost, Trust, Social Influence, Perceived Usefulness of Information Technology, Variety of Services and the demographic profiles. Accordingly, relevant hypotheses were developed; and to empirically test these hypotheses, the study utilized a paper questionnaire survey and collected data from a valid sample of 120 from 338 students in various universities in the United Arab Emirates. A structured equation model technique was used to analyze the data and test the research hypotheses. The findings of this study revealed that Trust and Social Influence were the most significant factors in predicting end user intention to adopt m-government services in the United Arab Emirates (Ahmad and Khalid, 2017).

Alain Yee and others explored which factors could predict consumers' behavioural intentions to adopt m-commerce in China and Malaysia based on the cultural difference between the two countries, and compared the results to see the influence of their different cultures. A conceptual model was developed by integrating the TAM and Diffusion of Innovation Theory (DOI) (and extended with additional variables. These factors were Cost, Trust, Social Influence, Variety of Services, Perceived Usefulness, Perceived Ease of Use and Trialability and used control variables such as age, educational level and gender.

Accordingly, relevant hypotheses were developed in this study based on the different cultures, and tested by a questionnaire survey. Data was collected from 222 Chinese and 172 Malaysian consumers, in various mobile phone shops in China and Malaysia. A hierarchical regression analysis technique was used to analyze and test the data.

This study showed different results in predicting consumers' decisions to adopt m-commerce based on the different cultures in the two countries. In Malaysia, the result showed that Trust, Cost, Age, Social Influence and Variety of Services were significant in predicting consumers' decisions to adopt m-commerce; however, in China, Trust, Cost and Social Influence were the significant factors. The researchers highlighted that Social Influence was the most significant factor in predicting both Malaysian and Chinese consumers' decisions to adopt m-commerce; however, Perceived Usefulness, Perceived Ease of Use and Trialability were not considered as significant factors in this respect (Chong, Chan and Ooi, 2012).

## **2.4 Conclusion**

This chapter presents a review of literature about E-government and m-government. The literature review in this chapter is divided into six main sections: E-government, E-government in the Context of Saudi Arabia, E-government Applications and Classification, Mobile

government, Mobile government Applications and Classification and Enabling Technologies. It also reviews the implementation of E-government and m-government in both developing countries and as well as developed countries; and discusses previous studies conducted to understand and analyze factors in such E-government and m-government adoption and utilization literature.

However, m-government emerged several years ago, the adoption of E-government services in general and m-government services in particular is still below expectations (Al-Hujran et al., 2015; Alghamdi and Beloff, 2014; Alotaibi et al., 2016c; Rana and Dwivedi, 2015). Also, m-government in most developing countries, including Saudi Arabia, is at an initial stage and faces a number of issues related to adoption, implementation and use (Alghamdi and Beloff, 2014; Alotaibi and Roussinov, 2015; Assar 2015). The maturity or the success of m-government differs among governments around the world and is dependent on various factors including a country's ICT infrastructure, user adoption, mobile device and internet penetration rates, reliability, security, privacy and effectiveness (Alsenaidy and Ahmad, 2012). Studies conducted in diverse areas such as rural China and Malaysia (Alqahtani et al. 2014; Faziharudean and Li-Ly, 2011; Liu et al., 2014) have adapted the Technology Acceptance Model (TAM) (see Fig. 1) and demonstrated how a range of social, cultural and technical factors have been usefully added to the TAM to explain what factors influence citizens' intention to make use of m-government systems to access information and services.

Cultural and technological factors such as culture, trust and the lack of necessary infrastructure have been shown to be of key importance by studies that compared m-government adoption in developed and developing countries (Al-Hadidi and Rezgui, 2010; Shareef et al., 2016). However, literature on the adoption of m-government in Arabic countries is still fairly limited, but studies in these areas (Almuraqab, 2017; Almuraqab and Jasimuddin, 2017b; Al-Hadidi and Rezgui, 2010; Shareef et al. 2016). Shareef et al. (2011) have highlighted the importance of factors such as trust and the extent to which using m-government services was perceived as being compatible with the citizen's lifestyle and culture, awareness and system quality as well.

A review of the literature suggests that there is a critical knowledge gap concerning how these factors could influence the adoption and utilization of m-government services. This study aims to fill this gap by offering a new theoretical model with which to conduct empirical research in this area. Research results arising from this new model will provide valuable new insights about the key factors affecting adoption of m-government services in Saudi Arabia. This awareness will be useful for policy makers who wish to employ strategies that would enable faster and more efficient adoption of m-government services; as well as providing useful information for researchers and the ICT industry. There is a need to conduct further research into m-government adoption in Saudi Arabia, as to our knowledge, there have not been empirical studies that take

factors such as culture, or compatibility into account, or which properly investigate citizens' perspectives about the quality of both human and technical factors involved in service quality, or which explore the problems from the perspectives of the providers as well as the intended users.

## **3 Chapter Three: The Research Model**

### **3.1 Introduction**

This chapter will review some technology adoption model and theories such as TAM, UTAUT and DOI that were used to analyze, investigate and understand factors that affect the use of technology in specific contexts, particularly for E-government and m-government, in order to evaluate the applicability of these models for studying m-government service adoption and use. Also, in order to analyze factors that affect users' adoption and use of m-government, this research has developed a model called the Mobile Government Adoption and Utilization Model (MGAUM). The MGAUM has been developed based on a critical analysis of the literature that relates to acceptance of technology, in conjunction with insights from several models and theories that are commonly used to analyze acceptance and usage of technologies.

### **3.2 Diffusion of Innovation (DOI)**

The Diffusion of Innovation model was developed by Rogers in 1995; and has been used in past studies, generally in education, communication, sociology, anthropology and marketing (Alhujran 2009; Rogers 1995). Recently, the DOI has been one of the theories that have been widely applied to the adoption of technological innovations, such as E-government. Rogers defined 'diffusion' as "the process by which an innovation is communicated through certain channels over time among the members of social society"(Rogers, 1995b), as Rogers proposed that any new idea or object that spread will be considered as an innovation. One of the key factors that affect the rate of adoption of an innovation is the perceived attributes of that innovation (Rogers, 1995b). Rogers described these five factors as follows:

- **Relative Advantage:** This is the extent to which the advantages provided by a new technology supersede those of its predecessor.
- **Compatibility:** This is the extent to which the user perceives the new technology to be compatible with their needs, experiences and beliefs.
- **Complexity:** This is the extent to which potential users perceive the new technology as hard to comprehend and use.
- **Trialability:** This is the degree to which limited experimentation can be conducted on the new technology.
- **Observability:** This is the extent to which the effects of the new technology can be observed by users.

The DOI model is considered as important in understanding the spread of an innovation; and is also one of the earliest theories in information system and technology adoption (Rogers, 1995b).

This model has more factors than the Technology Acceptance Model (TAM); as a result, it makes the DOI more complicated than the TAM. Furthermore, we can see some factors in the DOI model that are similar to those in the TAM, such as ‘complexity’ and ‘relative advantage’, in the DOI being similar to the TAM’s ‘ease of use.’ and ‘usefulness’. This suggests that the models could be used together, which allows for building or developing a more comprehensive model (Alghamdi, 2017).

### **3.3 Technology Acceptance Model (TAM)**

Davis developed the TAM according to concepts found in the Theory of Reasoned Action (TRA) (Davis, 1985). The TAM is considered as one the critical theoretical frameworks of technology acceptance in the field of Information Systems (Davis, 1985). The TAM has also been deemed an appropriate and robust model for research that seeks to explain technology acceptance in the IT field (Al-adawi, Yousafzai and Pallister, 2005). In particular, the TAM has been used to explain computer use behaviour (Davis, 1985). The TAM is more specific than the TRA model (Davis, Bagozzi and Warshaw, 1989); however, the TAM employs the TRA as a theoretical basis to detect and explain the links between key factors: Perceived Usefulness and Perceived Ease of Use, the potential users’ attitudes, Behavioural Intention and Actual Use Behaviour. Focusing on Perceived Usefulness and Perceived Ease of Use, the TAM seeks to explain the diffusion, implementation and adoption of IT through exploring how these factors impact on the users’ stated intentions to use and adopt the technology in question (Davis, 1985).

Two important constructs in the TAM model are Perceived Usefulness and Perceived Ease of Use, which explain the intention of the user to use and accept IT (Davis, 1985). Davis defined Perceived Usefulness (PU) as “the prospective user’s subjective probability that using a specific application system will increase his or her job performance within an organizational context”; and Perceived Ease of Use (PEU) is defined as “the degree to which the user expects the target system to be free of efforts” (Davis 1985).

### **3.4 The Unified Theory of Acceptance and Use of Technology (UTAUT)**

The UTAUT model was proposed by Venkatesh et al. in 2003, as a response to the limitations they perceived in the theories and models that purported to explain users’ adoption and acceptance of new technologies. Using the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Theory of Planned Behaviour (TPB), the Combined TAM and TPB (C-TAM-TPB), the Model of PC Utilization (MPCU) and Diffusion of Innovation theory (DOI), a comprehensive model was created from the factors that existed in these model, that were perceived to be of central significance (Venkatesh et al., 2003).

Some authors expected that the UTAUT model would fill the gaps and address any weaknesses that existed in all these models (Alzahrani and Goodwin, 2012; Venkatesh et al., 2003). The UTAUT is one of the latest models to be developed in the field of technology acceptance (Alshehri, Drew and Alghamdi, 2012). According to Alghamdi (2017), many studies have used the UTAUT model to analyze and understand users' adoption and acceptance of new technologies for instance E-government or e-commerce system. The UTAUT consists of eight constructs, namely: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Gender, Age and Experience of Use. The core constructs of the UTAUT model are Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions, and Venkatesh et al defined these constructs as follows:

- **Performance Expectancy:** is defined as “the degree to which an individual believes that using the system will help him or her to attain gains in job performance.”
- **Effort Expectancy:** is defined as “the degree of ease associated with 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.”
- **Facilitating Conditions:** is defined as “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.” (Venkatesh et al., 2003).

### 3.5 Critical Review of Technology Acceptance Theories and Models

Various technology adoption theories and models have been developed that aim to analyze, investigate and understand factors that affect the use of technology in specific contexts. A commonly used model is the Technology Acceptance Model (TAM)( Davis et al., 1989). Other models include: the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) and the Diffusion of Innovation Theory (DOI) (Rogers, 1995b). Of these, the reasons why the widely used models, namely the TAM, UTAUT and DOI were not sufficient for the purposes of the current study will be explored. Much of the research into technology acceptance regarding the adoption of E-government and m-government uses technology acceptance models and theories either in their original form, combines them or adds extra factors. However, there is no one model that will fit well in all contexts. With this in mind, a review of some of the main models of technology acceptance was carried out to identify some of the key factors that might be significant in influencing intention to adopt and use the technology used in E-government and m-government in the context of a developing nation characterised by a high mobile penetration, like Saudi Arabia. An evaluation of the

appropriateness of each model to the context, its shortcomings and the usefulness of the key factors is conducted with a view to creating a theoretical model. The proposed model is intended to fill the knowledge gap and act as a framework in which to conduct empirical research in the specified context.

This review was carried out to overcome the shortcomings of the existing models, and as well as to fill the knowledge gap by offering a new theoretical model with which to conduct empirical research in this specific area; and in the context of a developing nation characterised by a high mobile penetration, like Saudi Arabia.

Briefly, the DOI, TAM and UTAUT models were discussed in the previous sections. All these models have been used in different studies and the literature details how they evaluate the adoption and usage in different contexts, such as E-government, m-government, e-banking, e-commerce and m-commerce, either in their original form, as a combination with other models them or by adding extra factors.

Several researchers, for example, Sang and Lee (2009), Carter and Belanger (2005) and Tornatzky and Klien (1982), have suggested that in the DOI model, the most significant factors to explain technology acceptance and diffusion are Compatibility, Relative Advantage and Complexity (Tornatzky and Klein, 1982; Carter and Bélanger, 2005; Sang and Lee, 2009b). However, Trialability and Observability were not particularly relevant for investigating acceptance of technologies used in systems like E-government (Agarwal and Prasad, 1998; Bradford and Florin, 2003; Carter and Bélanger, 2005). In relation to this research, Trialability is not appropriate as the users of m-government services are not trialling the system and Observability (the degree to which the technology provides tangible and visible results) arguably just forms part of its Relative Advantage, or what users perceive the usefulness of the innovation to be.

In spite of the significant contribution that the DOI theory made to understanding technology acceptance, it lacks some crucial factors that may impact on intention to use m-government services if simply used in isolation, as it ignores the complex cultural and socio-economic factors that affect how such a service is adopted.

The TAM model, has been extensively tested and validated in acceptance behaviour over a wide variety of ICT innovations (Al-Hujran et al., 2015; Alomary and Woollard, 2015; Davis, 1985; Rabaa'i, 2015). Several researchers confirmed in their studies that Usefulness and Ease of Use were the most significant factors in acceptance behaviour over a wide variety of ICT innovations such as E-government and m-government. Nevertheless, there were limitations reported by Ramayah and Ignatius (2005) such as the TAM not taking Social Norms into account, although this factor was validated by the TRA (Theory of Reasoned Action).



According to Sang and Lee (2009), the TAM also does not properly explore external variables that may well affect PU (Perceived Usefulness) and PEU (Perceived Ease of Use)(Sang and Lee, 2009b). Therefore, in common with the DOI, the TAM ignores crucial factors that affect intention to use and adoption of new technologies, specifically m-government services, such as potential users' awareness of the service, how they far they trust the service and the privacy and security it affords, how they perceive its technical and customer service quality, how important factors such as mobility and compatibility are to them and how cultural aspects specific to the Saudi context influence their intention to use these services.

With regard to the UTAUT model, Venkatesh et al (2003) who created the model argue that it is useful for conducting a study on technology acceptance in an organisational context but that the model has limitations as the model was based on trials conducted with four organisations in the US(Venkatesh et al., 2003). Also, van Raaij and Schepers (2008) noted that the UTAUT model groups many disparate aspects into a single construct(Van Raaij and Schepers, 2008). For example, with regard to m-government, Facilitating Conditions is too wide a construct as it includes aspects such as perceptions about the quality of a system in terms of its technical qualities and customer services.

The UTAUT model thus has limitations for use in the context of this study, as discussed above, and there is an absence of factors which would seem essential for understanding the adoption of technology for a nation-wide system like m-government services; such as an awareness of their availability, the extent to which potential users see mobility and compatibility as important, how they far they trust the service, the privacy and security it affords and so on. Nevertheless, Venkatesh et al (2003) note that, according to their review of technology acceptance literature, Intention to Use appears to have a real influence on actual use of technology, as do Facilitating Conditions(Venkatesh et al. 2003). Accordingly, the current study will incorporate Intention to Use into the proposed model and separate Facilitating Conditions into the aspects relevant to our context.

As already noted, the models discussed above (DOI, TAM and UTAUT) have been widely used in understanding technology acceptance, but each of them has limitations when applied to specific contexts, perhaps as a result of being too general. Therefore, in order to create a more comprehensive framework that is appropriate for exploring the adoption and use of m-government services and systems, a new model will need to be created. To do this, it is wise to make use of certain constructs that have already been tried and tested by other scholars and shown to be significant in explaining technology acceptance; as well as identifying and incorporating key constructs that have been shown to have significance for technology acceptance in the context of m-government.

This research work will exploit the TAM model, which has been extensively tested and validated in acceptance behaviour over a wide variety of ICT innovations (Al-Hujran et al., 2015; Alomary and Woollard, 2015; Davis, 1985; Rabaa'i, 2015). Previous studies have demonstrated that the TAM constructs of Perceived Ease of Use and Perceived Usefulness have provided a good starting point in analyzing intention to use m-government technology, but that the cultural dimension is a crucial one in exploring barriers to acceptance. As such, more research is needed to understand more precisely what barriers there are to acceptance of m-government in Saudi Arabia. The development of a technology acceptance model that fits the Saudi context is an essential aspect of this. Two key constructs from the TAM model and a set of social, cultural and technological factors identified in the literature as important factors for our context have provided a basis for the development of a theoretical model.

In order to analyze factors that affect users' adoption and use of m-government, this research has developed a model called the Mobile Government Adoption and Utilization Model (MGAUM). The MGAUM has been developed based on a critical analysis of the literature that relates to acceptance of technology, in conjunction with insights from several models and theories that are commonly used to analyze acceptance and use of technologies. The MGAUM integrates the Technology Acceptance Model with a number of social, cultural and technological factors, taken from other recognized theoretical acceptance models that have been identified as key factors in the literature. Further, the MGAUM contains one dependent variable namely: Intention to use m-government (ITU), and three groups of independent variables namely: Practical Factors (PF), Human Factors (HF) and Technical Factors (TF). These independent variables comprise the key factors that critically influence the adoption and use of m-government.

This model uses the TAM as a starting point, along with factors from other theories to analyze how users adopt m-government services. Two factors were taken from the TAM: Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). These two factors comprise the Practical Factors of MGAUM. The Human Factors are those that were revealed by the literature as important in further understanding the role played by the individual users' acceptance in this context and the Technical Factors are those identified as the ones most likely to affect the adoption of m-government. The final design of MGAUM also used the researcher's experience of the local problems of accessing government services and information in Saudi Arabia to select those factors identified as key in the relevant literature. The main aim of the MGAUM is to investigate the adoption of m-government services by citizens in developing countries, particularly Saudi Arabia, in order to increase the adoption rate of m-government services. The framework of the MGAUM is shown in Figure 3-1 below. The following sub-sections introduce each of the MGAUM factors and describe in detail their role in investigating the intention to use

m-government services and information. It should be noted that in the case of Saudi m-government services, where the m-government services are already in place and many citizens have either already made use of it or have not, intention to use is an artificial construct which in practice devolves into two separate concepts: ‘intention to adopt and use’ is taken to mean ‘intention to continue to make use’ in the case of citizens already using m-government services and ‘intention to adopt and use in the future’ in the case of citizens who have not yet used it.

### 3.6 The Research Model (MGAUM)

Figure 3-1 below shows the MGAUM and illustrates the hypotheses concerning the relationships between the independent variables and Saudi citizens’ intention to adopt and use m-government (the dependent variable).

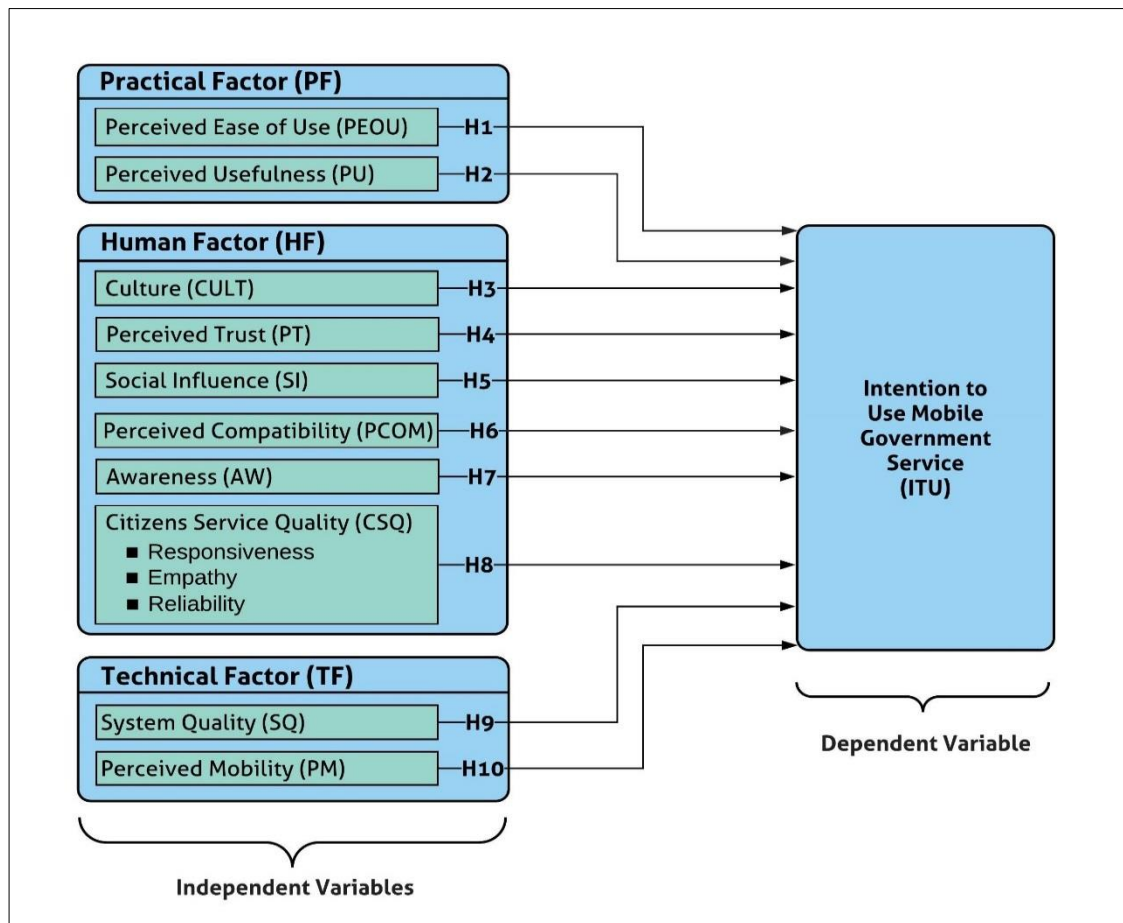


Figure 3-1: The research model (MGAUM)

The following sub-sections introduce each of the MGAUM factors and describe in detail their role in investigating the intention to use m-government services and information.

### **3.6.1 Practical Factors (PF)**

When considering the adoption or rejection of a new technology there are two fundamental practical considerations for the user. Firstly, whether that technology will help users to achieve their goals and secondly, how easy it is for them to operate that technology.

#### **3.6.1.1 Perceived Ease of Use (PEOU)**

Perceived ease of use is defined as “the degree to which a person believes that using the system will be free of effort” (Davis, 1989 p. 320). PEOU is one of the key factors in the TAM, which influences users' intention to use technology (Davis, 1985). The complexity of the technology has been found to have a negative impact on a user's intention to use mobile government services when they consider using m-government services difficult or complicated. On the other hand, if a user finds m-government easy to use and that it saves time and effort, then this impacts positively on his/her behavioural intention to adopt and use m-government services (Alotaibi and Roussinov, 2016). Furthermore, other prior studies have found that PEOU has a strong critical impact on user behavioural intention to adopt and use m-government services (Abu-Shanab and Haider, 2015; S Y Hung et al., 2013; Liu et al., 2014; Shareef et al., 2012). Based on the above discussion, the following hypothesis is posited:

***H1: Perceived Ease of Use positively influences users' intention to use m-government services.***

#### **3.6.1.2 Perceived Usefulness (PU)**

Perceived usefulness is defined as “the degree to which a person believes that use of the system will enhance his or her performance”(Davis, 1989, p.320). As part of the Technology Acceptance Model (TAM), PU is one of the most significant determinants of a person's positive or negative attitude towards using a technology. Perceived usefulness is based on user perceptions about the potential benefits of using a specific Information Technology and Information Systems (IT/IS) and will directly influence a user's behavioural intention (Davis, 1985). Many previous and recent studies have empirically found that PU positively influences behavioural intention to use new technologies. such as a banking information system which includes online banking, online credit card management and automated teller machines (ATM) services (Reid and Levy, 2008; Guriting and Ndubisi, 2006), and m-services (Nysveen, Pedersen and Thorbjørnsen, 2005). In the context of E-government and m-government, researchers found that PU is a vital factor that positively determines the intention to use m-government services when users perceive their benefits (Abdelghaffar and Magdy, 2012; Alqahtani et al., 2014; Liu et al., 2014). Based on the above discussion, the following hypothesis is posited:

***H2: Perceived Usefulness positively influences users' intention to use m-government services.***

### **3.6.2 Human Factors (HF)**

Human factors can play a significant role in the field of technology acceptance, because they can potentially improve productivity, transparency and communication, leading to better information and services. So, it is important to understand the part human factors may play when implementing a system such as m-government. Human factors refer to those factors that originate in individual users and affect the relationship between them and the system with which they interact. Human factors may also impact on adoption of that system. This construct is comprised of six significant factors that are likely to influence the adoption and utilization of m-Government: Culture, Perceived Trust, Social Influence, Perceived Compatibility, Awareness and Citizen Service Quality.

#### **3.6.2.1 Culture (CULT)**

Prior literature in the field of information technology and information systems (IT/IS) have indicated that the national and organizational culture are considered as being contributing factors in the IT/IS transfer and adoption (Al-Hujran et al., 2015). The concept of 'culture' is complex and multi-dimensional in nature, and therefore, it is not an easy concept to define. According to Chang (2002), culture contains many different aspects, for example, religion, social structure, language, political institutions, education and economic philosophy. Thus, a human culture is created over an extended period and shaped with the time, education, art and their own abilities (HMBP, 2016). For this reason, many of the previous studies mentioned that there is no specific universally agreed upon definition that describes the concept of culture (Al-Hujran et al., 2015; Martinsons and Davison, 2003; Chang, 2002). Hofstede (1997, p.21) defines national culture as "the collective programming of the mind which distinguishes the members in one human group from another" (Hofstede, 1997). In another, broad definition, Ali et al. (2009) define culture as "the values, beliefs, norms and behavioural patterns of a group – people in a society for national culture, staff of an organization for organizational culture, specific professions for professional".

There is no doubt that cultural aspects including cultural influences, culture awareness and national culture can have a strong impact on the implementation of new technology (Akkaya et al., 2012; Baker et al., 2010; AlAwadhi and Morris, 2009); particularly when this new technology is related to the development and improvement of citizens' lifestyles (Alghamdi, 2017). Culture is considered as one of the non-technical factors that affect the implementation of new technology (Goldstuck, 2003). Cultural issues have been also investigated largely in E-government adoption literature, and it has been found that there is a primary correlation between

cultural aspects and intention to adopt and use new public services offered by either an E-government system (Al-Hujran et al., 2015; Akkaya et al., 2012; Alateyah, Crowder and Wills, 2013; Ali et al., 2009) or an m-government system (Shareef et al., 2016; Alqahtani et al., 2014; Chong et al., 2012).

The Arab countries have a unique and a complex culture that differs significantly from that of Western countries (Straub, Loch and Hill, 2001). The behavioural intentions of Arab users are very much influenced by social values, interpersonal relationships and other issues related to religion (Hu, Al-Gahtani and Hu, 2014). Therefore, in this research, we argue that there are many cultural aspects that need to be investigated and analyzed to see how culture impacts on users' adoption and use of an m-government system in Saudi Arabia. The most important cultural aspects proposed in this research are the following:

- **Image**

The image is an interesting norm in any society; and is related to different aspects such as social, behavioural and also cultural aspects (Shareef et al., 2011). Image, in this context, refers to the degree that individuals believe that the adoption of the mobile service would enhance their image or status in the social system (Moore and Benbasat, 1991). In the E-government domain, Shareef et al. (2011) defines image as “perceptions that using and adopting an E-government system will make them superior to others in the society”. In other words, the interaction with government by using an E-government service, instead of the traditional way, that required visiting government offices in person, is perceived to give the user a superior status (Shareef et al., 2011). Also, offering government services through the mobile channel will offer adopters many advantages in accessing the latest government information, therefore, they will become an important source of information among their peers, which may help them to improve their image (Liu et al., 2014). In addition, users who adopt an IT innovation could enhance their social status more than those who don't, which could be viewed as a kind of social pressure on others to adopt the innovation (Liu et al., 2014).

The integration of the image construct into the existing adoption models has its own theoretical and empirical support. Several previous studies have examined the relationship between image and behavioural intentions in different domains such as IT adoption (Moore and Benbasat, 1991), E-government (Shareef et al., 2011), mobile services (Revels, Tojib and Tsarenko, 2010), and m-government (Liu et al., 2014).

In a summary, e/m-government adoption might be an indication of the users' familiarity with modern technologies, efficiency in using computer and Internet, a higher level of education and a high degree of modernism. Therefore, adopting e/m-government services is expected to add some measure of social value and prestige (Shareef *et al.*, 2011). Accordingly, image is

incorporated into this research model as a vital cultural aspect that needs to be investigated and explored in the Saudi context.

- **Resistance to change**

Resistance to change refers to “adverse reaction of users to the proposed change” (Hirschheim and Newman, 1988). In the context of this research, resistance to change refers to a citizen’s reluctance to change their ways in accomplishing government transactions from the traditional channel (i.e. physically visiting government offices) to the electronic channels offered by E-government (Lallmahomed et al., 2017). Resistance to change is believed to be one of the non-technical factors that could negatively affect the implementation of new technology, and this generally happens because people fear the unknown, or are not able to cope with uncertainty (Al-Hadidi, 2010; Al-Somali et al., 2009; Watson et al., 1994). It is evident in the related literature that resistance to change is considered one of the challenges that can delay or prevent the successful implementation of E-government and m-government services (AlAwadhi and Morris, 2009; Abu-Shanab, 2014; Alotaibi et al., 2016; Alghamdi, 2017). In the pre-adoption phase, some citizens will show resistance to change to use newly implemented E-government services (Abu-Shanab, 2014). In developing countries, some citizens could resist using E-government services due to trust issues, while others could resist using E-government services because they prefer to interact with the government face-to-face as this interaction makes them more confident (AlAwadhi and Morris, 2009). In addition, some people show resistance to using certain systems because these systems are not compatible with the existing culture.

There is one example of resistance to change that occurred in Saudi Arabia regarding internet usage pattern, which demonstrates its impact the adoption and use of any new technology. In 1999, Saudi Arabia started to offer internet services to the public. However, as the ability to access all the contents on the web was easy, this step had faced strong opposition because some of the contents were incompatible with Saudi culture. Therefore, the Saudi government applied a filtering system to prevent some of the contents being accessed (Alzahrani and Goodwin, 2012). Such resistance to change demonstrates the impact of the cultural aspect on adoption, acceptance and usage of new technologies. Therefore, the resistance change aspect is taken into account in this research to investigate its influence on the adoption and use of m-government services.

- **Interpersonal social networks (*Wasta* or Connections or Nepotism)**

*Wasta* exists in the culture of many countries including Arab countries, and has been considered as an influential factor in the decision-making process (Hutchings and Weir, 2006). In Arabic culture, *Wasta* is one of the prevalent forms of administrative corruption. *Wasta*, in general, can

be defined as asking for help from a person, be it an employee or top manager, who has the power and authority to make decisions or the ability to exercise power, in order to achieve a certain result which the asker alone could not achieve. In a government system, *Wasta* refers to the use of personal connections inside government agencies and influence in places of power by an employee or manager who has authority to speed up processes or skip procedures to complete paperwork and complete transactions. In other words, *Wasta* is used to accomplish transactions outside normal procedures in government agencies.

It is expected that an m-government system will limit and reduce *Wasta* and other negative practices by declining unusual transactions and giving citizens equality when dealing with their transactions. Since every transaction will be processed electronically and every action on the transaction will be controlled and recorded, some citizens could resist using an m-government system and continue to seek help from their personal connections inside government agencies to accomplish their transactions.

Based on the previous discussion about the effect of the cultural aspects (i.e. image, resistance to change and *Wasta*) on the behavioural intention to adopt and use m-government services, the following hypothesis is posited:

***H3: Culture influences user intention to use m-government services.***

### **3.6.2.2 Perceived Trust (PT)**

Trust can be defined as “an individual’s belief and expectation that another party will perform a particular action that is important to the trustor in the absence of the trustor’s control over the trustee’s performance” (Mayer, Davis and Schoorman, 1995). User trust is viewed as an important factor in online environments due to the associated risks (Lankton and McKnight, 2016). Indeed, trust has been theorized as a direct determinant of behavioural intention to use online services offered by E-government or m-government systems (Al-Hujran et al., 2015). When using e/m-government, especially when it comes to online transactions, risks such as sharing and storing personal information are involved (Alghamdi, 2017:100; Shareef et al., 2011).

In the context of E-government, trust has a major role to play in helping users to overcome their anxieties about the perceived risks while using government services online (Alghamdi, 2017, p.100). In fact, the existing E-government literature has reported that one of the main barriers that faced the adoption of E-government services was a lack of trust in online transactions. This was due to the unreliability and risks that usually occur when such transactions are made online (Bélanger and Carter, 2008; Horst, Kuttschreuter and Gutteling, 2007). Therefore, user trust should be taken into account in all environments that have any degree of security risk, to



increase users' trust towards making transactions on online government services (Qingfei, Shaobo and Gang, 2008; Zarm pou et al., 2012); and to ensure the credibility of the services offered via the internet (Warkentin et al., 2002).

The trust factor has been studied in the context of E-government and m-government in Saudi Arabia (Alghamdi and Beloff, 2014; Alrowili et al., 2015); and it has been found that the adoption of E-government services by Saudi citizens is based on what they believe about the trustworthiness of the services and delivery channels (Alotaibi and Roussinov, 2016). For instance, when users access information via any government portal, they expect the information to be reliable, up-to-date and accurate (Bélanger and Carter, 2008). Therefore, trust can be considered as an important factor that could impact on citizens' intention to adopt m-government services. Based on the above discussion, the following hypothesis is posited:

***H4: Trust positively influences users' intention to use m-government services.***

### **3.6.2.3 Social Influence (SI)**

Several definitions of SI have been found in the literature; Venkateshet al., (2003) define it as "the degree to which an individual perceives that important others believe he or she should use the new system". In the E-government context, Weerakkodya et al. (2013) define SI as "the normative pressure of associated members like family or friends that influences the intention to use E-government". Social influence is one of the constructs in the Unified Theory of Acceptance and Use of Technology Model (UTAUT) and is regularly considered as an important determinant of users' behavioural intentions (Venkateshet al., 2003; Venkatesh et al., 2012; Zhou and Wang, 2010).

In the early stage of the adoption of any technology, individuals usually have little or no experience in using this technology; for that reason, what they believe could be greatly influenced by others' opinions (Venkatesh et al., 2012). In other words, the opinions of other people, for instance reference groups, family, opinionated leaders, friends and colleagues will positively or negatively play a role key in influencing individuals' decision to adopt new technological innovations (Ahmad and Khalid, 2017; Zhou and Wang, 2010).

Prior studies found that SI is a significant factor that impacts on users' behavioural intention to adopt and accept technologies such as E-government (Alghamdi, 2017), m-government (Ahmad and Khalid, 2017), m-learning (Al-hujran, Al-lozi and Al-debei, 2014) and mobile data services (Faziharudean and Li-Ly, 2011). In addition, the influence of SI would be greater in countries that have a more collectivistic culture, (Im, Hong and Kang, 2011) such as Saudi Arabia. Accordingly, the following hypothesis is posited:

***H5: Social Influence positively influences users' intention to use m-government services.***

#### **3.6.2.4 Perceived Compatibility (PCOM)**

Compatibility is one of the constructs in the Diffusion of Innovation model (DOI), which argues that a user has the intention to adopt and accept a new technology if it synchronizes with his/her behavioural, social, cultural and psychological beliefs (Shareef et al., 2016). Rogers (1995, p.223) defines compatibility as “the degree to which an innovation is perceived as being consistent with the existing values, past experience and needs of potential adopters”. In the m-government context, compatibility refers to what degree that prospective end users perceive an application or service to be convenient and compatible with their lifestyles, their requirements, routines and the way they prefer to access government services (Almuraqab and Jasimuddin, 2017). In fact, it is very important that the new technology or its solutions are compatible with people's work style and lifestyle (Almuraqab, 2017). Compatibility is considered one of the important aspects in innovation adoption because it has a significant impact on individual intention to adopt a new technology, not only in the context of general information technology, but also when considering the services that can be provided by mobile phones (Chen, 2008). For example, in reference to mobile payment, Chen (2008) proposed that people are more likely to adopt a mobile payment system when they see that the services are compatible with their purchasing behaviours and lifestyles, and which in turn could also raise their social image. Moreover, a high level of compatibility with the innovation will increase users' intention to adopt and use it. On the other hand, if an innovation seems to be incompatible with citizens' values, behaviour or social, cultural and psychological beliefs, it will negatively affect their intention to adopt this innovation (Rogers, 1995).

It was found that compatibility is an essential factor in the decision to adopt an innovation such as mobile payment (Sellitto and Fong, 2015), cloud computing (Morgan and Conboy, 2013) and m-government (Abu-Shanab and Haider, 2015; Almuraqab, 2017; Almuraqab and Jasimuddin, 2017b). Thus, based on the above discussion, the following hypothesis is proposed:

***H6: Perceived Compatibility positively influences users' intention to use m-government services.***

#### **3.6.2.5 Awareness (AW)**

Awareness is defined as "People's knowledge of technology and the availability of electronic services" (Mofleh and Wanous, 2008). In the context of E-government, Alghamdi (2017) defined awareness as "the degree to which users are aware of E-government services and its potential". Awareness is the first step in user experience of a new service offered by the government. Users need to know what services are available, how these services are relevant to them, and how they can access and use these services (Abdelghaffar and Magdy, 2012; El-Kiki and Lawrence, 2007). In more detail, users should be aware of a new system including its

functions and the services that it provides to them, before implementing any interactive E-government system (Alghamdi, 2017).

The impact of awareness on users' behavioural intentions has been confirmed by scholars in different research contexts, especially in developing countries. For example, Alkhaldi (2016) explored the adoption of mobile banking in Saudi Arabia. His study's findings indicated that there is a significant lack of awareness about m-banking services in that country, and as a result, m-banking services were not widely accepted by customers. In another context, Shareef et al. (2011) found that awareness is a significant determinant of E-government adoption. The Awareness construct involves many aspects, which includes the extent to which citizens are informed about how public administration will be transformed, the mission and objectives of E-government, implementation of innovation, the advantages and disadvantage of implementing and using E-government services (Shareef et al., 2011) and that E-government offers its services via mobile technologies (Abdelghaffar and Magdy, 2012). In addition, the public needs to be aware about m-government services, and public organizations need to provide more information about the advantage of using m-government services to ensure general public accessibility to m-government services (Alssabaiheen and Love, 2015). These aspects supposedly have a significant impact on users' adoption and acceptance of E-government and m-government services. Therefore, governments, especially in developing countries, need to put more effort into promoting citizens' awareness about the available m-government services, particularly those in remote areas.

The lack of awareness could increase the digital divide and lead to E-government failure (Shareef et al., 2011). For example, in Jordan, one of the factors that prevented Jordanian citizens from adopting E-government services was a significant lack of awareness. Therefore, several researchers highly recommended that the governments need to raise awareness about the main goals of E-government, the available E-government services and the advantages and benefits gained from the use of E-government services to conduct various transactions (Al-hujran et al., 2015; Alomari, 2010). Also, public awareness could be enhanced in various ways including: interactive advertising and social media campaigns as well as traditional advertising methods such as newspapers, brochures, TV, messages on public transport and subway (Alghamdi, 2017; Assar, 2015).

Recent studies found that the awareness is a significant factor that influences users' behaviour intention to adopt and accept E-government technologies (Alghamdi, 2017). m-government (Ahmad and Khalid, 2017) mobile banking (Alkhaldi, 2016) and mobile data services (Assar, 2015). Therefore, the following hypothesis is posited:

***H7: Awareness positively influences users' intention to use m-government services.***

### 3.6.2.6 Citizen Service Quality (CSQ)

The concept of service quality (SQ) has been addressed in several fields such as commerce, management, marketing, education and IT/IS. Previous studies have shown the importance of this factor in electronic environments; ranging from mobile services (Agarwal, Wang and Xu, 2007), e-commerce (Al-dweeri et al., 2017), e-banking (Ayo et al., 2016), e-learning (Sharma et al., 2017), m-government (Alotaibi, 2017); to E-government (Alghamdi, 2017; Al Hujran, Aloudat and Altarawneh, 2013). Parasuraman et al. (1998) define service quality as the customer's evaluation of the overall experience of services (Parasuraman, Zeithaml and Berry, 1988). Service quality explains the difference between users' perception and their expectations of the service offered by service providers (Sharma, 2015). Parasuraman et al. (1998) developed and validated the SERVQUAL model to measure service quality. In this model, service quality has a number of dimensions; these are: tangibility, reliability, responsiveness, assurance and empathy. In the E-government domain, some researchers suggested that reliability, responsiveness and empathy are the most applicable dimensions to measure service quality (Al Hujran et al., 2013). Therefore, these dimensions will be used in this research to measure service quality. Reliability focuses on the ability of the service provider to deliver the promised service dependably. Responsiveness refers to the customers' perceptions of the promptness of the service provider; and Empathy measures whether the service provider cares and put enough attention on customers' best interests (Parasuraman et al., 1988).

In the E-government domain, the significant role of service quality as a key driver of the overall service experience has been widely acknowledged. Indeed, the main goal of developing E-government services is to bridge the gap between citizens' expectations and service delivery (Sá, Rocha and Cota, 2016). To attain this goal, it is extremely important for public organizations to recognize the expectations of their citizens and tailor E-government services to satisfy those expectations (Al Hujran et al., 2013; Sá et al., 2016). Delivering high quality E-government services by public organization would help to achieve higher levels of citizens' engagement, participation and willingness to use E-government services (Sharma, 2015). Accordingly, the following hypothesis is posited :

***H8: Citizen service quality factors (responsiveness, empathy and reliability) positively influence intention to use m-government services.***

### 3.6.3 Technical Factors (TF)

In understanding the adoption of a system such as m-government it is important to identify the key technical factors that impact on users of the system. In this study, System Quality comprises user's perceptions of general technical factors that affect use; and Perceived Mobility focuses on how that feature of m-government is perceived.

### **3.6.3.1 System Quality (SQ)**

In 1992, DeLone and McLean introduced the success model in IS, which measured three dimensions, namely: system quality, information quality, and service quality. They declared that system quality and information quality are not only primary predictors for the use of an information system, but also influence user satisfaction (DeLone and McLean, 1992). Therefore, system quality is frequently considered as one of the important quality factors that need to be addressed in any particular system, especially when analyzing the intention of users to adopt and use the system. System quality refers to the quality level of the system including the technical aspects that are recognized by users, and which can affect their willingness and intention to adopt and use m-government systems (Alghamdi and Beloff, 2014). Petter and McLean (2009) define system quality as “performance of the IS in terms of reliability, convenience, ease of use, functionality and other system metrics” (Petter and Mclean, 2009). System quality elements are related to service quality elements and ease of use (Nelson et al., 2005). System quality reflects different aspects such as access speed, ease-of-use, navigation and visual appeal (Vance, Elie-dit-cosaque and Straub, 2008; Zhou, Li and Liu, 2010).

In the context of this study, the system quality construct will comprise technical issues including unresponsive service, links not working, bugs, screen touch problems, freezing, access speed, navigation and layout. Furthermore, unlike personal computers, mobile terminals have screens which are small, and the input can be inconvenient. Therefore, these issues will also be covered.

The relationship between the quality of the system and user acceptance in the IT/IS context has been the subject of several studies; the majority of which revealed that users’ beliefs are significantly affected by system quality (AL Athmay, Fantasy and Kumar, 2016; Baabdullah et al., 2019; Khan and Qutab, 2016; Park, Kim and Ohm, 2015). Moreover, a high correlation has been reported between system quality and the adoption of E-government and m-government services (Alghamdi 2017; AL Athmay et al., 2016; Baabdullah et al., 2019). Accordingly, this research posits the following hypothesis:

***H9: System quality positively influences user intention to use m-government services.***

### **3.6.3.2 Perceived Mobility (PM)**

The rapid advances in wireless technologies allowed individuals to access information and interact with electronic services from anywhere at any time. Mobility can be defined as the feature that allows users to access information during the state of mobility (Hung et al., 2013). Mobility is a unique feature that mobile devices have brought to individuals, compared to static devices such as desktop computers; and it offers many advantages to users as it makes communication and access to information and services available irrespective of location or time.

Mobile phones and mobile communication devices are thus distinguished by mobility of communications and communication services that support many contents (Hong et al., 2008).

Using government services anytime and anywhere, without the need for a wired network, and not having to rely on time and location is one of the unique features of m-government (Hung et al., 2013). People usually use computers at home or work to access the internet, but when people are travelling or far away from their home or office, the easy way to access the internet is through mobile devices, for that reason, the concept of mobility has recently emerged, as people need to access the internet quickly (Alotaibi and Roussinov, 2016).

Adding mobility to E-government services is very useful not only for developed countries but also for developing countries. Countries can save time, cost and avoid a building huge infrastructure that required to access regular internet by adopting wireless internet technologies (Zmijewska and Elaine, 2004). For instance, some governments are still having difficulty in communicating continuously with citizens, especially with people in rural areas and remote areas and with homebound users or those with low computer literacy computer or chronic illnesses which make it difficult to use E-government(Editor and Becker, 2002).

A review of mobile data services adoption literature showed that mobility is among the significant factors that affect the adoption of mobile services (Hong et al., 2008; Shanab and Haider, 2015). However, even though mobile data services have grown rapidly, research about the impact of mobility on use behaviour is still limited(Hong et al., 2008; Shanab and Haider, 2015). The mobility feature of m-government and its ability to make access to services always available will drive citizens intention to use m-government services ( Hung et al., 2013). In view of this, the following hypothesis is proposed

***H10: Perceived Mobility positively influences users' intention to use m-government services.***

We believe that the MGAUM will allow a more precise analysis of m-government adoption in the Saudi context. The factors in the MGAUM have been used as a basis for developing the research instruments to be used in the empirical study; the results of which will arguably provide valuable information about the key factors affecting adoption of m-government services in Saudi Arabia. This will be useful for policy makers who wish to employ strategies that would make for faster and more efficient adoption of such services, as well as providing useful information for researchers and the ICT industry.

### **3.7 Conclusion**

Considering some of the most commonly used and tested technology acceptance models, and exploring aspects of the Saudi context that appear directly relevant for the adoption and use of m-government services has allowed the researcher to create a theoretical model (the MGAUM)

that is specially designed to explore the behavioural intention of Saudi citizens regarding m-government technology. Hypotheses based on each of the factors in the MGAUM have been created and the next chapter explains the research methodology used to test these hypotheses and to use the MGAUM to explore the phenomenon from both citizens' and ministerial m-government managers' perspectives.

## **4 Chapter Four: The Research Methodology**

### **4.1 Introduction**

As we have seen, the Literature Review identified the key aspects of both E-government and m-government and the relevant elements of technology acceptance; and the following chapter detailed a theoretical model, the MGAUM, that was developed to explore the extent to which each factor influenced citizens' intention to adopt and use m-government. As this thesis aims to base the research design on the MGAUM, Chapter 4 outlines the rationale that underpins the choice of research methods in the light of the research objectives, the resources available, the analysis required and the study context. This empirical study was conducted in order to test the MGAUM model and to understand the impact of the factors from the perspective of both citizens and managers of e/m-government in key Saudi ministries.

This chapter outlines the research philosophies, design and research methods employed in this study, providing the rationale behind the selection of these, as well as detailing the procedures that were utilized in analysing the data. It is important to distinguish between the research methodology, which is the overall approach and procedural framework of the research and comprises the philosophy that provides its foundation, and the methods which comprise the techniques and instruments used to collect data (Bryman, 2008). In order to achieve a final result of a high standard, the underlying research methodology must be appropriate (AL-Shehry et al., 2006). Nevertheless, the advantages and disadvantages of each appropriate research design must be weighed up and the ultimate choice will usually entail a measure of compromise (McGrath et al., 1982). Indeed, several authors have noted that there are many factors that need to be taken into account when selecting a research design, some of the most important being the topic under study, the type of investigation required, the research objectives, the role of the researcher, where the study is being carried out and the resources available (Abdalla, 2012; Sekaran and Bougie, 2010; Yin, 2003).

### **4.2 Research Design**

Research design involves establishing procedures that are to be followed to acquire the data used to answer the research questions and achieve the objectives. The research design comprises four main elements: underlying philosophy, approach, strategy and method (Crotty, 1998); each of which will be detailed in the following sections.

This study followed a research design in order to answer the following question "What are the key factors that impact citizens' intention to adopt and use m-government services in Saudi Arabia".



The researcher began defining the research problems in Saudi Arabia by looking at the current situation regarding the provision of E-government and m-government; also, by investigating and reviewing the research field including E-government literature, m-government literature and technology acceptance and adoption literature. After identifying the research gap in the literature, the research questions were created; these formed a basis on which the aims and objectives of the research were outlined. The next step was to build and develop a research model (theoretical framework) called the Mobile Government Adoption and Utilization Model (MGAUM). The MGAUM was developed from a critical analysis of the literature that relates to acceptance of technology, in conjunction with insights from several models and theories that are commonly used to analyse acceptance and use of technologies. After defining the relationships between the model's constructs, the research hypotheses were established. The next step was to create research instruments that would generate both quantitative and qualitative data and be targeted at Saudi citizens (users) and key officials responsible for E-government and m-government services in selected Saudi ministries.

Pilot studies were conducted to test the developed instruments, to check the reliability and validity of the instruments and make any amendment required. Mixed methods, i.e. a questionnaire and semi-structured interviews, were used to collect the quantitative and qualitative data required to answer the research questions. After conducting and analysing the pilot study, the main study was carried out in Saudi Arabia, using questionnaires to obtain data from citizens and semi-structured interviews with officials from selected Saudi ministries to obtain qualitative data that would generate further insight into intention to adopt and use m-government.

The collected data was analysed to test the proposed hypotheses and to answer the research questions. Both the questionnaire and semi-structured interviews were translated from Arabic; and the SPSS 25 and NVivo12 programs were used to analyse the quantitative and qualitative data. Lastly, the research findings and their implications, the contributions of the study and its limitations were discussed, and recommendations were made for further study.

### **4.3 Research Philosophy**

Although the term 'philosophy' is sometimes used in its widest sense to mean any belief, value or viewpoint, research philosophy relates more particularly to developing knowledge in a particular field of study and to the nature of that knowledge rather than to any specific philosophy held personally by the researcher (Kroeze, 2011; Saunders et al., 2009). This study aims to investigate and analyse factors that can impact citizens' intention to adopt and use m-government services in developing countries, particularly Saudi Arabia, in order to increase the adoption rate of m-government services. Therefore, the knowledge required is to identify the

important factors that can influence citizens' intention to adopt and use m-government services from two different perspectives (citizens and ministry officials), to understand to what extent and why these factors are significant and what this implies for the successful implementation of m-government in Saudi Arabia.

Research is underpinned by philosophical paradigms that describe the researcher's beliefs about the nature of the phenomena they are studying and how we can know about them. The two central aspects of these beliefs are referred to as ontology and epistemology (Burrell and Morgan, 1979). Ontology refers to the nature of the reality under investigation and epistemology refers to what is considered acceptable knowledge in that field of study and how it can be obtained (Denzin and Lincoln, 1994; Hirschheim, 1992; Saunders et al., 2009). The research design is thus underpinned by a particular research philosophy which describes the relationship between data and theory (Easterby-Smith et al., 2002). The field of information systems (IS) in which the current study is located, is not linked to a specific theoretical perspective as it is multidisciplinary (Orlikowski and Baroudi, 1991). Saunders et al., (2009) divided research philosophy into four paradigms: Pragmatism, Interpretivism, Realism and Positivism (See Figure 4-1).

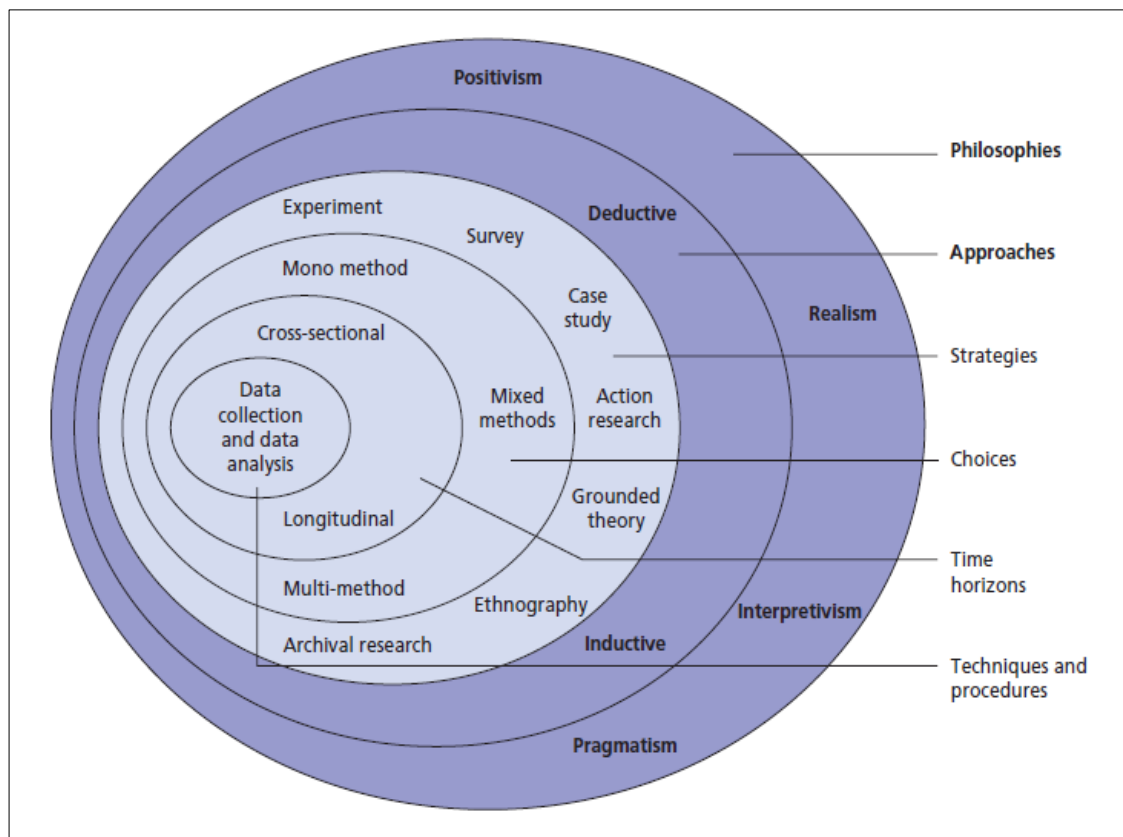


Figure 4-1: The main research philosophies (Saunders et al., 2009)

These paradigms form the outmost circle of the ‘research onion’ and summarises the main research philosophies. However, in information systems research the philosophical approaches of Positivism and Interpretivism have tended to dominate and are considered to be the main philosophical approaches used in IS research (Saunders et al., 2009).

#### **4.3.1 Positivism**

Positivism is one of the philosophies that are widely used in the field of social science, as a scientific method of investigation (Neuman, 2013). Positivism basically assumes that reality exists independently from the researcher and independently from what is being studied and that, in practice, this means that phenomena remain consistent between subjects; so that positivist researchers “assume that reality is objectively given and can be described by measurable properties” (Myers, 2009). For example, in the current study it is assumed that factors such as ‘intention to use m-government services’ remain consistent in each response to a survey question about it, and that these responses can thus be given a statistical weight.

The positivist approach stresses the use of empirical, objective and scientific means that are mainly quantitative, where researchers are often testing out theories through the use of hypotheses to discover reality; thus applying methods found in the natural sciences to the study of social reality (Bryman and Bell, 2003). In positivist research, developing the right research strategy to acquire quantitative data often starts with adopting an existing theory from which to start building research hypotheses, which can then be tested to see if they are valid and provide a firm foundation (Saunders, Lewis and Thornhill, 2016). Because of this focus on testing hypotheses in order to support or refute them, this positivist approach often employs this deductive approach (Bryman and Bell, 2015; Myers, 2009).

The current study aims to build a theoretical model which explains Saudi citizens’ intention to use technology to access m-government services and information. Each of the factors in the developed model needs to be tested quantitatively; and for this reason, a positivist paradigm underlies much of the empirical research. However, to rely on a purely positivist approach in a study which focuses so centrally on people’s perceptions might be said to lack the rich detail needed to fully understand such a complex phenomenon and to not adequately reflect the meanings and significance that the relevant social actors give this phenomenon (Saunders et al., 2009).

#### **4.3.2 Interpretivism**

On the other hand, an interpretivist approach, which is also a paradigm which is widely used in the social sciences, holds the view that the meaning of a phenomenon is created by people and that it cannot be assumed that what is being observed is interpreted in the same way. Thus,

when ministry officials were questioned about their understanding about what was important when implementing m-government service it was important to examine differences and nuances in the respondents' understanding. In this paradigm, the researcher finds means to interact with the subjects in the target population in order to understand their perspectives of the issues under investigation; and due to this focus, interpretivist research requires qualitative data. This subjective data is then evaluated to explain how the subjects experience the phenomena; as reality in this paradigm is assumed to be accessed through understanding social actors, to interpret their subjective understandings and to see how the reality of the phenomena in question is accessed through these social actors and their constructions (Bryman and Bell, 2011; Neuman, 2013; Saunders et al., 2009). In this paradigm, the context of the phenomenon being studied is of paramount importance, as social constructions of reality vary from one situation to another and different people's perceptions of something depend on their experiences. For this reason, an inductive approach and the gathering of qualitative data best suits the Interpretivist approach (Creswell, 2013; Teddlie and Tashakkori, 2009). Just as using a positivist approach by itself had limitations; sole use of an interpretivist approach also can be limiting as it is not possible to make generalisations from the findings which can then be applied to the wider population (Winfield, 1991).

#### **4.4 Research approach (Deductive and Inductive)**

Collis and Hussey (2009) defined the deductive approach as a study where theories and hypotheses are developed, and the research is designed to test them empirically. The deductive approach has been described as 'top-down' as the researcher progresses from a theory to hypotheses and seeks data that supports or contradicts the theory. By contrast, the inductive approach is 'bottom-up'; and participants' views are used to build wider themes and produce a theory which interconnects those themes (Creswell and Clark, 2007). In other words, the deductive approach moves from the general to the specific; whereas the inductive approach moves from the specific to the general (Trochim, 2006).

Regarding research philosophy and approach, it can be seen that "deduction owes more to positivism and induction to interpretivism" (Saunders et al., 2009). However, this is not a fixed rule; there are some studies that have combined interpretivism with deduction (Milonakis and Fine, 2009). Moreover, some research has used both inductive and deductive approach (Schadewitz and Jachna, 2007). So, as mentioned in the previous section, researchers in the information systems field can choose the appropriate research method, approach and strategy for their research since that field is not linked to a specific theoretical perspective (Orlikowski and Baroudi, 1991). This allows the researcher the freedom to choose whatever approach is the most appropriate for their research.

#### **4.5 Approach Taken by this Study and Justifications**

As previously stated, in the information systems field researchers can select the most appropriate research method, approach and strategy, as that field is not associated with a specific theoretical perspective; and both the Positivist and the Interpretivist paradigms have been used in IS research (Orlikowski and Baroudi, 1991). This allows the researcher the freedom to choose whatever approach is the most appropriate for their research. This research mainly relies on a positivist approach, but has also added some aspects of the interpretivist approach by conducting semi-structured interviews as a complementary and supportive method to benefit and enrich the findings of the research with a view to obtaining comprehensive results that can facilitate a better understanding of factors that impact Saudi citizens' intention to adopt and use m-government services from different perspectives.

The justification for adopting a mainly positivist approach in this research are as follows: Firstly, it is the most dominant approach used in IS research; 75% of IS research has employed this approach, whereas 17% employed the interpretivist approach (Mingers, 2003). One of the research aims is to develop a comprehensive theoretical model, so this research developed a model called MGAUM to explore intention to use m-government services and access information through mobile technology; which is another reason for adopting a mainly positivist approach.

The MGAUM was based on the Technology Acceptance Model (TAM) but incorporated a number of other factors from other models to make especially suitable for the Saudi context and for predicting intention to use m-government services on a nation-wide basis. The new model needed to be tested by investigating each of the constructs in terms of their influence on Intention to Use. In order to do this, it was necessary to use a sample that was large enough to be statistically significant, to test each construct, such as Mobility, by asking Saudi citizens questions about it and generating data that could be interpreted to see how influential it was in predicting Intention to Use. The statistical findings could then be generalised to the population of Saudi citizens (the targeted recipients of m-government services and information). In order to do this, it was necessary to assume that 'mobility' existed and respondents to the survey would have a similar perception of what it was.

On the other hand, the researcher felt that in order to gain a better insight into how each construct in the model affected technology acceptance it would be invaluable to also get the perspectives of managers in eight key ministries, as they had expertise and inside knowledge about the implementation of the Saudi system of m-government. When the researcher interviewed the managers, he wanted to hear how they construed factors such as 'mobility'; and also how they explained the reasons for the acceptance or resistance to using m-government, in

case there were other constructs, or aspects of constructs, that the MGAUM had omitted but needed including. Hence, an interpretivist paradigm underpins the interview stage of the research, qualitative data is required and an inductive approach is used to gain further insights into how the MGAUM might be further refined.

## **4.6 The Research Strategy**

In conducting a study, there are several research strategies that can be used by a researcher. Creswell describes a research strategy as a detailed “plan or proposal to conduct research” in order to answer a research question or questions (2009, p.5). These research strategies are divided by Saunders et al. (2009) into seven strategies: experiment, survey, case study, action research, grounded theory, ethnography and archival research (Saunders *et al.*, 2009). According to Yin (2003), each one of these strategies can be used for descriptive, explanatory and/or exploratory research.

Saunders et al (2009, p.141) note that it is possible to include other strategies within one overall research strategy, thus within a case study, individual strategies like surveys can be used. The research strategies used in the current study are outlined below as well as the rationale behind their selection.

### **4.6.1 Survey Strategy**

One of the most widely used research strategies in the social science field is the survey as it allows the researcher to acquire accurate, valid and reliable data in a short space of time (Neuman, 2013). It is thus frequently made use of in the field of information systems research (Orlikowski and Baroudi, 1991). Surveys allow the generation of quantitative data, usually collected by means of questionnaires or structured interviews, and are also compatible with a deductive approach (Saunders et al., 2016). This makes surveys particularly suitable for research designs that are descriptive and explanatory (Denzin and Lincoln, 2011). Saunders et al. (2016) also point out that this strategy facilitates an explanation of how variables relate to each other and statistical analyses of the results; and, as samples are generally large and thus significant, it is possible to generalise from the results. Furthermore, the survey strategy is generally associated with the positivist paradigm, which, as we have explained, is the approach that is mainly followed in this study.

The current study thus applied a survey strategy to examine and investigate the hypothesised relationships between the proposed factors in the developed MGAUM model. This strategy will enable questions about to what extent each factor in the theoretical model influences Saudi citizens' intention to use m-government services to access information and conduct transactions.

#### 4.6.2 Case study strategy

When a phenomenon is to be studied in-depth, a case study is often used, and this is a popular method of collecting data in IT/IS research (Myers and Avison, 2002). Indeed, some scholars suggest that as it is so apt for exploring the relationship between IT innovations and the context in which they are used, the case study has become the most commonly used qualitative strategy in the field (Darke, Shanks and Broadbent, 1998; Myers, 2009; Orlikowski and Baroudi, 1991). Other authors have outlined the uses and advantages of the case study approach such as its being a strategy used in a real-life context, often with multiple sources of evidence (Robson, 2002, p.178); and Yin (2009, p.18) defined a case study as follows: “*A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident*”.

The case study is a strategy rather than a method, as it uses a range of methods to acquire detailed information (Collis and Hussey, 2009). It has the advantage of giving insights into both ‘what’ and ‘how’ questions about a phenomenon; for example, this study addresses what factors influence Saudi citizens’ intention to adopt and use m-government and how these factors would contribute to the successful implementation of m-government in the Kingdom.

A single case study thus provides an insight that contributes to answering research questions; however, it is from a single perspective, such as that of one organisation, government agency or ministry. This disadvantage can be addressed by conducting multiple case studies; and Yin notes that the strategy of using multiple case studies can be preferable as: “analytic conclusions from two or more case studies are more powerful than those coming from a single case” (2009, p.61).

Case studies may require multiple data collection methods in order to establish case construct validity (Omar Alhujran, 2009). Yin (1994) addressed several data collection methods that can be used in a case study, these methods are categorised to include:

1. Documentation.
2. Archival record.
3. Interviews – structured, semi-structured, or unstructured.
4. Direct observation of activities and phenomena and their environment.
5. Participant observation.
6. Physical artefacts.

In this study, face-to-face semi-structured interviews were carried out to collect data from managers in eight ministries in Saudi Arabia; and all interview questions were based on the previously conducted survey.

The main aims of conducting and using multiple case studies were to enable the researcher to test, validate, analyse and to understand in depth the factors proposed in the MGAUM that could influence Saudi citizens' intention to adopt and use m-government services and to identify other factors not in the proposed model that were deemed important from a managerial perspective. Also, the case studies phase not only reinforces the results of the survey; and whether or not survey results were consistent with managers' ideas about what factors influenced Saudi citizens' intention to adopt and use m-government services; but also revealed that there were some other underlying factors which were considered essential incentives. Moreover, analysis of the case study findings allows a comparison of the theoretical findings with actual practice; and expands the understanding of the impact of factors from the managerial perspective, strengthening the research findings by providing further results that relate to increasing citizens' intention to adopt and use m-government services. This would significantly contribute to providing the knowledge required for implementing m-government services in the Saudi context with a high level of success; which is a major aim of this study.

#### **4.7 The Research Method: (Quantitative, Qualitative and Mixed Methods)**

In this section, the quantitative, qualitative and mixed approaches to collecting data are discussed and related to the aims, objectives and context of this research to explain why the particular research methods were chosen for this study.

##### **4.7.1 The Quantitative Method**

The quantitative method is defined as "a type of research that explains phenomena by collecting numerical data that are analysed by using mathematically based methods (in particular statistics)" (Creswell, 1994, p.12). This method is a way of testing theories by hypothesising and investigating how variables in those theories relate to each other. These variables and their relationship to each other are typically turned into numerical data that can be analysed statistically, thus quantitative research is predicated on creating metrics that are employed to describe any phenomena under investigation (Creswell 2013; Smithson and Cornford, 1996). Quantitative research is associated with a positivist approach that includes statistical analyses, scientific procedures and the presentation of data in numerical form (Creswell, 2008). It is also used with a deductive approach to test hypotheses in order to accept, reject or modify a theory (Matthew and Carole, 2004). A quantitative approach is most appropriate when factors that influence an outcome need to be identified; the best predictors of outcomes determined or the usefulness of an intervention evaluated; this approach is also recommended for research that aims to test a theory or explanation (Creswell, 2003).



The quantitative method is considered useful for collecting data within one-time frame from a large population or many organisations (Myers, 2009). The primary method of data collection in this study is quantitative as the factors influencing users' intention to adopt and use m-government services were to be investigated. The factors in the MGAUM (the proposed theoretical framework) were to be examined by testing the hypotheses about how these factors correlated; and this necessitated collecting data from a sample sufficiently large to be statistically significant. The data had to be structured such that calculations could be made and this meant that the most appropriate method for gathering this data was a survey with closed questions; an approach that is also usually associated with the positivist paradigm which underpins this study.

#### **4.7.2 The Qualitative Method**

Qualitative research can be characterised as “a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data” (Creswell, 2013). Similarly, Bryman (2008) described the qualitative method as “a research strategy that usually emphasises words rather than quantification in the collection and analysis of data”. The qualitative method is thus looking to explore and understand meanings rather than produce numbers, and studies social and cultural phenomena in depth, often focussing on text and aiming to provide a deeper understanding of phenomena through analysis and interpretations of interactions (Creswell 2008; Johnson and Christensen, 2011; Myers, 2009). The qualitative method is associated with an interpretivist philosophy and uses an inductive approach. In this research, the qualitative method is applied as a complementary and supportive method to the primary quantitative method.

The qualitative part of the research is conducted through a case study, which includes semi-structured interviews with key officials responsible for E-government and m-government in selected Saudi ministries. These ministries are considered as the most critical ministries in Saudi Arabia in that citizens have to deal with them frequently. Applying this method enables the researcher to understand in depth, the proposed factors that could influence Saudi citizens' intention to adopt and use m-government services and to identify other factors not in the proposed model from a managerial perspective. Interview analysis also allows a comparison of the theoretical findings with actual practice. Furthermore, this method aims to expand the understanding of the impact of factors from the managerial perspective to strengthen the result of research by providing further findings.

### 4.7.3 Mixed Methods

There are many terms for approaches that combine quantitative and qualitative methods: multi-methods, multi-strategy, mixed methodology or mixed methods (Brannen, 1992; Bryman, 2004; Creswell, 2008; Tashakkori and Teddlie, 2008). Although mixed methods research can use a range of methods that are purely quantitative or qualitative; this approach suits research that has both questions which require measurements to answer and those that require exploring in greater depth (Johnson et al., 2007; Shields and Twycross, 2003). Typically, researchers will make use of methods of data collection and analysis that reflect each of these approaches as appropriate as well as having elements of the philosophies that underlie these approaches (Creswell, 2013; Johnson et al., 2007). In terms of research design, the quantitative and qualitative data can be collected and analysed sequentially or in parallel; however, the researcher will need to make sure that analysis techniques are appropriate to the approach used at the particular phases of the research (Creswell and Plano Clark, 2011; Saunders et al., 2009). The extent of each of the approaches used depends on the nature of the research, and three main types of mixed method approaches (purely qualitative, purely quantitative and mixed) can be discerned in this respect. In the diagram below (see Figure 4-2), the areas between any two pure approaches represent their combination, i.e. qualitative dominant mixed method and quantitative dominant mixed method (Johnson et al., 2007). Research that mainly relies on a qualitative approach and adds quantitative data to supplement and enrich the research is described as 'qualitative dominant'; whereas research which is mainly dependent on a quantitative approach with the addition of enriching qualitative data is 'quantitative dominant' (Johnson et al., 2007).

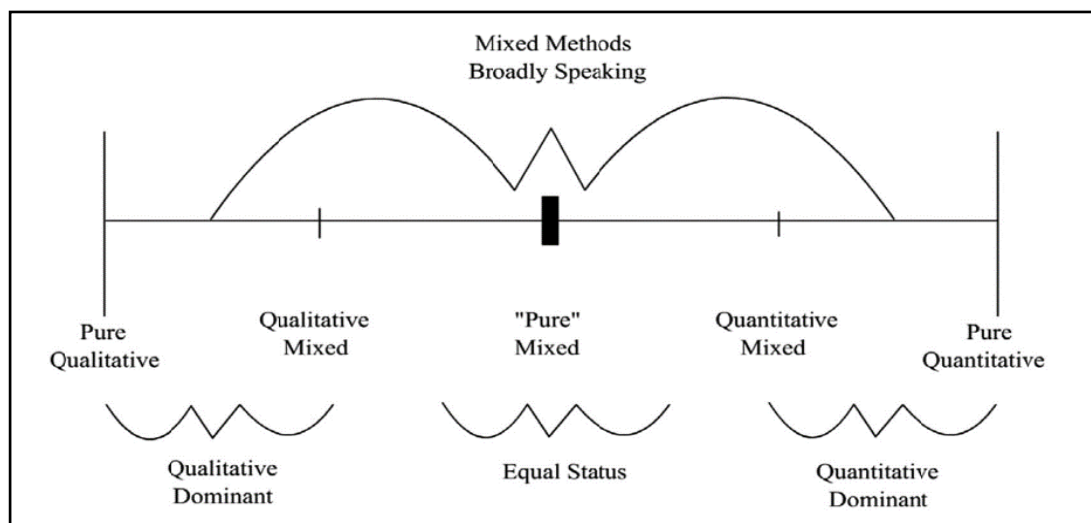


Figure 4-2: The three main research paradigms, including subtypes of mixed methods (Johnson et al., 2007)

Mixing approaches can have significant benefits as single-method approaches have their own weaknesses as well as strengths, so a mixed approach can strengthen research (Creswell and Clark, 2007; Nau, 1995).

The use of mixed methodology is commonly found in IT/IS research (Myers, 1997). This combination of research methods is referred to as triangulation, which can be defined as the study of one phenomenon using a combination of methodologies (Denzin, 1978); or more specifically as: “the use of more than one method or source of data in the study of a social phenomenon so that findings may be cross-checked” (Bryman and Bell, 2003). Triangulation can involve the use of various types of sample and sources of data as well as different ways to collect data, which is done in order to capture different perspectives of the same phenomenon as well as cross-validating the data; and triangulation should be considered as using complementary rather than contradictory methods (Jick, 1979; Patton, 1999).

The approach used by this study can be categorised as ‘quantitative dominant’ primary method with an additional qualitative method used as a complementary and supportive method to benefit and enrich the findings of the research. As both quantitative and qualitative data in this study was collected in parallel, mixing can be said to occur at the stage of data collection as well as during the process of data analysis (Creswell et al., 2011).

There were several reasons for using mixed methods in parallel as some researchers recommend. Denzin (1978) recommended the use of between-method triangulation, contending that by utilizing mixed methods, (a) “the bias inherent in any particular data source, investigators, and particularly method will be cancelled out when used in conjunction with other data sources, investigators and methods” (p.14); and (b) “the result will be a convergence upon the truth about some social phenomenon” (p.14). According to Denzin (1978), three outcomes arise from triangulation: convergence, inconsistency and contradiction.

Jick (1979) notes that despite its unsuitability for certain types of research, triangulation has several advantages. Researchers can have more faith in the findings and may even be encouraged to discover different means by which they can gather their data which will enrich the information they gather and often mean it is more detailed. Using triangulation can facilitate the integration or synthesis of theories, reveal any contradictions and thus may serve to decide between competing theories (Jick, 1979).

Also, there were several reasons for using mixing methods in parallel as follows: The researcher has a limited time to finish the PhD (between 3 to 4 years) and this was one of the obstacles that hindered the researcher from doing further empirical studies. The issue of distance is that the research focuses on Saudi Arabia; and the researcher had to travel to Saudi Arabia to collect data from citizens as well as key officials responsible for implementing E-government and m-

government services in different Saudi ministries. This forced the researcher to collect data in a limited time and use a parallel approach, knowing that it would be difficult to return and collect data from the targeted participants once he had travelled back to the United Kingdom.

Triangulation is employed in this study by using surveys and semi-structured interviews to collect data with the aim of acquiring data that is both robust and sufficiently detailed to allow a better understanding of the factors that influence Saudi citizens' intention to adopt and use m-government services; furthermore, that this is seen both from the users' and the providers' perspectives.

#### **4.8 Data collection**

Data collection for both Phase 1 (quantitative data) and Phase 2 (qualitative data) will be outlined in this section. Phase 1 involved the use of a questionnaire survey and in Phase 2 a semi-structured interview was used. The research instruments and their validity and reliability, the pilot studies, translation of the research instruments, data analysis and sampling techniques will also be discussed.

##### **4.8.1 Research Instruments Design – The questions**

The researcher required data from the perspectives of the citizens who are users or prospective users of m-government services, and of managers in Saudi ministries who are responsible for the implementation of these services. Data collection instruments were designed with this in mind; and were developed by modification of instruments previously used in the domains of research into technology adoption, E-government and m-government.

In this study, a cross-sectional approach (snapshot study) is used rather than a longitudinal one, which means that a substantial amount of data from both Saudi citizens (the survey) and ministry officials responsible for implementing m-government services was only collected once, and within a relatively short period of time. A limitation of this research could be considered to be that the research only relied on a cross-sectional approach, and did not use a longitudinal approach to measure the influence of these factors from the same group at different points in time. In short, a longitudinal approach could check whether or not the citizens' intention to adopt and use m-government services would change with time. Janssen and Cresswell, 2005 note that unlike a longitudinal study, a cross-sectional one is unable to show changes over time, although comparisons over time are possible if it is very accurately replicated. Cross-sectional studies are however cheaper and faster to conduct than longitudinal studies (Janssen and Cresswell, 2005).

A survey questionnaire comprising of 76 items and semi-structured interviews were created with questions developed and modified from studies found in the literature into both E-

government and m-government(Davis, 1989;Shareef et al., 2012; Alghamdi, 2017; Alloghani et al., 2015; Venkatesh et al., 2012; Chong et al., 2012; Moore and Benbasat, 1991; Hong et al., 2008; Al Hujran et al., 2013; Zhou, 2012; Mahmood, 2013; Doll and Torkzadeh, 1988).The questionnaire comprises three sections: general information, internet and mobile government use and factors relating to intention to adopt and use m-government services (see Appendix C). The interview questions focused on managers' perceptions of factors affecting intention to adopt and use m-government in Saudi Arabia (see Appendix E).

Moreover, the researcher took into consideration many aspects when designing the research instruments to assure the quality of the research and to avoid bias in the study. For instance, the questions were clear, straightforward and simple; and avoided using complex or uncommon words, more than one statement in one question and leading questions. Double negative questions and open-ended questions were minimized; in addition, the researcher only targeted Saudi citizens 18 years old or over.

Strength of opinion was measured in the survey by a 5-point Likert scale where respondents could choose from 'Strongly agree' to 'Strongly disagree'. All questions on both instruments were translated into Arabic, the participants' native language; and data was translated back into English for analysis after collection data. All participants were given a brief explanation of the UK Data Protection law as regards data collection and provided with a link to a website outlining the principles of the Act, as well as being given assurances that information was confidential, and data was to be securely stored and destroyed when no longer require. Anonymity was preserved by interview participants being given pseudonyms and all data anonymised.

From the perspective of the researcher, an electronic version of the survey was preferred, as clarity would be maintained, and questionnaires were less likely to be incomplete. However, manual distribution was also carried out to get a broader and more representative result. The questionnaire was given to citizens in public areas (shopping centres, parks and cafes) as well as at government agencies and some universities; the majority of people agreeing to participate asked to be sent the electronic version (by email, WhatsApp and Twitter).

#### **4.8.2 Instrument test (Pilot study)**

Conducting a pilot study is a crucial step in order to achieve several aims of the research, in order to evaluate the validity and reliability of the questions in the research such as testing words, statements, estimating response rate as well as the question and interview time(Ticehurst and Veal, 2000). The pilot study usually is conducted in order to test and evaluate the validity and reliability of the instruments and as well as eliminate the weakness of the instruments (Zikmund et al., 2013).

The pilot study for the questionnaire was conducted in the UK and sent to Saudi citizens of 18 years and over, whether or not they had used mobile government services. Although there were 71 participants, incomplete questionnaires were excluded, leaving a final pilot sample of 58 which exceeded the recommended pilot sample size of 10 to 30 respondents and the relative large sample size was felt to be likely to yield a more accurate result (Emory and Cooper, 1991; Hill 1998; Isaac and Michael, 1995). Data from these respondents were analyzed with the SPSS program.

Carrying out a pilot study allowed the researcher to properly check that the research instruments were doing the job they were designed to do, to see how long it would take to fill out the questionnaire and whether respondents would fully understand the questions and be unlikely to have objections about answering them. Feedback from pilot participants allowed the researcher to make improvements to the questionnaire. The results of this pilot study revealed that all items in the survey instrument were reliable and valid within the range of acceptable academic research and suitable for use in the main study.

#### **4.8.3 Research instrument validity**

Validity as a concept was introduced by Kelley, (1927); and measures what the researcher intended (Bhattacharya, 2010; Blumberg, Cooper and Schindler, 2005). The validity of an instrument is the extent to which it does this and provides the information required (Colton and Covert, 2007). Worthen et al. (1993) note that the validity of an instrument is evaluated by the evidence, rather than being directly measured. There are numerous ways to establish and assess the validity of research such as: Content Validity, Criterion Validity, Face Validity and Construct Validity; but in order to establish the validity of our research instrument, the face validity and content validity were selected rather than construct validity and criterion validity.

Moreover, Kerlinger and Lee stated that content validity is "the representativeness or sampling adequacy of the content – the substance, the matter, the topics - of a measuring instrument"(2000, p.667). Also, content validity is defined as "the degree to which items in an instrument reflect the content universe to which the instrument will be generalized" (Straub *et al.*, 2004).

Face validity is designed to establish the extent to which the purpose of the instrument is clear even to a lay person with only basic education (Nevo, 1985), for example a 1st grader at school. There is a high level of face validity if the questionnaire items are unambiguous and clear; if the items are seen as difficult to understand or confusing, then the face validity is low (Nevo, 1985). The pilot study allowed the face validity of each item to be tested by participants so as to ensure that the model's factors measured what they were intended to measure. Items without sufficient clarity, unambiguity or relevance were revised or deleted accordingly to the feedback from

participants. Content validity, in many cases, can be discussed and evaluated with experts and colleagues (Blunch, 2013). Accordingly, six academics, all of whom had expertise in the field, were asked to review the items in the research instrument, this review and the pilot study demonstrated that all the items used therefore had a high degree of face and content validity.

#### 4.8.4 Research instrument reliability

Blunch (2013) stated states that if a research instrument is to be reliable, it should produce similar results if used in comparable conditions. Sekaran (2003) noted that an instrument's reliability depends on how free it is of error. (Straub et al., 2004) defined the reliability as "the extent to which a variable or set of variables is consistent in what it is intended to measure". Huck (2007) points out that consistency in all parts of a measuring instrument must be established if the reliability of a study is to be assured. In order to assess the reliability of the questionnaire used in the pilot study, Cronbach's Alpha was chosen because the internal consistency of the constructs used in the questionnaire had to be established; in other words, we needed to measure the extent to which items in the questionnaire measured the same things when referring to a specific independent or dependent construct, and how these related to each other. Cronbach's Alpha is the most commonly used test to calculate and evaluate internal consistency, and thus reliability (Eucharia and Nnadi, 1999). Cronbach's Alpha has a scale of 0 to 1, with 1 being the highest reliability, a value for independent and dependent variables of 0.6 is considered to be acceptable (Suhr and Shay, 2008). Table 4.1 shows the result of the Cronbach's Alpha test of all instrument in this pilot study, which demonstrates that the reliability of each of the constructs (independent and dependent variables) lies within the range of what is considered acceptable in academic research at 0.6.

*Table 4-1: Internal Consistency of the Pilot Study Instrument*

Measured Variable	Number of Items	Cronbach's Alpha
Perceived Usefulness (PU)	7	.841
Perceived Ease of Use (PEOU)	4	.848
Social Influence(SI)	3	.753
Perceived Compatibility (PCOM)	2	.824
Perceived Trust (PT)	7	.618
Culture (CULT)	5	.606
Awareness (AW)	4	.816
Perceived Mobility (AW)	3	.819
Citizen Service Quality (CSQ)	8	.920
System Quality (SQ)	7	.755
Intention to use M-government (ITU)	4	.879

#### **4.8.5 Sampling**

As the constraints of resources often make it impossible for researchers to question an entire target population (i.e. conduct a census), a smaller sample group that represents this larger population is used (Saunders et al., 2009). As well as allowing the research to be conducted within time and budgetary limits, sampling arguably may even improve results by allowing more time to be allocated to in-depth analysis of data (Henry, 1990). Sampling techniques will depend on factors such as research context and objectives, study location, time and budget and divided into two main types- probability (random selection where everyone in the target population has an equal chance of being chosen) and non-probability (Blumberg et al., 2008; Bryman and Bell, 2011). As the target population for this study is every Saudi citizen who uses or might use m-government services, it is not feasible to have a list of everyone in that population; thus, a non-probability sampling technique will have to be used.

Of the non-probability sampling techniques, the researcher has chosen the convenience (or opportunity) sampling technique where data is obtained from subjects who are available and willing. It was important to get as many Saudi users or potential users of m-government services as possible in the time available and with fairly limited resources. One of the strengths of this sampling technique is that it is relatively cheap and fast and increases the likelihood of getting sufficient participants (Blumberg et al., 2008). Being able to recruit a large sample means that generalizability of the results will be greater, this advantage has made a popular choice in social and behavioural research (Saunders et al., 2009; Stangor, 2010). Furthermore, sampling was not limited to one area of Saudi Arabia, resulting in a sample that was more likely to be representative of Saudi citizens, thereby increasing the generalizability and reliability of the findings and to some extent offsetting possible biases that might have been the result of using a convenience sample.

#### **4.8.6 The Survey Sample Size**

It is important to obtain the correct sample size; on one hand, an over-large sample size is a waste of resources and would not necessarily result in greater accuracy in findings, although too small a sample might decrease accuracy (Bryman and Bell, 2011; Hair et al., 2010). Different authors recommend various ideal sample sizes, and note that resources available usually influence the final sample size (Saunders et al., 2009).

Saunders et al., (2009) also provided and recommend a simple guide table to determine the sample size for different sizes of the population at 95 confidence level, see Figure 4-3.



Sample sizes for different sizes of population at a 95 confidence level (assuming data are collected from all cases in the sample)				
Population	Margin of error			
	5%	3%	2%	1%
50	44	48	49	50
100	79	91	96	99
150	108	132	141	148
200	132	168	185	196
250	151	203	226	244
300	168	234	267	291
400	196	291	343	384
500	217	340	414	475
750	254	440	571	696
1 000	278	516	706	906
2 000	322	696	1091	1655
5 000	357	879	1622	3288
10 000	370	964	1936	4899
100 000	383	1056	2345	8762
1 000 000	384	1066	2395	9513
10 000 000	384	1067	2400	9595

*Figure 4-3: Sample sizes for different sizes of population(Saunders et al., 2009)*

Saudi Arabia has a population of around 33.5 million, according to the General Authority of Statistics (GASTAT, 2018b). Based on the previous suggestion and Saudi Arabia population, the recommended survey sample size for this population size is 384 participants would give a 95% degree of confidence. This is confirmed by sample size calculation websites such as surveysystem.com (<https://www.surveysystem.com/sscalc.htm>). This simple size calculator website, which is introduced as public service by Creative Research Systems, can be used to identify an appropriate sample for a study at different confidence levels. The final sample size, after screening out responses that were not deemed useable was 1,286 participants which exceeded the recommended size.

#### **4.8.7 A Large-Scale Study**

A cross-sectional approach is used in this study, which means that a substantial amount of data from both Saudi citizens (the survey) and ministry officials responsible for implementing m-government services is only collected once, and within a relatively short period of time. This could be done once permission had been given by the relevant authorities.

The process of data collection started in January 2018 for three months and ended in April. The

questionnaire was distributed to Saudi citizens (public users) whether they had used mobile government services or not. Participants had to be 18 years old or over to participate in this survey. The questionnaire was distributed electronically (via Email, Twitter and WhatsApp) and manually in different cities in Saudi Arabia. This method is opportunistic, and the questionnaire was distributed to public users in government agencies, some universities and public areas such as parks, coffee shops, and shopping centres. The main reason behind the questionnaire being distributed electronically and manually was to get broader and more comprehensive results. Questionnaires given to participants manually were to be collected by the researcher who would also be on hand if the participant has any questions.

Before distributing the questionnaire electronically and manually, the participant had to confirm that he/she was 18 years old or over by marking the age confirmation statement in the questionnaire. Anyone consenting to filling in a questionnaire was given the same written information about the study as participants doing the electronic questionnaire. They were also told how long the questionnaire was likely to take; that they could refuse to answer any questions or withdraw from doing the questionnaire at any time and that anonymity and confidentiality was guaranteed. Electronically, participants were invited to participate via Email, Twitter and WhatsApp. University and Ministry databases were used to send email messages with the link to the survey. The researcher used personal contacts on Twitter and WhatsApp to further distribute the survey link.

At the end of the questionnaire for both paper and online versions, each participant was given a unique identifier, which they were advised to note and retain in case if they might decide to withdraw their data from this research. If they decided to proceed with the withdrawal of their data, they needed to email the researcher with that unique identifier and request removal of the data before the deadline. The deadline for such withdrawal was two weeks after the data collection date.

The questionnaire was divided into three different sections: The first section being general information; the second section being information about internet and mobile government usage; and the last section focusing on information related to factors that may influence citizens to adopt and use mobile government.

An online questionnaire is recommended for target population located far from the researcher or over a large area. Online communication has the advantages of being speedy, cheap and often more reliable than using the postal service; data handled and stored electronically may reduce the possibility of error and saves time as the researcher does not need to enter data manually; participants may find it easier to fill in an online questionnaire where they can be automatically directed to the next question and save their replies and return to the question later, and this can

increase response rate and reduce errors (Sincero, 2012). However, online questionnaires cannot be used by members of the target population that have no internet access. Nevertheless, given the high penetration rate for PCs and mobiles in Saudi Arabia, it was assumed that most participants would be able to access the electronic questionnaire. There was a paper version for those that could not.

The participant thus had two options: to participate in this survey using a hard copy or electronic version of the questionnaire. Distributing the questionnaire personally in this way had the following advantages:

- The opportunity to motivate and encourage the respondents to participate.
- Data can be obtained quickly and easily from large number of participants at a single specified time.
- Allows a specific group to be targeted for data collection. (In this study- all Saudis over 18).
- Items can be explained to the participants when needed; (this ability to clarify the questions strengthens the validity and reliability of the results).
- Obtains a higher response rate than mailing the questionnaire.

As mentioned before, although the questionnaire was distributed to public users (Saudi citizens) in government agencies, some universities and public areas such as parks, cafes, and shopping centres, most participants sent back an electronic version of the questionnaire (via Email, Twitter and WhatsApp). The few hard copy questionnaires that were returned were inadequately completed and therefore discarded. Using hard copy questionnaires has many disadvantages as follows:

- High cost.
- Low response rate.
- Time-consuming to fill out the questionnaires.
- Limited sample size.
- Manual data entry.
- High likelihood of error.
- Higher number of items missed.
- Data collection takes more time.

The number of female participants in the survey was very high for Saudi Arabia, given that the researcher was male, which can pose cultural and religious difficulties for collecting data from female participants. Few male Saudi researchers (to our knowledge) have been able to acquire as many female participants as this study. Using an electronic version of the questionnaire

appeared to be a solution to this difficulty.

The electronic version of the questionnaire was developed using the surveygizmo website, which was selected because of its good reputation for data collection and analysis in academic research. There are many advantages to this survey tool. Firstly, it offers considerable flexibility in the way questions are presented (85 different possible forms) and the questions can be written in Arabic script. Secondly, the resulting survey is easy for participants to navigate; and thirdly collection and analysis of data is made easy for the researcher as data can be automatically scored as soon as it is entered (SurveyGizmo, 2017). Furthermore, the data could be exported directly to SPSS as it was possible to design the survey so that participants were prevented from missing a question, thus avoiding having to 'clean' data to identify unanswered questions (Munn and Dreyer, 1996).

## **4.9 Data analysis**

The procedures for preparatory data cleaning and screening, procedure for detecting and handling outliers and the analysis of all the steps that were taken to answer the research questions and achieve the research objectives are outlined below.

The SPSS statistical package (version 24) was chosen for analysis of quantitative data as it is easy-to-use, offers a range of statistics for analysis, can be used to create graphs and tables and crucially enables calculation of the correlations that exist in a large set of variables (factor analysis). Data analysis methods need to be appropriate for the type of data to be analyzed and also relate to the research questions (Pallant, 2013). In view of this, both descriptive and statistical analysis was used. Due to the survey using an online questionnaire, it was easy to export the data to the statistics software as all the variables were defined and coded at the design stage. There are however, certain procedures to be carried out prior to data analysis (Churchill and Iacobucci, 2004); and these are outlined below.

### **4.9.1 Data cleaning and screening**

In order to make sure that the research data was properly prepared and ready to be analyzed, several data screening examinations were carried out. Any cases that could not be considered appropriate for the target sample had to be identified and eliminated; and data which was entered incorrectly or missing also had to be found and dealt with. This was in addition to the evaluation and management of outliers.

- **Missing and incorrect data**

It is important for a researcher to be able to identify any missing data, which could occur because a participant did not want to answer or did not know how to answer a particular

question or because a data entry mistake was made (Creswell, 2013). To alleviate this common problem, the electronic version of the questionnaire was designed such that respondents could not continue without completing an answer and any manually filled incomplete questionnaires were excluded since questions were about all the constructs in the research model and all needed to be completed. Thus, of the 1882 survey respondents, 1286 successfully completed the questionnaire, 813 were male (63.20%) and 473 were female (36.80%).

Data screening and cleaning occurs in two stages: Firstly, the data is checked for errors and any out-of-range values must be detected for each variable. Secondly, erroneous data must be deleted or corrected (Pallant, 2013). Accordingly, questionnaires were checked for missing, incorrect and out-of-range values. It was noticed, however, that several missing values were because the omitted responses were due to answers to prior questions. For instance, the answer 'No' to the question 'Have you ever used non-m-government online services?' meant that the respondent would skip questions asking them to rate these services. Although these skipped questions showed as 'missing values' they were retained as they were not really 'missed' and needed to be shown in the analysis.

- **Outliers**

Outliers are unusually low or high values on a variable or combinations of values over several variables; and these need to be investigated during analysis so that their impact can be evaluated (Hair et al., 2010). Accordingly, data was examined to detect any possible cases of outliers. There are four kinds of outlier, depending on their source: Firstly, outliers can result from errors in procedure, such as incorrect data entry. These need to be identified during data cleaning and recoded or removed. Secondly, outliers that occur because of unusual circumstances; and thirdly outliers which are inexplicable, which need to be removed unless they are felt to represent a valid part of the target population. Finally, there are outliers that have a unique combination of values across the variables and which should be retained (unless they are not valid elements in the population) (Hair et al., 2010). Outliers in this study fall into the last category of outlier, this is because data gathered by using a Likert Scale has a particular range; in this case 'Strongly Agree' (corresponding to 1) to 'Strongly Disagree' (corresponding to 5).

In this study, outliers in the variables were detected by examining maximum and minimum values, means and standard deviation values and the composite scores calculated for each factor. These scores could then be checked for outliers using the standardized Z score procedure. Z scores should lie between -3.29 and +3.29 and any value outside this range is an outlier (Fidell and Tabachnick, 2007; Tinsley and Brown, 2000). The number and assessed impact of outliers for each factor are shown in Chapter 5.

- **Treating the detected outliers**

As mentioned above, outliers in this study fall into the category of those that need to be addressed but are usually retained. Furthermore, if a case is identified as an outlier in several items it will be useful to pay special attention to other responses belonging to that case. To assess the impact of outliers, the results were analysed twice in the descriptive analysis, once with and once without the responses of the identified outliers, with the responses of the outlier being retained for the analysis of other factors in both cases. For statistical analysing, outliers are treated such that correlation tests can be properly conducted. A systematic technique known as ‘winsorization’, whereby outlier values are replaced by the next lowest/highest values not suspected to be outliers was employed as this is considered to improve accuracy (Field, 2013; Wilcox, 2010).

#### **4.9.2 The descriptive analysis**

A descriptive analysis of the results was also provided in order to explain users’ perceptions and behaviour towards adoption and use of m-government services and illuminate how the various factors in the MGAUM impact of intention to use these services. This approach also served to investigate and validate the MGAUM and to answer the research questions and achieve the research objectives. This description served to illustrate the statistical analysis which was based on the results from the 5-point scales used to measure the impact of factors in the model. Procedures used are described in the following sections.

- **Measures of central tendency**

A single value that describes a set of data is a measure of central tendency and can be expressed as a mean, median or mode. As central tendency sums up an entire set of differing values, the researcher needs to use the mean, median or mode according to what is most appropriate for the specific conditions being described; although the mean, which is the sum of all the values divided by the total number of values, is the most common measure of central tendency (Khan, 2008; Statistics, 2018). In the current study, the mean was used to calculate central tendency.

- **Likert Scales**

Developed by Resins Likert in 1932, this instrument was designed to calculate individual attitudes to specific phenomena(Likert, 1932) on the premise that it was possible to allocate a particular weight or significance to a participant’s response to a question formulated in line with this rating scale (Saunders et al., 2009).In the course of data analysis, the individual items in the Likert Scale are combined into a single composite score/variable which measures the intended aspect either as a sum or the mean of the combined items(Clason and Dormody, 1994). Thus, the Likert Scale is an interval measurement scale. Indeed, the mean, along with standard

deviation to describe variability are the descriptive statistics recommended for use with five-point Likert scales, which were chosen as the main instrument in this study's questionnaire (Boone and Boone, 2012).

The reason behind the choice of a Likert scale is that it is recommended as being the simplest and most practical way to measure strength of opinion; and a review of the literature shows that is most commonly and successfully employed in IS research (Bhattacharjee, 2001; Taylor and Todd, 1995; Venkatesh et al., 2003; Viswanathan et al., 2004).

- **Clarification of Likert Scale weighted averages**

The Likert Scale weighted averages were calculated as follows: Strongly Agree=1, Agree=2, Don't Know or Neutral=3, Disagree=4 and Strongly Disagree=5. This was done so that the composite scores' tendencies could be determined. The numbers entered into SPSS are therefore said to represent 'weight' and, in order to understand the means, the weighted averages for the scale need to be calculated. This is done by dividing the distances between the scale values (4 in a 5-point Likert scale) by the number of values (5); and the period length ( $4/5 = 0.80$ ) is then used to calculate the weighted averages (Alfarra, 2009; Nguli, 2016.). Another 5-point Likert Scale ('Very Influential' to 'Very Uninfluential') was used to measure participants' perceptions of how advertising influences. Table 4.2 below indicates the weighted average categories for all of them, as well as interpreting the result for each category. The degree of influence for each factor can be calculated using this table as a guide.

*Table 4-2: Weighted averages for 5-point Likert Scales*

<b>Weighted average</b>	<b>Result</b>	<b>Result interpretation</b>
1 – 1.79	Strongly agree/ Very influential	Very influential
1.80 – 2.59	Agree/ Influential to some extent	Influential
2.60 – 3.39	Don't know or neutral/ Don't know	Neutral or do not know
3.40 – 4.19	Disagree/ Uninfluential to some extent	Uninfluential
4.20 – 5	Strongly disagree/ Very uninfluential	Very uninfluential

In order to interpret participants' tendencies and their responses for each factor, average values have been calculated so that the influence of each factor in the MGAUM can be assessed separately. These findings were used in conjunction with results from the statistical analysis (see next section) to answer the research questions and test each hypothesis.

#### **4.9.3 The statistical analysis**

In order to assess the impact of different factors on Saudi citizens' intention to adopt and use mobile government, correlations between the independent and the dependant variables need to be statistically analysed. Most commonly Spearman's correlation coefficient, Kendall's tau and Pearson's correlation coefficient are used to calculate correlations. This study chose to use Pearson's as the data met all the requirements needed to use this statistical tool. The procedure for using Pearson's correlation coefficient is explained in the next section.

- **Pearson's correlation coefficient**

The strength and direction of the relationship between any two numerical or ranked variables can be measured by Pearson's correlation coefficient, the value of which varies from a perfect negative correlation (-1) to a perfect positive correlation (+1). The correlation coefficients between -1 and +1 means the relationship between variables is weaker; and 0 indicates that the variables are independent (Saunders et al., 2009). In order to use Pearson's correlation coefficient, certain conditions have to be in place: The two variables have to be measured on a fraction scale, there should be a linear relationship between the two continuous variables, there should be no significant outliers and the data should be normally distributed (Statistics, 2018). Cohen (1988) has interpreted correlation coefficient values (irrespective of whether the correlation is negative or positive) as follows:

- The correlations  $r$  [0.10 to 0.29] indicate a weak relationship between factors.
- The correlations  $r$  [0.30 to 0.49] indicate a moderate relationship between factors.
- The correlations  $r$  [0.50 to 1.00] indicate a strong relationship between factors.

This interpretation will be adopted by this study

- **Test of normality**

Normality means the form of data distribution for a single metric variable and its compliance with the normal distribution of the benchmark for statistical methods (Hair et al., 2010). There are many ways to assess the normality of data. In this study, skewness and kurtosis were used to measure and evaluate the normality of data. Several researchers recommended values for data to be a normal distribution, a skewness should not be greater than three, and the kurtosis should not be greater than ten (Kline, 2011). Also, West et al. (1996) proposed a reference for the normality of data, if the skewness value  $> 3$  and kurtosis value  $> 7$  data will have departed from normality.

In this research, the skewness and kurtosis are computed twice, as seen in table 4.3 and 4.4, with outliers and without outliers for all factors after modifying the outliers with a z-score - one of



the procedures to deal with outliers. In both cases, by observing the skewness and kurtosis of each of the factors, we can assume that all meet the normality assumption. So, the distributions of all variables in this research for both skewness and kurtosis tests are normally distributed and within the suggested range.

*Table 4-3 : The skewness and kurtosis of each factor before Z score with outliers*

<b>Factor</b>	<b>N</b>	<b>Skewness</b>	<b>Kurtosis</b>
<b>PEOU</b>	1286	.913	.219
<b>PU</b>	1286	1.548	2.560
<b>CULT</b>	1286	.242	-.712
<b>PT</b>	1286	-.187	-.118
<b>SI</b>	1286	.752	.011
<b>PCOM</b>	1286	1.186	1.369
<b>AW</b>	1286	.710	.402
<b>CSQ</b>	1286	.242	-.285
<b>SQ</b>	1286	.226	-.254
<b>PM</b>	1286	.839	.462
<b>ITU</b>	1286	1.477	2.028

*Table 4-4: The skewness and kurtosis of each factor after Z score without outliers*

<b>Factor</b>	<b>N</b>	<b>Skewness</b>	<b>Kurtosis</b>
<b>PEOU</b>	1286	.884	.076
<b>PU</b>	1286	1.281	.956
<b>CULT</b>	1286	.214	-.772
<b>PT</b>	1286	-.187	-.118
<b>SI</b>	1286	.727	-.127
<b>PCOM</b>	1286	.971	.280
<b>AW</b>	1286	.710	.402
<b>CSQ</b>	1286	.234	-.321
<b>SQ</b>	1286	.197	-.373
<b>PM</b>	1286	.709	-.225
<b>ITU</b>	1286	1.272	.824

#### **4.10 Qualitative Data Using Interviews**

Interviewing is the qualitative method used to collect data in this research. In qualitative research, interviews are considered the primary and most effective tool to collect data (Denzin and Lincoln, 2000), as well as in interpretive research (Myers and Newman, 2007). Clarke,(1999) described the interview as "a conversation with a purpose". Interviews can be conducted with an individual or a number of respondents who are asked a number of questions that have been determined in advance by the researcher. The interview can be taped, or

respondents' answers written down. There are three types of qualitative interviews which are a structured or formal interview, semi-structured or focused interview and unstructured interview. In this research, we used a semi-structured interview. Wengraf (2001) stated that "Semi-structured interviews are designed to have a number of interviewer questions prepared in advance, but such prepared questions are designed to be sufficiently open that the subsequent questions of the interviewer can't be planned in advance but must be improvised in a careful and theorized way" (Wengraf, 2001).

The most common type of interview used in the Information Systems field is semi-structured; which allows the researcher to explore a social situation in depth (Myers and Newman, 2007). In brief, in semi-structured interviews there will be a set of questions, but the respondent is given the opportunity to speak freely about the issues in question.

An NVivo12 software program was utilized to analyse the interviews, due to advantages such as identifying patterns in the data that can lead to more subtle themes being generated. The program easily analyses qualitative data without the detail being lost (Bazeley and Richards, 2000). According to Cavana et al. (2001), this software program is appropriate for analysing data generated by unstructured or semi-structured interviews; and is well-suited for use with a small quantity of recorded and transcribed interviews, hence it is one of the most commonly used programs.

#### **4.10.1 Interview Design**

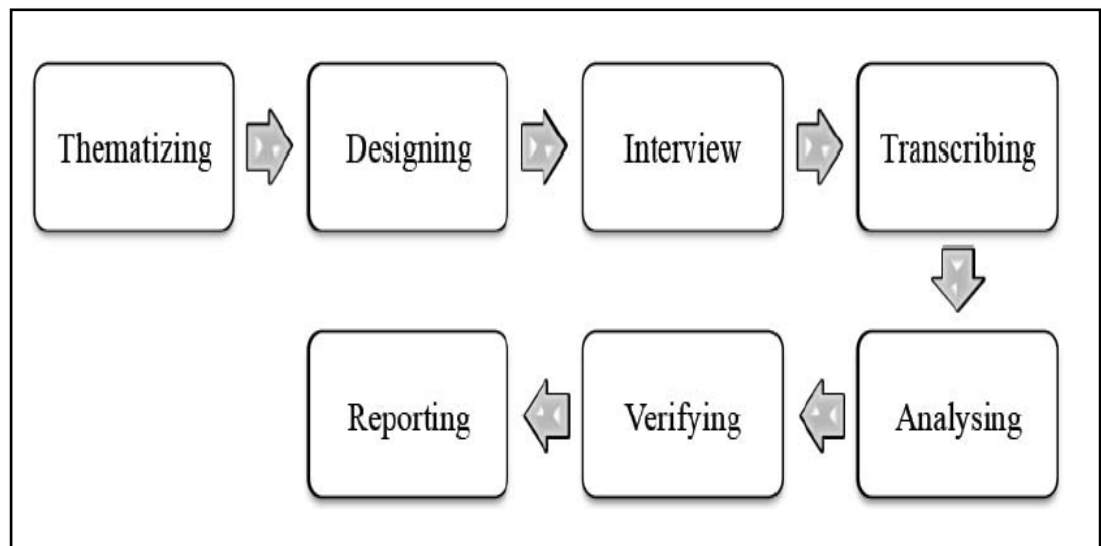
As already mentioned the semi-structured interview lies between the structured and unstructured interview types, whereby a set of questions is used by the interviewer, but the respondent is encouraged to add details, speak freely and can ask questions. Questions can be asked in the most appropriate order and additional prompts such as "Can you tell me more about that?" may be introduced.

In this section, all stages of the interview design will be briefly explained. The main aims of conducting the interview are to enable the researcher to understand in depth the proposed factors that could influence Saudi citizens' intention to adopt and use m-government services and to identify other factors not in the proposed model from a managerial perspective. Interview analysis also allows a comparison of the theoretical findings with actual practice. Moreover, this strategy was used to provide a managerial perspective about the influence of factors affecting behavioural intention to adopt and use m-government and to reinforce the research results with these additional findings.

Kvale (1996) recommended that an interview design should comprise seven stages, which are shown below in figure 4-4. These stages can be described as: thematising, designing,

interviewing, transcribing, analysing, verifying and reporting.

The first of these stages is thematising; which addresses what is to be studied, how and why it is to be investigated. The main purpose of conducting semi-structured interviews was to answer the question: 'What are the key factors that impact citizens' intention to adopt and use m-government services in Saudi Arabia'. This thematising thus describes what concepts are to be explored and is carried out before any interviews are conducted. So as all interview questions were based on the previously conducted survey, the themes of interviews were previously identified. In the final stage of conducting the interview, an assessment is made about whether the themes should remain or be further refined if necessary. Kvale (1996) suggests that stage 2 of the research design should involve preparation of the interview schedule and making all the practical arrangements that need to be in place before conducting the interviews. Figure 4.4 shows the plan made at this point for all the following stages of the qualitative part of this research.



*Figure 4-4: Seven stages of interview (Source: Kvale, 1996)*

#### **4.10.2 Interview Pilot Study**

The interview questions were translated into the Arabic language since it is the native language of the participants. After collecting the data, it was translated into English for analysis. Before conducting the main interview in Saudi Arabia, the pilot study was conducted in the UK with five Saudis. The main reason for conducting the pilot study was to check the research questions were doing the job they were designed to do, to see how long it would take to answer the questions and whether the questions were clear and unambiguous. Also, numerous academics, all of whom had expertise in the field, were asked to review the interview questions. All the

amendments suggested for the interview questions by feedback from both participants and the academics allowed the researcher to make improvements to the interview questions.

#### **4.10.3 Conducting the Interviews**

In this study, face-to-face interviews were adopted to collect qualitative data from eight managers in Saudi ministries. All interview questions were based on the previously conducted survey because this process was mainly used to explore these factors from different perspectives (see Appendix B).

At the interview, interviewees were asked if the interview could be taped; thus, if they refused, or ask for the tape to be turned off during the interview, the researcher could make use of notes. Interviewees were given the researcher's email so that they could be in contact if they had any queries or if they wanted an Arabic transcript of the interview once this had been completed. Interviewees were told that recordings would be kept securely and destroyed when no longer needed. The questionnaires and the interview questions were translated into Arabic, since it is the native language of the participants. After collecting the data, it was translated into English for analysis.

The interviews started in January 2018 and ended in April; and were conducted in eight ministries with key officials responsible for implementing E-government and m-government services. These ministries are considered the most important ministries in Saudi Arabia and Saudi citizens deal with them on a daily basis. All the interviews were between 40 and 60 minutes long; and all were taped, apart from in one ministry where the answers were written down and sent by email. All the interviews took place in the Riyadh, the capital of Saudi Arabia. Other ministries were approached for interviews, but these refused. However, all the directors were very interested and cooperative. Interviewees were told that recordings would be kept securely and destroyed when no longer needed. Interviewees had been told that interview would not take more than 60 minutes of their time; and all had been given written information explaining what the study is for and asked to sign a consent form before participating. A mobile device was used to tape the interview. Recording the interview with an iPhone device allows the researcher to focus on communication with participants, and the data it yields is more accurate and less biased than just note-taking. During the interview, the researcher took some notes regarding both the important factors proposed in the MGAUM or and those not in the model, to identify other factors managers considered important.

#### **4.10.4 Transcription and Translation**

In order to encode the collected data ready for analysis, researcher transcribed the audio-taped interviews and written notes into Arabic. After this, the Arabic transcription was translated into

an English language version. Each interview's professionally produced transcript was saved in a separate word processor document.

#### **4.10.5 Data Analysis for Phase Two**

Phase 2 of the research used thematic analysis, which Boyatzis (1998) defines as a means of identifying, analysing and reporting patterns (themes) contained in qualitative data. Flexibility is a major advantage of this method; however, meticulous preparation and execution is needed; and the central role of the researcher in determining which themes are selected needs to be recognised (Braun and Clarke, 2006).

The analysis can be done inductively or deductively. The latter process uses a theory based on a proposed model, such as the MGAUM in this study, which provides a basis from which to derive propositions that need to be tested (Saunders et al., 2009; Yin, 2003). For deductive analysis the main themes that are to be identified in the data are decided in advance and the interview questions actively generate them.

Deductive analysis is limited in that it does not address major themes contained in the data that were not in the original proposed model. This can be offset by using inductive analysis where these other themes can be identified in the data. Saunders et al. (2009) point out that this facilitates a better match between the actual perceptions of the participants and the final theory that emerges; and that consequently both approaches are often used in thematic analysis. Accordingly, this was done in the current study.

#### **4.10.6 Validity and Reliability of the Interviews– Verification Stage**

Although validity and reliability are usually associated with quantitative research, these concepts also apply to qualitative research (Zalah, 2017). However, as these concepts emerge from a positivist perspective they need some redefining if they are to apply to research that has an interpretivist approach (Golafshani, 2003).

All the government managers to be interviewed were informed about the main aim of the research and that a clear plan was devised for all the stages so that they understood how the interview would be conducted, recorded and translated, how their data would be kept private and how it would be processed and analysed. It was also important that this was done consistently for all interviewees as this meant that a degree of auditability and consistency had been established, such that the procedures could be reliably replicated and consistently applied. In qualitative research, reliability is determined by this auditability and consistency (Guba and Lincoln, 1989). Accordingly, seven of the interviews were carried out by the researcher face-to-face, audio-taped and lasted 40 to 60 minutes long. One ministry manager chose to write down his answers to questions and send them to the researcher by email.

The researcher used the following procedures to make sure that both auditability and consistency were applied in each interview:

Before starting the interview, the researcher asked the interviewees if they were willing to have the interview audio-taped. If they refused, or asked for the tape to be turned off during the interview, notes would be used. Interviewees were given the researcher's email so that they could send any queries or request an Arabic transcript of the interview once it had been completed. Interviewees were told that the recordings would be kept securely and destroyed when no longer needed; and that the interview would not take more than 60 minutes of their time to complete. All interviewees were given written information explaining the purpose of the study and asked to sign a consent form before participating. A mobile device was used to tape the interview; as taping the interview gave the researcher more freedom to interact with the interviewees; also the data is a more accurate and less biased record of the interview than just a noted account. During the interview, the researcher took notes regarding important factors that managers felt affected citizen's adoption of m-government that were proposed in the model. Especial note was made of any factors mentioned that were not in the proposed model.

The validity of information obtained from interviews can be assessed by the comparisons with other sources of data. In our case, this was generally achieved by comparing the interview findings with the results of the survey (Emory and Cooper, 1991; Sekaran, 2003). To further ensure validity the researcher asked the interviewees to check the key points that had been noted during the interview to avoid any discrepancies, as recommended by Irani et al. (2005). This procedure ensured that key points recorded by the researcher properly reflected the attitudes and experiences of the managers. This means of making the findings more credible, corresponds to the 'internal validity' that is aimed at in quantitative research (Sandelowski, 1986).

#### **4.11 Ethical Considerations**

The research was conducted according to the ethical requirements of the University of Sussex and the Ethics Committee issued a certificate of approval before the field study could begin (see Appendix H). Details of the steps taken to comply with the ethical requirements are given for both phases of the research: Section 4.8.7 details the steps taken to ensure ethical treatment of survey participants, Appendix B shows the information sheet given to participants, Appendix F shows the consent form and appendices I, J and K the wording used to invite citizens to participate in the survey by email, Twitter and WhatsApp respectively. Sections 4.11.3 and 4.11.4 detail ethical considerations for conducting the semi-structured interviews and storing the tape-recordings, Appendix D shows the information sheet for government sector participants and Appendix G the consent form for interviewees.

#### **4.12 Conclusion**

This chapter has outlined the process of conducting the field research in this study from the underlying philosophical paradigms to the final gathering of primary data. Justifications have been given for the approaches and methods selected. The findings from the first phase of the study are discussed in the next chapter.

## 5 Chapter Five: Data analysis and discussion from the citizens' perspectives

### 5.1 Introduction

This chapter provides an overview of respondents' demographic characteristics: age, education level, occupation, use of mobile and the internet, knowledge of m-government before participating, experience and how they rate using m-Government. Also, a descriptive analysis for each factor proposed in the MGAUM is given in order to explain their impact on citizens' intention to adopt and use m-government services in Saudi Arabia. Moreover, this chapter provides a discussion of the statistical analysis of the results and an evaluation of the hypotheses about the relationship between the dependent factor (Intention to use m-government service), and independent variables (the factors), to determine which of the hypotheses will be accepted or rejected. In this study, Pearson's correlation coefficient was used to assess the relationship for all factors.

#### 5.1.1 Demographic data for the citizens' sample

At the beginning of the questionnaire, respondents were requested to provide their demographic data. The following section provides a description of all the demographic data:

##### *Participants' Gender*

*Table 5-1: Gender distribution of the sample*

<b>Gender</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	813	63.2	63.2	63.2
	Female	473	36.8	36.8	100.0
	Total	1286	100.0	100.0	

Table 5.1 illustrates that 1286 participants took part in the questionnaire; 813 participants were male (63.2 %) and 473 were female (36.8 %). In general, the response rate of participants was generally excellent, and the main reason was that the questionnaire was distributed electronically (via Email, Twitter and WhatsApp) and manually in different cities in Saudi Arabia. The questionnaire was distributed to public users in government agencies, some universities and public areas such as parks, cafes and shopping centres. Most participants sent back an electronic version of the questionnaire (via Email, Twitter and WhatsApp). The few manual questionnaires that were returned were inadequately completed and therefore discarded. From the researcher's perspective, the most successful strategy to publish the questionnaire was electronically. To our knowledge, very few male researchers in Saudi Arabia have had such a



large number of female participants in their studies. The electronic version of the questionnaire rather than the hard copy helped me to acquire a large number of female participants because one of the obstacles and challenges in this study was collecting data personally from female participants. In general, male researchers in Saudi Arabia face a big challenge if collecting data personally from female participants. However, it appears that with the electronic version, this problem has been resolved.

Although the male participants were double that of the female participants in the sample, it is still representative of the current target population. Males usually carry out government transactions and services rather than females; however, the number of transactions by females conducting government transactions looks set to increase. This is because currently the government of Saudi Arabia has allowed females to conduct their government transactions and services, such as obtaining ID cards, passports and driving licenses, by themselves without any permission or authorisation by one of their male family members. Before that, any female needing to conduct any government transactions, needed authorisation from one of her male relatives, like her father, brother, husband or son, who conducted and completed her transactions on her behalf. Therefore, although there are now more males accessing and conduct government services than females, the percentage of females accessing and conducting government services are expected to shortly be very close to the percentage of males.

### ***Participants' age groups***

*Table 5-2: Participants' age groups*

		<b>Age</b>			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18 - 30	692	53.8	53.8	53.8
	31 - 45	512	39.8	39.8	93.6
	46 - 60	76	5.9	5.9	99.5
	Over 60	6	.5	.5	100.0
	Total	1286	100.0	100.0	

Table 5.2 shows that the highest percentage of participants were aged 18 - 30 years, which in this sample is more than half the total number of participants; Moreover, the table shows and that the smallest groups who participated in this study, were aged 46 - 60 and especially the over 60s. There are several possible reasons for this. Firstly, some data collection took place in shopping centres, which are not heavily frequented by the over 60s in Saudi Arabia; and secondly, elderly Saudis commonly authorise a relative to complete their government transaction. As a result, it was difficult to have direct contact with many members of this age cohort. Moreover, in government agencies, elderly customers usually have priority in accessing government services; and since they have quick service they do not congregate in the waiting

areas. Also, another reason that prevented elderly participants and some others to complete the survey in this study was that the survey was too long. Table 5.3 below shows that the sample is however quite representative, most Saudi citizens being aged 15 to 54 (GASTAT, 2018a).

*Table 5-3: Saudi Arabia's population by age, Groups, and Gender* (General Authority for Statistics (GASTAT) Saudi Arabia, 2018a).

Age structure	Percentage
0 – 14	30.33%
15 – 24	18.65%
25 – 54	41.26%
55 – 64	5.57%
65 years and over	4.19%
Total	100.00%

### *Participants' educational level*

*Table 5-4: Participants' Educational Level*

What is your education level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Secondary school or less	222	17.3	17.3	17.3
	Diploma	330	25.7	25.7	42.9
	Bachelor degree	484	37.6	37.6	80.6
	Master degree	183	14.2	14.2	94.8
	Doctorate degree	67	5.2	5.2	100.0
	Total	1286	100.0	100.0	

Table 5.4 illustrates that there are five groupings by educational level in this research. The highest percentage of participants (37.6%) hold a Bachelor degree, 25.7% have a Diploma and 17.3% of them a secondary school certificate or lower. Approximately 19 % of participants hold a graduate degree of which 14.2% have a Masters and 5.2% have a PhD.

### *Participants' Occupation*

*Table 5-5: Participants' Occupation*

What is your occupation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unemployed	110	8.6	8.6	8.6
	Student	462	35.9	35.9	44.5
	Governmental employee	600	46.7	46.7	91.1
	Private sector employee	88	6.8	6.8	98.0
	Self employed	26	2.0	2.0	100.0
	Total	1286	100.0	100.0	

Table 5.5 illustrates that close to half the participants (46.7%) were government employees, followed by student participants (35.9%) with the rest of the participants (17.4%) divided between the unemployed, private sector employees and the self-employed. Many people in Saudi Arabia hold government jobs; which explains the large number of government employees who participated in this research.

### ***Mobile phone ownership***

*Table 5-6 : Participants' mobile phone devices*

		Frequency	Percentage (%)
Do you have a mobile phone?	Yes	1280	99.5
	No	6	.5
What kind of mobile device do you have?	Smartphone	1274	99.1
	Non – Smartphone (Traditional phone)	6	.5
What brand of mobile device do you have?	IPhone – IOS	974	75.7
	Samsung – Android	237	18.4
	Windows Phone	6	0.5
	Nokia	3	0.2
	Other brands of mobile	60	4.7

Most participants in this study (99.5 %) had Smartphone devices with only .5% having a non – Smartphone (i.e. traditional phone). These results confirm the high penetration of mobile devices discussed in section 1.2.

### ***Participants' skills in using a mobile***

*Table 5-7: Participants' skills in using mobile devices*

How do you rate your mobile skills overall?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No skills	30	2.3	2.3	2.3
	Beginner	34	2.6	2.7	5.0
	Intermediate	502	39.0	39.2	44.2
	Advanced	714	55.5	55.8	100.0
	Total	1280	99.5	100.0	
Missing System		6	.5		
Total		1286	100.0		

Table 5.7 illustrates that the majority of participants rated their skills in using mobile devices as intermediate or advanced (39% and 55.5% respectively). The high level of proficiency in using

mobile devices is likely due to the ease of using of mobile devices compared to computers, and the high educational level of most participants (see Table 5.4). Therefore, it was to be expected that participants would have a good knowledge and experience in using mobile devices.

### ***Frequency of mobile use***

*Table 5-8: Frequency of mobile use*

How often do you use a mobile?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	1234	96.0	96.4	96.4
	Two or three times a week	34	2.6	2.7	99.1
	Two or three times a month	12	.9	.9	100.0
	Total	1280	99.5	100.0	
Missing System		6	.5		
Total		1286	100.0		

Table 5.8 illustrates that the great majority of participants (96.0%) use mobiles daily. Over the last few years, mobile devices, especially Smartphones, have become an essential part of Saudi citizens' lives. These Smartphones are not just phones but are more like portable mini-laptops; characterized by speed and extensive memory, they can do many tasks and perform efficiently. Through mobile applications and internet connection communication has become easier, more accessible and faster; therefore, the result that the majority of participants would be using mobile devices on a daily basis was expected.

### ***Participants' rate of Internet use***

*Table 5-9 : Participants' rate of Internet use*

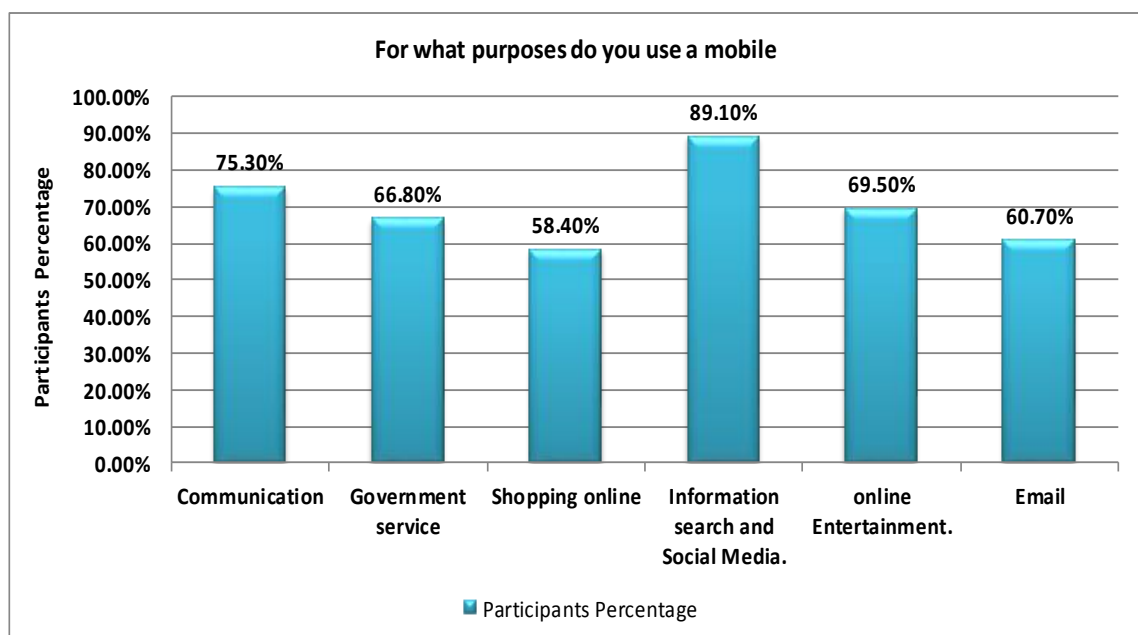
How often do you usually use the Internet?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Everyday	1200	93.3	93.8	93.8
	Several days a week	54	4.2	4.2	98.0
	Several days a month	17	1.3	1.3	99.3
	Never use the Internet	9	.7	.7	100.0
	Total	1280	99.5	100.0	
Missing System		6	.5		
Total		1286	100.0		

Table 5.9 shows that a large majority of participants (93.3%) generally use the internet daily. With the development of ICT (information and communication technology) in general and particularly with the development of modern technologies such as computers, Smart devices, Smartphones and Tablets, the use of the internet has branched out. The internet has become

more influential in the details of people's daily lives to the point that for many it can no longer be dispensed with. A person without the internet has become isolated from the virtual world, and losing connection with it can be serious, especially if employment is entirely dependent on it. The internet is relied on to carry out many activities in daily life such as studying, searching for information, emailing, using social media and communicating. Through mobile applications and internet connection communication has become easier, more accessible and faster. Therefore, this result –that most participants would be using the internet on a daily basis, was expected. The high rate of internet use indicated in this study suggests that participants are able to make use of online services, including m-government services, and that such use could become part of their daily lives.

#### ***Participants' reasons for using a mobile device***

The participants were asked about their primary purpose for using mobile devices. The options included communication, using a government service, shopping online, information search and social media, online entertainment and Email. Each participant could choose as many options as they wanted. Figure 5-1 below reveals that most participants use mobiles for a variety of daily activities. Figure 5-1 shows that 89.1% use mobiles for 'Information search and Social Media', making it the most popular reason for mobile use. The 'Communication' option was selected by 75.3% of the sample, followed by 'Online Entertainment' (69.5%); the 'Government Services' option was selected by 66.8%, which indicates that most participants in this sample are already happy to use m-government services. The 'Email and Shopping Online' options were selected by 60.7% and 58.4% of participants respectively.



*Figure 5-1 : Participants' purposes in using mobile devices*

### ***Availability of m-government services applications for mobile devices***

*Table 5-10 : Availability of m-government services applications on mobile devices*

Are m-government services applications available on your mobile devices such as iPhone (IOS), Samsung (Android) and Windows Phone or others?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1152	89.6	90.0	90.0
	No	128	10.0	10.0	100.0
	Total	1280	99.5	100.0	
Missing System		6	.5		
Total		1286	100.0		

The participants were questioned about the availability of m-government services applications on their mobile devices. The research indicates that the majority of the participants (89.6%) said that mobile government services applications were available via their mobile devices; whereas only 10.0% of the total sample reported that they were not. Mobile government services (applications / Website) are available for all Smartphones such as iPhone - IOS, Samsung - Android, Windows Phone and other brands. However, not all ministries provide applications (See Table 5.10).

### ***Participants' knowledge about the term 'm-government'***

*Table 5-11: Participants' knowledge of the term 'm-government'*

Participants' knowledge of the term 'm-government, before participating in this questionnaire					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	986	76.7	77.0	77.0
	No	294	22.9	23.0	100.0
	Total	1280	99.5	100.0	
Missing	System	6	.5		
Total		1286	100.0		

The results indicate that approximately three-quarter of the respondents (76.7%) know a certain amount about m-government services in Saudi Arabia, whereas 22.9% of the respondents did not know the meaning of the term 'm-government' prior to participating in the survey. Also, that respondents know about m-government services in Saudi Arabia does not always indicate that they have used them, but at least a large majority knew its meaning. Defining the term 'm-government' for participants was necessary if the survey was to obtain precise information about the factors that influence their intention to adopt and use m-government services (See Table 5.11).

***Participants' willingness to know more about m-government services***

*Table 5-12 : Participants' willingness to know more about m-government*

Do you have a willingness to know more about m-government services?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1166	90.7	91.1	91.1
	No	114	8.9	8.9	100.0
	Total	1280	99.5	100.0	
Missing System		6	.5		
Total		1286	100.0		

Table 5.12 shows that the great majority of participants (90.7%) were willing to know more about m-government including its benefits, services and potential, whereas 8.9% of the respondents did not. It is probable that the participants who were unwilling to know more about m-government services, maybe thought that they knew enough already, or they did not intend to use m-government services. The great willingness to know more about m-government benefits, services and potential is possibly due to a lack of awareness of advertising campaigns by m-government service providers. An interviewee from the Ministry of Justice stated that there were three aims for a Smart government when advertising government services to citizens: Firstly, to raise awareness and provide citizens with information about m-government services on their favourite channels and social media; secondly, to explain who can use the services and who the target of these services is and thirdly, to get feedback from citizens regarding these services.

***Participants' use of online services (government and non-government)***

*Table 5-13: Participants' use of online services (government and non-government)*

		Frequency	Percentage (%)
Have you ever used any Saudi mobile government service (Application /Website) such as the Absher services from the Ministries of the Interior or Education and universities?	Yes	1164	90.5
	No	116	9.0
What are the reasons that prevent you from making m-government transactions? (You can choose more than	I do not have a Smartphone	4	0.3
	I do not have the internet	11	0.9
	m-government services applications are not available for my mobile	26	2.0

one answer)	devices		
	I do not trust m-government services	43	3.3
	The government transactions that I need are not available through m-government	43	3.3
How do you rate your experience of using m-government in general?	Very Satisfactory	518	40.3
	Satisfactory to some extent	570	44.3
	Not Satisfactory	76	5.9
What are the reasons that made your m-government experience unsatisfactory?	The requirements of the intended m-Services were not clear	290	22.6
	System quality not good	342	26.6
	I did not get the expected results	153	11.9
	The difficulty of using m-government services	268	20.8
	Other reasons	46	3.6
Have you ever used online services other than m-government (such as mobile online banking, booking hotels and flights...? etc.)?	Yes	1124	87.4
	No	156	12.1
How do you rate your experience of using non-government online services in general?	Very Satisfactory	665	51.7
	Satisfactory to some extent	430	33.4
	Not satisfactory	29	2.3

Table 5.13 illustrates that the majority of participants (90.5%) had already used m-government services, whereas 9.0% had not. Using m-government services does not just entail applying for government services or completing government transactions, but also involves getting information from government agencies such as their location, opening hours, driving penalties, services provided and requirements for each service.

The survey wanted to obtain reasons that hindered participants from using m-government transactions, and participants were given options or could give their own. The result showed that 0.3% of participants did not have a Smartphone, and 0.9 % of them did not have internet access. Moreover, 2.0% of participants said m-government services applications were not available for their mobile devices. Approximately 3.3% of the participants revealed that they did



not trust m-government services while 3.3% reported that the government transactions that they needed were not available through m-government services.

The survey also asked the participants that had already used m-government services to evaluate their experience of using m-government in general. The result showed that 40.3% were very satisfied with m-government services, 44.3% were satisfied to some extent but 5.9% were not satisfied with m-government services. As to the reasons given for not being satisfied: 22.6% of the participants indicated that the requirements of the intended m-services were unclear; 26.6% of them believed that the system quality of m-government services was not good; 11.9% revealed that they did not get results they expected from using m-government services and 20.8% reported that they faced difficulties when using m-government services. Furthermore, 3.6% of the participants listed the following problems: attaching documents, adding more services through m-services (because some services are not offered via mobile devices, especially applications), the difficulty of registering and logging in to m-government services and internet problems. Customer services and technical support were considered slow and inadequate, some government agencies required a hard copy of documents and visiting the government agency to complete the electronic government transaction and some applications are not compatible with the features of mobile devices. Further difficulties that were mentioned included essential documents needed to complete the transaction not being shown or sufficiently described; a lack of advice and examples of how to use the services and the services themselves not being properly described.

Regarding the use of non-m-government online services, such as mobile online banking, booking hotels and flights, Table 5.13 illustrates that 87.4% of participants have made use of non-m-government online services; however, around 12.1% have not used them. The survey also asked the participants that had already used non-m-government services to rate their experience of using these services in general. The result showed that 51.7% were very satisfied, 33.4% were to some extent satisfied whereas only 2.3% were unsatisfied with these online services.

## **5.2 Descriptive analysis of the proposed factors from the citizens' perspective**

This section provides a descriptive analysis for each factor proposed in the MGAUM to explain their impact on citizens' intention to adopt and use m-Government services in Saudi Arabia. Participants' attitudes, intentions and behaviour towards adopting and using Saudi m-government services were explored by means of responses to statements for which Likert scores could be calculated. In order to interpret participants' responses for each factor, average values were calculated so that the influence of each factor in the MGAUM could be assessed

separately.

### 5.2.1 Practical factors (PF)

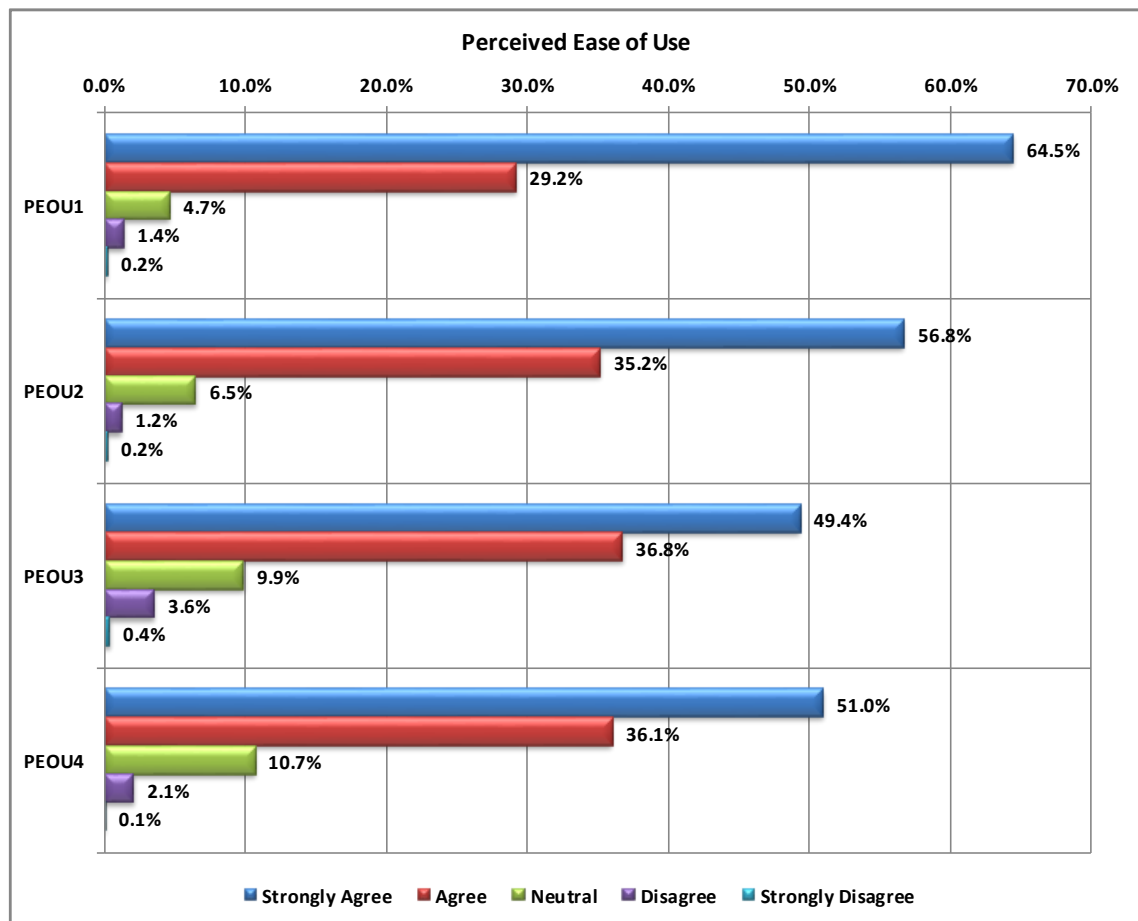
Based on the research model (MGAUM), there are two practical factors, which are Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). The following sections summarises the findings of the descriptive analysis with interpretations of the results for all factors. There is also a guide that interprets the results of the descriptive analysis (see Chapter 4, Table 4.2).

#### 5.2.1.1 Perceived Ease of Use (PEOU)

In this survey, four items were used to measure Saudi citizens' (public users), PEOU, another factor in the MGAUM model. This factor comprises users' perceptions about the ease of using m-government services, and how this would encourage their intention to use them. As for all the other factors in the MGAUM all items were measured with a 5-point Likert scale (from 'Strongly agree' to 'Strongly disagree'). All measuring items for PEOU are shown in Table 5.14, the findings presented in Figure 5-2 and the results briefly discussed.

*Table 5-14: The items measuring PEOU factor*

Constructs	Items	
	code	Statements
Perceived Ease of Use	PEOU1	"Learning to use mobile government services would be easy for me."
	PEOU2	"I believe my interaction with mobile government services to access government services would be clear and understandable."
	PEOU3	"Using mobile government services does not require a lot of skills and effort."
	PEOU4	"I believe that mobile government services are easy to use."



*Figure 5-2: The results of items measured PEOU factor*

In item **PEOU1**, the participants were asked whether learning to use mobile government services would be easy for them. Figure 5-2 shows that the vast majority of participants (93.7%) reported it would, while 4.7% of them were neutral, and 1.4% disagreed. The total Likert score for this item was 1.44, which indicates a highly positive perception of ease of use for m-government services.

The participants were also asked (item **PEOU2**), whether their interactions with mobile government services to access government services would be easy to understand. The results in Figure 5-2 showed that 92% of the participants agreed; in contrast, far fewer participants were neutral or disagreed (6.5% and 1.4% respectively). The item's score was 1.53, which indicates that citizen users' believed interaction with m-government services would be easy to understand.

Responses to item **PEOU3** that stated "Using mobile government services does not require a lot of skills and effort" indicated that 85.2% of participants agreed, 4.0% disagreed and 9.9% of the participants were neutral. The total score of the item was 1.69 which indicates that citizens believe that using m-government services does not necessitate a lot of skills and effort.

In item **PEOU4**, the participants were questioned about their beliefs that mobile government services are easy to use. Figure 5-2 illustrates that a large majority of participants (87.1%) agreed; while 10.9% of them were neutral and only 0.4% disagreed. The total Likert score for this item was 1.64.

The composite of the PEOU factor was 1.5741, which indicated that PEOU is very influential on users' adoption and use. When the composite score was tested against outliers, as was done with every factor, seven cases were revealed; and the re-calculated score was 1.5733. The difference is minimal, indicating that outliers did not strongly influence the results.

#### 5.2.1.2 Perceived Usefulness (PU)

The PU factor in the MGAUM model was measured by asking Saudi citizens (public users) seven items in this survey; and all the items were designed, to gather users' perceptions about the potential advantages of using m-government services. All items perceived usefulness are shown in Table 5.15, the statistical results are presented in Figure 5-3, and the findings briefly discussed.

*Table 5-15: The items measuring PU factor*

Constructs	Items	
	Code	Statements
<b>Perceived Usefulness</b>	<b>PU1</b>	"Using mobile government services would be useful in my daily life."
	<b>PU2</b>	"Using mobile government services would enable me to accomplish government transactions more quickly."
	<b>PU3</b>	"I think that using mobile government services saves me time, money and effort and enables me to perform transactions away from my location."
	<b>PU4</b>	"Using m-government services would make the communication between a government agency and citizens easier through text message, its applications and e-mail."
	<b>PU5</b>	"The ability to perform government transactions 24 hours/7 days will encourage me use m-government services more."
	<b>PU6</b>	"I think using m-government services would save me multiple visits to different agencies when performing my transactions."
	<b>PU7</b>	"I believe that using mobile government services will remind me of important dates for conducting government transactions in sufficient time or at the right time."

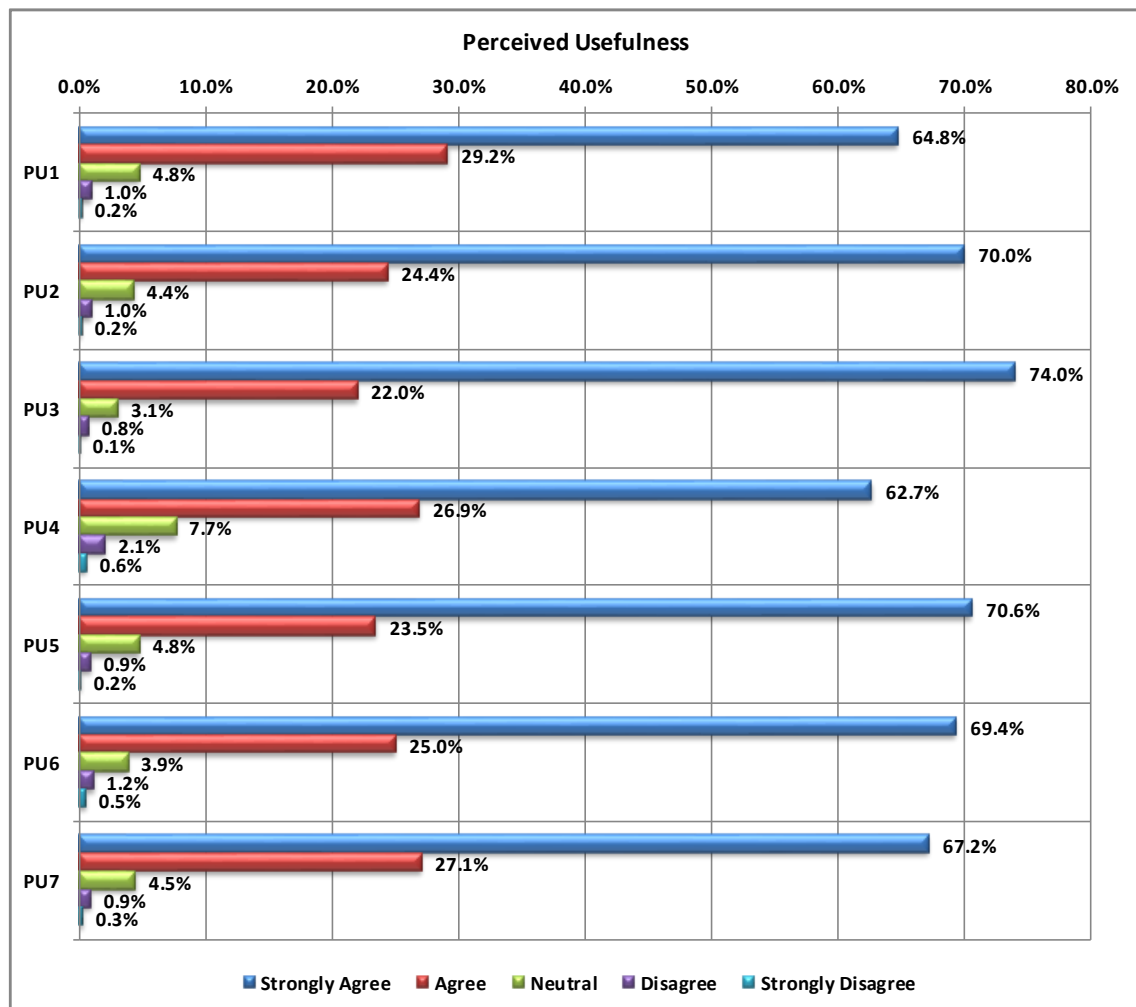


Figure 5-3: The results of items measuring PU factor

Participants were asked whether they considered using mobile government services would be helpful in their everyday life (item PU1). Figure 5-3 illustrates that a large majority of participants (94%) agreed they would, while 4.8% of them were neutral and 1.2% disagreed strongly. The total score for this item was 1.43, which indicates that participants' perceptions about the benefits to be gained from using m-government services were highly positive. In item **PU2**, participants were asked if they thought using mobile government services would enable them to carry out government transactions more quickly. Figure 5-3 shows that most participants (94.4%) agreed that they would, while 4.4% of them were neutral and 1.2% completely disagreed. The total score for this item was 1.37, and this demonstrates a high level of agreement that the use of m-government services would speed up government transactions.

In item **PU3**, the participants were asked if they thought that using mobile government services would save them time, money and effort and enable them to perform transactions when far from their location. Figure 5-3 illustrates that 96% of participants agreed it would, while 3.10% of them were neutral, and 0.9% disagreed. The total score for this item was 1.31, and this declares

a high level of agreement by participants that the use of m-government services would save time, money and effort, and enable them to conduct transactions far away from their location.

In item **PU4**, participants were asked if they believed using m-government services would make communication between a government agency and citizens easier through text message, applications and e-mail. Figure 5-3 shows that the vast majority of participants (89.6%) concurred with this statement, while 7.7% were neutral and 2.7% disagreed. The total score for this item was 1.51, indicating a high level of agreement that the use of m-government services would make communication between a government agency and citizens easier through text message, applications and e-mail.

The participants were asked in item **PU5**, whether the ability to perform government transactions 24 hours a day and 7 days a week would encourage them to use m-government services more. The results shown in Figure 5-3 reveal that almost 94.1% of participants agreed it would; and only a very small percentage of the participants were neutral (4.8%) or disagreed (1.1%). The score for PU5 was 1.37, which suggests that providing government services online and making them accessible 24/7 is highly likely to increase their adoption and use.

The participants were also questioned about whether they believed using m-government services would prevent them having to make several visits to different agencies in order to conduct transactions (item **PU6**). Figure 5-3 illustrates that most participants (over 94.4%) agreed with this statement; in contrast, far fewer were neutral or disagreed (3.9% and 1.7% respectively). The item's score was 1.38, which is positively high and indicates that perceiving that m-government saves visiting agencies increases likelihood of adoption and use.

In item **PU7**, the participants were questioned about whether they believed that using mobile government services would remind them of important dates in order to conduct government transactions in sufficient time or at the right time. The result showed in Figure 5-3 that almost 94.3% of the participants agreed, whereas only a small percentage of the participants were neutral or disagreed (4.5% and 1.2% respectively). The item's score was 1.40, which suggests that getting and receiving essential notifications regarding government transaction would probably increase the adoption and use of m-government services.

The composite score for the **PU** factor was 1.3957, indicating that Perceived Usefulness is very influential in increasing the adoption and use of m-government services. There were 25 detected outlier cases which brought the recalculated composite score to 1.3900, which demonstrates that the detected outliers do not strongly influence the results.

### **5.2.2 Human Factors (HF)**

The research model (MGAUM), comprises six human factors, namely, Culture (CULT),

Perceived Trust (PT), Social Influence (SI), Perceived Compatibility (PCOM), Awareness (AW) and Citizen Service Quality (CSQ). The following sections summarises the findings of the descriptive analysis with interpretations of the result for all factors.

#### 5.2.2.1 Culture (CULT)

Seven items were used to calculate the influence of the MGAUM's CULT factor on Saudi citizens' (public users') intention to use m-government services. All the items about CULT were designed to assess its effect on citizen's intention to use m-government services. All items measuring Culture (CULT) are illustrated in Table 5.16, and the results are provided in Figure 5-4 then briefly discussed.

*Table 5-16: The items measuring CULT factor*

Constructs	Items	
	Code	Statements
Culture	CULT1	"Using mobile government services will make me feel more sophisticated and will enhance people's perceptions about me."
	CULT2	"I believe that mobile government systems would reduce the influence of interpersonal networks ( <i>wasta</i> ) on processing individuals' transactions."
	CULT3	"I feel that dealing with the government agencies face-to-face is better than using mobile government services."
	CULT4	"I feel that visiting agencies to track my transactions is better than tracking them online."
	CULT5	"Using mobile government would prevent the negative influence of some uncooperative employees on my transaction."

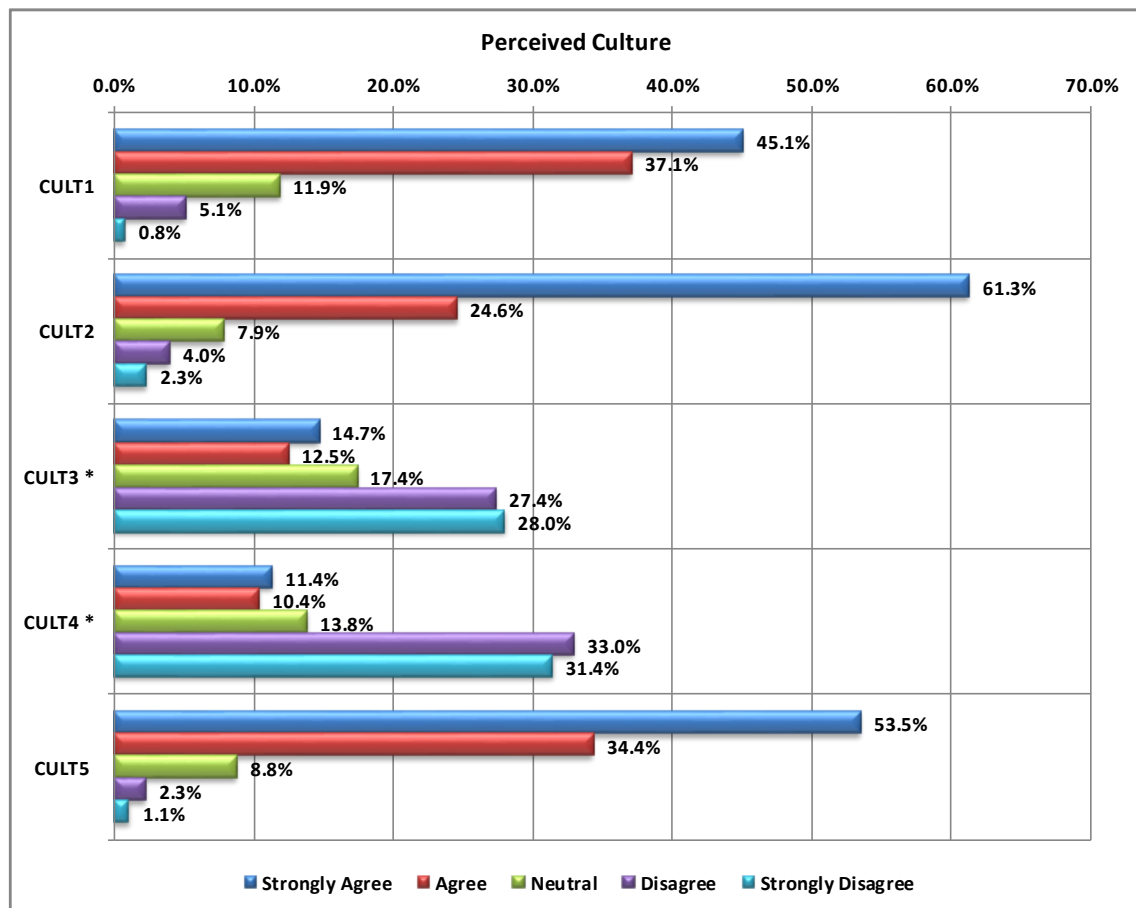


Figure 5-4: The results of items measuring CULT factor

In item **CULT1**, participants were asked if using mobile government services would give them a feeling of being sophisticated, and improve other people's perception of them. Figure 5-4 illustrates that a large majority (82.2%) agreed it would, while 11.9% of them were neutral, and 5.9% disagreed. The total score for this item was 1.79, which indicates that participants' perception about these benefits gained from using services m-government was positive.

In item **CULT2**, participants were asked if they believed that mobile government systems would decrease the effect of *wasta* (nepotism or personal relationships) in the processing of individuals' transactions. Figure 5-4 illustrates that 85.9% agreed it would, 7.9% of them were neutral and 6.3% disagreed. The total score for this item was 1.62, and this indicates a high level of agreement that the use of m-government services would reduce interpersonal networks (*wasta*) on processing individuals' transactions and control this harmful practice.

In item **CULT3**, the participants were asked whether they thought that dealing with the government agencies face-to-face was better than using mobile government services. Figure 5-4 shows that 27.2% agreed that face-to-face dealings were better, 17.4% of them were neutral and 55.4% disagreed entirely. The total score for this item was 2.59, indicating that this is an important aspect of this factor.



Results for item **CULT4** that stated "I feel that visiting agencies to track my transactions is better than tracking them online" showed that 21.8% of participants agreed with that statement, while 64.4% disagreed and 13.8% were neutral. The total score for the items was 2.37, indicating that this aspect is influential.

Participants were asked in item **CULT5** if they believed that using mobile government services would reduce the problem of possible uncooperativeness by some employees during their transaction. Figure 5-4 illustrates that 87.9% agreed it would, 8.8% were neutral and 3.4% disagreed. The total score for this item was 1.63, and this indicates a high level of agreement that the use of m-government services would serve to reduce this problem.

The composite of the CULT factor was 1.9997, a result that indicated that CULT is influential on users' intention to use of m-government services. There were no outlier cases detected.

#### 5.2.2.2 Perceived Trust (PT)

The MGAUM's Perceived Trust factor was calculated for Saudi citizens (public users) with seven items in this survey. All items were designed to calculate the impact of perceived Trust (PT) on citizens' intention to use adopt and use m-government services. All measuring items for PT are provided in Table 5.17, and the findings shown in Figure 5-5 then briefly discussed.

*Table 5-17: The items measuring PT factor*

Constructs	Items	
	code	Statements
Perceived Trust	<b>PT1</b>	"I feel that the internet is not safe to be used for dealing with the government."
	<b>PT2</b>	"I feel that mobile government services are a safe and trustworthy environment in which to conduct my government transactions."
	<b>PT3</b>	"I would hesitate to provide personal information (such as my address, my income... etc.) through mobile government systems."
	<b>PT4</b>	"I trust mobile government services to notify me of important information regarding the status of my government transactions, in sufficient time, by text messages or through its applications."
	<b>PT5</b>	"I expect that mobile government services will not take advantage of me and will protect my privacy such as my personal information and address."
	<b>PT6</b>	"I feel that my data that is stored in mobile government systems can be misused."
	<b>PT7</b>	"I think that government agencies in Saudi Arabia can be trusted to provide trustworthy mobile government services."

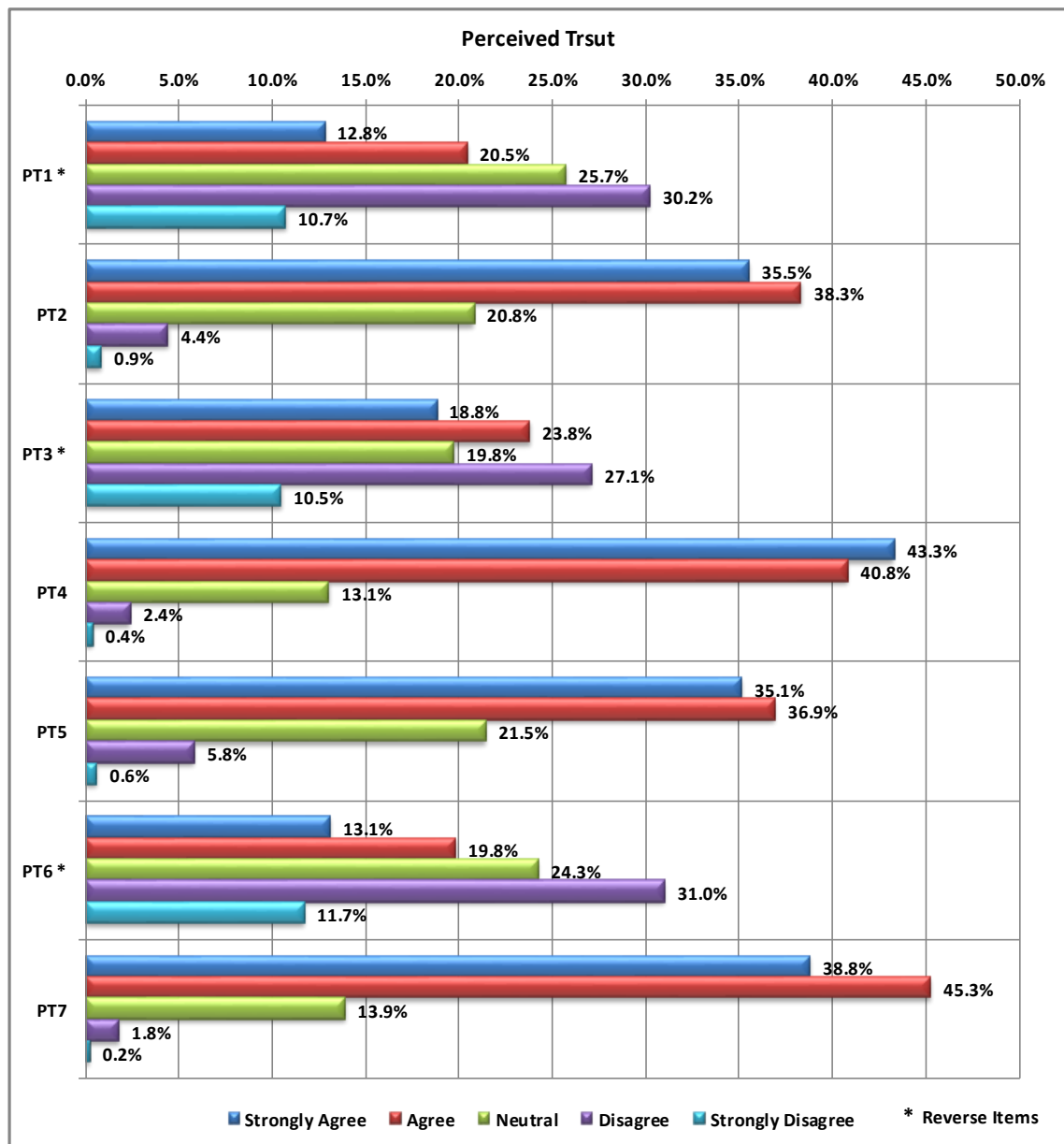


Figure 5-5: The results of items measuring PT factor

In item **PT1**, participants were questioned about whether they perceived the internet was a safe means of dealing with the government. Figure 5-5 shows that 40.9% of participants believed that the internet was safe, 33.3% believed it was not safe, while 25.7% of the participants were neutral. The Likert score for this item was 2.94, which suggests participants did not know or were uncertain about whether the internet was a safe means of interacting with the government.

Participants were asked in item **PT2** if they felt that mobile government service was a safe and trustworthy system in which to conduct government transactions. The result in Figure 5-5 shows that 73.8 % of participants agreed that it was, whilst the percentage of participants who were neutral or disagreed was 20.8% and 5.3 % respectively. The item’s score was 1.97, which indicates that citizens’ perceptions about the trustworthiness and security of the m-government

services environment are highly positive, and this would possibly have a positive effect on citizens' intention to use m-government services.

Figure 5-5 shows that 42.6% of participants agreed with item **PT3** that stated: "I would hesitate to provide personal information (such as my address, my income... etc.) through mobile government systems.", while 19.8% were neutral and 37.6% disagreed with the statement. The Likert score for item 3 was 3.13, which suggests participants did not know or were uncertain about providing personal information through m-government.

In item **PT4**, the participants were asked if they trusted mobile government services to notify them in good time of important information regarding the status of their transactions, by text messages or through applications. Figure 5-5 shows that the vast majority of the participants (84.1%) agreed they would; 13.1% of them were neutral, and 2.8% disagreed. The total score for this item was 1.76, and this suggests that receiving important information regarding the status of government transactions insufficient time by text messages or through its applications is very influential and encourages citizens to use m-government services.

Item **PT5** asked participants about their expectation that mobile government services would not abuse their trust and would protect their privacy, such as personal information and address. Figure 5-5 shows that the vast majority of the participants agreed (72%), with a lower number of participants who were neutral or disagreed (21.5% and 6.4% respectively). The item's score was 2.00, which is positively high.

In item **PT6**, the participants were asked if they felt that personal data stored by mobile government systems could be misused. Figure 5-5 illustrates 32.9% agreed it could; 24.3% were neutral but 42.7% disagreed. The total score for this item was 2.92, and this suggests that the participants were unsure about whether personal data could be misused.

Item **PT7** asks participants if they could trust government agencies to provide mobile government services. The result in Figure 5-5 showed that 84.1% of the participants agreed that they could. In contrast, a lower percentage of the participants were neutral or disagreed (13.9% and 2.0% respectively). The item's score was 1.79.

The composite of the PT factor was 2.3586, with the result indicating that PT is influential on intention to use m-government. There were no outlier cases detected.

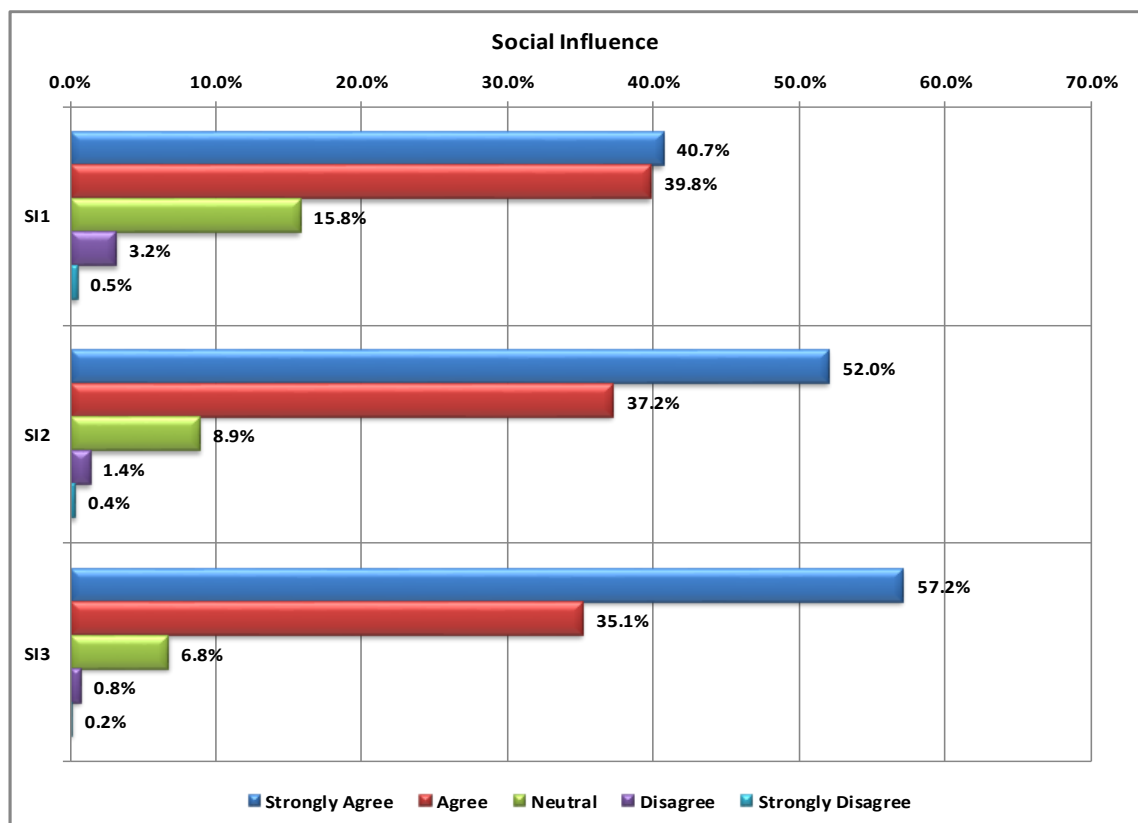
### 5.2.2.3 Social Influence (SI)

Three items measured how the Social Influence factor in the MGAUM affected Saudi citizens (public users). This factor addresses users' perception about the effect of social influence and how this would encourage intention to use m-government services. All items used for measuring Social Influence are shown in Table 5.18; the statistical results for this factor are

presented in Figure 5-6 and then briefly discussed.

*Table 5-18: The items measuring SI factor*

Constructs	Items	
	code	Statements
Social Influence	SI1	“People who are important to me would think that I should use mobile government services.”
	SI2	“The use by my family members and my friends of mobile government services will encourage me to use it.”
	SI3	“It is the current trend to use mobile government services.”



*Figure 5-6: The results of items measuring SI factor*

In item **SI1**, participants were questioned about whether significant others would think that they ought to use mobile government services. Figure 5-6 shows that many participants (80.5%) agreed this was the case, while 15.8% of them were neutral, and 3.7% disagreed. The total score for this item was 1.83, which was positive.

In item **SI2**, the participants were asked whether family members and friends’ use of mobile government services would motivate them to use it. Figure 5-6 illustrates that the vast majority of participants (89.2%) agreed, 8.9% were neutral and 1.8% disagreed. The total score for this item was 1.63, and this suggests that the use of mobile government services by family members

and friends is influential in encouraging citizens' intention to use them.

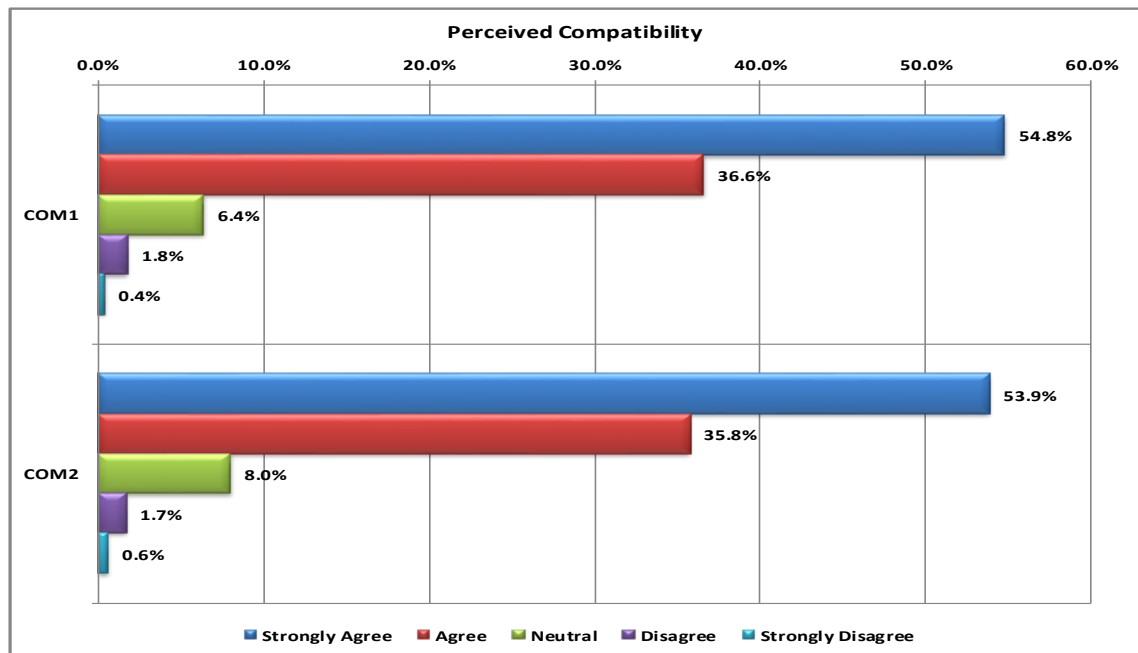
Item **SI3** ask participants if they believed that using mobile government services was the trend. Figure 5-6 illustrates that 92.3 % agreed, 6.8% were neutral and 1.0% disagreed. The total score for this item was 1.52, and indicates a very high level of agreement. The composite of the SI factor was 1.6522, indicating that SI is very influential on users' adoption and use. There were eight detected outliers, bringing the recalculated composite score to 1.6516.

#### 5.2.2.4 Perceived Compatibility (PCOM)

Perceived Compatibility, another factor in MGAUM, was measured by two items in this survey in relation to citizens (public users). This factor focuses on how users perceive about the compatibility of m-government services to their lifestyle and behaviour, and how that compatibility affects and encourages their intention to make use of m-government services. All measuring items for perceived compatibility (PCOM) are shown in Table 5.19 and the results are presented in Figure5-7 then briefly discussed.

*Table 5-19: The items measuring PCOM factor*

Constructs	Items	
	code	Statements
Perceived Compatibility	COM1	"I believe that using mobile government services will fit well with my lifestyle."
	COM2	"I believe that using mobile government services will fit well with the way I like to conduct my government transactions."



*Figure 5-7: The results of items measuring PCOM factor*

Item **COM1** asks participants if they believed that using mobile government services would fit well with their lifestyles. Figure 5-7 illustrates that most participants (91.4%) agreed that it would, 6.4% of them were neutral and 2.2% disagreed. The total score for this item was a very positive 1.56.

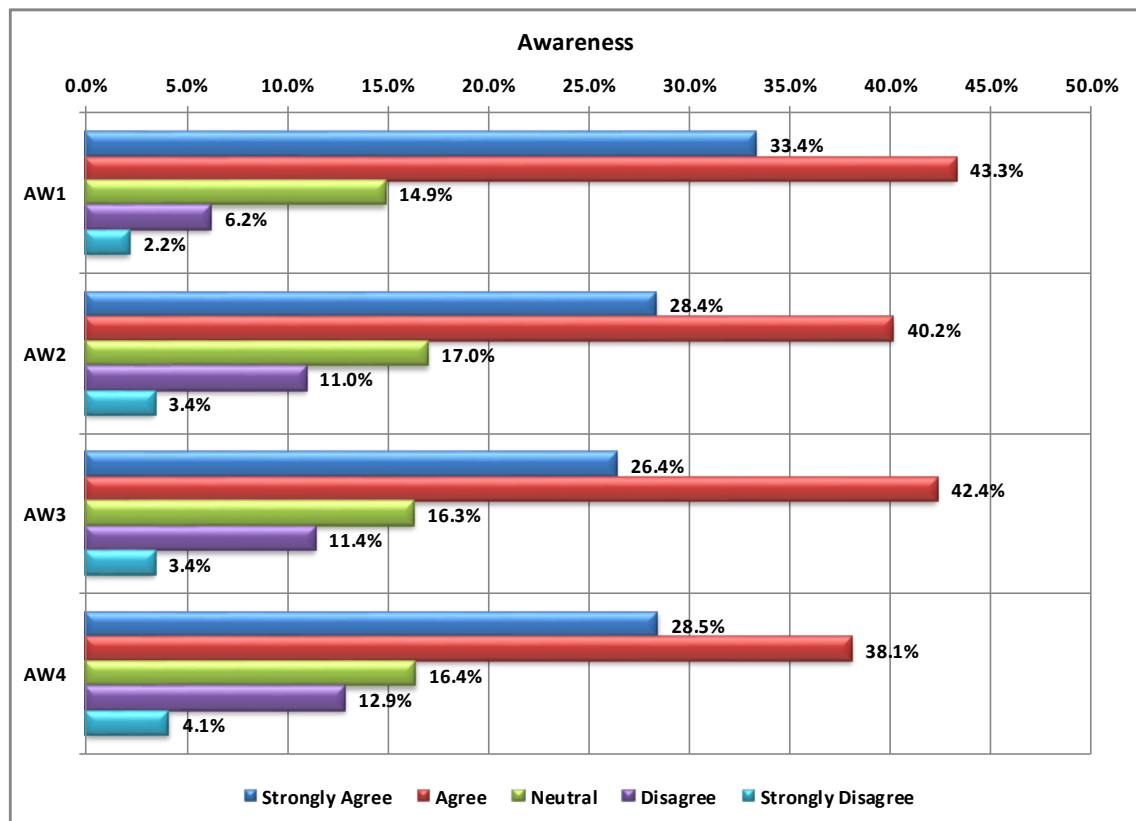
The participants were asked, in item **COM2**, whether they believed that using mobile government services would be a means by which they liked to conduct government transactions. The results shown in Figure 5-7 demonstrate that 89.7% of the participants agreed that it would; in contrast, a small percentage of the participants were neutral or disagreed (8.0% and 2.3% respectively). The item's score was 1.5708, recalculated to 1.5638 after 20 outliers were detected, which indicates that PCOM is very influential on users' intention to use.

#### 5.2.2.5 Awareness (AW)

Four items in this survey were designed to measure the impact of the MGAUM's AW factor on Saudi citizens' (public users) intention to use m-government services. All items measuring Awareness (AW) are shown in Table 5.20, and the results for items about this factor are presented in Figure 5-8 then briefly discussed.

*Table 5-20: The items measuring AW factor*

Constructs	Items	
	code	Statements
Awareness	AW1	"I feel that I have a good knowledge about mobile government services' benefits, features and services."
	AW2	"I think it is easy to find out if a government agency offers its services via mobile devices."
	AW3	"I have received enough information and guidance on how to use mobile government services."
	AW4	"In general, I am satisfied with the current awareness campaigns and advertising about mobile government services in Saudi Arabia."



*Figure 5-8: The results of items measuring AW factor*

Item **AW1** asks participants whether they felt that they had a sound knowledge of mobile government features, services and benefits. Figure 5-8 illustrates that 76.7% of participants thought they did, 14.9% of them were neutral, and 8.4% disagreed. The total Likert score for this item was 2.01, suggesting a positive perceived knowledge of mobile government features, services and benefits.

Item **AW2** asks participants if they thought it was easy to find out if a government agency offered its services via mobile devices. The result shown in Figure 5-8 was that almost 68.6% of participants agreed it was. The percentage of participants who were neutral or disagreed (17.0% and 14.4% respectively) was similar. The item's score was 2.21.

Responses to item **AW3** that stated "I have received enough information and guidance of how to use mobile government services" indicated that 68.8% of participants agreed with the statement, while 14.8% disagreed and 16.3% were neutral. The total score for the item was 2.23.

In item **AW4**, participants were asked whether in general they were satisfied with the advertising and awareness campaigns about mobile government services in Saudi Arabia currently being implemented. Figure 5-8 illustrates that 66.6% were satisfied, while 16.4% of them were neutral and 17.0% were not. The total Likert score for this item was 2.26.

The composite of the AW factor was 2.1763 with the result indicating that AW influences

users' intention to use m-government services. There were no detected outlier cases.

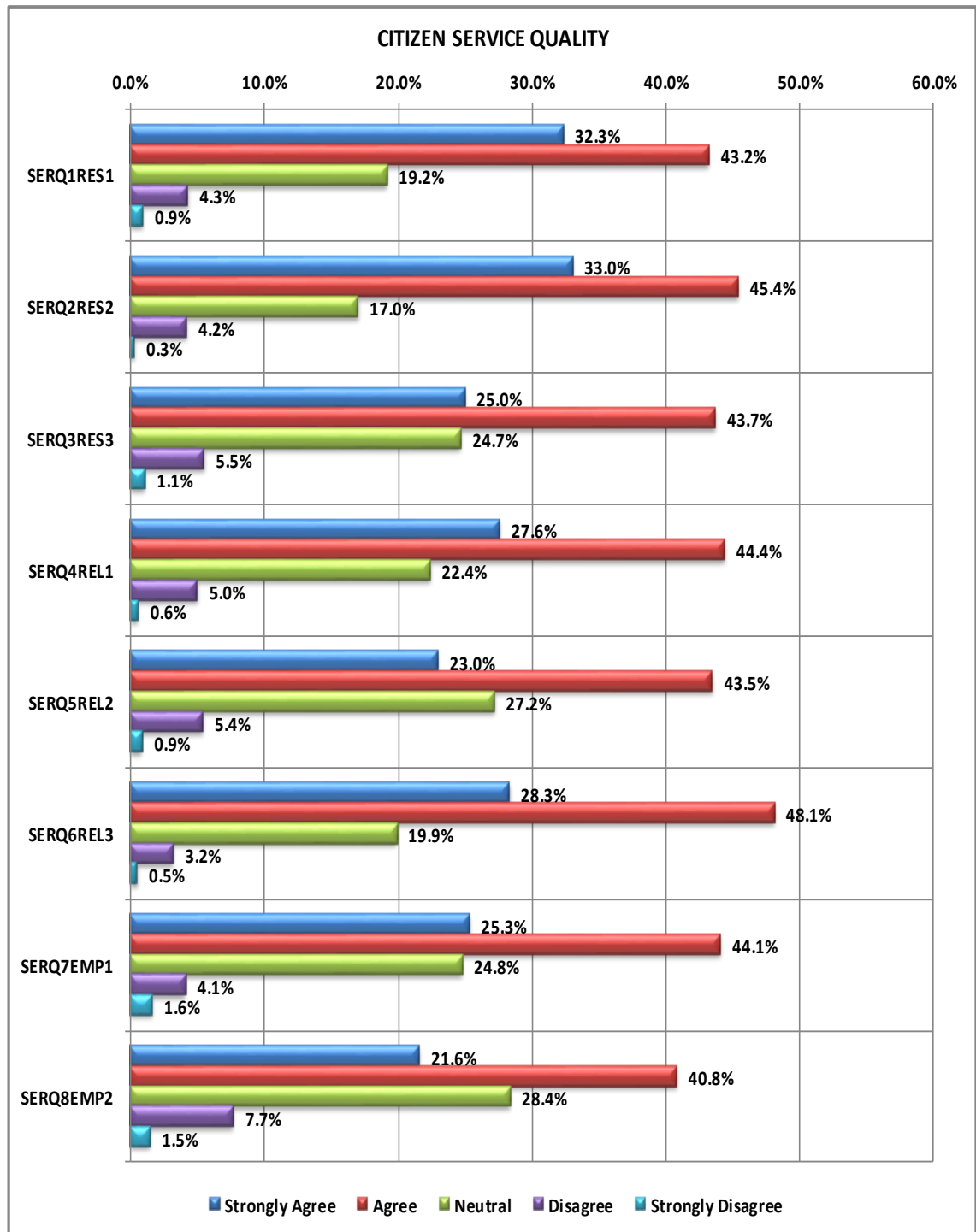
#### 5.2.2.6 Citizen Service Quality (CSQ)

Eight items in the survey were designed to measure the MGAUM model's CSQ factor with Saudi citizens (public users). All items were thus designed to measure customers' evaluation of the overall experience of services and go some way to explaining the difference between users' perceptions and what they expected from the services offered by the government; because delivering high-quality m-government services by the government would help to achieve higher levels of citizen engagement, participation and willingness to use m-government services. All items measuring CSQ are provided in Table 5.21; the results are given in Figure 5-9 then briefly discussed.

*Table 5-21: The items measuring CSQ factor*

Constructs	Items	
	Code	Statements
Citizen Service Quality	SERQ1RES1	"I believe that mobile government services providers give a prompt service with a good response."
	SERQ2RES2	"Mobile government services providers offer helpful assistance through SMS."
	SERQ3RES3	"I believe that mobile government services providers are always willing to help customers."
	SERQ4REL1	"Mobile government services providers provide easy-to-use tools for checking on the status of an ordered service."
	SERQ5REL2	"Mobile government services providers deliver on their undertakings to do certain things by a certain time."
	SERQ6REL3	"I believe that information provided through mobile government services is accurate."
	SERQ7EMP1	"Mobile government services providers show a sincere interest in solving citizens' problems."
	SERQ8EMP2	"Mobile government services providers understand my specific needs."





*Figure 5-9: The results of items measuring CSQ factor*

In item **SERQ1RES1**, the participants were given the statement "I believe that mobile government services providers give a prompt service with a good response". Figure 5-9 shows 75.5% of participants agreed, while 19.2% were neutral, and 5.2 % disagreed. The Likert score for this item was 1.98.

The participants were asked in item **SERQ2RES2** whether they thought mobile government service providers offered helpful assistance through SMS. The results in Figure 5-9 showed that

78.4% of participants agreed they did; in contrast, the percentage of participants who were neutral or disagreed was 17.0% and 4.5% respectively. The item's score was 1.93, indicating that providers offering helpful assistance through SMS influences citizens' intention to adopt and use m-government services.

Figure 5-9 illustrates that 68.7% of participants agreed with item **SERQ3RES3** that stated: "I believe that mobile government services providers are always willing to help customers through mobile government systems.", while 24.7% were neutral. In contrast, only 6.6% disagreed. The Likert score for item SERQ3RES3 was 2.14.

In item **SERQ4REL1**, the participants were asked if they thought mobile government services providers provided an easy means of checking on the status of a service they had ordered. Figure 5-9 illustrates that 72% agreed, 22.4% were neutral and 5.6% disagreed. The total score for this item was 2.07, suggesting that providing easy-to-use tools to order or check government services will influence and encourage citizens' intention to use the services.

Item **SERQ5REL2** present participants with the statement: "Mobile government services providers deliver on their undertaking to do certain things by a certain time." Figure 5-9 illustrates that 66.5% of participants agreed with this statement; and the portion of the participants who were neutral or disagreed was 27.2% and 6.3% respectively. The item's score was 2.17, which is positively high.

Item **SERQ6REL3** asks participants if they believed that information provided through mobile government services was accurate. Figure 5-9 illustrates that 76.4% agreed it was, while 19.9% were neutral and 3.7% disagreed. The total score for this item was 2.00, and this indicates that the accuracy of information that provided by the government will impact on their intention to use m-government services.

The participants were asked in item **SERQ7EMP1** whether m-government services providers show a sincere interest in solving citizens' problems. The result displayed in Figure 5-9 shows that 69.4% of participants thought that they did, nearly a quarter of participants (24.8%) were neutral and 5.7% disagreed. The item's score was 2.13.

Item **SERQ8EMP2** stated "Mobile government service providers understand my specific needs." 62.4% of participants agreed with the statement, while 9.2% disagreed and 28.4% were neutral. The total score for the items was 2.27.

The composite of the CSQ factor was 2.0854, recalculated to 2.0852 after detecting six outliers, indicating that CSQ is influential on users' intention to adopt and use m-government services.

### 5.2.3 Technical Factors (TF)

Based on the research model (MGAUM), there are two factors that are technical, i.e. System Quality (SQ) and Perceived Mobility (PM). The following sections shows and summarizes the findings of the descriptive analysis with interpretations of the results for all factors.

#### 5.2.3.1 System Quality (SQ)

Seven items in the survey were designed to measure the MGAUM model's SQ factor with Saudi citizens (public users). All items were thus designed to calculate the quality level of the system, including the technical elements that are recognised by users, and which can influence their intention and willingness to adopt and use m-government services. All items measuring citizen service quality are shown in Table 5.22, and the findings for the items relating to this factor are presented in Figure 5-10 then briefly discussed.

Table 5-22: The items measuring SQ factor

Constructs	Items	
	Code	Statements
System Quality	SYSQU1	"The speed of launching the m-government services application m (pages, graphics, option.... etc) will affect my willingness to use it."
	SYSQU2	"I believe that mobile government services (application/website) are easy to navigate (to move between screens and pages) and provide good navigation functions."
	SYSQU3	"The existence of technical errors while using mobile government services (application/website)-such as applications crashing, links not working and unresponsiveness- would reduce my willingness to use them for my transactions."
	SYSQU4	"Bad layout and unattractive interfaces of a mobile government service (application/website) would reduce my willingness to use its services."
	SYSQU5	"I think m-government services (application/website) should be compatible with devices features such as GPS and camera."
	SYSQU6	"I think mobile government services (application/website) will provide fast responses to my enquiries."
	SYSQU7	"I think that mobile government services (application/website) provide up-to-date information."

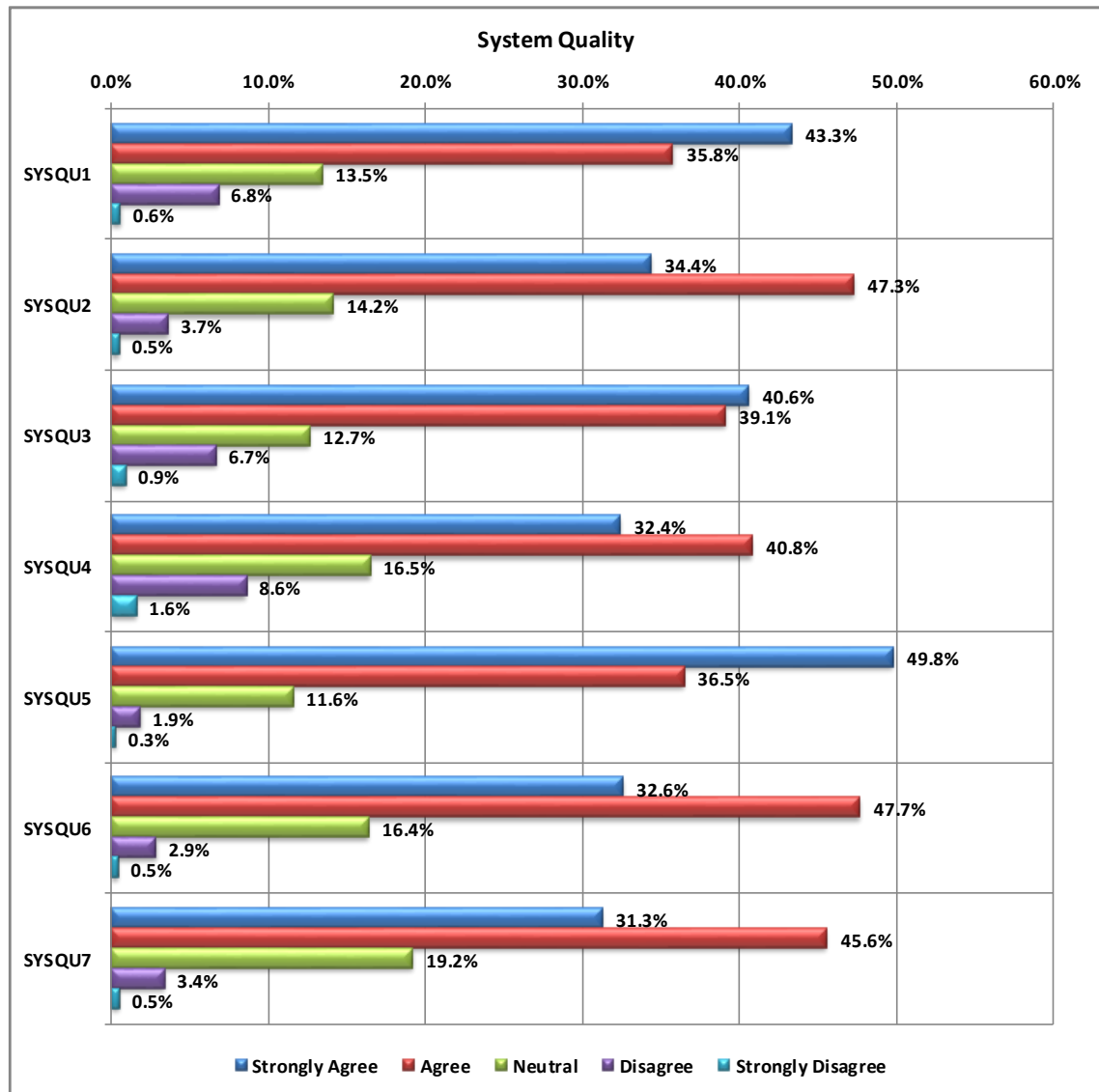


Figure 5-10: The results of items measuring SQ factor

Item **SYSQU1** asks participants if the speed of launching the m-government services application (pages, graphics, option.... etc.) would affect their willingness to use it. Figure 5-10 shows 79.1% of the participants agreed it would, while 13.5% were neutral and 7.4% disagreed. The Likert score for this item was 1.86, which is considered positively high.

The participants were then questioned whether they believed that mobile government services (application/website) were easy to navigate, move between screens and pages and provided good navigation functions (item **SYSQU2**). The results in Figure 5-10 demonstrate that 81.7% of participants agreed they were. In contrast, the percentage of the participants who were neutral or disagreed was 14.2% and 4.2% respectively. The item's score was 1.89, indicating that providing easy-to-navigate m-government services influences citizens' intention to adopt and use m-government services.

Figure 5-10 shows that 79.7% of participants agreed with item **SYSQU3** that stated: “The existence of technical errors, such as applications crashing, links not working and unresponsiveness, while using mobile government service application/website would reduce my willingness to use it for my transactions”; 12.7% were neutral and only 7.6% disagreed with the statement. The Likert score for item **SYSQU3** was 1.88.

In item **SYSQU4**, the participants were asked if bad layout and unattractive interfaces of mobile government services (application /website) would make them less willing to use its services. Figure 5-10 illustrates that 73.2 % agreed they would, 16.5% of them were neutral and 10.2% disagreed. The total score for this item was 2.06.

The participants were asked in item **SYSQU5** about the compatibility of m-government services with mobile devices. Figure 5-10 illustrates that 86.3% of participants agreed that they should be compatible. In contrast, fewer participants were neutral or disagreed (11.6% and 2.2% respectively). The item’s score was 1.66, indicating that the compatibility of m-government services with mobile devices highly influences citizens’ intention to adopt and use them.

Item **SYSQU6** asks participants if they believed that mobile government services (application/website) would provide fast responses to their enquiries. Figure 5-10 illustrates that 80.3% agreed they would, while 16.4 % were neutral and 3.4% disagreed. The total score for this item was 1.91.

Item **SYSQU7** stated: "I think that mobile government services (application/website) provide up-to-date information." 76.9 % of participants agreed with the statement, while 3.9% disagreed and 19.2% of the participants answered ‘Neutral’. The total score for the item was 1.96.

The composite of the SQ factor was 1.8897 recalculated to 1.8891 after four outliers were detected, indicating that SQ is influential on users’ intention to adopt and use m-government services.

### **5.2.3.2 Perceived Mobility (PM)**

In this survey, three items were designed to calculate the impact of the MGAUM model’s PM factor on Saudi citizens (public users), in other words how users perceived the importance of accessing information and using m-government services whilst on the move. All items measuring PM are shown in Table 5.23; the results for this factor are presented in Figure 5-11 then briefly discussed.

Table 5-23: The items measuring PM factor

Constructs	Items	
	code	Statements
Perceived Mobility	PM1	"I expect that I would be able to use mobile government services at any time, and anywhere, when I need them."
	PM2	"I would find mobile government services to be easily accessible, portable and easy to use on different models of Smartphone."
	PM3	"It is important to me to get critical alert notifications on my mobile from government agencies during mobility via text or email regarding passport renewal, traffic penalties and emergency cases."

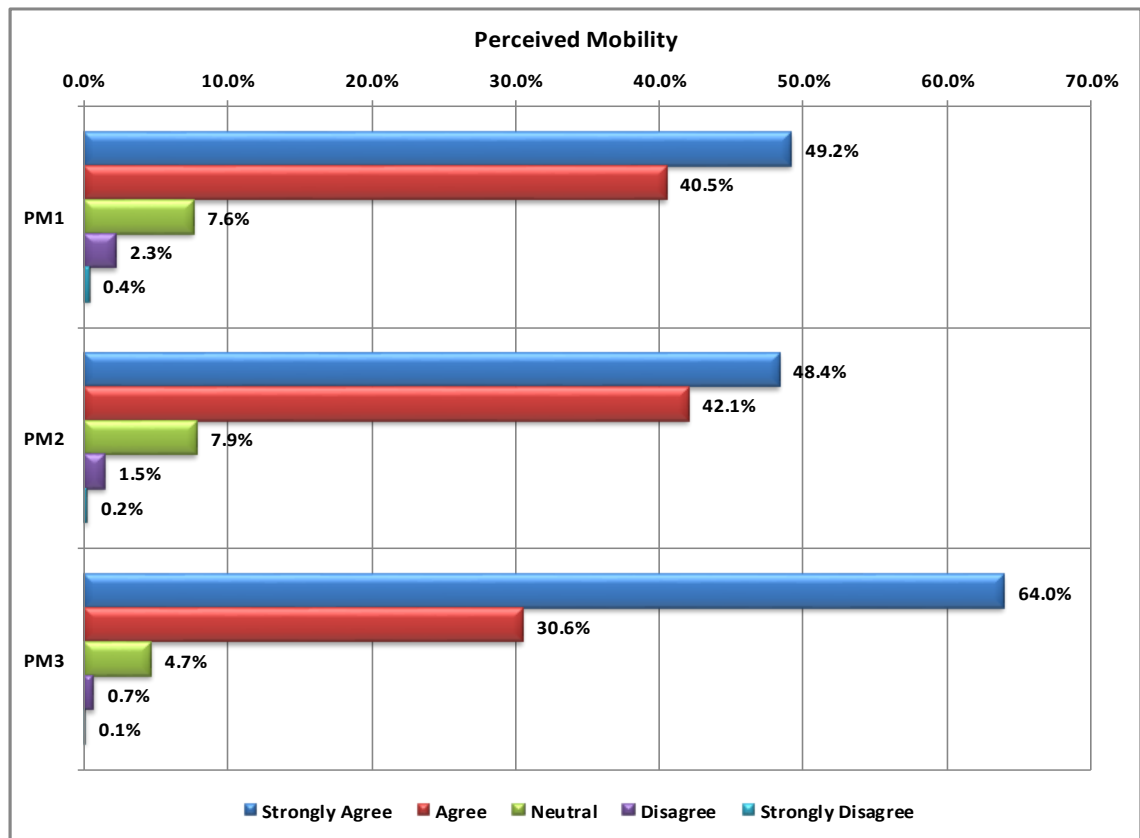


Figure 5-11: The results of items measuring PM factor

In item **PM1**, the participants were asked if they were expecting to access mobile government services at anytime and from anywhere when required. Figure 5-11 illustrates that 89.7% of participants expected this, while 7.6% of them were neutral and 2.7% did not have this expectation. The total Likert score for this item was 1.64, which is positively high.

The participants were then questioned about whether they found mobile government services were easily accessible, portable and easy-to-use on different models of Smartphone (item **PM2**). Figure 5-11 shows that most participants (90.5%) thought they were. In contrast, a small

percentage of participants were neutral or disagreed (7.9 % and 1.7 % respectively). The items score was 1.63, which also is positively high.

The participants were asked in item **PM3** if they considered it important to get critical alert notifications on their mobiles from government agencies during mobility via text or email regarding passport renewal, traffic penalties and emergency cases. The results in Figure 5-11 showed that 94.6% of the participants agreed it was. In contrast, a low percentage of the participants were neutral or disagreed (4.7% and 0.8% respectively). The item's score was 1.42, indicating that getting and receiving essential notifications regarding government transaction is very influential to increasing intention to adopt and use m-government services.

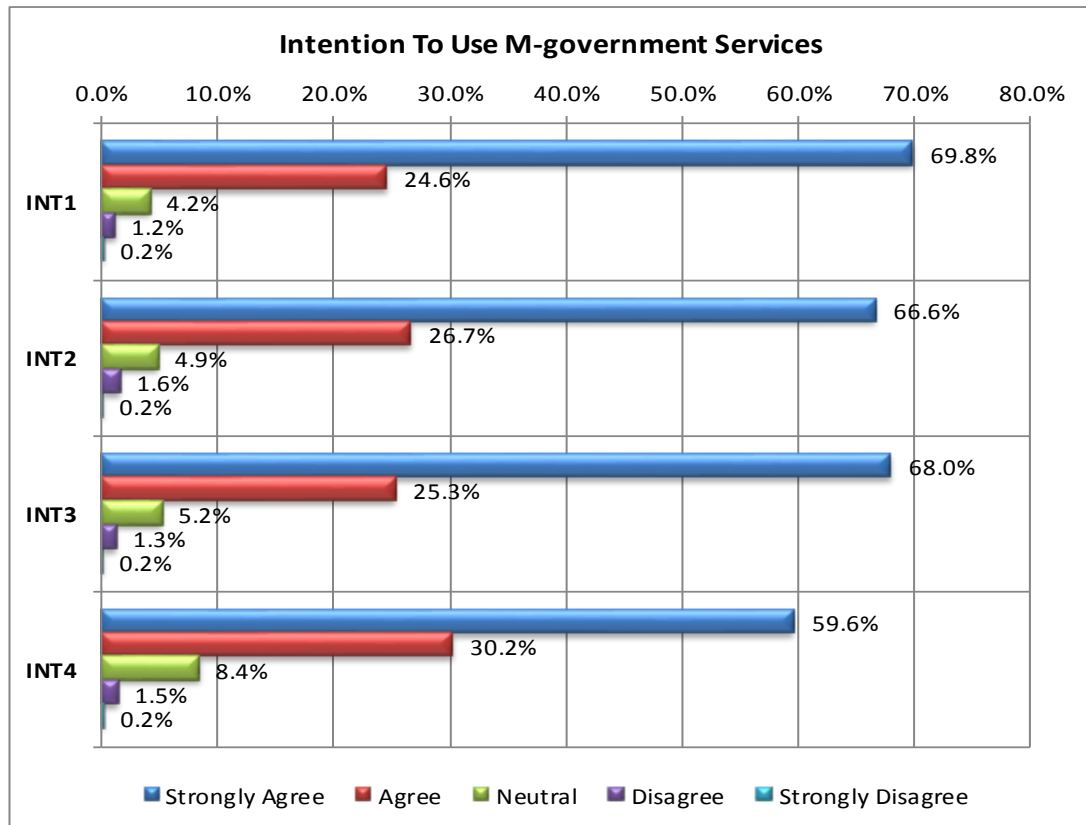
The composite of the PM factor was 1.5651, recalculated to 1.5625 after nine outliers were detected, and which indicates that PM is a very significant factor on intention to adopt and use m-government services.

#### 5.2.4 Intention to Use M-government (ITU)

Intention to use m-government is another construct in the MGAUM model that was presented to Saudi citizens (public users) by four items in this questionnaire. All items were designed to calculate willingness and intention to adopt and use m-government services. All items measuring Intention to Use M-government (ITU) are shown in Table 5.24 and the findings for the items are provided in Figure 5-12 then briefly discussed.

*Table 5-24: The items measuring ITU factor*

Constructs	Items	
	code	Statements
Intention to use m-government	INT1	"I intend to use mobile government services in the future."
	INT2	"I intend to use mobile government services frequently."
	INT3	"I will use mobile government services to conduct government transactions."
	INT4	"I would recommend that others use mobile government services."



*Figure 5-12: The results of items measuring ITU factor*

In item **INT1**, participants were questioned about their future intention to use m-government services. Figure 5-12 shows that most participants (94.4%) agreed they would use them in the future, 4.2% were neutral, and 1.4% disagreed. The total Likert score for this item was 1.37, which indicates a high future intention to use m-government services.

The participants were asked in item **INT2** if they intended to use mobile government services often. The results in Figure 5-12 showed that 93.3% of participants agreed they would; whereas a small percentage of participants were neutral or disagreed (4.9% and 1.8% respectively). The item's score was 1.42, which indicates that there is a high intention to often use m-government services.

Results for item **INT3** that stated: "I will use mobile government services to perform government transactions" showed 93.3% agreed with the statement, 1.5% disagreed and 5.2% were neutral. The total score for the item was 1.43, which is high.

In item **INT4**, the participants were asked if they would recommend others to use mobile government services. Figure 5-12 illustrates that 89.8% of the participants agreed they would, while 8.4% were neutral and 1.7% disagreed. The total Likert score for this item was 1.52.

The composite of the ITU factor was 1.4304, recalculated to 1.4252 after 21 outliers were detected, indicating a very high intention to use.



### 5.3 Statistical analysis and evaluation of hypotheses from the citizens' perspective

The result of the previous descriptive analysis will be summarised in this section in order to find out the effect of every factor of the MGAUM model. Also, the correlation between the dependent factor (Intention to use m-government service) and the independent variables (factors) will be investigated and analyzed. The findings of this study will determine which of the hypotheses will be accepted or rejected. In order to examine the relationship between the constructs in the research model, the correlation coefficient must be applied to explore each hypothesised relationship. In the Research Methodology (Chapter Four), the correlation coefficient procedures were discussed in more detail. Briefly, the procedures discussed included both Pearson's and Spearman's correlation coefficients. There are numbers of assumptions for each procedure, each procedure will be tested for any possible violation, and the most appropriate correlation test will consequently be chosen. In this research, Pearson's correlation coefficient was generally used for all factors. Also, the normality test will be applied in this research for every variable in order to identify the correct correlation test procedure. The Skewness and Kurtosis procedure will be applied to test and measure normal distribution in this study. Finally, all outliers detected in this study will be subjected to the Winsorization procedure (see Chapter 4).

As previously discussed in Chapter Four, the skewness and kurtosis tests were computed to establish the normal distribution of the study data to determine if there is a normal distribution or not for each factor. The result of the normality test revealed that all factors were normally distributed within the normal range of both skewness and kurtosis based on the recommended content and scope (See Chapter Four, section 4.9.3).

#### 5.3.1 Practical factors (PF)

Based on the research model (MGAUM), there are two practical factors, which are Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). Table 5.25 shows and summarises the results of the descriptive analysis with interpretations of the result. The impact of both practical factors was statistically examined, and the findings are discussed below. All factors in this construct were significantly influential on citizens' intention to adopt and use m-government services.

*Table 5-25: Summary of the descriptive analysis of PF from the citizens' perspective*

Factor	N	Number of items	Mean	S.D.	Interpretation of Results
PEOU	1286	4	1.5733	.61942	Very influential
PU	1286	7	1.3900	.49876	Very influential

### 5.3.1.1 Perceived Ease of Use Factor (PEOU)

It is clear from the descriptive analysis that Perceived Ease of Use (PEOU) positively influences citizens' intention to use m-government services. The composite of the PEOU factor was 1.5733, a result that indicated PEOU has a high positive impact on citizens' intention to use it (see Table 5.27). This supports the relationship (H1) hypothesized to be between the Perceived Ease of Use and Intention to use m-government services.

***H1: Perceived Ease of Use positively influences intention to use m-government services.***

The correlation between Perceived Ease of Use and Intention to use m-government service was explored to find out the extent of the strength and the direction of the relationship. Each factor was normally distributed, as is shown in Table 5.26. In this case, the Pearson correlation coefficient assumption (normality) was considered to assess the relationship between two factors. The result of the Pearson correlation coefficient indicates a statistically significant positive relationship between PEOU and ITU,  $r_s = .635$ ,  $n=1286$ ,  $p<0.01$ .

The relationship trend-line (the straight line in each of the figures) was produced by computing a linear regression equation, which is describe as follow, see equation 5.1:

$$\text{Equation 5.1:} \quad y = a + bx$$

(where  $a$  is the intercept and  $b$  is the slope), Plots conventionally depict  $x$  as the independent variable on the horizontal axis ( $x$  axis) and  $y$ , the dependent variable on the vertical axis ( $y$  axis).

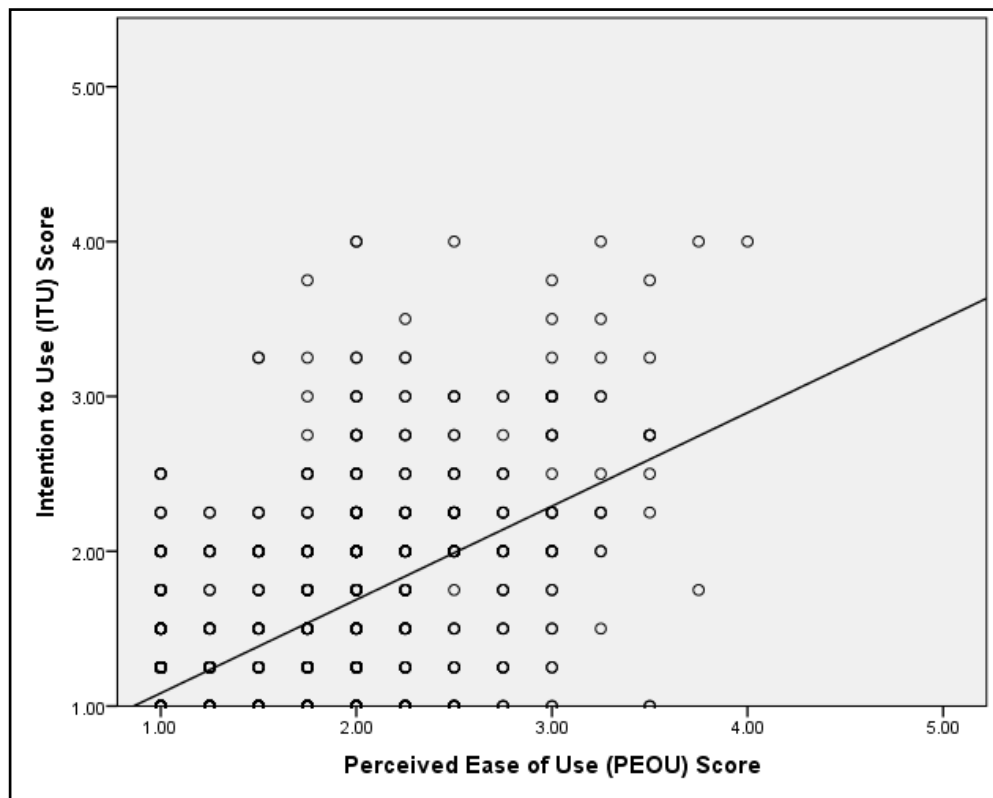
The trend line will be shown in a different place in each graph, as it is drawn based on the strength of the relation and the result of the equation. The value of  $r_s$  represents the coefficient correlation, which is used to measure how strong a relationship is between two variables. A formula for computing the Pearson correlation coefficient is as follow, see equation 5.2 (Bewick, Cheek and Ball, 2003).

$$\text{Equation 5.2:} \quad r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2}}$$

Based on the points plotted and trend line, the relationship between factors will be described in each graph starting from Figure 5-13 to Figure 5-23. A perfect positive correlation between variable  $x$  and  $y$  are indicated by a straight line composed of points plotted from bottom left and rising to top right. Indeed, any tendency for the line to proceed upwards from bottom left to top right indicates this positive correlation even when not all the plotted points are sited along a

straight line. The relationship between the two variables is direct in either case. On the other hand, if the line of plotted points appears to go in the opposite direction (top right to bottom left) the correlation between variables is negative and the relationship between them indirect (Molugaram and Rsao, 2017). Also, some points are bold whereas others are not. These plotted points represent all the participants in the survey with different shapes of distribution from one graph to another. Each bold point represents more than one participant's answer whereas the normal point represents only one participant's answer.

Figure 5-13 illustrates the relationship trendline representing the positive relationship between PEOU and ITU. Citizens' perception of the ease of using m-government technology is thus one of the most influential factors to positively correlate with their intention to adopt and use m-government services.



*Figure 5-13: The relationship trend line between PEOU and ITU*

The graph above illustrates a positive relationship between citizens' perceptions of how easy it is to use m-government services and their intention to use them, since as the score for PEOU for m-government services increases, the score for intention increases as well. Consequently, the hypothesis for this factor is supported.

Perceived Ease of Use is positively associated with citizens' intention to use m-government

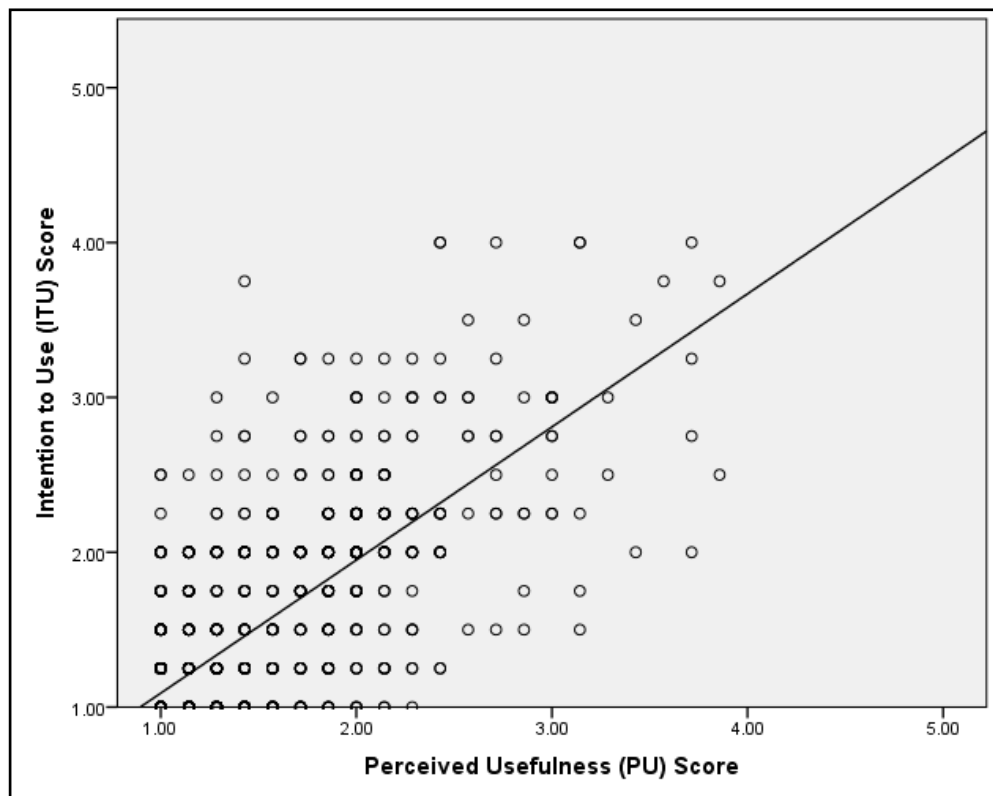
services, and we can see a strong and positive relationship between these two factors. It is a primary factor of critical importance and considered as the first step in ensuring the adoption and use of m-government services. Thus, it is likely that providing m-government services that are easy to use and including various features that facilitate citizens' use of these services will increase their intention to use m-government services and concomitantly increase the adoption and use of these services. The findings for this factor are with line with previous studies. Liu *et al.* (2014) conducted a study in Zhejiang province, a rural area of China, to investigate how the perceptions of rural populations affected the adoption of mobile government services. Their results revealed that PEOU had a positive direct effect on intention to use mobile government services. Additionally, Abu-Shanab and Haider (2015) studied m-government services in Jordan and explored Jordanian citizens' perceptions about using m-government. The results of their study also confirmed that PEOU was a significant predictor of intention to use m-government.

### **5.3.1.2 Perceived Usefulness Factor (PU)**

From the descriptive analysis, it is clear that Perceived Usefulness (PU) influences citizens' intention to use m-government services positively. The calculated composite score for this factor was 1.3900, which indicates that PU is very influential in increasing the intention of citizens to use m-government services (See Table 5.27); and supports the hypothesized relationship (H2) between Perceived Usefulness and Intention to Use m-government services.

***H2: Perceived Usefulness positively influences intention to use m-government services.***

The correlation between PU and citizens' intention to use m-government services was explored to find out the strength and direction of the relationship. Each factor was normally distributed, as is shown in Table 5.26. For this correlation, the Pearson correlation coefficient assumptions (normality) were examined to assess the relationship between two factors. The result of the Pearson correlation coefficient indicates a statistically significant positive relationship between PU and ITU,  $r_s = .757$ ,  $n=1286$ ,  $p<0.01$ . This relationship shows a high level of PU is linked to a high level of intention to use m-government. Figure 5-14 shows the relationship trendline that demonstrates the positive relationship between PU and ITU. This factor has the highest significant correlation value that correlates positively with citizens' intention to use m-government services.



*Figure 5-14: The relationship trend line between PU and ITU*

The graph above illustrates a positive relationship between citizens' perception of the usefulness of m-government services and their intention to use them since as the score for perceived usefulness of m-government services increases, the score for intention also increases; and thus supports the hypothesis for this factor.

Other studies in the relevant literature also found a positive relationship between PU and intention to use m-government services. For example, Abdelghaffar & Magdy (2012) empirically investigated factors that might affect the adoption of m-government services in developing countries, particularly in Egypt, another Arab nation. The result of their study found that PU was a significant predictor of participants' intention to use m-government. Research by Hung et al. (2013) also found that PU was critical in the acceptance of m-government services. Furthermore, a study by Liu et al. (2014) in Zhejiang province in rural China, which used a conceptual model based on the TAM, demonstrated that both short-term and long-term Perceived Usefulness positively influenced the intention to use m-government and specifically, that long-term PU had a direct influence on ITU. Additionally, Alqahtani et al. (2014) carried out a study in Saudi Arabia with the aim of firstly, understanding factors that influenced citizens to accept a mobile transaction, and secondly, building a conceptual framework from these factors to show how they influenced citizens' intentions to use mobile transactions. Their study applied a qualitative approach based on focus group interviews; and their results highlighted

that PU significantly influenced citizens to accept and adopt m-transactions in Saudi Arabia.

In conclusion, the result suggests that the user experience is the first step in adoption; and if a user finds m-Government services easy to use and that it saves time and effort, then this impacts positively on his/her behavioural intention to adopt and use them. If services are easy to use, and people do not have to depend on asking for help from another person to use the application, the number of users will increase. Thus, PU and PEOU are essential factors in the MGAUM, and any theoretical framework which seeks to analyse intention, adoption and use of m-government in the Saudi context or similar contexts in developing countries.

### 5.3.2 Human Factors (HF)

The research model (MGAUM), comprises six human factors, namely, Culture (CULT), Perceived Trust (PT), Social Influence (SI), Perceived Compatibility (PCOM), Awareness (AW) and Citizen Service Quality (CSQ). Table 5.26 shows and summarizes the findings of the descriptive analysis with interpretations of the results for all factors. The influence of the human factors was examined statistically, and the findings are discussed below. All human factors significantly influenced citizens' intention to adopt and use m-government services except Awareness which was found closely to be moderately significant.

*Table 5-26: Summary of the descriptive analysis of HF from the citizens' perspective*

Factor	N	Number of items	Mean	S.D.	Interpretation of Results
<b>CULT</b>	1286	5	1.9997	.69224	Influential
<b>PT</b>	1286	7	2.3586	.62882	Influential
<b>SI</b>	1286	3	1.6516	.62692	Very influential
<b>PCOM</b>	1286	2	1.5638	.66208	Very influential
<b>AW</b>	1286	4	2.1763	.87356	Influential
<b>CSQ</b>	1286	8	2.0852	.69808	Influential

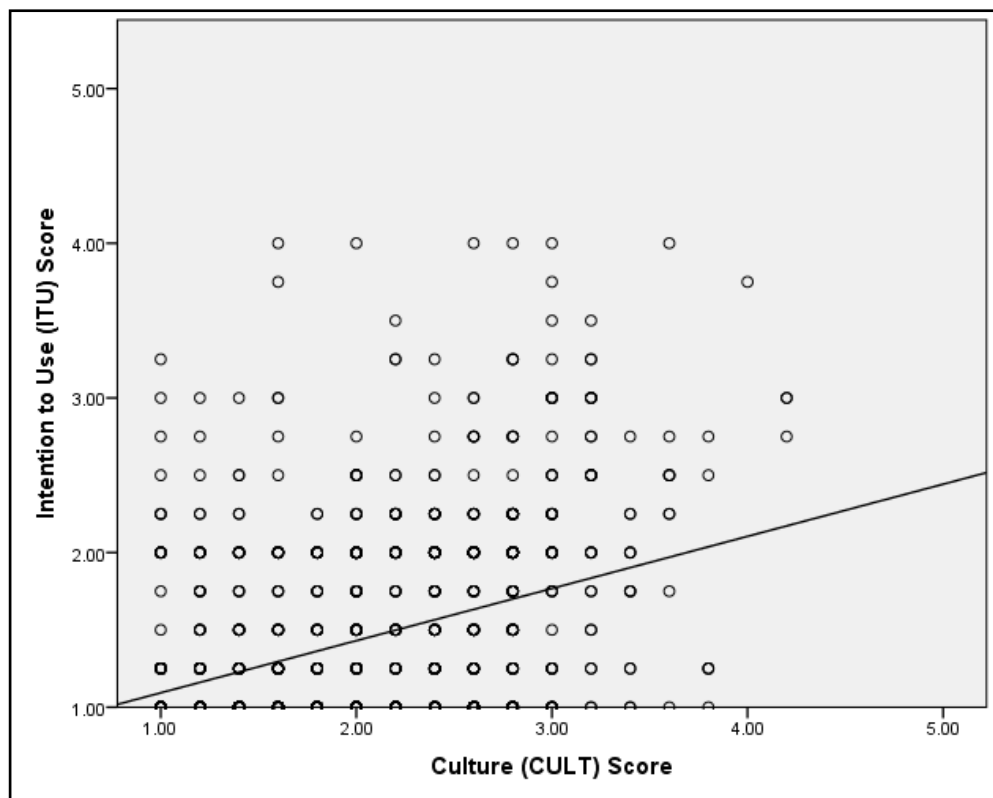
#### 5.3.2.1 Culture Factor (CULT)

From the descriptive analysis it can be seen that the Culture factor (CULT) has a positive effect on citizens' intention to use m-government services (see Table 5.28). The composite of the CULT factor was 1.9997, a result that indicated CULT influences user's intention to use m-government services. This supports hypothesis H3 about the relationship between the Culture factor and intention to use m-government services.

***H3: Culture influences intention to use m-government services.***

The correlation was computed between CULT and intention to use m-government services to

investigate the strength and the direction of that relationship. The result of the normality test assessed by Skewness and Kurtosis for both factors was normally distributed (see Table 5.26). The Pearson correlation coefficient assumption (normality) was considered to assess the relationship between two factors. The result of the Pearson correlation coefficient indicates a statistically significant positive relationship between CULT and ITU,  $r_s = .398$ ,  $n=1286$ ,  $p<0.01$ ; making Culture one of the most influential factors to positively correlate with Saudi citizens' intention to use m-government services. Figure 5-15 illustrates the trendline that shows the positive relationship between CULT and ITU.



*Figure 5-15: The relationship trend line between CULT and ITU*

The diagram above illustrates the positive relationship between the two factors. As the score for **CULT** increases, the score for intention also increases. As a result, the hypothesis for this factor is supported.

A positive correlation exists between the cultural aspects and intention to adopt and use new public services offered by either an e /m-government system. The influence of the Culture factor on Intention to Use corresponds with findings by other related studies. Alghamdi (2017) studied factors that affected the adoption and use of an E-government system and services in Saudi Arabia from three different perspectives, i.e. those of citizens, the business sector and public employees. The social and cultural aspects in the research included Image, Resistance to

Change and Interpersonal Social Networks (*wasta* or connections); and this research revealed a positive correlation between these social and cultural aspects and Saudi citizens' intention to adopt and use E-government systems. This result was echoed by a study in Sri Lanka which demonstrated that the cultural factors influenced adoption of E-government services significantly (Ranaweera HMBP, 2016). Furthermore, Naqvi & Al-Shihi (2009) evaluated the ICT sector and the state of the m-government services initiative in Oman at the time, with the objective of determining key factors that influence the adoption of m-government services. The result of their study showed that regarding the adoption of m-government, Oman has more cultural issues than technical ones. Using a model which integrated Hofstede's cultural dimensions and the TAM, Al-Hujran et al. (2011) discovered that the cultural dimensions of power distance and uncertainty avoidance significantly impacted on citizens' intention to adopt and use E-government. Liu et al. (2014) also studied the adoption of mobile government, and the results of their study demonstrated that Perceived Image, a cultural aspect considered in the current study, had a positive significant impact on intention to use mobile government.

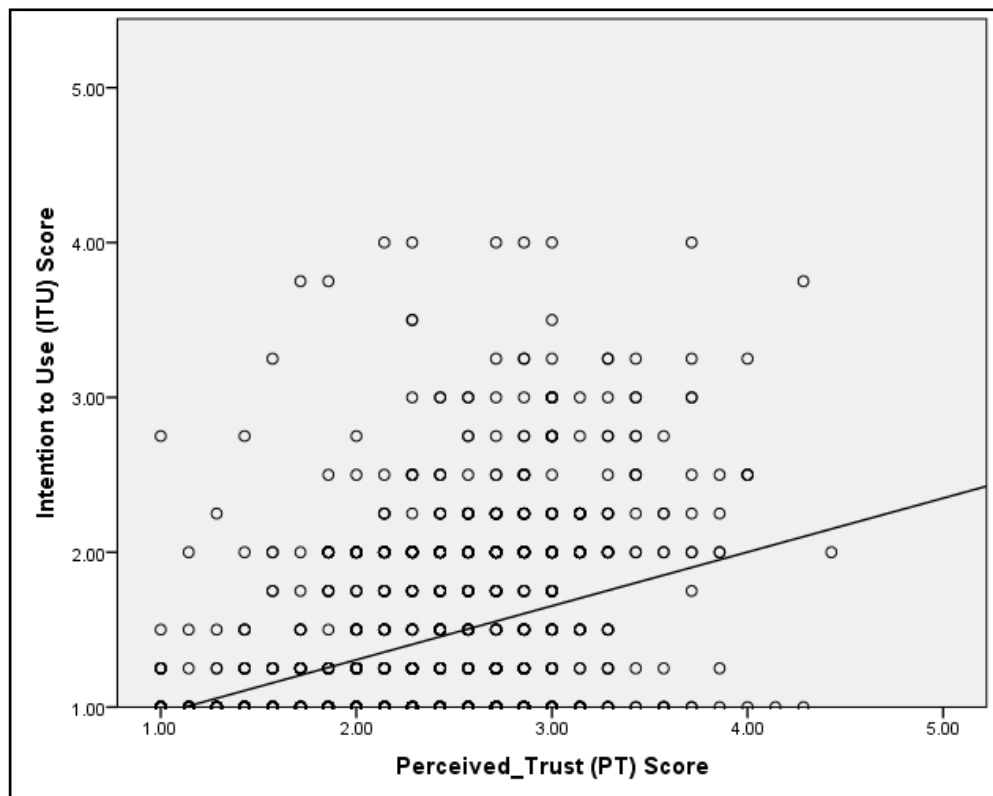
#### **5.3.2.2 Perceived Trust Factor (PT)**

From the descriptive analysis, PT has a positive effect on citizens' intention to adopt and use m-government services, which is clearly demonstrated in Table 5.28. The composite of the PT factor was 2.3586 with the result indicating that PT is influential on citizens' intention to adopt and use m-government services. This supports the hypothesized relationship (H4) between PT and intention to use m-government services.

***H4: Perceived Trust positively influences intention to use m-government services.***

The correlation was computed between Perceived Trust and intention to use m-government services to investigate the strength and the direction of the relationship. The result of the normality test, assessed by skewness and kurtosis for both factors was normally distributed. The Pearson correlation coefficient assumptions (normality) were considered in this case to assess the relationship between the two factors (see Table 5.26). The result of the Pearson correlation coefficient indicates a statistically significant positive relationship between PT and ITU,  $r_s = .376$ ,  $n=1286$ ,  $p<0.01$ . This relationship shows a high level of PT is linked with a high level of intention to use m-government. Figure 5-16 below shows the trendline that demonstrates the positive relationship between PT and ITU. This is one of the most significant factors that correlate positively with citizens' intention to use m-government service.





*Figure 5-16: The relationship trend line between PT and ITU*

The graph above illustrates a positive relationship between the two factors. As the score for perceived trust increases, the score for intention also increases; thus supporting the hypothesis for this factor.

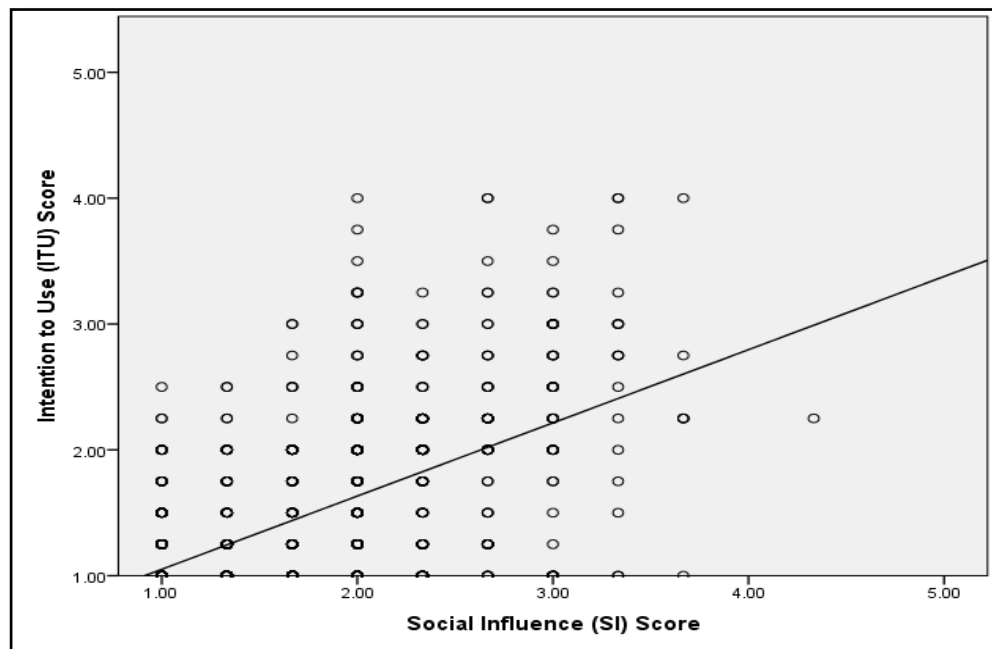
This positive relationship between Perceived Trust and intention to use m-government services is reflected by other, related research. For instance, Sellitto et al. (2016) discovered that Perceived Trust was one of the factors that determined consumer adoption of m-payment services in Thailand. Moreover, one survey of a wide range of citizens at a US community event indicated that trust was an important factor; and elements such as trust in the internet and the government correlates positively to citizens' intention to use E-government (Carter and Belanger, 2005). Furthermore, Alkhalidi (2016) empirically investigated the adoption of m-banking services in Saudi Arabia. The researcher found that privacy and security issues were considered as obstacles which influenced the adoption and acceptance of m-banking services negatively. Weerakkody et al. (2013) also suggested that trust played an important role in E-government adoption. Syed Zamberi Ahmad and Khalizani Khalid (2017) studied the acceptance of m-government services from the citizens' perspectives in the UAE. Their findings revealed that trust was linked positively with users' intention to adopt m-government services.

### 5.3.2.3 Social Influence (SI)

It is clear from the descriptive analysis in Table 5.28 that it is highly probable that Social Influence positively affects citizens' intention to adopt and use m-government services. The composite of the SI factor was 1.6516, a result that indicated that SI has a very positive influence on users' intention to use m-government services. This result positively supports the hypothesized relationship (H5) between Social Influence and Intention to Use m-government services.

***H5: Social Influence affects intention to use m-government services.***

The correlation was computed between SI and intention to use m-government services to investigate the strength and direction of the relationship. The result of the normality test assessed by skewness and kurtosis for both factors was normally distributed. In this case, the Pearson correlation coefficient assumptions (normality) were considered to assess the relationship between the two factors. The result of the Pearson correlation coefficient indicates that statistically there is a significant positive relationship between SI and ITU,  $r_s = .621$ ,  $n=1286$ ,  $p<0.01$ . This relationship shows a very high level of Social Influence is linked with a high level of intention to use m-government. Figure 5-17 shows the trendline that demonstrates the positive relationship between SI and ITU. This factor is thus one of the most significant that correlates positively with citizens' intention to use m-government service.



*Figure 5-17: The relationship trend line between SI and ITU*

The diagram above illustrates a positive relationship between Social Influence and citizens' intention to use m-government since, as the SI score increases, the score for intention also does;

thus supporting the hypothesis for this factor.

The positive relationship between the Social Influence and intention to use services is echoed by other similar research, and this factor is considered to significantly impact on users' behavioural intention to adopt and accept technologies. For instance, a study was conducted in the UEA that aimed to determine factors that affected the adoption of m-government services from the citizens' perspectives. The results of their study revealed that social influence is positively associated with intention to adopt m-government services (Ahmad and Khalid 2017). Furthermore, Tao Zhou and Bin Wang (2010) showed that users' adoption of mobile banking in China was positively affected by social influence. Also, Al-Hujran *et al.* (2014) examined factors influencing Saudi college students' intentions to use m-learning technology, and the results showed that social influence has a positive impact on students' intention to adopt and use m-learning. Alain *et al.* (2012) explored which factors could predict consumers' behavioural intentions to adopt m-commerce in China and Malaysia based on these countries' cultural differences. Their research findings confirmed that the social influence was significant in predicting consumers' decisions to adopt m-commerce in both countries. Moreover, research by Liu *et al.* (2014) in China that explored how rural populations' perceptions affected the adoption of mobile government services, stated that Social Influence directly influenced the intention to use m-government.

#### **5.3.2.4 Perceived Compatibility (PCOM)**

From the descriptive analysis shown in Table 5.28, it is highly probable that Perceived Compatibility influences citizens' intention to adopt and use m-government services positively. The composite of the PCOM factor was 1.5638, with the result suggesting that PCOM is very influential on citizens' intention to use m-government services. This result means that the hypothesized relationship between Perceived Compatibility and intention to use m-government services (H6) is supported.

#### ***H6: Perceived Compatibility positively influences intention to use m-government services.***

The correlation also was computed to investigate the strength and the direction of the relationship between these factors. The result of the normality test, assessed by skewness and kurtosis for both factors was normally distributed. The Pearson correlation coefficient assumptions (normality) for this correlation were considered to assess the relationship between two factors. The result of the Pearson correlation coefficient indicates a statistically significant positive relationship between PCOM and ITU,  $r_s = .651$ ,  $n=1286$ ,  $p<0.01$ , which means that citizens' perceived compatibility correlated very significantly to their intention to use m-government services. Figure 5-18 shows the trendline that demonstrates the positive relationship between PCOM and ITU.

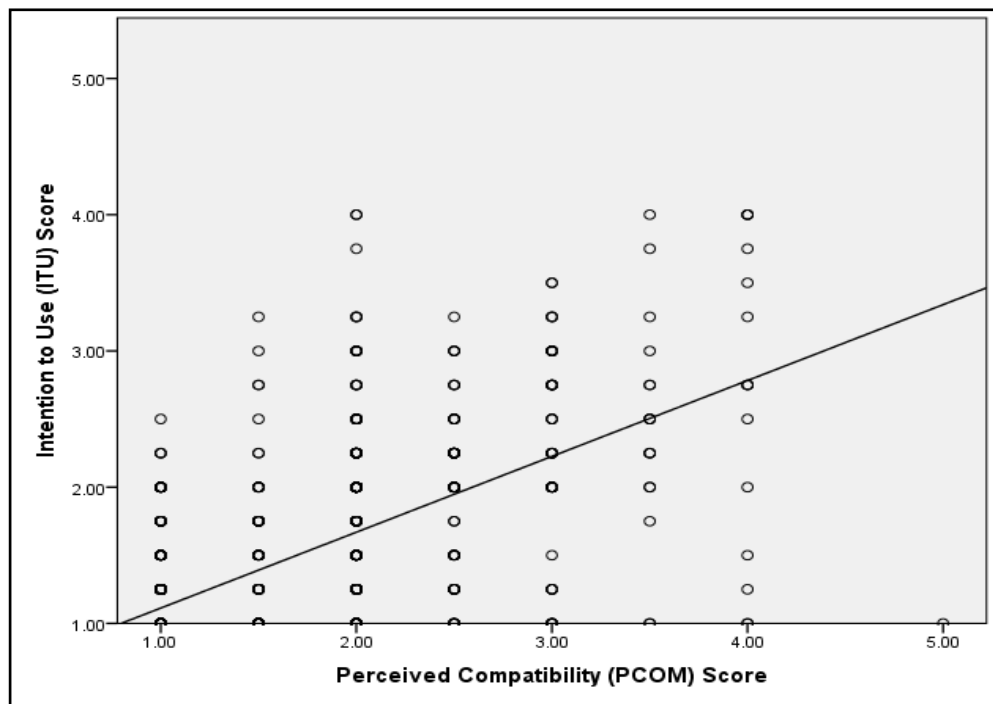


Figure 5-18: The relationship trend line between PCOM and ITU

The diagram above illustrates a high positive level of relationship between the perceived compatibility of government services and citizens' intention to use them, since if the score for PC increases, so will the score for intention; thus, supporting the hypothesis for this factor.

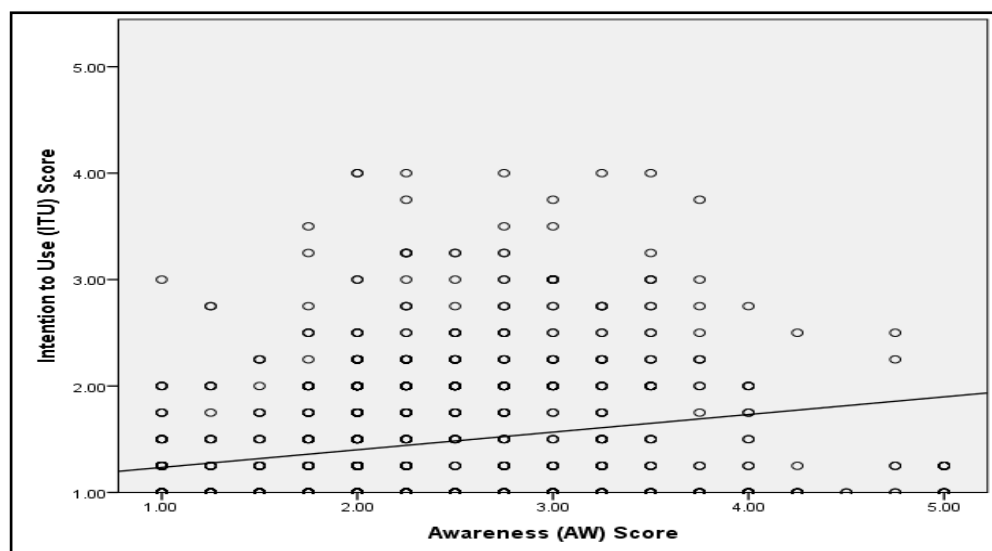
This positive relationship between Perceived Compatibility and intention to use services is in line with other related research that shows a high level of compatibility with the innovation will increase users' intention to adopt and use it. Indeed, it is very important that the new technology or its solutions be compatible with people's work style and lifestyle (Almuraqab, 2017). Perceived Compatibility is considered one of the critical aspects in innovation adoption because it has a significant impact on individual intention to adopt a new technology, not just in the context of general information technology but also when considering the services that can be provided by mobile phones (Chen, 2008). Moreover, Abu-Shanab and Haider (2015) stated that PC was one of the most important predictors of intention to use m-government in Jordan; and Carter and Bélanger (2005) argued that Compatibility significantly predicted citizens' intention to use E-government services. Sellitto and Fong (2015) investigated factors that might influence Thai consumers' intention to adopt mobile payment services. Their research revealed that Compatibility was one of the factors that significantly influenced consumers to adopt mobile payment services. Moreover, Abdelghaffar and Magdy (2012) empirically investigated factors that could affect the adoption of m-government services in developing countries, especially Egypt. Their results demonstrated that compatibility was significant in predicting participants' use of m-government. This research, which unlike other previous studies, included a high

number of Saudi female participants, demonstrates how using m-government is perceived as compatible to a lifestyle where using mobiles occurs daily. In a society where contact between sexes is sensitive related to religious and cultural reason, conducting government transactions on their phones arguably gives Saudi women both privacy and removes the need for any face-to-face interactions with male government officials.

### 5.3.2.5 Awareness (AW)

It is clear from Table 5.28, which provides a descriptive analysis of this factor, that AW is likely to positively influence citizens' intention to adopt and use m-government services. The composite of the AW factor was 2.1763, which indicated that AW influences the level of citizens' intention to use m-government services. The correlation was computed between the AW and intention to use m-government services to investigate the strength and the direction of the relationship. The result of the normality test, assessed by skewness and kurtosis for both factors was normally distributed. The Pearson correlation coefficient assumptions (normality) were considered to evaluate the relationship between two factors. The result of the Pearson correlation coefficient indicates that statistically a significant positive relationship exists between AW and ITU,  $r_s = .270$ ,  $n=1286$ ,  $p<0.01$ . Although the correlation coefficient was low and close to moderate level according to Cohen's guide (see Chapter 4) (Cohen, 1988), the findings for this relationship show a positive correlation between the two factors; and thus the hypothesized relationship (H7) is supported.

***H7: Awareness positively influences intention to use m-government services.***

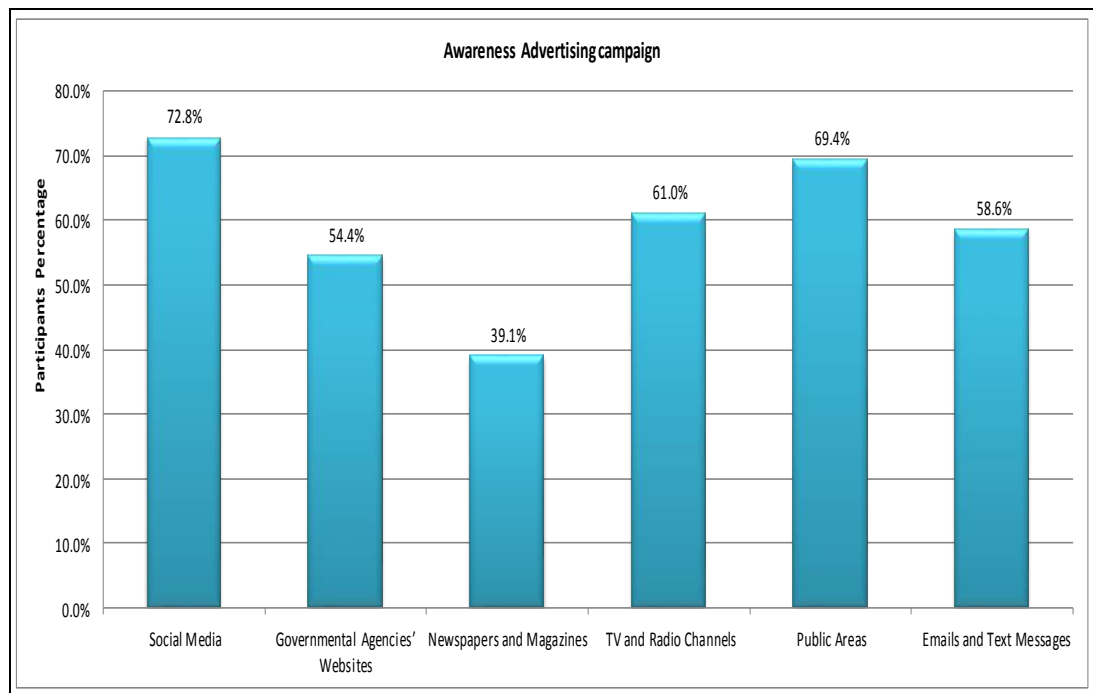


*Figure 5-19: The relationship trend line between AW and ITU*

The graph above shows a positive relationship between Awareness of m-government services and citizens' intention to use them since when the score for Awareness increases, the score for

intention does too; this supports the hypothesis for this factor.

In addition, related to the Awareness factor, participants were asked about which advertising methods could affect citizens' awareness of m-government services and encourage their use. Public awareness could be enhanced in various ways including interactive advertising and social media campaigns as well as traditional advertising methods such as newspapers, brochures, TV, messages on public transport and subway. Participants rated advertising methods (shown in Figure 5-20) as follows: social media (20.5%), advertisements in public areas (19.5%), TV and radio channels (17.2%), government agencies' websites (14.03%), email and text messages (16.5%) and finally, newspapers and magazines (11.0%).



*Figure 5-20: Awareness advertising campaigns*

The correlation coefficient for the Awareness factor was very close to reaching a moderate level. This indicates that as citizens' awareness of m-government services, potential and benefits increases their intention to use also increases. Awareness is the first step in user experience of a new service offered by the government. Users need to know what services are available, how these services are relevant to them, and how they can access and use these services. The impact of awareness on users' behavioural intentions has been confirmed by scholars in different research contexts, especially in developing countries. Our result for the Awareness factor is incompatible with some previous empirical studies. For example, Alkhaldi (2016) explored the adoption of mobile banking in Saudi Arabia; and his research showed that customers did not widely accept m-banking services due to the lack of awareness. The lack of awareness could

increase the digital divide and lead to E-government failure (Shareef et al., 2011). For example, in Jordan, a significant lack of awareness was found to be one of the factors that prevented Jordanian citizens from adopting E-government services. Also, Abdelghaffar and Magdy (2012) stated that awareness was one of the significant factors predicting participants' intention to use m-government. Moreover, Shareef et al. (2011) found that awareness was a significant determinant of E-government adoption. Furthermore, one study revealed that in Kuwait, AW correlates positively with willingness to use E-government systems; and another revealed the same for E-government services in Oman (AlAwadi and Morris, 2009; Alshihi, 2005). Furthermore, Mariam Rehman and Vatcharaporn Esichaikul (2011) demonstrated that awareness was a significant variable influencing citizens' intention to use E-government services. Also, Sabah Abdullah Al-Somali and Roya Gholami (2009) stated in their study that awareness significantly impacted on customer attitudes toward acceptance of online banking in the Saudi commercial banks.

Therefore, our research recommends that the government needs to raise awareness about the main goals of m-government, the available m-government services and the advantages and benefits gained from the use of m-government services to conduct various transactions. Public awareness could be enhanced in various ways including interactive advertising and social media campaigns as well as traditional advertising methods such as newspapers, brochures, TV, messages on public transport and subway. The current research implies that an increase in Saudi citizens' awareness would contribute significantly to increasing their willingness and intention to adopt and use m-government services.

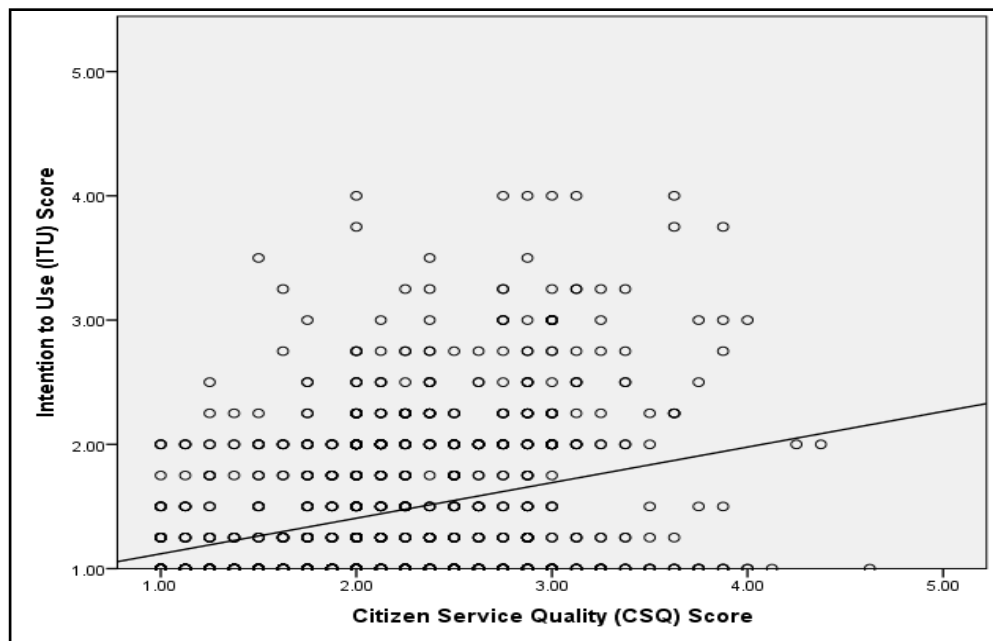
#### **5.3.2.6 Citizen Services Quality (CSQ)**

From the descriptive analysis, the relationship between Citizen Service Quality (CSQ) and intention to use m-government services can be interpreted as showing that Citizen Service Quality is a significant factor (see Table 5.28). The computed composite score for the CSQ factor was 2.0852. The hypothesized relationship (H8) between the Citizen Service Quality and intention to use m-government services is therefore supported.

***H8: Citizen Service Quality factors (responsiveness, empathy and reliability) positively influence intention to use m-government services.***

The correlation between Citizen Service Quality and intention to use m-government services was explored to find out the strength and the direction of the relationship. Each variable was normally distributed, as assessed by skewness and kurtosis (see Table 5.26). The Pearson correlation coefficient assumptions (normality) were considered to assess the relationship between the two factors. The result of the Pearson correlation coefficient indicates that there is a statistically significant, moderate positive correlation between CSQ and ITU,  $r_s = .339$ ,  $n=1286$ ,

at 0.01 level. The graph below shows a positive relationship between Citizen Service Quality and citizens' intention to use m-government since if the score for CSQ increases, so does the score for intention; thus supporting the hypothesis for this factor.



*Figure 5-21: The relationship trend line between CSQ and ITU*

The positive relationship between the Citizen Service Quality and intention to use services corresponds with other studies in the literature. Alhujran et al. (2013) stated that the service quality dimensions (including responsiveness, reliability and empathy) impact significantly on citizen satisfaction which is one of the important predictors of Jordanian citizens' intention to use E-government services. Charles K. Ayo et al. (2016) also revealed that perceived e-service quality (responsiveness and reliability) had a significant effect on customer satisfaction and use of e-banking in Nigeria. Sharma (2015) studied the relationship between service quality dimensions and willingness to use E-government services in Oman, and showed that service quality, including reliability and responsiveness, were important determinants of willingness to use E-government services. Moreover, Shareef et al. (2012) investigated the adoption of mobile government among Indians; and found that Perceived Empathy was the most influential factor to predict citizens' adoption of m-government. Charles K. Ayo et al. (2016) studied the effect of E-Service Quality and E-Loyalty (which is similar to citizen service quality) on online shopping in Jordan, and found that customer service is one of the main explanatory factors of E-Service Quality that influences online customer trust and satisfaction; which impacts directly on E-Loyalty in online Shopping. Also, Ya-Hui Wang (2017) carried out research in Taiwan to study the effect of expectation and service quality on satisfaction and behavioural intention in Taiwan's medical tourism industry. The results of their study indicated that service quality



dimensions (including Tangibility, Reliability, Responsiveness, Assurance and Empathy) had a direct effect on both satisfaction and behavioural intention.

### 5.3.3 Technical Factors (TF)

Based on the research model (MGAUM), there are two technical factors, i.e. System Quality (SQ) and Perceived Mobility (PM). Table 5.27 shows a summary of the findings of the descriptive analysis with interpretations of the results for all factors. The influence of the technical factors was tested statistically, and the findings are discussed below. Both factors were significantly influential on citizens' intention to adopt and use m-government services.

*Table 5-27: Summary of the descriptive analysis of TF from the citizens' perspective*

Factor	N	Number of items	Mean	S.D.	Interpretation of Results
<b>SQ</b>	1286	7	1.8891	.54653	Influential
<b>PM</b>	1286	3	1.5625	.57052	Very influential

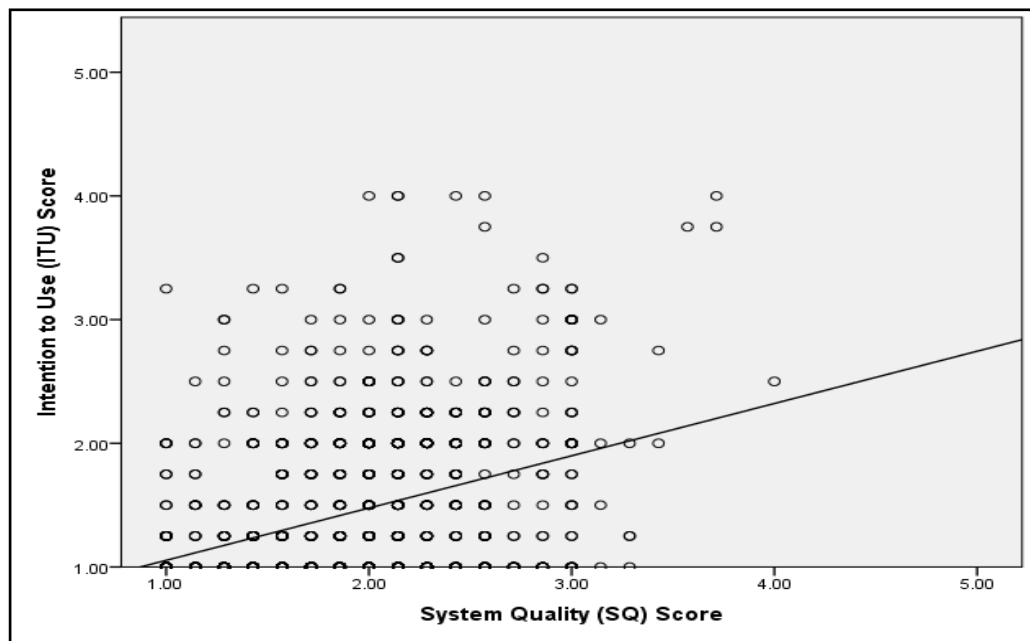
#### 5.3.3.1 System Quality (SQ)

From the descriptive analysis, SQ positively influences citizens' intention to adopt and use m-government services, and this can be seen clearly in Table 5.29. The composite of the SQ factor was 1.8891 with the result indicating that SQ is influential on citizens' intention to adopt and use m-government services. The hypothesized relationship (H9) between the System Quality and intention to use m-government services is thus supported.

***H9: System Quality positively influences intention to use m-government services.***

The correlation was also computed between the variables to investigate the strength and the direction of the relationship. The result of the normality test assessed by skewness and kurtosis for both factors was normally distributed. In this case, the Pearson correlation coefficient assumptions (normality) were considered to assess the relationship between the two factors (see table 5.26). There was a statistically significant, moderate positive correlation between SQ and ITU,  $r_s = .390$ ,  $n=1286$ , at the  $p=0.01$  level. Figure 5-22 demonstrates the trendline that illustrates the positive relationship between SQ and ITU.

The graph below illustrates the positive relationship between the two variables. If the SQ score increases, the score for intention also increases; therefore, supporting the hypothesis for this factor.



*Figure 5-22: The relationship trend line between SQ and ITU*

The positive relationship between System Quality and intention to use services corresponds to findings in other studies in the literature, i.e. whenever the system quality of the provided m-government services rises, so will citizens' intention to adopt and use them. AlaaAldin A. AL Athmay et al. (2015) investigated factors that impact the adoption of UAE-government services from the citizens' perspective. Their findings revealed that E-government system quality had a strong impact on the intention to use E-government services. Moreover, Fadi Taher Qutaishat (2013) studied the relationship between Jordanian citizens' perceptions of website quality and how this affected intention to use E-government services. The results of his study indicated that system quality positively impacted user intention to use E-government services(Qutaishat, 2013). Abdullah M. Baabdullaha et al. (2019) conducted a study in Saudi Arabia to explore the main factors that could affect the use of mobile banking in Saudi Arabia. They found that system quality (including ease-of-use, access speed, visual appeal and navigation) was one of the main factors that significantly affected actual use behaviour. Also, Xiao Jiang and Shaobo Ji (2014) examined Chinese citizens' adoption and continuance intention (CI) of an E-government web portal from the perspective of service level and service quality. They found in their study that the Web portal's service quality dimensions (including information quality, design and function, and the system's reliability) significantly affect user's adoption and continuance intention and that the effect differed among different types of user groups. Bakar and Melan (2018) studied the impact of System Quality criteria on continuous intention to use a tax e-filing system in Malaysia. Moreover, Abdullah M. Baabdullaha et al.(2019) found that system quality was one of the key factors that significantly impacted on

actual use behaviour. The result of their study revealed that the system's usability and availability, functionality and navigation facility had an impact on continuous intention to use government e-services.

### 5.3.3.2 Perceived Mobility (PM)

The descriptive analysis in Table 5.29 shows that PM has a high positive influence on citizens' intention to adopt and use m-government services. The composite of the PM factor was 1.5625 which indicates PM is a very influential in affecting citizens' intention to adopt and use m-government services. The hypothesized relationship between the Perceived Mobility factor and intention to use m-government services (H10) is therefore supported.

***H10: Perceived Mobility positively influences intention to use m-government services.***

The correlation was also computed between the two variables to investigate the strength and the direction of the relationship. The result of the normality test, assessed by skewness and kurtosis for both factors was normally distributed. The Pearson correlation coefficient assumptions (normality) were considered to assess the relationship between the two factors. There was a statistically significant, strong positive correlation between PM and ITU,  $r_s = .548$ ,  $n=1286$ , at the  $p=0.01$  level. Figure 5-23 presents the trendline that shows the positive relationship between SQ and ITU.

The graph below illustrates that there is a positive relationship between these variables; as when the score for Perceived Mobility increase, so does the score for intention; which supports the hypothesis for this factor.

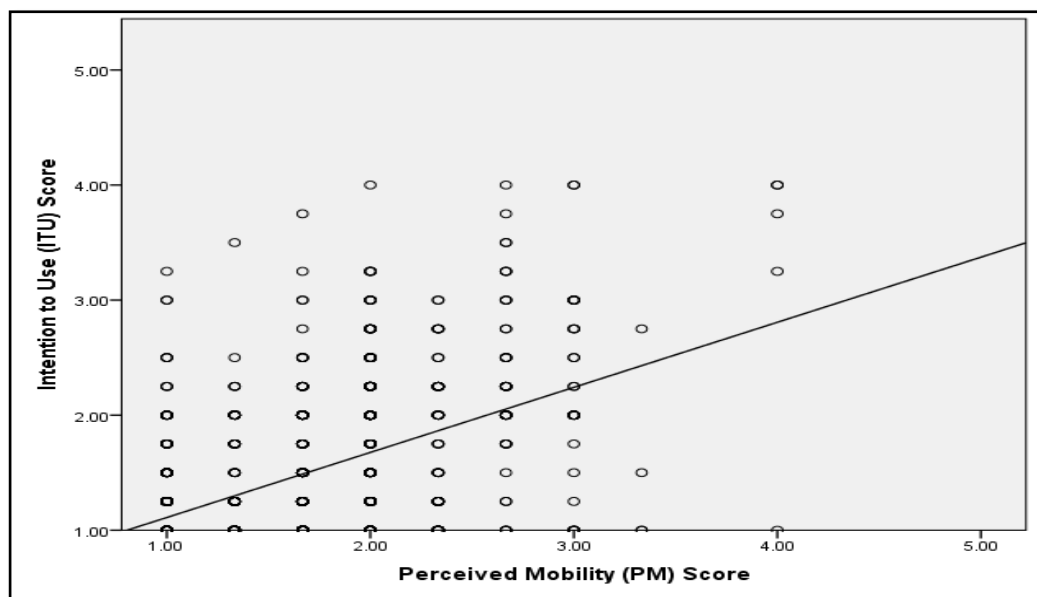


Figure 5-23: The relationship trend line between PM and ITU

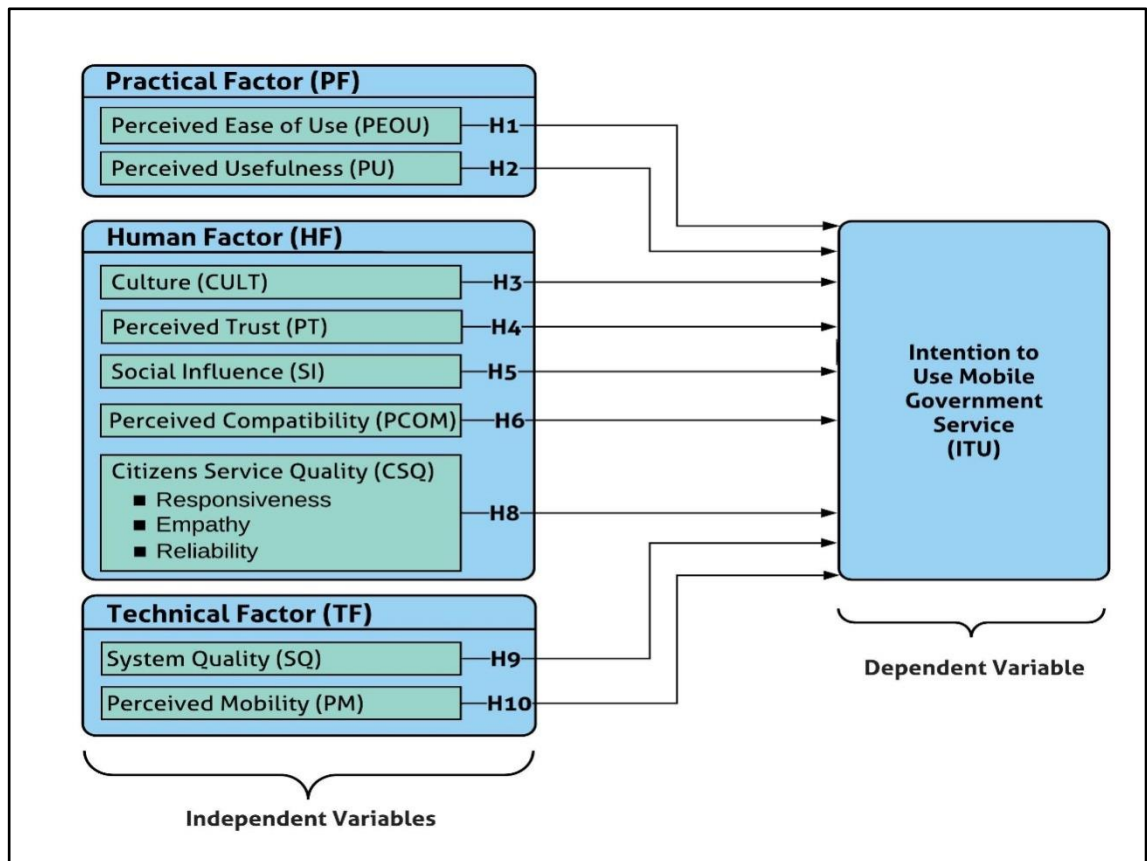
The positive relationship between perceived mobility and intention to use services is reflected in other research. Yung-Shen Yen & Feng-Shang Wu (2016) carried out a study in Taiwan, to investigate factors that could affect the continued use intention for mobile financial services (MFS). They stated in their research that perceived mobility significantly affected continued usage intention for MFS. Moreover, Jen-Hung Huang et al. (2006) carried out research in Taiwan universities to explore and identify predictors for the acceptance of mobile learning (m-learning). Their research showed that perceived mobility value was one of the predictor factors of user intention to use and accept m-learning. Also, Changlin Wang (2014) stated that continued use of mobile government in China is strongly influenced by mobility. Moreover, TM Faziharudean and Tan Li-Ly (2011) confirmed that Perceived Mobility has a significant positive effect on consumers' intention to use mobile data services in Malaysia.

## 5.4 Conclusion

Table 5.28 presents all the relationships between the MGAUM's constructs and the intention to use m-government services that were hypothesized. It is clear that all the factors, except Awareness, were revealed to have significant positive and direct relationships with citizens' intention to adopt and use m-government services (See Figure 5-24).

Table 5-28: Summary of the results of the hypothesized relationships from the citizens' perspective

Hypothesized Relationship			Direction of Relationship	Hypothesis Test	Relationship Strength		
PEOU	→	ITU	Positive	Supported	Strong	(rs = .635 **)	sig
PU	→	ITU	Positive	Supported	Strong	(rs = .757 **)	sig
CULT	→	ITU	Positive	Supported	Moderate	(rs = .398 **)	sig
PT	→	ITU	Positive	Supported	Moderate	(rs = .376 **)	sig
SI	→	ITU	Positive	Supported	Strong	(rs = .621 **)	sig
PCOM	→	ITU	Positive	Supported	Strong	(rs = .651 **)	sig
AW	→	ITU	Positive	Supported	Weak	(rs = .270 **)	sig
CSQ	→	ITU	Positive	Supported	Moderate	(rs = .339 **)	sig
SQ	→	ITU	Positive	Supported	Moderate	(rs = .390 **)	sig
PM	→	ITU	Positive	Supported	Strong	(rs = .548 **)	sig
* . Correlation is significant at the 0.05 level.							
** . Correlation is significant at the 0.01 level.							



*Figure 5-24: The Updated MGAUM model from the citizens' perspective*

The findings of this study imply that from Saudi citizens' perspectives all factors in the MGAUM, with the exception of Awareness, need careful consideration to successfully implement m-government services. Doing so would increase citizens' intention to make use of these services, thus achieving a higher level of satisfaction and actual use. Nevertheless, according to the descriptive analysis Awareness was close to being moderately influential and still needs consideration although it is suggested that the other factors should be given a higher priority.

## **6 Chapter Six: Qualitative Analysis**

### **6.1 Introduction**

This chapter presents a qualitative analysis of the data collected by the researcher. The data collection and analysis method were presented in the research methodology chapter (Chapter Four). For the qualitative investigation, we used a semi-structured interview, which is the most common type of interview used in Information Systems research and allows the researcher to explore social situations in depth (Myers and Newman, 2007). Based on a recommendation in the book, the best practical way to obtain qualitative data is the semi structured interview. In this study, face-to-face interviews were conducted to collect qualitative data from managers in eight ministries in Saudi Arabia. All interview questions were based on the previously conducted survey, because this process mainly aims to explore the factors from a different perspective (see Appendix B). The main aims of conducting the interview are to enable the researcher to understand in depth the proposed factors that could influence Saudi citizens' intention to adopt and use m-government services and to identify other factors not in the proposed model from a managerial perspective. The interview analysis also allows a comparison of the theoretical findings with actual practice. Furthermore, this method aims to expand the understanding of the impact of factors from the managerial perspective to strengthen the result of research by providing further findings that will enable an increase in citizens' intention to adopt and use m-government services. All interviews were conducted during official working hours.

The analysis takes a narrative form due to the nature of the collected data which was generated by open-ended questions. This meant that no statistical data could be generated; however, interviewees' responses have been tabulated to assess the frequency that aspects of each factor were mentioned (see Appendix C).

Narrative data is most appropriately analysed thematically (see Chapter 4); and the main points that answered the research questions and further clarified how managers in Saudi ministries perceived the influences on Saudi citizens' intention to adopt and use m-government services needed to be identified. Silverman (2005) suggested that data analysis is conducted from the start of the interviewing phase and this was done using both inductive and deductive approaches. Allocating codes to themes meant that analysis could be conducted through use of the NVivo12 coding tool (Silverman, 2005). The professionally produced transcript of each interview was saved in a separate word document; to enable the researcher to understand in depth, the proposed factors that could influence Saudi citizens' intention to adopt and use m-government services and to identify other factors not in the proposed model from a managerial

perspective, thus using both deductive and inductive analysis.

The codes were clustered into themes and diagrams created, which displayed all themes, which were based on the MGAUM. Additional themes were added after the interviews with managers had been conducted. After analysis, the factors were evaluated to see whether the findings from the interviews were consistent with the findings from the survey; and finally the MGAUM was reconfigured in accordance to reflect the results of the qualitative study. The research questions were thus codified and broken down into themes and number of categories (see Table 6.1). All interview questions were mainly based on the factors from the proposed model which are clarified in Table 6.1. Note that cells coloured gold are not factors from the proposed model, but were included in the interview questions to understand these issues from the managers' perspective.

All interviewees were assigned codenames (from Interviewee1-MOH to Interviewee 8-MOLSD). Anonymity was therefore preserved by interview participants being given pseudonyms and all data anonymised. All details about interviewees are summarised in Table 6.2. Before starting the descriptive analysis of the interviews, the proposed model was presented in the Nvivo12 program (as shown in Figure 6-1).

*Table 6-1: Topics, Codes and Categories*

<b>Topics</b>	<b>Code</b>	<b>Categories</b>
The advantages and usefulness for users when they adopt and use m-government services compared to traditional ways or by computer	Usefulness	Advantages and Usefulness
An easy to use and navigate mobile government service (Applications/Websites) compared to a computer.	Ease of Use	Ease of Use and Navigation
Awareness and advertising campaigns.	Awareness	Awareness and Advertising campaigns.
Ease of access to m- government service	Accessibility	Ease of access
Social influence (e.g. influenced by others' use such as family and friends)	Social Influence	Social influence
Mobility	Mobility	Mobility
Compatibility	Compatibility	Compatibility
Availability of mobile government service (applications / Website) for all Smartphones such as iPhone - IOS, Samsung - Android, Windows Phone and other brands.	Availability	Availability of mobile government service (applications / Website) for all Smartphones.
Whether trust would affect users' intention to adopt and use mobile government services.	Trust	Trust in government and its services
Whether cultural aspects of Saudi society would affect users' adoption and use (e.g.	Cultural Aspects	Image, Resistance to change,

Image, resistance to change, Wasta, others' praise/criticism when used, fear of using technology)		Wasta
Whether service quality (from the non-technical side such as responsiveness, reliability and empathy) from the citizens' perspective would affect their adoption and use of mobile government services	Service Quality	Service quality from the non-technical side such as responsiveness, reliability and empathy
The degree to which system quality (from the technical side, such as access speed, ease-of-use, navigation and visual appeal) could impact on citizens negatively or positively to adopt, accept and use mobile government services	System Quality	Access speed, ease-of-use, navigation and visual appeal
The factors and reasons that might encourage users to adopt and use mobile government services	Factors and reasons that might encourage users	Factors and reasons that might encourage user's intention to adopt and use m-government services
The factors and reasons that might discourage/prevent users from using mobile government services	Factors and reasons that might discourage/prevent users	Factors and reasons might discourage/prevent user's intention to adopt and use m-government services

Table 6-2: Interviewee Profiles

N	Code	Age	DEGREE	Gender	MINISTRY
1	Interviewee1-MOH	30	Master of Information Technology	Male	Ministry of Housing
2	Interviewee 2-MOCS	37	Master of Computer Science	Male	Ministry of Civil Service
3	Interviewee 3-MOJ	33	Master of Computer Science& MBA	Male	Ministry of Justice
4	Interviewee 4-MOCIT	40	Master of Information System	Male	Ministry of Communication and Information Technology
5	Interviewee 5-MOE	29	Master of Information Technology	Male	Ministry of Education
6	Interviewee 6-MOCI	-	Master of Computer Science	Male	Ministry of Commerce and Investment
7	Interviewee7-MOI	45	Master of Computer Science	Male	Ministry of the Interior
8	Interviewee 8-MOLSD	40	Bachelor of Computer Science	Male	Ministry of Labour and Social Development



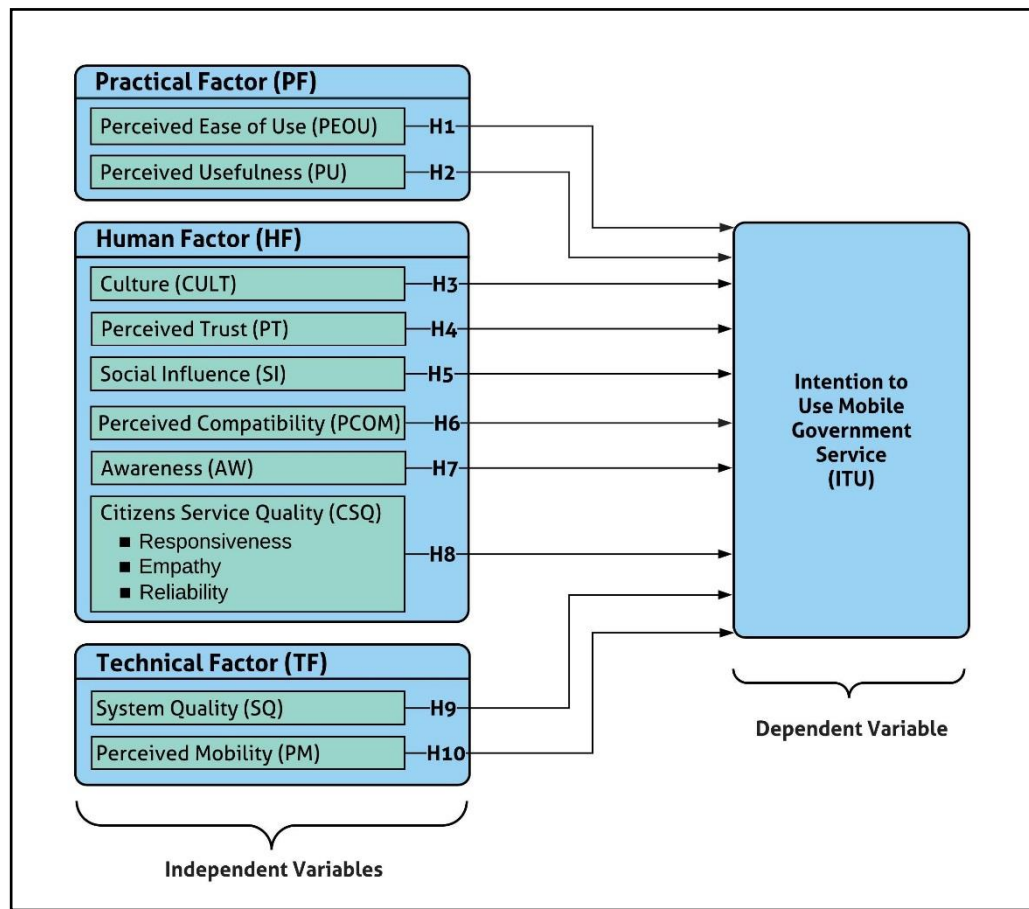


Figure 6-1: The originally proposed MGAUM model

## 6.2 Description of Interviewees' Answers

This section is divided into three parts; the first briefly deals with the results of the introductory part of the interview; the second with the results of questions relating to factors in the proposed MGAUM and the third with questions relating to extra factors.

### 6.2.1 The Initial Questions

The first two questions in the interview were:

1. *Have mobile government services been implemented in any government agencies in Saudi Arabia?*
2. *What are they?*

These questions were designed to get the interviewees talking about m-government services in general and to elicit information about the level of implementation of m-government services in their respective ministries at the time of the interviews. All the interviewees said that several m-government services from their ministries were available and some detailed what was available

as follows:

- 37 services available via the website (which is responsive to mobiles) and applications. There is also a call centre for customer services (7-MOI)
- Applications are available on IOS and Google Play (3-MOJ)
- The electronic channel is mobile-compatible to allow for uploading PDF files and images, conducting transactions and following them up. 50% of users do access sites with mobiles and 60% use mobiles for transactions. (1-MOH)
- There are two applications available (Safeer and Tawasul); both are popular and are already used more than the ministry website. (5-MOE)

### 6.2.1 Interviewees' Answers Concerning Factors in the Proposed MGAUM

This section shows the questions that interviewees were asked, along with the factor in the MGAUM that the question related to. Quotations are used to illustrate how the interviewees answered those questions, and to show what aspects of each factor they highlighted as important. The results which directly relate to the MGAUM factors: Perceived Ease of Use, Perceived Usefulness, Awareness, Social Influence, Perceived Mobility, Perceived Compatibility, Perceived Trust, Culture, Citizen Service Quality including (Reliability, Responsiveness and Empathy) and System Quality are given first, before moving on to additional areas (which are described in section 6.2.3).

3. *Can you please explain what the advantages and usefulness for users are when they use m-government services compared to traditional ways or by computer? (Perceived Usefulness)*

Factor	Interviewees' Responses							
Perceived Usefulness								
Aspects:								
	1-MOH	2-MOCS	3-MOJ	4-MOCIT	5-MOE	6-MOCI	7-MOI	8-MOLSD
Applications	✓	✓	✓	✓	✓	✓	✓	✓
Features on mobile devices such as Reminders, Location and Camera	—	—	✓	—	✓	—	✓	—
No visits	✓	—	✓	—	—	—	—	—
24/7 availability	✓	—	—	—	—	✓	✓	✓
Security	—	✓	✓	—	—	✓	✓	—
Save time/effort/money	✓	✓	✓	✓	✓	✓	✓	—

Ministry Productivity	✓	—	—	—	—	—	—	—
Availability of m-government services through mobile devices	✓	✓	—	—	✓	—	—	✓
follow up the government transaction in a few steps	✓	—	—	—	—	—	—	—
Notifications	✓	—	✓	✓	—	—	—	—
ease of communication	✓	—	—	—	—	✓	—	—

The interviewees identified several advantages for the Saudi citizen in using m-government services. Interviewee 7-MOI indicated that of especial usefulness were:

*“...features on mobile devices that add value to services and that are not found on the website, such as reminders, location and camera.”*

Another interviewee (1-MOH) focused on the advantage of not having to visit a government department in person:

*“...citizens are not supposed to visit government agencies physically at specific times during official working hours (whereas with m-government) there is the availability of services 24/7 to conduct government transactions at any time and from any place”*

Saving time and effort and receiving notifications were mentioned by several interviewees, including 3-MOJ who added that the security afforded by m-government was also an advantage. Perceived Usefulness from the point of view of the ministries was highlighted by one interviewee:

*“Furthermore, employee productivity is increased because they (ministry employees) do not need to spend time with citizens. Savings in time, effort and costs are made, not only for citizens but also for the government.”* (1-MOH)

However, another made it clear that

*“From the government’s side, the critical thing is the citizens; citizens should be satisfied with services that are provided by the government.”* (3-MOJ)

The results for this factor (theme) are therefore consistent with the findings from the survey.

**4. Please explain to what extent you think that the following factors could influence citizens' intention to adopt, accept and use m-government services**

- *An easy to use and navigate mobile government service (with applications and websites) (Perceived Ease of Use).*

Factor	Interviewees' Responses							
Perceived Ease of Use								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Ease of Use	✓	✓	✓	✓	✓	✓	✓	✓

All the managers questioned believed that Ease of Use was a critical factor in deciding whether or not citizen would use m-government services. One commented:

*"Whenever the services are easy to use, the number of users will increase."* (2-MOCS)

Another was convinced that being easy to use was the most important aspect of m-government services in influencing citizens to use them:

*"What do I think is the feature that most influences citizens to adopt and use m-government services? I think it is ease in using m-government services, which means that a person can use the application without asking help from another person."*(5-MOE)

The results for this factor (theme) are therefore consistent with the findings from the survey.

- *Awareness and advertising campaigns (Awareness).*

Factor	Interviewees' Responses							
Awareness and Advertising								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Awareness	✓	✓	✓	✓	✓	✓	✓	✓
Advertising campaigns	✓	✓	✓	✓	✓	✓	✓	✓
Social Media	✓	✓	✓	—	✓	—	—	—
Motivating to use	✓	✓	✓	✓	✓	✓	✓	✓
High rate of use	✓	—	✓	✓	✓	✓	✓	✓
Explain the services and the services are available	✓	—	✓	—	—	—	—	—
Getting feedback	—	—	✓	—	—	—	—	—

Save time, effort and cost	✓	—	—	—	✓	—	✓	—
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The Interviewees had a lot to say about this factor and made interesting suggestions as to how awareness about m-government services could be raised. One of these confirmed that:

*“An advertising campaign is critical at the beginning of establishing government services, after each advertising campaign the percentage of those using m-government services increases massively. When the ministry established the first application for its services, in only three days, 300,000 users downloaded the application, and the main reason behind the large number downloading the application is raised awareness and the advertising campaign on social media, especially Twitter.” (7-MOI)*

He added that at the time of the interview, over 9 million citizens were using m-government services in his ministry. Another interviewee concurred, saying:

*“Awareness is critical, and the first step for a ministry or a government agency to consider when shifting to digital provision.”(3-MOJ)*

He considered that advertising campaigns on social media was best way to raise awareness in citizens, but advertisements in newspapers and magazines, in public areas and on TV and radio channels were also important. The reason for choosing how to advertise m-government services was given by interviewee 2-MOCS who stated

*“I determine my awareness and advertising campaigns according to the target population. For instance, if the target population is between 18 and 30, social media is the best approach”.*

Interviewee 7-MOI provided a further insight into advertising campaigns on social media:

*“When the ministry established the first application for its services, in only three days, 300,000 users downloaded the application...The main reason behind the large number downloading the application is raised awareness and the advertising campaign on social media, especially Twitter.”*

One interviewee emphasised that just being aware of m-government services in general was not sufficient. Indeed, it was perfectly possible for citizens to find out what services were available from sources such as the ministry portal, from friends or when they visited the government agency in person; however:

*“Raising awareness only through the government agency website would lead to a low rate of use and has little effect... The most beneficial way to increase the using of m-government*

*services is through advertising campaigns.” (3-MOJ)*

He also believed that these campaigns for establishing “smart government” had to have three distinct aims:

*“First raise awareness and provide citizens with information about m-government services on their favourite channels and social media. Secondly, explain who can use the services and who the target of these services is. Thirdly, acquire feedback from citizens regarding these services.” (3-MOJ)*

Interestingly, the same interviewee pointed out that awareness could be higher in the ministries themselves:

*“Many ministries and government agencies are establishing new services, but unfortunately, we do not know which services are available electronically or through mobile devices applications.”(3-MOJ)*

The results for this factor (theme) are therefore inconsistent with the findings from the survey.

- ***Social influence, i.e. influence by others’ use, such as family and friends (Social Influence).***

Factor	Interviewees’ Responses							
Social Influence								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Motivating to use	✓	✓	✓	✓	✓	✕	✓	✓
Like a free awareness and advertising campaign	✓	—	—	—	—	✓	—	—

Several participants were convinced that social influence played an important part in influencing Saudi citizens’ intention to adopt and use m-government services. For example, one believed that:

*“This is a very important factor in encouraging people to use m-government services; social influence acts like a free advertising campaign, as the information is provided by friends and family.” (1-MOH)*

Other interviewees gave an indication of how this might operate:

*“If the services provided by the government have been helpful to me, I would definitely advise my family and friends to use it”. (3-MOJ)*

*“People in middle age could face pressure from families and friends to use m-government services after explaining the vast and massive benefits of adopting and using m-government services.” (7-MOI)*

In contrast, one interviewee stood out as the only ministry manager who thought that social influence was no longer an important factor.

*“Social influence does not affect citizens’ adoption and use of m-government services, because using m-government services has now become part of the social culture.” (6-MOCI)*

The results for this factor (theme) are therefore consistent with the findings from the survey.

- **Perceived Mobility**

Factor	Interviewees’ Responses							
Perceived Mobility								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Motivating to use	✓	✓	✓	✓	✓	✓	✓	✓
Notification	✓	—	✓	—	✓	—	✓	—
Accessibility from a mobile device and free	—	—	✓	—	—	—	—	—
No visit	—	—	✓	—	—	—	—	—
Explore services	—	—	✓	—	—	—	—	—
Main aim of establishing m-services	✓	—	—	—	✓	—	—	—
Features on mobile devices such as GPS location	—	—	—	—	—	—	✓	—

Ministry managers were generally convinced that mobility was very influential on Saudi citizens’ intention to make use of m-government services. Many of them gave reasons why this was the case, such as the interviewee who stated that this was because:

*“...government agencies use and exploit features on the mobile devices such as GPS location to access the government agency’s location.” (7-MOI)*

One interviewee was of the opinion that it was the popularity of mobile devices in Saudi Arabia that lay behind the importance of this factor:

*“When a service is available through mobile devices, maybe some people will use it even if they*

*do not need it, because this service is accessible from a mobile device, free and from a government agency, so they explore the service”. (3-MOJ)*

Another interviewee believed that mobile systems had another advantage:

*“Citizens receive notifications regarding all government transactions, such as their login to the system, completion of the process and any update regarding the transaction.” (5-MOE)*

He added that in his opinion, mobility was crucial to the adoption of m-government and was the “primary target” of its implementation.

The results for this factor (theme) are therefore consistent with the findings from the survey.

- **Perceived Compatibility**

Factor	Interviewees' Responses							
Perceived Compatibility								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Motivating to use	—	✓	✓	✓	✓	✓	✓	✓
Responsive design	—	✓	—	—	—	—	✓	—
High rate of use	—	✓	—	—	—	—	✓	—
Compatible with mobile devices and people	✓	✓	—	—	—	—	✓	—

The managers interviewed came up with several reasons why they considered compatibility an important factor in influencing Saudis' intentions to adopt and use m-government services. So that one interviewee noted that:

*“If services are not compatible with people and mobile devices, this will frustrate and discourage users.” (4-MOCIT)*

This was echoed by another who said:

*“If the application is not compatible with mobile devices and the way that citizens prefer to conduct government transactions, the adoption and usage of m-government services will definitely be at a low rate.” (5-MOE)*

One manager explained that:

*“To increase the percentage of using mobile applications rather than the website (portal), that mobile application must be compatible with the native features of mobile devices.” (7-MOI)*

The results for this factor (theme) are therefore consistent with the findings from the survey.



5. *Do you think that trust would affect users' intention to adopt and use mobile government services (e.g. trust in the government, provider, internet and privacy)? (Perceived Trust)*

Factor	Interviewees' Responses							
Perceived Trust								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Motivating to use	✓	✓	✓	✗	✗	✓	✓	✗
Trustworthy	✓	—	—	✓	—		✓	✓
Privacy and Security	✓	—	—	✓	—	✓	—	—
Authentication via User ID and password	—	—	✓	—	—	—	—	—

As this factor comprises trust in the government, its services, the provider, the internet and trust that privacy will be maintained, interviewees' answers for each of these aspects will be considered separately.

As government employees, the managers were positive in their assessment of trust in government and its importance, and sometimes stressed their own trust:

*"When a government agency provides services, citizens will trust it. From my perspective, the government is always trustworthy."* (1-MOH)

*"I would not hesitate to make immediate use of the Absher application provided by the Ministry of Interior and every new service established."* (5 MOE)

There were also indications that they believed Saudis generally placed high trust in the government:

*"I think citizens trust the government and demand that all government services are provided electronically through mobile devices and websites"* (3-MOJ)

Furthermore, one interviewee believed that the high initial downloading of his ministry's m-services:

*"... indicates trust in this ministry and the benefits of its services."* (7-MOI)

Trust in the provider was linked by some managers to trust in the government:

*"Trust in the provider is a part of the contract between the government agency and the provider. Trust in the provider can be considered as part of trust in government."* (3-MOJ)

*"... when services are provided by government they are trustworthy, whether the services are*

*provided by the government itself or via other providers. The contract for providing service is between the ministry and the providers, but the relationship between the beneficiary of the services and the entity (the government) is direct, regardless of the providers.” (1-MOH)*

Lack of trust in the Internet was seen as a problem that was decreasing as people became used to using it. As one participant pointed out:

*“...when a person has been accessing banking services through the internet and a banking mobile application, this demonstrates significantly that there is confidence in using it...We already have passed the stage of distrust or lack of confidence; it may still affect a few but not the majority.” (1-MOH)*

Exactly who those ‘few’ who distrusted the internet were identified by one manager as follows:

*“I think this problem is faced by older people or by uneducated people, and this problem has faded and begun to be less than before.” (3-MOJ)*

This interviewee however noted that he believed there was a problem with the internet ‘related to security’.

Privacy was generally seen as essential; and one interviewee was keen to point out how this was maintained in his ministry:

*“... we employ different techniques to ensure the highest level of privacy... all services in the ministry require authentication to log onto the service such as User ID and password; a two-factor authentication includes mobile number and password. A citizen cannot get benefit from a confidential service, which contains confidential and sensitive information, without logging to the system himself through his mobile number which is registered with the National Information Centre.” (1-MOH)*

It is interesting that two interviewees differed in rating trust as only having a moderate effect on intention to adopt and use m-government services (4-MOCIT) or no effect (8-MOLSD).

The results for this factor (theme) are therefore consistent with the findings from the survey.

**6. Do you think that cultural aspects of Saudi society would affect users’ adoption and use e.g. Image, resistance to change, Wasta, others' praise/criticism when used, fear of using technology?**

Factor	Interviewees’ Responses							
Culture								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Motivating to use	✓	✗	✗	✗	✗	✗	✗	✓

Several interviewees thought that culture was not a significant influence on Saudi citizens' adoption and use of m-government services. One interviewee explained why this was the case especially for young Saudis:

*"Young people are digital natives because they are already using technology and smart devices by default."* (7-MOI)

Two interviewees also believed that the impact of culture was small:

*"...because most people nowadays are using technology."* (3-MOJ)

And

*"Nowadays with the huge use of Smartphones, I think cultural aspects do not have a high impact on use of m-government services."* (5-MOE)

Referring to the issue of *wasta*, the latter commented:

*"There are a few people looking to wasta to speed up their government transactions, but I think electronic services eliminate the need for wasta because there is no human agency in the middle and everything is done automatically. Electronic services significantly reduce wasta."* (5-MOE)

The only participant who stated that culture was a critical factor and had a high impact on people's use of m-government services was 8-MOLSD.

The results for this factor (theme) are therefore inconsistent with the findings from the survey.

**7. Do you think that service quality (from the non-technical side such as responsiveness, reliability and empathy) from the citizens' perspective would affect their adoption and use of mobile government services?**

Factor	Interviewees' Responses							
Citizen Service Quality								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Motivating to use	✓	✓	✓	✓	✓	✓	✓	✓
Human factor	✓	✓	✓	✓	✓	—	✓	—
Enhance government image and positive relation with customers	—	✓	—	—	✓	—	✓	—
Supportive of system quality	✓	✓	✓	✓	✓	—	✓	—

Quality design of the program	—	—	—	—	—	—	✓	—
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The non-technical aspects of service quality were seen by ministry managers as significant in influencing Saudi citizens' intention to adopt and use m-government services. As one commented:

*"Its impact is tremendous...One of the main elements that support electronic services and applications is the human factor."* (1-MOH)

As one interviewee explained, there is no point in having high technical quality, if there are failings on the part of ministry staff to provide customer satisfaction:

*"However, there are some comments indicating problems that faced users when using the services such as: not getting notifications about the status of the services, the government transaction taking a long time to conduct and being refused a government transaction without any reason being declared. In other words, the human factor in service quality has a critical influence on the use of m-government services."* (5-MOE)

Designing a system that was responsive and reliable was also identified as important in this regard:

*"When designing any program in the ministry, we take great care that it sends appropriate notifications to customers at the appropriate time."* (7-MOI)

Another participant identified that the impact of this factor was high because:

*"People now have a high expectation, because many users are young people. Users expect quality of services, not only technical quality but also non-technical quality such as the human factor."* (4-MOCIT)

Another manager saw the non-technical factors as needing to support the technical aspects of the service:

*"Human factors, customer services and supportive services to the technical side are all critical factors which affect the use of m-government services."* (3-MOJ)

The results for this factor (theme) are therefore consistent with the findings from the survey.

8. *To what degree do you think that system quality (from the technical side, such as access speed, ease-of-use, navigation and visual appeal) could impact on citizens negatively or positively to adopt, accept and use mobile government services?*

Factor	Interviewees' Responses							
System Quality								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Motivating to use	✓	✓	✓	✓	✓	✓	✓	✓
High rate of use	✓	✓	—	—	—	—	—	—

The participants generally believed that there was a direct relationship between technical system quality and citizens' decision to make use of m-government services. Two such examples illustrate this point:

*“In general, when a system has high technical quality, this results in an increase in the adoption and use of m-government services.”* (1-MOH)

and

*“There is a direct relationship between system quality and use of m-government services, whenever the relation is positive, the percentage of use is increases; when negative, the percentage of use decreases.”* (2-MOCS)

The managers unanimously announced the importance of this factor.

The results for this factor (theme) are therefore consistent with the findings from the survey.

### 6.2.2 Summary of Results for MGAUM Factors Derived from Interviews with Managers in Eight Saudi Ministries

All the factors in the proposed MGAUM that were explored in the interviews were seen as significant by the participants with the exception of Culture. The resulting model for acceptance of m-government services from the ministry managers' perspective is shown below in Figure 6 - 2.

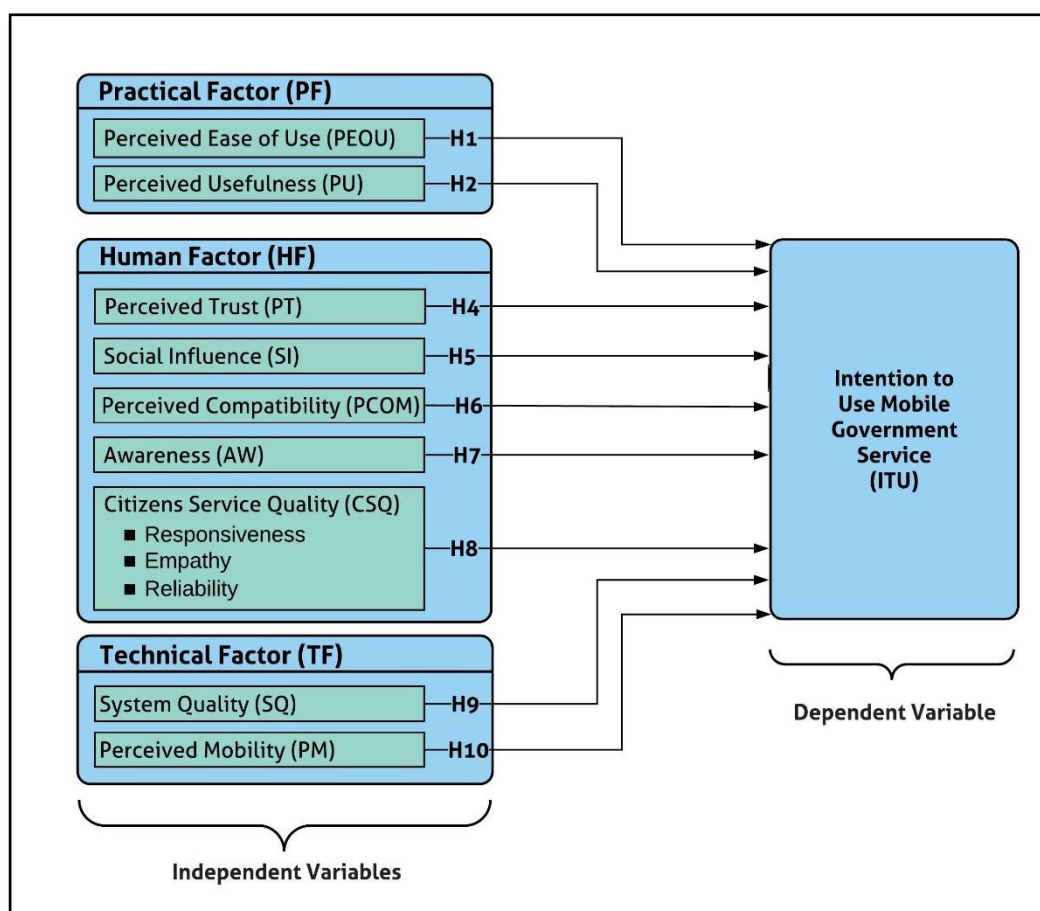


Figure 6-2: The Updated MGAUM model from the ministry managers' perspective

### 6.2.3 Interviewees' Answers Relating to Additional Factors

This section shows the results of the interviews that relate to additional factors; i.e. Ease of Access to m-government services, Availability of m-government services (applications / Website) for all Smartphones, factors and reasons that might encourage users to adopt and use m-government services and factors and reasons that might discourage or prevent users adopting and using m-government services. The first two of these factors were included in Q.4 of the interview.

- *Ease of access to m- government service*

Factor	Interviewees' Responses							
Ease of Access								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Motivating to use	✓	✓	✓	✓	✓	✓	✓	✓
Fast and High rate of access	—	✓	✓	✓	—	✓	✓	—

Enhance search engine optimization	—	—	✓	—	—	—	—	—
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All participants agreed that ease of access to m-government services was a critical factor in influencing citizens' decision to use them.

One interviewee explained why this was the case:

*“The highest rate of access to m-government services in our ministry is through search engines such as Google. When beginning to use m-government services, most citizens look for these services through search engines such as Google, then later shift to its application or keep using the website. All services on the government website are designed to be responsive to mobile devices.” (3-MOJ)*

The importance of the portal being mobile responsive was also emphasised:

*“The highest accessing of m-government services is through the portal, which is mobile responsive, rather than by mobile application.” (4-MOCIT)*

Another explained the advantages and disadvantages of accessing m-government services by application or ministry website as follows:

*“It is important to reach government services fast, but the easiest way to reach a government service directly is via the application, and it is better than the website (portal) because the website has a lot of text and images that will distract the user and it takes a long time to search for the service. A mobile application is more advanced than a responsive web design (the mobile-friendly version). One of the disadvantages of using a mobile application is that services are limited, compared to those on the website (portal) which includes all the services. If the government service requires uploading an attachment, users prefer using a personal computer.” (7-MOI).*

- ***Availability of mobile government service (applications/website) for all Smartphones such as iPhone - IOS, Samsung - Android, Windows Phone and other brands. (This factor was asked about under Q4)***

Factor	Interviewees' Responses							
Availability of mobile government service (applications/website) for all Smartphones								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Motivating to use	✓	✓	✓	✓	✓	✓	✓	✓
Mobile responsive website	✓	✓	✓	✓	✓	—	✓	✓

High rate of use	✓	—	✓	—	✓	—	✓	✓
Notification	✓	—	—	—	—	—	—	—
Establishing services users regularly need on application and using continuously	✓	—	✓	—	✓	—	✓	✓
Native application and establish applications on all platforms	✓	✓	✓	✓	✓	—	✓	—
Compatibility with mobile devices add value to service not found in the website	✓	—	✓	—	✓	—	✓	—

All participants agreed that availability of m-government services (applications and website) on all Smart phones was a critical factor in influencing citizens to use them. Several of them outlined reasons for this, and how their ministries had responded to the need for m-government services to be readily available:

*“If you do not offer m-government services on different platforms mainly IOS and Android at the same time, then you will lose a large number of customers. The latest ministry statistics show that there are more than 1 million users; and 60% of users are using the IOS system, and 40% are using an Android system.” (7-MOI)*

and

*“It (availability) has a massive impact on adoption and use of m-government services. People prefer to use native applications rather than a mobile responsive website.” (2-MOCS)*

and

*“If you do not concentrate on serving all citizens who use different types of mobile devices and platforms such as IOS and Android at the same time, then the result will be a low user adoption -as expected.” (5-MOE)*

and

*“One of the strategies in the ministry, when establishing m-government services, is to ensure that services are available on all platforms, such as IOS and Android.” (4-MOCIT)*

and

*“All m-government must be compatible with all browsers, mobile devices and must support all*



technology; it should be available on different platforms such as IOS and Google Play.” (3-MOJ)

The availability of m-government services on a 24/7 basis was also mentioned as important by interviewee 8-MOLSD

One interviewee however, warned that there should be some limits on what was provided because of the cost involved:

*“I think that the massive expansion in establishing mobile government services must be controlled, and not all services offered through the application, but only the services users regularly need. For example, there is no benefit in establishing a mobile government application for a service that will maybe only be used once or twice a year; it will cost a lot of money and effort without any real benefits. It is crucial to establish applications on all platforms to increase the use of m-government services; otherwise, this use will be negatively affected. There are two applications in the ministry, and all other services are offered online via the portal; there are no services available through a call centre or messaging system.”*(1-MOH).

**9. In your opinion, what are the factors and reasons that might encourage users to adopt and use mobile government services?**

Factor	Interviewees Responses							
Other factors and reasons that might encourage users to adopt and use mobile government services								
Aspects:								
	1- MOH	2- MOCS	3- MOJ	4- MOCIT	5- MOE	6- MOCI	7- MOI	8- MOLSD
Accessibility and Ease of access	✓	✓	✓	✓	✓	✓	✓	✓
Availability of mobile government service (applications/website) for all Smartphones	✓	✓	✓	✓	✓	✓	✓	✓
Good design	✓	—	—	—	—	✓	—	—
Full automation serviced Fully automated end-to-end and without manual processing	✓	—	—	✓	—	—	✓	✓
Unifying access to government services through the national ID and mobile number	✓	✓	—	—	✓	✓	✓	✓

Security	✓	—	✓	—	—	✓	✓	—
Privacy	✓	—	✓	✓	—	✓	—	—
Offering different channels to conduct a government transaction	✓	—	—	—	—	—	—	—
Getting critical alerts and notifications from government agencies	✓	—	✓	—	✓	✓	—	—
Full cooperation between all ministries	✓	✓	—	—	✓	✓	—	✓
Description of services and processing are clear and shown in the portal or apps	—	—	—	✓	—	—	✓	—
Customer service available after completion of the transaction	—	—	—	✓	—	—	—	—
Compatibility with mobile devices	✓	—	✓	—	✓	—	—	—
Awareness and Advertising campaigns	✓	—	✓	✓	✓	—	✓	—
Availability of services (24 Hours-7 Days)	—	—	✓	—	—	✓	—	✓
Value added to service	✓	—	✓	—	—	—	—	—
Establishing services users regularly need on application and using continuously.	✓	—	✓	✓	—	—	✓	—

The aim of this question was to uncover factors not contained in the MGAUM that ministry managers believed would influence Saudi citizens' intention to adopt and use m-government services. Such factors uncovered during the course of the interviews can be considered as new themes. Two of these factors (Ease of Access and Availability) have been described above, so the quotations below focus on any new factors identified by the ministry managers that were interviewed. The factors identified as critical are summarised at the end of this section.

Good design was considered important by 6-MOCI and 1-MOH as were other technical factors such as full automation which was mentioned by 8-MOLSD and 7-MOI. The latter explained that m-government services should be:

*“...fully automated end-to-end and without manual processing as far as possible and ... the user gets a response in a few seconds or minutes. Full automation is the best way to conduct m-government services.” (7-MOI)*

Another was also convinced that automation was important:

*“The government should pay more attention to providing all services electronically, such that the only way to deal with citizens is through the automation of electronic services; which means that government agencies provide services in full without requiring citizens to physically visit the agency. This will lead citizens to use the electronic service and make them more satisfied about services provided by the government.”* (1-MOH)

Adding value to the service that Saudi citizens receive from their government was also highlighted by 3-MOJ; and 4-MOCIT and 1-MOH mentioned that providing customer services after transactions was essential. There was a strong indication that it was important to understand m-government services from the point of view of the user, and this manager commented that there needed to be:

*“...a good description of services, processing is clearly evident, end-to-end service and a customer service available after completion of the transaction.”* (4-MOCIT)

The user’s choice of m-government service channels was also thought to be an important factor as this interviewee commented:

*“...offering different channels for citizens to conduct a governmental transaction such as website, call centre and applications will increase the adoption and use of m-government services”* (1-MOH).

Although receiving alerts and notifications were not specifically mentioned in answer to Question 9, this factor appeared to be of importance as several managers had referred to it as influencing citizens’ use of m-government services during the course of their interviews.

The majority of ministry managers focused on two particular factors that from their perspective were influential in acceptance and use of m-government services. This quotation illustrates both:

*“... unifying the access to government services via mobile number and number ID in order to facilitate conducting government services and the registration process. This requires full co-operation from all ministries.”* (5-MOE)

***Other factors and reasons that might encourage users to adopt and use mobile government services can be summarised as follows:***

1. Accessibility and ease of access to m-government services.
2. Availability of mobile government service (applications/website) for all Smartphones.
3. Fully automated service without manual processing
4. Unified access to government services through the national ID and mobile number.

5. Security.
6. Privacy.
7. Offering different channels to conduct government transactions.
8. Getting critical alerts and notifications from government agencies via text message or email regarding government transactions.
9. Full cooperation between all ministries.
10. Description of services and processing are clear and shown in the portal or apps.
11. Customer service available after completion of transactions.
12. Compatibility with mobile devices.
13. Awareness and advertising campaigns.
14. Availability of services (24 Hours-7 Days).
15. Value added to service
16. Good design.
17. Establishing services users regularly need on application and enabling continuous use.

*10. What are the factors and reasons that might discourage/prevent users from using mobile government services?*

Factor	Interviewees' Responses							
Other factors and reasons that might discourage/prevent users from using mobile government services								
Aspects:								
	1-MOH	2-MOCS	3-MOJ	4-MOCIT	5-MOE	6-MOCI	7-MOI	8-MOLSD
Bad system Quality	✓	✓	—	✓	✓	—	✓	✓
Bad service quality	✓	—	—	✓	✓	—		✓
Difficulty of use	✓	✓	✓	✓	✓	✓	✓	✓
Distrust	✓	—	—	—	✓	—	—	—
Incompatibility service with mobile device	✓	✓	✓	✓	✓	✓	✓	✓
Lack of awareness and advertisement	✓	✓	✓	✓	✓	✓	✓	✓
Lack of mobility	✓	✓	✓	✓	✓	✓	✓	✓
Lack of Usefulness	✓	✓	✓	✓	✓	✓	✓	✓
Difficulty of access	✓	✓	✓	✓	✓	✓	✓	✓
Non-availability of services 24/7	✓	—	—	—	—	✓	—	✓
Services not being complete or fully automated	—	—	✓	✓	—	✓	✓	✓
Description of services and processing not being sufficiently clear	—	—	—	✓	—	—	✓	—
Service not fully automated	—	—	✓	✓	—	✓	✓	✓
Poor security	—	✓	—	—	—		✓	✓
Regulation and policy		✓	—	—	—			✓
Non-privacy	✓		✓	✓	—	✓	—	—
Requiring much input to complete or conduct a government transaction	—	—	✓	—	—	✓	—	—
M-government service required physically visiting the government agency	✓	—	✓	—	—	—	—	—
Bad design	✓	—	—	—	—	✓	—	—
Non-Availability of mobile government service(applications/website) or Offering different channels to conduct a government transaction	✓	✓	✓	✓	✓	✓	✓	✓
Lack of unified access to government services through	✓	—	✓	✓	—	—	✓	—

national ID or mobile number.								
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The managers thought that there were a whole range of factors that might discourage or prevent the use of m-government services. Many of the factors contained in the MGAUM were reiterated in that a lack of them was considered a serious barrier to acceptance and use of m-government services. Thus, bad system and service quality, difficulty of use, distrust, incompatibility and lack of awareness, mobility and usefulness were all mentioned. The reverse of the extra factors identified as important from the ministry managers' perspectives also appeared as answers to this question; so, difficulty of access and non-availability of services 24/7 were both mentioned. Also, the reverse of factors mentioned in answer to Q.9 were thought to be important barriers such as services not being complete or fully automated, the description of services and processing not being sufficiently clear for the customer and any bad follow-up service. Poor security regulation and policy and consequent poor security were also stressed.

One manager painted a picture of what might discourage or prevent someone from using m-government services:

*“If a citizen cannot get full service from a mobile or website, the citizen fills out a form and must physically visit the government agency; and in this case, there is no benefit from electronic government services. Also, complicated service which requires much input to complete or conduct a government transaction or upload files- any lengthy way of processing.”* (3 MOJ).

All the factors, identified by participants as discouraging or preventing citizens from intending to adopt and use m-government services are summarized as follows:

1. Bad system quality.
2. Bad service quality.
3. Difficulty of use.
4. Distrust.
5. Incompatibility of services with mobile devices.
6. Lack of awareness and advertising.
7. Lack of mobility.
8. Lack of perceived usefulness.
9. Difficulty of access.
10. Non-availability of services 24/7.
11. Services not being complete.
12. Service not fully automated.
13. Bad design.

14. Description of services and processing not being sufficiently clear in the portal or apps.
15. Poor security.
16. Lack of appropriate regulation and policy.
17. Lack of privacy.
18. Requiring too much input to complete or conduct a government transaction.
19. M-government service requiring physically visiting the government agency.
20. Non-availability of mobile government service (applications/website) or not offering different channels to conduct a government transaction.
21. Lack of unified access to government services through national ID and mobile number.
22. Not establishing what services users regularly need on the application and continuous use not being available.

#### **6.2.4 Summary**

The main aims of conducting the interviews were to enable the researcher to understand in depth the factors proposed in the MGAUM that could influence Saudi citizens' intention to adopt and use m-government services and to identify other factors not in the proposed model that were deemed important from a managerial perspective. Also, the interview phase not only reinforces the results of the survey; and whether or not survey results were consistent with managers' ideas about what factors influenced Saudi citizens' intention to adopt and use m-government services; but also revealed that there were some other underlying factors which were considered essential incentives. Moreover, analysis of interview findings allows a comparison of the theoretical findings with actual practice; and expands the understanding of the impact of factors from the managerial perspective to strengthen the results of research by providing further findings related to increasing citizens' intention to adopt and use m-government services.

### **6.3 Discussion of the Results of the Interviews**

The outcomes outlined in this chapter were based on the proposed model in the quantitative part, and other factors that came up during the interviews with managers in eight Saudi ministries; and reveal that Perceived Ease of Use, Perceived Usefulness, Social Influence, Perceived Trust, Perceived Compatibility, Awareness, Service Quality, System Quality, Mobility, Value added to service, Unifying access to government services through the national number ID and mobile number, Security, Privacy, Offering different channels for citizens to

conduct a governmental transaction, Good design, Getting critical alerts notification from government agencies via text message or email regarding government transaction, Fully automated services, Fully automated end-to-end and without manual processing as far as possible, Full cooperation between all ministries to provide services, Description of services and processing are clear and shown in the portal or apps, Customer service available after completion of the transaction, Compatibility with mobile devices, Awareness and Advertising campaigns, Availability of services (24 Hours-7 Days), Availability of mobile government service (applications-Website) and Accessibility and Ease of access to m- government services were the factors that managers perceived as needing the most careful consideration in order to successfully implement m-government services. This would lead to increasing citizens' intention to use these services, as well as obtaining a higher and more satisfactory level of adoption and use.



## **7 Chapter Seven: Conclusion and Recommendations**

### **7.1 Introduction**

This chapter represents the conclusion of the research, and contains the following:

- Section 7.2: Research overview.
- Section 7.3: The revised research model (MGAUM)
- Section 7.4: Recommendations for government agencies to implement m-government services for citizens.
- Section 7.5: The research contributions
- Section 7.6: Research limitations.
- Section 7.7: Opportunities for future work.

### **7.2 Research overview**

This section presents a quick overview of each chapter and the procedures that were carried out in this research to satisfy the aims and objectives of the research.

Chapter 1 presents the research problem, research questions and research scope as well as the aims and objectives of this research. It also includes information from the literature related to the adoption and usage of E-government and m-government. Recent advances in mobile technologies such as mobile compatibilities, the development of wireless communication, mobile applications and devices are enabling governments to deliver services in new ways to citizens more efficiently and economically. In the last decade, many governments around the globe are utilizing these advances effectively to develop their next generation of E-government services. However, a low adoption rate of m-government services by citizens is a common problem in Arabian countries, including Saudi Arabia. In spite of this, very little research has been focused on understanding the factors that influence citizen adoption of these m-government services in this part of the world. There are various factors that lead to an increase in the intention to adopt and use m-government services. However, there appears to be a lack of comprehensive research which would allow a clear understanding of how factors such as these might impact the adoption and use of m-government services from the perspectives of the providers as well as the intended users.

This study aims to fill this gap by offering a new theoretical model with which to conduct empirical research in this area. The research findings arising from this new model will provide valuable new insights about the key factors affecting the adoption of m-government services in Saudi Arabia. This awareness will be useful for policymakers who wish to employ strategies that would enable faster and more efficient adoption of m-government services; as well as

providing useful information for researchers and the ICT industry. Thus, the aim of this research is to develop a conceptual model in order to analyze factors that affect user's intention to adopt and use m-government in the Saudi context. Moreover, this research aimed to use this developed model to focus on understanding and analyzing factors that could influence citizens' adoption and utilization of m-government services in Saudi Arabia from two different perspectives that of Saudi citizens and that of key officials responsible for implementing E-government and m-government services in different Saudi ministries.

Chapter 2 presents a review of literature about E-government and m-government. The literature review in this chapter is divided into six main sections: E-government, E-government in the Context of Saudi Arabia, E-government Applications and Classification, Mobile government, Mobile government Applications and Classification and Enabling Technologies. It also reviews the implementation of E-government and m-government in both developing countries and as well as developed countries. It also discusses previous studies conducted to understand and analyze factors in such E-government and m-government adoption and utilization literature.

In Chapter 3, various technology adoption theories and models have been developed to analyze, investigate and understand factors that affect the use of technology in specific contexts such as the TAM, DOI, and UTAUT are reviewed. This chapter achieves one of the aims and the objective of this study which is: ***“reviewing various technology adoption theories and models that have been developed that aim to analyze, investigate and understand factors that affect the use of technology in specific contexts.”***

Based on findings in Chapter 2, this research has developed a model called the Mobile Government Adoption and Utilization Model (MGAUM), which is one of the main contributions of this research. The MGAUM has been developed based on a critical analysis of the literature that relates to acceptance of technology, in conjunction with insights from several models and theories that are commonly used to analyze acceptance and usage of technologies. The MGAUM integrates the Technology Acceptance Model with a number of social, cultural and technological factors, taken from other recognized theoretical acceptance models that have been identified as key factors in the literature. Further, the MGAUM contains one dependent variable namely: Intention to use m-government (ITU), and three groups of independent variables namely: Practical Factors (PF), Human Factors (HF), and Technical Factors (TF). These independent variables comprise the key factors that critically influence the adoption and use of m-government. Based on the MGAUM, the researcher defined and developed the research hypotheses about the proposed relationships between factors in the MGAUM and users' intention to adopt and use. This chapter thus identifies factors that affect the use of technology in specific contexts and influence user intention to adopt and use m-government services, which is the second aim and objective of the research, namely: ***“Developing a model***

*called the Mobile Government Adoption and Utilization Model (MGAUM) based on a critical analysis of the literature that relates to acceptance of technology, in conjunction with insights from several models and theories that are commonly used to analyze acceptance and usage of technologies"* and to answer the first question in this research which is:

**“Question 1: What is the appropriate theoretical framework that can be used to analyze factors that can impact user’s intention to adopt and use m-government services from citizens’ perspectives, particularly in Saudi Arabia?”**

Chapter 4 discusses the research methodology adopted in this research to collect quantitative and qualitative data. The research methodology chapter is divided into sections, namely: research philosophy, design, approach, method, research instruments, sampling and data analysis. The approach used by this study can be categorised as a ‘quantitative dominant’, primary method with an additional qualitative method used as complementary and supportive method to benefit and enrich the findings of the research.

#### **Findings and discussion from the citizens’ perspective**

Chapter 5 provides an overview of respondents’ demographic characteristics: age, education level, occupation, use of mobile and the internet, knowledge of m-government before participating, experience and how they rate using m-Government. Also, a descriptive analysis for each factor proposed in the MGAUM is given in order to explain its impact on citizens’ intention to adopt and use m-Government services in Saudi Arabia. Moreover, this chapter provides a discussion of the statistical analysis of the findings and an evaluation of the hypotheses about the relationship between the dependent factor (Intention to use m-government service), and independent variables (factors), to determine which of the hypotheses will be accepted or rejected. In this study, Pearson’s correlation coefficient was mainly used to assess the relationship for all factors.

The main aim and objective in Chapter 5 is to use the developed MGAUM to investigate and understand Saudi citizens’ perceptions towards the adoption and utilization of m-government services in developing countries, particularly Saudi Arabia, in order to increase the adoption rate of m-government services. This study focuses on two different perspectives: that of Saudi citizens and that of key officials responsible for implementing E-government and m-government services in different Saudi ministries. The study aims to provide the knowledge needed to ensure a high level of success when implementing m-government services in this context. The following research questions were answered as follows:

***Question 2: What are the key factors that could influence the adoption and utilization of m-government services in Saudi Arabia from citizens’ perspectives?***

All the details to answer this question are presented in Chapter 5. The summary of Chapter 5 is as follows: Section 5.1.1 provides an overview of respondents' demographic characteristics. Section 5.2 also provides descriptive analysis for each factor proposed in the MGAUM and Section 5.3 provides the discussion and findings from statistical analysis and an evaluation of the relationships in the hypotheses from citizens' perspectives. The end of this chapter summarizes all the hypothesized relationships between the MGAUM's constructs and the intention to use m-government services. This chapter reveals that all the factors except Awareness were found to be significant and critical factors in having a positive and direct relationship with citizens' intention to adopt and use m-government services. The degree of effect and the influence of these factors are as follows: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Mobility (PM), Social Influence (SI) and Perceived Compatibility (PCOM) had a very strong effect on citizens' intention, whereas, Perceived Trust (PT), Culture (CULT), Citizen Service Quality (CSQ) and System Quality (SQ) had a moderate effect on citizens' intention.

### **Findings and discussion from managerial perspectives**

Also, the researcher conducted qualitative face-to-face interviews in this research to answer the previous question based on the MGAUM, namely: *Question 3. What are the key factors that could influence the adoption and utilization of m-government services in Saudi Arabia from managerial perspective?* These interviews were conducted with key officials responsible for E-government and m-government in eight selected Saudi ministries. These ministries are considered as the most important ministries in Saudi Arabia in that citizens have to deal with them frequently. The main aims of conducting the interviews were to enable the researcher to understand in depth the factors proposed in the MGAUM that could influence Saudi citizens' intention to adopt and use m-government services and to identify other factors not in the proposed model that were deemed important from a managerial perspective. Also, the interview phase not only reinforces the results of the survey; and whether or not survey results were consistent with managers' ideas about what factors influenced Saudi citizens' intention to adopt and use m-government services; but also revealed that there were some other underlying factors which were considered essential incentives. Moreover, analysis of the interview findings allows a comparison of the theoretical findings with actual practice; and expands the understanding of the impact of factors from the managerial perspective to strengthen the results of research by providing further findings related to increasing citizens' intention to adopt and use m-government services. The focus of the qualitative stage of this study was to understand and analyse factors in the MGAUM that could affect citizens' intention to adopt and use Saudi m-government services from the perspectives of officials in various Saudi ministries who have the responsibility for implementing E-government and m-government services. Providing the

knowledge required for implementing m-government services in the Saudi context with a high level of success is thus a major aim of this study.

All the details to answer this question are presented in Chapter 6. The summary of Chapter 6 is as follows: section 6.1 presents a qualitative analysis of the data collected by the researcher. Sections 6.2, 6.2.1 and 6.2.2 also provide a description of interviewees' answers for each factor proposed in the MGAUM and a summary of results for the MGAUM factors derived from interviews with managers in eight Saudi ministries. Section 6.2.3 provides the interviewees' answers relating to additional factors that are not proposed in the MGAUM. The end of this chapter summarizes and outlines the result of the interviews.

### **Summary of Interviewees' Answers Concerning Factors in the Proposed MGAUM (Conducted with Managers in Eight Saudi Ministries)**

All the factors in the proposed MGAUM model that were explored in the interviews were seen as significant by the participants with the exception of Culture.

### **Interviewees' Answers Relating to Additional Factors:**

Section 6.2.3 shows the results of the interviews that relate to additional factors; i.e. Ease of Access to m-government services, Availability of m- government service (applications / Website) for all Smartphones, Factors and reasons that would encourage users to adopt and use m-government services and Factors and reasons that would discourage or prevent users adopting and using m-government services.

### **In your opinion, what are the factors and reasons that might encourage users to adopt and use mobile government services?**

The outcomes outlined in Chapter 6 were based on the model proposed in the quantitative part, and other factors that came up during the interviews with managers in eight Saudi ministries; and reveal that Value added to service, Unifying access to government services through the national number ID and mobile number, Security, Privacy, Offering different channels for citizens to conduct a governmental transaction, Good design, Getting critical alerts notification from government agencies via text message or email regarding government transaction, Fully automated services, Fully automated end-to-end and without manual processing as far as possible, Full cooperation between all ministries to provide services, Description of services and processing are clear and shown in the portal or apps, Customer service available after completion of the transaction, Compatibility with mobile devices, Awareness and Advertising campaigns, Availability of services (24 Hours-7 Days), Availability of mobile government service (applications-Website) and Accessibility and Ease of access to m- government services are the factors that need to be considered very carefully in order to implement and provide

successful m-government services. This would lead to increasing citizens' intention to use these services, as well as obtaining a higher and more satisfactory level of adoption and use.

**What are the factors and reasons that might discourage/prevent users from using mobile government services?**

The managers also thought that there were a whole range of factors that might discourage or prevent the use of m-government services. Many of the factors contained in the MGAUM were re-iterated in that a lack of them was considered a serious barrier to acceptance and use of m-government services. Thus, bad system and service quality, difficulty of use, distrust, incompatibility and lack of awareness, mobility and usefulness were all mentioned. The reverse of the extra factors identified as important from the ministry managers' perspectives also appeared as answers to this question; so, difficulty of access and non-availability of services 24/7 were both mentioned. Also, the reverse of factors mentioned in answer to Q.9 were thought to be important barriers such as services not being complete or fully automated, the description of services and processing not being sufficiently clear for the customer and any bad follow-up service. Poor security regulation and policy and consequent poor security were also stressed.

**The revised research model, Recommendations, Contributions, Limitations and Future Work**

Based on the final results of testing the MGAUM in the quantitative and qualitative part, several recommendations emerged to answer the following question:

***Question 4: How can the results of this research from different perspectives that of Saudi citizens and that of key officials responsible for implementing E-government and m-government services in different Saudi ministries assist government agencies in Saudi Arabia and other Arab countries in similar circumstances to enhance, increase and influence citizens adoption and utilization of m-government services?***

These recommendations are detailed in section 7.4. We intend the results to provide a valuable insight into the main factors that influence citizen intention to adopt and use m-Government services in Saudi Arabia; which will be useful for researchers, the ICT industry and for policymakers who are keen to find strategies that result in quicker and more efficient take-up of such services.

### **7.3 The revised research model (MGAUM)**

In order to analyse factors that affect users' adoption and use of m-government, this research developed a model called the Mobile Government Adoption and Utilization Model (MGAUM). This model is presented in Chapter 3. Based on the quantitative results in Chapters 5 and 6, the

research model was revised and is presented in Figure 7-1.

The revised model from the citizens' perspectives revealed that all the factors except Awareness were found to be significant and were critical factors in influencing behavioural intention to adopt and use m-government services.

Perceived Usefulness, Perceived Ease of Use, Perceived Mobility, Social Influence and Perceived Compatibility were very influential on citizens' intention, whereas, Perceived Trust, Culture, Citizen Service Quality and System Quality were influential to some degree.

The revised model from the managers' perspectives revealed that all the factors except culture were found to be significant and were critical factors in that managers perceived them to be influential on citizens' intention to adopt and use m-government services.

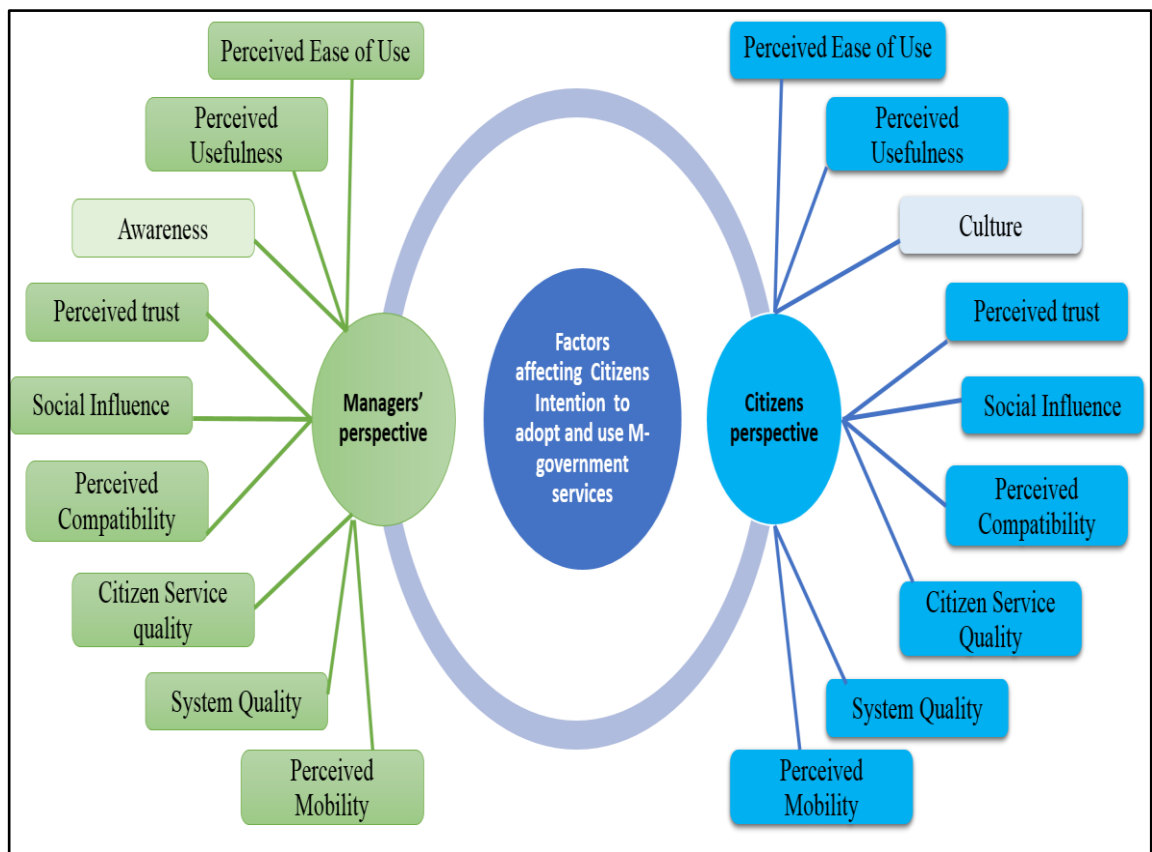


Figure 7-1: Revised MGAUM Model from Two Perspectives

#### **7.4 Recommendations for government agencies to implement m-government services for citizens**

The outcomes of the developed MGAUM model in the quantitative part in Chapter 5 indicated that Perceived Usefulness, Perceived Ease of Use, Perceived Mobility, Social Influence and Perceived Compatibility, Perceived Trust, Culture, Citizen Service Quality and System Quality were the most significant factors that were influential on citizens' intention to adopt and use m-government services.

The outcomes outlined in Chapter 6 were based on the proposed model in the qualitative part, and other factors that came up during the interviews with managers in eight Saudi ministries; and these outcomes generated the following recommendations to provide a valuable insight into the main factors that influence adoption of m-government services in Saudi Arabia, which will be useful for researchers, the ICT industry and for policymakers who are keen to find strategies that result in quicker and more efficient take-up of such services:

- ***Providing services that are easy to use***

Government agencies should concentrate on providing services that are easy to use because user experience and consequently the services' ease of use is considered as the first step in ensuring adoption and use of m-government services. If the citizens find m-government services easy to use without asking help from anyone, this will motivate and influence them to make use of them, resulting in an increase in Saudi citizens using m-government services. One way of making it easier for citizen to access m-government services is to implement a unified access to government services through a national number ID and mobile number that is registered with the National Information Centre. Also, m-government services need to be well-designed and have a very clear description of services and processing shown in the portal or applications. The ease of access to m-government services can be maximised by ensuring that citizens can use their preferred route i.e. website or application.

- ***Perceived Usefulness of services and value added to service***

Government agencies should take into consideration the requirements and needs of users to be met before implementing any services and adding value to these services. There are many advantages to using m-government services, which citizens could access via mobile devices especially applications: Firstly, user experience will be better in terms of ease of use, saving time and effort and being easy to access. Secondly, citizens can use features on mobile devices that are not found on the website, such as ease of access, mobility, receiving notifications, reminders, location and a camera, which all add value to the services. This will encourage and influence many citizens to use m-government.



- ***Social Influence***

The results show that Social Influence was a significant factor to influence citizens to adopt and use m-government services; and there are many ways related to this factor that the government could make use of to incentivize citizens to use them. Saudis who are already using m-government services could be encouraged to recommend them to family members, friends and colleagues as part of advertising campaigns that the government runs about its m-government services. Saudis who are not already using the services could be targeted in advertising and public information campaigns which encourage asking family, friends and colleagues to show them how easy the services are to use at any time and from any place simply by accessing them through a mobile device. Also, government agencies could encourage citizens to use m-government services by showing that the use of m-government services is the current trend in conducting government transactions and accessing services.

- ***Increasing trust and ensuring high levels of privacy and security***

The results show that there is already a high level of trust in government agencies, and it is rather that there are concerns about putting information on the internet that worries Saudi citizens. The government can build on the trust that Saudis have in its agencies to maintain privacy and security by building in reassurances about this into the services themselves. Saudi citizens who wish to have further information about these matters could be guided to a part of the service that provides answers to frequently asked questions (FAQs) and these could give information to questions such as ‘How safe is my personal data?’.

Also, government agencies should provide as part of their services all the critical information related to trust policies, privacy policies and security policies that have been implemented and are applicable to all stakeholders such as users, employees and other government agencies. Government agencies should make this information readable for users, which mean that it must be clear, short, concise and understandable. Moreover, government agencies should make it clear to all stakeholders that they employed different techniques to ensure the highest level of privacy, which mean that all data related to each user stored in ministries or government agencies databases are in trusted and in safe environments. This means that no one can misuse data because the government agencies applied restricted rules that only allow access to person with permission to access data; otherwise, the access is denied. The government agencies can apply the following techniques to conduct transactions and access any government services, such as use of a national number ID and mobile number or User ID and password; there is also a two-factor authentication that includes mobile number and password and fingerprints. Moreover, citizens could not get benefit from a confidential service, which contains confidential and sensitive information, without logging on to the system themselves through a mobile

number, which is registered with the National Information Centre. Publicising these strategies will raise citizens' intention to use m-government services and increase their adoption and use.

- ***Culture***

In relation to image-enhancement being seen as important to many Saudi citizens, advertising campaigns can include an element of this by suggesting that accessing government services via mobile devices indicates familiarity with modern technology and thus a high level of education and modernism. This image may not appeal to all sections of Saudi society and such advertisements would have to be targeted to audiences who would find this appealing. Similarly, some Saudis may be resistant to change and prefer face-to-face interactions to conduct government service transactions. It may be possible that staff could offer to show citizens how to use m-government at these face-to-face transactions or that some other means of such citizens being encouraged to use m-government services by being shown how to use them by a friendly and patient person can be found. Advertising campaigns encouraging citizens to offer to show family members how to access these services has already been suggested.

Regarding citizens preferring to use face-to-face interactions because of *wasta*; this practice needs to be addressed at source, perhaps as part of training government employees in carrying transactions more ethically. As far as using *wasta* electronically, various electronic techniques can be applied to detect whether electronic services are not being controlled to ensure that all citizens' requests are processed equally, thus making it less possible for citizens to use *wasta* in their government transactions.

Furthermore, government agencies can minimize the impact of the aspect of Saudi culture that involves resistance to change by raising awareness and providing more awareness campaigns targeted at citizens about the enormous benefits of using m-government services.

- ***Perceived Compatibility***

The ministries and government agencies that provide m-government services must ensure that these are compatible with mobile devices and fit in well with how citizens like to conduct government services. Compatibility with mobile devices means that citizens can use features that are not found on the website, such as ease of access, mobility, receiving notifications, reminders, location and a camera. Moreover, all government services should employ responsive web design (the mobile-friendly version).

- ***Awareness and Advertising campaigns***

The results show that in order for m-government services to be used by citizens they need to be aware of the services that are available and the benefits of accessing them. The government needs to ensure that m-government services are widely published on a range of media and to

take into account the audiences that each of these media attract and to make the campaign relevant to that target audience in terms of the design of the advertisement and the language used. Public awareness could be enhanced by government agencies in various ways including interactive advertising and social media campaigns as well as traditional advertising methods such as newspapers, brochures, TV, messages on public transport and in subways.

- ***Citizen Service Quality and Customer Service available after completion of the transaction***

The m-government service (website-apps) could have a feedback section built in so that citizens using the service could evaluate the quality of the m-government service provided in terms of how satisfied they were with the speed and ease-of-use of the service as well as the dimensions of citizen service quality (Responsiveness, Reliability and Empathy). Following completion of transactions, citizens must be able not only to give feedback but to receive support where necessary if they require further assistance or information. This could be provided in a range of ways (free phone line, email or chat) depending on what the user prefers. Citizens now have high expectations, so they expect the quality of service not only from the technical side but also from non- technical side such as human factors. So, when government agencies establish any services, they should carefully consider that citizen service quality is a part of the quality design of the program.

- ***System Quality***

The results yielded several issues related to ensuring high levels of system quality. One such was that services should be fully automated end-to-end without manual processing as far as possible; another involved the citizen automatically getting critical alerts notifications from government agencies via text message or email regarding their government transactions. This could be provided in a range of ways (free phone line, email or chat) depending on what the user prefers. Government agencies must not leave citizens and others behind, so government agencies should be offering different channels for citizens to conduct a government transaction such as App, website, text message service and call centre and as well as on different platforms, mainly IOS and Android; and all at the same time.

Moreover, one of the system qualities that government agencies should be taking into account is enhanced search engine optimization (SEO) for its websites and services. Applying SEO will ensure high ranking and the agencies should aim to be the first website ranked in the search engine result. When citizens need to conduct a government transaction or access a government service for the first time, they will look at web search engines such as Google, Yahoo or Bing. So, the government websites should aim to be ranked at the beginning of the web search engine to make access to its services are accessible and fast. Later the citizen will maybe download the

application from this government agency.

From the researcher's perspective and experience, general users who do not have any technical experience will find the easy way to contact government agencies is through the website by searching via web search engines. Citizens who do not have technical experiences will face some difficulty to conduct services from applications because they need to search on a mobile device such App Store or Google Play; and if they find it, to download the application, then activate the program and register from the application to conduct the government services. For that reason, government agencies should have enhanced search engine optimization (SEO) for its websites and services, and be ranked at the beginning of the web search engine result with the following: the full website link of the government agency, the availability of mobile government applications on different platforms mainly IOS and Android with direct links to download the program for each platform, to make it more accessible to citizens. Clearly, the m-government system's technical efficiency needs to be monitored to ensure it is maintaining a high standard and there need to be effective strategies in place for dealing with any problems that arise.

- ***Developing the postal service in Saudi Arabia***

Some government services, for example, when issuing a new passport or renewing it, require the presence of citizens to receive a hard copy of this official document. This step, as well as the lack of delivery options such as postal services will not help to improve electronic services transactions in Saudi Arabia; and the main objective of establishing any government service is to conduct and deliver it electronically. In view of this, government agencies should cooperate with postal services and use them effectively as a fast and reliable way to deliver hard copies of official documents if required. Each citizen could receive documents at home without having to physically visit the government agency. This step would definitely be a positive point and encourage citizens to use m-government services.

These are the key factors that need to be considered very carefully in order to implement and provide successful m-government services. This would lead to increasing citizens' intention to use these services, as well as obtaining a higher and more satisfactory level of adoption and use. In order for the recommendations to be more effectively implemented there needs to be full cooperation between all ministries to take the necessary steps to maximise performance in providing m-government services.

## **7.5 The research contributions**

The contributions made by the current study to the field of m-government adoption and use in terms of theory, practice and methodology are presented here.

### 7.5.1 Theoretical contributions

**Firstly**, this research provides a comprehensive literature review on E-government and m-government; covering several aspects such as: E-government, E-government in the Context of Saudi Arabia, E-government Applications and Classification, E-government Applications and Classification, Mobile government, Mobile government Applications and Classification and Enabling Technologies. It also reviews the implementation of E-government and m-government in both developing countries and as well as developed countries.

**Secondly**, this model is one of the main contributions of this research to knowledge as the MGAUM provide a valuable insight into the main factors that influence citizen intention to adopt and use m-Government services in Saudi Arabia; which will be useful for researchers, the ICT industry and for policymakers who are keen to find strategies that result in quicker and more efficient take-up of such services.

**Thirdly**, in this research, the MGAUM is empirically tested and validated by collecting and analysing primary data from the citizens' perspectives. There were a large number of participants (1286 participants); and 813 participants were male (63.2 %), and 473 were female (36.8 %). From a research perspective, to our knowledge very few male researchers in Saudi Arabia have had this large a number of female participants in their studies. This is one of the main fundamental contributions to this research. This model could properly be applied in different countries and context primarily similar countries in a context such as other Arab countries, and especially in Arabian Gulf Countries. This will provide valuable information about the key factors affecting the adoption of m-government services which will be useful for policymakers who wish to employ strategies that would make for faster and more efficient adoption of such services, as well as providing useful information for researchers and the ICT industry.

**Fourthly**, in this research, the MGAUM model is also empirically tested by a qualitative approach; namely, semi-structured interviews with key officials who have the responsibility for implementing E-government and m-government services in eight Saudi ministries. These ministries are considered as the most critical ministries in Saudi Arabia in that citizens have to deal with them frequently. Applying this method enabled the researcher to understand in depth, the proposed factors that could influence Saudi citizens' intention to adopt and use m-government services and to identify other factors not in the proposed model from a managerial perspective. This is also another main contribution to this research. This result will provide valuable information about the key factors affecting the adoption of m-government services which will be useful for policymakers who wish to employ strategies that would make for faster and more efficient adoption of such services, as well as providing useful information for

researchers and the ICT industry.

**Fifthly**, the methodology (mixed methods) employed in this study can be usefully applied to the study of technology acceptance in other contexts.

## **7.6 Research Limitations**

For this study, the researcher has made a great effort and spent time to carefully achieve the objectives and to answer the research questions. However, like any other research, this research has some limitations that are as follows:

- ***The issues of time and distance***

The researcher has a limited time to finish the thesis (between 3 to 4 years) and this was one of the obstacles that hindered the researcher from doing further empirical studies. If that limit time had been extended, the level of data would be higher, richer and have added more value to the study. For example, the researcher would like to conduct further research and more interviews such as focus groups on challenges facing m-government implementation and adoption. The issue of distance is that the research focuses on Saudi Arabia; and the researcher had to travel to Saudi Arabia to collect data from citizens as well as key officials responsible for implementing E-government and m-government services in different Saudi ministries.

This forced the researcher to collect data in a limited time and use a parallel approach, knowing that it would be difficult to return and collect data from the targeted participants once he had travelled back to the United Kingdom.

- ***Lack of relevant literature***

There was a lack of literature about m-Government services, adoption and usage in the developing countries and Arab countries, particularly the Gulf countries. There was also a lack of literature that looked at m-government services from the perspectives of both citizens and managers in various ministries and government agencies. Because of this lack, it was difficult to compare the results of this research with that of other studies and with research conducted in a similar context. It was particularly difficult to find studies that addressed the perspective of managers in various ministries and government agencies.

- ***Restriction and complicated procedures involved in meeting key officials***

In order to use a qualitative approach and interview key officials responsible for implementing E-government and m-government services in different Saudi ministries, there were restrictions and complicated procedures which hindered the process.

The interviews were conducted by the researcher in 8 ministries with key officials responsible

for implementing E-government and m-government services. These ministries are considered the most important ministries in Saudi Arabia and Saudi citizens deal with them regularly. Other ministries were approached for interviews, but these refused. The refusals and the restrictions were related to security, privacy and sensitivity of some ministries that only allow authorised employees to access their technical and information technology department. Also, to get permission from some of the ministries, the procedure required a long time, sometimes several months, and the issue of time was one of the limitations mentioned above. This prevented the researcher from providing further findings related to increasing citizens' intention to adopt and use m-government services with actual practice from the perspectives of officials in these ministries.

- ***The issue of gender***

In this study the high number of male participants compared to female ones could be considered as limitation. To our knowledge, very few male researchers in Saudi Arabia have had this large a number of female participants in their studies. The electronic version of the questionnaire rather than the hard copy of the questionnaire helped to acquire a large number of female participants because one of the obstacles and challenges in this research was collecting data personally from female participants. In general, male researchers in Saudi Arabia face a big challenge if collecting data personally from female participants. However, it appears that with the electronic version, this problem has been resolved. Although the male participants were double that of the female participants in the sample, it is still representative of the current target population.

- ***A cross-sectional approach***

A cross-sectional approach is used in this study, which means that a substantial amount of data from both Saudi citizens (the survey) and ministry officials responsible for implementing m-government services is only collected once, and within a relatively short period of time. The limitation of this research could be considered that the research is only relied on a cross-sectional approach, and did not use a longitudinal approach to measure the influence of these factors from the same group at different points in time. In short, a longitudinal approach could check whether or not the citizens' intention to adopt and use m-government services would change with time. This issue is considered to be partially related to the time issues mentioned above.

## **7.7 Opportunities for Future Work**

M-government in most developing countries, including Saudi Arabia, is at an initial stage and faces a number of issues related to adoption, implementation and use. Thus, this research can be

further developed and expanded to analyse, investigate and understand factors that affect the use of m-government services as well as providing the knowledge and understanding to ensure a high level of success when implementing m-government services in this context beyond the scope of this research. Some areas relate to this research, which needs to be investigated and explored further, these include:

- Testing and validating the developed MGUAM in one of the neighbouring Gulf Cooperation Council (GCC) countries, to investigate and understand their perception about mobile government services. As Gulf countries shares similar social and cultural values, one of the developing countries would provide valuable information about the key factors affecting adoption of m-government services in these countries, which will be useful for policymakers who wish to employ strategies that would make for faster and more efficient adoption of such services as well as providing useful information for researchers and the ICT industry. For example, a comparative analysis of m-government services adoption and usage in these countries could be conducted. This notwithstanding, it is critically important to take into consideration the cultural, political, social and economic differences between different contexts because they play a significant role in validating the effect of the factors. This step would validate the developed MGAUM and extend the generalisability as well as the contribution of the MGAUM in different contexts.
- Given the disparity between the quantitative and qualitative results for the Culture and Awareness factors; further research needs to be conducted into how aspects of these factors influence acceptance of m-government technologies in different social groups.
- Further research involving the developed MGAUM could be conducted using a qualitative approach, and to acquire further information from the perspectives of officials in various Saudi ministries who have the responsibility for implementing E-government and m-government services. This would enable the researcher to understand in more depth, the factors that impact on the adoption of m-government services from a managerial perspective by providing further findings that will enable an increase in citizens' intention to adopt and use m-government services.
- Investigating, understanding and analysing factors in the developed MGAUM that could influence citizens' intention to adopt and use m-government services in Saudi Arabia could be done from Saudi women's perspectives; and the best people to conduct this research in the Saudi context would be female researchers.



- The MGAUM developed in this research could be used in a longitudinal study to focus on the influence of these factors on the same group at different points in time.
- The MGAUM can be adapted to investigate and analyse factors that can impact Saudi citizens' adoption and usage of different interactive systems and electronic system such as m-banking, m-learning system, cloud computing services and m-commerce.
- The research model could be developed to focus on interaction processes such as G2G, G2B or C2G, which is another important area of the research that needs to be carried out in order to address the needs of each of these categories in developing such projects.
- The relationships between the demographic data and the MGAUM, such as age, gender, education, income and experience of using mobile devices, could be investigated in order to explore the influence of each on adoption and use of m-government services.
- From the practical side, the MGAUM can be tested by designing and implementing m-government services programs based on the finding of this research and considering the most influential factors as well as aspects that are involved in each factor. This will help to evaluate and confirm the influence of these factors particularly and the results compared with the findings of this research, to see whether the results are consistent or not.
- Exploring the indirect relationships between the influential factors and assessing the impacts amongst them is also another future work direction to better understand the users' adoption and use

In conclusion, we believed that the results of this research will provide valuable information about the key factors affecting adoption of m-government services in Saudi Arabia which will be useful for policy makers who wish to employ strategies that would make for faster and more efficient adoption of such services as well as providing useful information for researchers and the ICT industry.

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## Appendices

### Appendix A: Raw data of the citizens' sample

Table 8-1: Raw data of Perceived Usefulness (PU) items

PU Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
PU1	Frequency	833	375	62	13	3	1286	1.43	0.656	Strongly Agree
	Percent	64.8%	29.2%	4.8%	1.0%	0.2%	100.0%			
PU2	Frequency	900	314	56	13	3	1286	1.37	0.640	Strongly Agree
	Percent	70.0%	24.4%	4.4%	1.0%	0.2%	100.0%			
PU3	Frequency	952	283	40	10	1	1286	1.31	0.576	Strongly Agree
	Percent	74.0%	22.0%	3.1%	0.8%	0.1%	100.0%			
PU4	Frequency	806	346	99	27	8	1286	1.51	0.778	Strongly Agree
	Percent	62.7%	26.9%	7.7%	2.1%	0.6%	100.0%			
PU5	Frequency	908	302	62	12	2	1286	1.37	0.635	Strongly Agree
	Percent	70.6%	23.5%	4.8%	0.9%	0.2%	100.0%			
PU6	Frequency	892	322	50	15	7	1286	1.38	0.671	Strongly Agree
	Percent	69.4%	25.0%	3.9%	1.2%	0.5%	100.0%			
PU7	Frequency	864	348	58	12	4	1286	1.40	0.651	Strongly Agree
	Percent	67.2%	27.1%	4.5%	0.9%	0.3%	100.0%			
Total	Frequency	6155	2290	427	102	28	9002	1.39	0.499	Strongly Agree
	Percent	68.4%	25.4%	4.7%	1.1%	0.3%	100.0%			

Table 8-2: Raw data of Perceived Ease of Use (PEOU) items

PEOU Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
PEOU1	Frequency	829	376	60	18	3	1286	1.44	0.672	Strongly Agree
	Percent	64.5%	29.2%	4.7%	1.4%	0.2%	100.0%			
PEOU2	Frequency	730	453	84	16	3	1286	1.53	0.695	Strongly Agree
	Percent	56.8%	35.2%	6.5%	1.2%	0.2%	100.0%			
PEOU3	Frequency	635	473	127	46	5	1286	1.69	0.821	Strongly Agree
	Percent	49.4%	36.8%	9.9%	3.6%	0.4%	100.0%			
PEOU4	Frequency	656	464	138	27	1	1286	1.64	0.762	Strongly Agree
	Percent	51.0%	36.1%	10.7%	2.1%	0.1%	100.0%			
Total	Frequency	2850	1766	409	107	12	5144	1.57	0.619	Strongly Agree
	Percent	55.4%	34.3%	8.0%	2.1%	0.2%	100.0%			

Table 8-3: Raw data of Culture (CULT) items

CULT Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
CULT1	Frequency	580	477	153	66	10	1286	1.79	0.896	Agree
	Percent	45.1%	37.1%	11.9%	5.1%	0.8%	100.0%			
CULT2	Frequency	788	316	101	51	30	1286	1.62	0.955	Strongly Agree
	Percent	61.3%	24.6%	7.9%	4.0%	2.3%	100.0%			
CULT3 (REVE)	Frequency	189	161	224	352	360	1286	2.59	1.391	Agree
	Percent	14.7%	12.5%	17.4%	27.4%	28.0%	100.0%			
CULT4 (REVE)	Frequency	146	134	178	424	404	1286	2.37	1.324	Agree
	Percent	11.4%	10.4%	13.8%	33.0%	31.4%	100.0%			
CULT5	Frequency	688	442	113	29	14	1286	1.63	0.822	Strongly Agree
	Percent	53.5%	34.4%	8.8%	2.3%	1.1%	100.0%			
Total	Frequency	2391	1530	769	922	818	6430	2.00	0.692	Agree
	Percent	37.2%	23.8%	12.0%	14.3%	12.7%	100.0%			

(REVE = Reversed)

Table 8-4: Raw data of Perceived Trust (PT) items

PT Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
PT1 (REVE)	Frequency	165	263	331	389	138	1286	2.94	1.203	Neutral or do not know
	Percent	12.8%	20.5%	25.7%	30.2%	10.7%	100.0%			
PT2	Frequency	457	493	268	57	11	1286	1.97	0.904	Agree
	Percent	35.5%	38.3%	20.8%	4.4%	0.9%	100.0%			
PT3 (REVE)	Frequency	242	306	254	349	135	1286	3.13	1.291	Neutral or do not know
	Percent	18.8%	23.8%	19.8%	27.1%	10.5%	100.0%			
PT4	Frequency	557	525	168	31	5	1286	1.76	0.798	Strongly Agree
	Percent	43.3%	40.8%	13.1%	2.4%	0.4%	100.0%			
PT5	Frequency	452	475	276	75	8	1299	2.00	0.925	Agree
	Percent	35.1%	36.9%	21.5%	5.8%	0.6%	100.0%			
PT6 (REVE)	Frequency	169	255	312	399	151	1286	2.92	1.224	Neutral or do not know
	Percent	13.1%	19.8%	24.3%	31.0%	11.7%	100.0%			
PT7	Frequency	499	582	179	23	3	1286	1.79	0.760	Agree
	Percent	38.8%	45.3%	13.9%	1.8%	0.2%	100.0%			
Total	Frequency	2541	2899	1788	1323	451	9002	2.36	0.629	Agree
	Percent	28.2%	32.2%	19.9%	14.7%	5.0%	100.0%			
(REVE = Reversed)										

Table 8-5: Raw data of Social Influence (SI) items

SI Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
SI1	Frequency	523	512	203	41	7	1286	1.83	0.844	Agree
	Percent	40.7%	39.8%	15.8%	3.2%	0.5%	100.0%			
SI2	Frequency	669	479	115	18	5	1286	1.61	0.740	Strongly Agree
	Percent	52.0%	37.2%	8.9%	1.4%	0.4%	100.0%			
SI3	Frequency	735	452	87	10	2	1286	1.52	0.671	Strongly Agree
	Percent	57.2%	35.1%	6.8%	0.8%	0.2%	100.0%			
Total	Frequency	1927	1443	405	69	14	3858	1.65	0.627	Strongly Agree
	Percent	49.9%	37.4%	10.5%	1.8%	0.4%	100.0%			

Table 8-6: Raw data of Perceived Compatibility (PCOM) items

PCOM Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
COM1	Frequency	705	471	82	23	5	1286	1.56	0.727	Strongly Agree
	Percent	54.8%	36.6%	6.4%	1.8%	0.4%	100.0%			
COM2	Frequency	700	465	104	22	8	1299	1.58	0.733	Strongly Agree
	Percent	53.9%	35.8%	8.0%	1.7%	0.6%	100.0%			
Total	Frequency	697	463	101	21	4	1286	1.56	0.662	Strongly Agree
	Percent	54.2%	36.0%	7.9%	1.6%	0.3%	100.0%			

Table 8-7: Raw data of Awareness (AW) items

AW Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
AW1	Frequency	429	557	192	80	28	1286	2.01	0.964	Agree
	Percent	33.4%	43.3%	14.9%	6.2%	2.2%	100.0%			
AW2	Frequency	365	517	219	141	44	1286	2.21	1.086	Agree
	Percent	28.4%	40.2%	17.0%	11.0%	3.4%	100.0%			
AW3	Frequency	340	545	210	147	44	1286	2.23	1.068	Agree
	Percent	26.4%	42.4%	16.3%	11.4%	3.4%	100.0%			
AW4	Frequency	366	490	211	166	53	1286	2.26	1.126	Agree
	Percent	28.5%	38.1%	16.4%	12.9%	4.1%	100.0%			
Total	Frequency	1500	2109	832	534	169	5144	2.18	0.874	Agree
	Percent	29.2%	41.0%	16.2%	10.4%	3.3%	100.0%			

Table 8-8: Raw data of Citizen Service Quality (CSQ) items

CSERQ Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
SERQ1	Frequency	416	556	247	55	12	1286	1.98	0.894	Agree
RES1	Percent	32.3%	43.2%	19.2%	4.3%	0.9%	100.0%			
SERQ2	Frequency	425	584	219	54	4	1286	1.93	0.852	Agree
RES2	Percent	33.0%	45.4%	17.0%	4.2%	0.3%	100.0%			
SERQ3	Frequency	322	562	317	71	14	1286	2.14	0.91	Agree
RES3	Percent	25.0%	43.7%	24.7%	5.5%	1.1%	100.0%			
SERQ4	Frequency	355	571	288	64	8	1286	2.07	0.884	Agree
REL1	Percent	27.6%	44.4%	22.4%	5.0%	0.6%	100.0%			
SERQ5	Frequency	296	560	350	69	11	1286	2.17	0.894	Agree
REL2	Percent	23.0%	43.5%	27.2%	5.4%	0.9%	100.0%			
SERQ6	Frequency	364	618	256	41	7	1286	2.00	0.833	Agree
REL3	Percent	28.3%	48.1%	19.9%	3.2%	0.5%	100.0%			
SERQ7	Frequency	326	567	319	53	21	1286	2.13	0.912	Agree
EMP1	Percent	25.3%	44.1%	24.8%	4.1%	1.6%	100.0%			

SERQ8 EMP2	Frequency	278	525	365	99	19	1286	2.27	0.949	Agree
	Percent	21.6%	40.8%	28.4%	7.7%	1.5%	100.0%			
Total	Frequency	2784	4543	2361	506	96	10290	2.09	0.698	Agree
	Percent	27.1%	44.1%	22.9%	4.9%	0.9%	100.0%			

Table 8-9: Raw data of System Quality (SQ) items

SYSQ Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
SYS QU1	Frequency	557	460	173	88	8	1286	1.86	0.937	Agree
	Percent	43.3%	35.8%	13.5%	6.8%	0.6%	100.0%			
SYS QU2	Frequency	442	608	182	47	7	1286	1.89	0.817	Agree
	Percent	34.4%	47.3%	14.2%	3.7%	0.5%	100.0%			
SYS QU3	Frequency	522	503	163	86	12	1286	1.88	0.933	Agree
	Percent	40.6%	39.1%	12.7%	6.7%	0.9%	100.0%			
SYS QU4	Frequency	417	525	212	111	21	1286	2.06	0.989	Agree
	Percent	32.4%	40.8%	16.5%	8.6%	1.6%	100.0%			
SYS QU5	Frequency	640	469	149	24	4	1286	1.66	0.777	Strongly Agree
	Percent	49.8%	36.5%	11.6%	1.9%	0.3%	100.0%			
SYS QU6	Frequency	419	613	211	37	6	1286	1.91	0.800	Agree
	Percent	32.6%	47.7%	16.4%	2.9%	0.5%	100.0%			
SYS QU7	Frequency	402	586	247	44	7	1286	1.96	0.831	Agree
	Percent	31.3%	45.6%	19.2%	3.4%	0.5%	100.0%			
Total	Frequency	3399	3764	1337	437	65	9002	1.89	0.547	Agree
	Percent	37.8%	41.8%	14.9%	4.9%	0.7%	100.0%			

Table 8-10: Raw data of Perceived Mobility (PM) items

PM Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
PM1	Frequency	633	521	98	29	5	1286	1.64	0.752	Strongly Agree
	Percent	49.2%	40.5%	7.6%	2.3%	0.4%	100.0%			
PM2	Frequency	622	541	101	19	3	1286	1.63	0.712	Strongly Agree
	Percent	48.4%	42.1%	7.9%	1.5%	0.2%	100.0%			
PM3	Frequency	823	393	60	9	1	1286	1.42	0.624	Strongly Agree
	Percent	64.0%	30.6%	4.7%	0.7%	0.1%	100.0%			
Total	Frequency	2078	1455	259	57	9	3858	1.56	0.571	Strongly Agree
	Percent	53.9%	37.7%	6.7%	1.5%	0.2%	100.0%			

Table 8-11: Raw data of Intention to Use (ITU) items

INT Items	Measure	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Std. Deviation	Result
INT1	Frequency	898	316	54	15	3	1286	1.37	0.645	Strongly Agree
	Percent	69.8%	24.6%	4.2%	1.2%	0.2%	100.0%			
INT2	Frequency	857	343	63	21	2	1286	1.42	0.677	Strongly Agree
	Percent	66.6%	26.7%	4.9%	1.6%	0.2%	100.0%			
INT3	Frequency	874	326	67	17	2	1286	1.40	0.666	Strongly Agree
	Percent	68.0%	25.3%	5.2%	1.3%	0.2%	100.0%			
INT4	Frequency	767	389	108	19	3	1286	1.52	0.731	Strongly Agree
	Percent	59.6%	30.2%	8.4%	1.5%	0.2%	100.0%			
Total	Frequency	3396	1374	292	72	10	5144	1.43	0.574	Strongly Agree
	Percent	66.0%	26.7%	5.7%	1.4%	0.2%	100.0%			

## **Appendix B: Participant Information Sheet For Public Users (English version)**

### **Information sheet for general public participants**

Dear Participant,

My name is Mohammed Alonazi and I am conducting my PhD research into “Factors Affecting the Adoption and Utilization of Mobile Government in Saudi Arabia.” at Sussex University Informatics Department under the supervision of Dr. Natalia Beloff.

You are invited to participate in this research if you are a Saudi citizen (18 years or over), whether you are currently using mobile government services or not. Before you decide to participate in this research or not, please read the following details to know more about this research and its main aims.

Mobile government means the utilization of Information and Communication Technologies (ICTs) and mobile technology to improve the way services are delivered to citizens, businesses and all government agencies. Mobile government services mean any government service that you can access from a mobile device especially Smartphones, whether through an official government mobile application, via their website designed for mobiles, text messaging or through a call centre. Examples of mobile government services that provided by the government agencies of Saudi Arabia or will be provided in future through mobile devices are:

- Ministry of Interior services (through the Absher application or its website) enabling you to renew passports, apply for the national ID card or a driving license.
- Booking appointments with government agencies online.
- Applying for government jobs (Ministry of Civil Service)
- Universities in Saudi Arabia.

The main aim of this research is to examine and determine factors that could affect citizens’ adoption and use of mobile government services in Saudi Arabia.

Your participation in the study is greatly appreciated and will contribute to an understanding of citizens’ concerns about mobile government services. The questionnaire will not take more than 30 minutes of your time to answer it. The questionnaire consists of three sections. The first section will be general information. The second section will require information about your Internet and mobile government use. The last section focuses on information related to factors that may influence citizens to adopt and use mobile government.

Participation in the questionnaire is voluntary, meaning that you can decide not to continue with the questionnaire at any time. In this study, all data and information will be kept strictly confidential. The data and information in this study will be analyzed only for educational purpose, and the result of the study will be used in my research thesis. If you would like to receive a copy of the results, please contact me at my email address.

University of Sussex has insurance in place to cover its legal liabilities in respect of this study. This study has been approved by the Sciences & Technology Cross-Schools Research Ethics Committee (crecsitec@sussex.ac.uk). The project reference number is ER/MA900/1. If you like to withdraw your data from this research you will need to email this request to the researcher ma900@sussex.ac.uk. The deadline for such withdrawal will be 2 weeks after the data collection date.



Researcher contact :

Mohammed Alonazi

E-mail: [ma900@sussex.ac.uk](mailto:ma900@sussex.ac.uk)

Phone: +44 7491500652

If you have any concern about the way in which the study has been conducted, you could contact my supervisor and the ethics committee (C-REC):

Dr Natalia Beloff

E-mail: [N.Beloff@sussex.ac.uk](mailto:N.Beloff@sussex.ac.uk),

Phone: +44 (0) 1273 678919

Department of Informatics, University of Sussex,

Falmer, Brighton BN1 9QJ

Ethics Committee (C-REC): [crecscitec@sussex.ac.uk](mailto:crecscitec@sussex.ac.uk)

Thank you for taking time to read the information sheet

Date:

## Appendix C: Questionnaire for Saudi Citizens Public Users (English Version)



*You must be aged 18 years or over to be eligible to participate in this study. To confirm that you are eligible to participate, please tick the box below:*

☐ I confirm that I am aged 18 years or over.

### First section : General information

Please answer the following questions by choosing the right answers that apply to you:

#### 1. Please indicate your gender :

☐ Male ☐ Female

#### 2. What is your age ?

☐ 18 - 30 ☐ 46 - 60  
☐ 31 - 45 ☐ Over 60

#### 3. Which of the following best describes the type of area you live in ?

☐ Large city ☐ Small city ☐ Village

#### 4. What is your education level ?

☐ Secondary school or less  
☐ Diploma  
☐ Bachelor degree  
☐ Master degree  
☐ Doctorate degree

#### 5. What is your occupation ?

☐ Unemployed  
☐ Student  
☐ Governmental employee  
☐ Private sector employee  
☐ Self employed

### Second section: Information about your Internet and m-government usage

Please answer the following questions by choosing the right answers that apply to you:

#### 6. Do you have a mobile phone ?

☐ Yes  
☐ No ( move to question 22 )

#### 7. What kind of mobile device do you have ?

☐ Smartphone  
☐ Non – Smartphone ( Traditional phone )

**8. What brand of mobile device do you have ?**

- ☐ iPhone - IOS
- ☐ Samsung - Android
- ☐ Windows Phone
- ☐ Nokia
- ☐ Others, mention it please .....

**9. How do you rate overall your mobile skills?**

- ☐ No skills
- ☐ Beginner
- ☐ Intermediate
- ☐ Advanced

**10. How often do you use mobile ?**

- ☐ Daily
- ☐ Two or three times a week
- ☐ Two or three times a month

**11. How usually do you use the Internet ?**

- ☐ Everyday
- ☐ Several days a week
- ☐ Several days a month
- ☐ Never use the Internet ( move to question 22 )

**12. For what purposes do you use the mobile? ( You can choose more than one answer )**

- ☐ Communication
- ☐ Government service
- ☐ Shopping online
- ☐ Information search and Social Media.
- ☐ online Entertainment
- ☐ Email

**13. Are m-government services applications are available for your mobile devices such as iPhone ( IOS ), Samsung ( Android ) and Windows Phone or others?**

- ☐ Yes
- ☐ No

**14. Did you know what is the meaning of m-government before participating in this Questionnaire ?**

- ☐ Yes
- ☐ No

**15. Do you have the willingness to know more about m-government services ?**

- ☐ Yes
- ☐ No

**16. Have you ever used any Saudi mobile government service (Application / Website ) such as Absher services for ministry of Interior, Ministries of education and universities ?**

- ☐ Yes ( move to question 18 )
- ☐ No

**17. What are the reasons that prevent you from using m-government transactions ?** ( You can choose more than one answer, then move to question 20 )

- ☐ I do not have a Smartphone
- ☐ I do not have Internet
- ☐ m-government services applications are not available for my mobile devices
- ☐ I do not trust m-government services
- ☐ The governmental transactions that I need are not available through m-government

**18. How do you rate your experience of using m-government in general?**

- ☐ Very Satisfactory ( move to question 20 )
- ☐ Satisfactory to some extent
- ☐ Not satisfactory

**19. What are the reasons that made your m-government experience unsatisfactory ?** You can choose more than one answer)

- ☐ The requirements of the intended m-Services were not clear
- ☐ system quality not good
- ☐ I did not get the expected results
- ☐ The difficulty of using m-government services
- ☐ Other reasons, mention it please .....

**20. Have you ever performed non-m-governmental online services (such as Mobile online banking, booking hotels and flights ....etc.)?**

- ☐ Yes
- ☐ No ( move to question 22 )

**21. How do you rate your experience of using non-government online services in general ?**

- ☐ Very Satisfactory
- ☐ Satisfactory to some extent
- ☐ Not satisfactory

**22. What are the advertising methods that can affect your awareness about m-government services to use it?**

	Very influential	Influential to some extent	I do not know	Uninfluential to some extent	Very uninfluential
A. Advertisements on social media	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Advertisements on Governmental agencies' websites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Advertisements in Newspapers and magazines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Advertisements in public areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. Advertisements through emails and text messages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F. Advertisements on TV and radio channels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Third section: Information related to factors that may influence your m-government usage

Please indicate your opinion about the following statements by circling the number which best represent your choice.

- 1 = Strongly agree  
 2 = Agree  
 3 = I do not know or neutral  
 4 = Disagree  
 5 = Strongly disagree

23. Statements about your willingness to use m-government services		Strongly agree	Agree	I do not know or neutral	Disagree	Strongly disagree
a.	I intend to use mobile government services in the future.	1	2	3	4	5
b.	I intend to use mobile government services frequently .	1	2	3	4	5
c.	I will use mobile government services to perform governmental transactions.	1	2	3	4	5
d.	I would recommend that others use mobile government services.	1	2	3	4	5
24. Statements about perceived usefulness from using m-government services		Strongly agree	Agree	I do not know or neutral	Disagree	Strongly disagree
a.	Using mobile government services would be useful in my daily life.	1	2	3	4	5
b.	Using mobile government services would enables me to accomplish governmental transactions more quickly.	1	2	3	4	5
c.	I think that using mobile government services save my time, money and effort and enables me to perform transactions that are not close in my location.	1	2	3	4	5
d.	Using m-government services would make the communication between a government agency and citizens more easy through text message, its applications and e-mail.	1	2	3	4	5
e.	The ability to perform governmental transactions ( 24 hours / 7 days) will encourage me use m-government services more.	1	2	3	4	5
a.	I think using m-government services would save me multiple visits to different agencies when performing my transactions.	1	2	3	4	5
b.	I believe that using mobile government services will remind me of important dates for conducting government transactions in sufficient time or at the right time.	1	2	3	4	5
25. Statements about perceived ease of use m-government services		Strongly agree	Agree	I do not know or neutral	Disagree	Strongly disagree
f.	learning to use mobile government services would be easy for me.	1	2	3	4	5
g.	I believe my interaction with mobile government services to access government services would be clear and understandable.	1	2	3	4	5
h.	Using mobile government services does not require a lot of skills and efforts.	1	2	3	4	5
i.	I believe that mobile government services are easy to use.	1	2	3	4	5

<b>26. Statements about Social Influence</b>		Strongly agree	Agree	I do not know or neutral	Disagree	Strongly disagree
a.	People who are important to me would think that I should use mobile government services.	1	2	3	4	5
b.	The use of my family members and my friends for mobile government services will encourage me to use it.	1	2	3	4	5
c.	It is the current trend to use mobile government services.	1	2	3	4	5
<b>27. Statements about Compatibility</b>		Strongly agree	Agree	I do not know or neutral	Disagree	Strongly disagree
a.	I believe that using mobile government services will fit well with my lifestyle.	1	2	3	4	5
b.	I believe that using mobile government services will fit well with the way I like to conduct my governmental transactions.	1	2	3	4	5
<b>28. Statements about trustworthiness aspect in m-government</b>		Strongly agree	Agree	I do not know or neutral	Disagree	Strongly disagree
a.	I feel that the Internet is not safe to be used for dealing with government.	1	2	3	4	5
b.	I feel that mobile government services is a safe environment and trustworthy to perform my governmental transactions.	1	2	3	4	5
c.	I would hesitate to provide personal information (such as my address, my income... etc.) through mobile government systems.	1	2	3	4	5
d.	I trust mobile government services to notify me of important information regarding the status of my governmental transactions, in sufficient time by text messages or through its applications .	1	2	3	4	5
e.	I expect that mobile government services will not take advantage of me and will protect my privacy such as my personal information and address.	1	2	3	4	5
f.	I feel that my data that is stored in mobile government systems can be misused.	1	2	3	4	5
g.	I think that government agencies in Saudi Arabia can be trusted to provide trustworthy mobile government services.	1	2	3	4	5

29. Statements about culture aspect		Strongly agree	Agree	I do not know or neutral	Disagree	Strongly disagree
a.	Using mobile government services will make me feel more sophisticated and will enhance people's perception about me. .	1	2	3	4	5
b.	I believe that mobile government systems would reduce the influence of interpersonal networks (WASTA) on processing individuals' transactions.	1	2	3	4	5
c.	I feel that dealing with the government agencies face to face is better than using mobile government services.	1	2	3	4	5
d.	I feel that visiting agencies to track my transactions is better than tracking them online.	1	2	3	4	5
e.	Using mobile government would prevent the negative influence of some uncooperative employee on my transaction	1	2	3	4	5
30. Statements about m-government awareness aspects		Strongly agree	Agree	I do not know or neutral	Disagree	Strongly disagree
a.	I feel that I have a good knowledge about mobile government services benefits, features and services.	1	2	3	4	5
b.	I think it is easy to find out if government agency offered its services via mobile devices.	1	2	3	4	5
c.	I have received enough information and guidance of how to use mobile government services.	1	2	3	4	5
d.	In general, I am satisfied with the current awareness campaigns and advertising about mobile government services in Saudi Arabia.	1	2	3	4	5
31. Statements about perceived mobility of using m-government services		Strongly agree	Agree	I do not know or neutral	Disagree	Strongly disagree
a.	I expect that I would be able to use mobile government services at any time, and anywhere, when I need it.	1	2	3	4	5
b.	I would find mobile government services to be easily accessible, portable and easy to use on different models of Smartphone's.	1	2	3	4	5
c.	It is important to me to get critical alert notification on my mobile from government agencies during mobility via text or email regarding passport renewal , traffic penalties and emergency cases.	1	2	3	4	5

<b>32. Statements about Citizens Service quality from user perspective ( Responsiveness)</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>I do not know or neutral</b>	<b>Disagree</b>	<b>Strongly disagree</b>
a. I believe that mobile government services providers give a prompt service with a good response	1	2	3	4	5
b. Mobile government services provider offers a helpful assistance through SMS”	1	2	3	4	5
c. I believe that mobile government services providers is always willing to help customers.	1	2	3	4	5
<b>33. Statements about Citizens Service quality from user perspective (Reliability )</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>I do not know or neutral</b>	<b>Disagree</b>	<b>Strongly disagree</b>
a. Mobile government services provider provides easy to use tools for checking on the status of an ordered service.	1	2	3	4	5
b. Mobile government services provider delivers on its undertaking to do certain things by a certain time.	1	2	3	4	5
c. I believe that information provided through mobile government services is accurate.	1	2	3	4	5
<b>34. Statements about Citizens Service quality from user perspective ( Empathy )</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>I do not know or neutral</b>	<b>Disagree</b>	<b>Strongly disagree</b>
a. Mobile government services provider shows a sincere interest in solving some citizen problems.	1	2	3	4	5
b. Mobile government services provider understand my specific needs.	1	2	3	4	5



35. Statements about system quality of m-government services	Strongly agree	Agree	I do not know or neutral	Disagree	Strongly disagree
a. The speed of launching the m-government services application ( pages, graphics, option.... etc) will affect my willingness to use it.	1	2	3	4	5
b. I believe that mobile government service ( application / website ) is easy to navigate “ to move between screens and pages “ and provides good navigation functions.	1	2	3	4	5
c. The existence of technical errors while using mobile government service application / website would reduce my willingness to use it for my transactions. Such as crash application, links not working and unresponsive.	1	2	3	4	5
d. Bad layout and unattractive interfaces of mobile government service ( application / website ) would reduce my willingness to use its services.	1	2	3	4	5
e. I think m-government services (applications / website) should be compatible with devices features such as GPS and camera.	1	2	3	4	5
f. I think mobile government service (application / website ) will provides fast responses to my inquiries.	1	2	3	4	5
g. I think that mobile government service ( application / website ) provide up-to-date information.	1	2	3	4	5

If you have any additional information related to implementing m-government services in Saudi Arabia and the factors that could influence its utilization, please write it here

.....

.....

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.....

.....

Thank you very much again for your time and your participation

Mohammed Alonazi

## Appendix D: Information sheet for government sector participants (English Version)

### Information sheet for government sector participants

Dear Participant,

My name is Mohammed Alonazi and I am conducting my PhD research into “Factors Affecting the Adoption and Utilization of Mobile Government in Saudi Arabia.” at Sussex University Informatics Department under the supervision of Dr. Natalia Beloff.

You are invited to participate in this research if you are a Saudi citizen (18 years or over), This interview will be with people who are responsible for implementing e-government and m-government services . Before you decide to participate in this research or not, please read the following details to know more about this research and its main aims.

Mobile government means the utilization of Information and Communication Technologies (ICTs) and mobile technology to improve the way services are delivered to citizens, businesses and all government agencies. Mobile government services mean any government service that you can access from a mobile device especially Smartphones, whether through an official government mobile application, via their website designed for mobiles, text messaging or through a call centre. Examples of mobile government services that provided by the government agencies of Saudi Arabia or will be provided in future through mobile devices are:

- Ministry of Interior services (through the Absher application or its website) enabling you to renew passports, apply for the national ID card or a driving license.
- Booking appointments with government agencies online.
- Applying for government jobs (Ministry of Civil Service)
- Universities in Saudi Arabia.

The main aim of this research is to examine and determine factors that could affect citizens’ adoption and use of mobile government services in Saudi Arabia.

Your participation in the study is greatly appreciated and will contribute to an understanding of citizens’ concerns about mobile government services. The interview will not take more than 60 minutes of your time to answer it. The interview questions will focus on information related to factors that may influence citizens to adopt and use mobile government.

Participation in the interview is voluntary, meaning that you can decide not to continue with the interview at any time. In this study, all data and information will be kept strictly confidential. The data and information in this study will be analyzed only for educational purpose, and the result of the study will be used in my research thesis. If you would like to receive a copy of the results, please contact me at my email address.

University of Sussex has insurance in place to cover its legal liabilities in respect of this study. This study has been approved by the Sciences & Technology Cross-Schools Research Ethics Committee (crecsitec@sussex.ac.uk). The project reference number is ER/MA900/1. If you like to withdraw your data from this research you will need to email this request to the researcher ma900@sussex.ac.uk .The deadline for such withdrawal will be 2 weeks after the data collection date.

Researcher contact :

Mohammed Alonazi

E-mail: [ma900@sussex.ac.uk](mailto:ma900@sussex.ac.uk)

Phone: +44 7491500652

If you have any concern about the way in which the study has been conducted, you could contact my supervisor and the ethics committee (C-REC):

Dr Natalia Beloff

E-mail: [N.Beloff@sussex.ac.uk](mailto:N.Beloff@sussex.ac.uk),

Phone: +44 (0) 1273 678919

Department of Informatics, University of Sussex,

Falmer, Brighton BN1 9QJ

Ethics Committee (C-REC): [crecsitec@sussex.ac.uk](mailto:crecsitec@sussex.ac.uk)

Thank you for taking time to read the information sheet

Date:

**Appendix E: Interview Guide from a managerial perspective at Government Sector  
(English Version)**



**Interview Guide from a managerial perspective at Government Sector with a manager who is responsible for implementing e-government and m-government services :**

1. Have mobile government services been implemented in any governmental agencies in Saudi Arabia?

**If yes,**

2. What are they?
3. Can you please explain what are the advantages and usefulness for users when they are adopting and using m-government service compared to traditional ways or computer?
4. Please explain to what extent do you think that the following factors could influence the citizens' intention to adopt , accept and willingness to use m-government services.
  - Easy to use and navigate mobile government service ( Applications / Websites) compared to a computer.
  - Awareness and advertising campaigns.
  - Ease of access to m- government service
  - Social influence ( e.g. influenced by others' use such as family and friends )
  - Mobility.
  - Compatibility.
  - Availability of mobile government service (applications / Website ) for all Smartphone's such as iPhone - IOS, Samsung - Android, Windows Phone and others brands.
5. Do you think that trustworthiness would affect users' intention to adopt and use mobile government services ( e.g. trust in government, provider, internet and privacy)?

6. Do you think that cultural aspects of the Saudi society would affect on then users' adoption and use (e.g. Image, resistance to change, Wasta, others' praise/criticize when use, fear of use technology)?
7. Do you think that service quality ( from non-technical sides such as responsiveness, reliability and empathy ) from citizens perspective would affect the users' adoption and usage of mobile government services ?
8. Do you think to which degree that system quality ( from technical sides such as access speed, ease-of-use, navigation and visual appeal ) could impact citizens negatively or positively to adopt and accept and use mobile government services?
9. In your opinion, what are the factors and reasons that would encourage users to adopt and use mobile government services?
10. What are the factors and reasons that discourage/prevent users from using mobile government services?
11. Is there anything you would like to add?

**If No,**

12. What are the reasons that prevent implementation and adoption of using m-government services ?
13. In your opinion, what government agencies should do to encourage users to adopt and use mobile government Services?

## Appendix F: Consent Form for Public User Participants (English Version)



### CONSENT FORM FOR PUBLIC USER PARTICIPANTS

**PROJECT TITLE:** **Factors Affecting the Adoption and utilization of Mobile Government Services in Saudi Arabia**

**Project Approval Reference:** \_\_\_\_\_

I agree to take part in the above University of Sussex research project. I have had the project explained to me and I have read and understood the Information Sheet, which I may keep for records. I understand that agreeing to take part means that I am willing to *(Please choose one or more )*:

☐ Respond to the questionnaire.

I understand that any information I provide is confidential, and that no information that I disclose will lead to the identification of any individual in the reports on the project, either by the researcher or by any other party.

I understand that all data will be anonymised and pseudonyms will be used.

I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.

I consent to the processing of my personal information for the purposes of this research study. I understand that such information will be treated as strictly confidential and handled in accordance with the Data Protection Act 1998.

University of Sussex has insurance in place to cover its legal liabilities in respect of this study.

This study has been approved by the Sciences & Technology Cross-Schools Research Ethics Committee (crecsitec@sussex.ac.uk). The project reference number is ER/MA900/1

Name: \_\_\_\_\_

Signature \_\_\_\_\_

Date: \_\_\_\_\_

## Appendix G: Consent Form for Interview Government Sector Participants



### CONSENT FORM FOR INTERVIEW GOVERNMENT SECTOR PARTICIPANTS

**PROJECT TITLE:** Factors Affecting the Adoption and utilization of Mobile Government Services in Saudi Arabia

**Project  
Approval  
Reference:** \_\_\_\_\_

I agree to take part in the above University of Sussex research project. I have had the project explained to me and I have read and understood the Information Sheet, which I may keep for records. I understand that agreeing to take part means that I am willing to (Please choose one or more ):

- ☐ Be interviewed by the researcher and allow the researcher to transcribe my answer.
- ☐ Allow the interview to be audio recorded.
- ☐ Make myself available for a further interview should that be required.

I understand that any information I provide is confidential, and that no information that I disclose will lead to the identification of any individual in the reports on the project, either by the researcher or by any other party.

I understand that all data will be anonymised and pseudonyms will be used.

I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.

I consent to the processing of my personal information for the purposes of this research study. I understand that such information will be treated as strictly confidential and handled in accordance with the Data Protection Act 1998.

University of Sussex has insurance in place to cover its legal liabilities in respect of this study.

This study has been approved by the Sciences & Technology Cross-Schools Research Ethics Committee (crecsitec@sussex.ac.uk). The project reference number is ER/MA900/1.

Name: \_\_\_\_\_

Signature \_\_\_\_\_

Date: \_\_\_\_\_

## Appendix H: Certificate of Ethical Approval



Sciences & Technology C-REC  
crecsiteo@admin.sussex.ac.uk

### Certificate of Approval

Reference Number	ER/MA900/2
Title Of Project	AMENDMENT TO ER/MA900/1 Factors Affecting the Adoption and utilization of Mobile Government in Saudi Arabia
Principal Investigator (PI):	Mohammed Alonazi
Student	Mohammed Alonazi
Collaborators	
Duration Of Approval	4 months
Expected Start Date	15-Jan-2018
Date Of Approval	08-Dec-2017
Approval Expiry Date	14-Apr-2018
Approved By	Karen Long
Name of Authorised Signatory	Anna Hobbs
Date	08-Dec-2017

\*NB. If the actual project start date is delayed beyond 12 months of the expected start date, this Certificate of Approval will lapse and the project will need to be reviewed again to take account of changed circumstances such as legislation, sponsor requirements and University procedures.

Please note and follow the requirements for approved submissions:

#### Amendments to protocol

- \* Any changes or amendments to approved protocols must be submitted to the C-REC for authorisation prior to implementation.

#### Feedback regarding the status and conduct of approved projects

- \* Any incidents with ethical implications that occur during the implementation of the project must be reported immediately to the Chair of the C-REC.

#### Feedback regarding any adverse(1) and unexpected events(2)

- \* Any adverse (undesirable and unintended) and unexpected events that occur during the implementation of the project must be reported to the Chair of the Science and Technology C-REC. In the event of a serious adverse event, research must be stopped immediately and the Chair alerted within 24 hours of the occurrence.

#### Monitoring of Approved studies

The University may undertake periodic monitoring of approved studies. Researchers will be requested to report on the outcomes of research activity in relation to approvals that were granted (full applications and amendments).

#### Research Standards

Failure to conduct University research in alignment with the Code of Practice for Research may be investigated under the Procedure for the Investigation of Allegations of Misconduct in Research or other appropriate internal mechanisms (3). Any queries can be addressed to the Research Governance Office: [rgoffice@sussex.ac.uk](mailto:rgoffice@sussex.ac.uk)

(1) An "adverse event" is one that occurs during the course of a research protocol that either causes physical or psychological harm, or increases the risk of physical or psychological harm, or results in a loss of privacy and/or confidentiality to research participant or others.

(2) An "unexpected event" is an occurrence or situation during the course of a research project that was a) harmful to a participant taking part in the research, or b) increased the probability of harm to participants taking part in the research.

(3) <http://www.sussex.ac.uk/staff/research/rq/policy/research-policy>



## **Appendix I: E-mail template to invite Saudi citizens (English Version)**

### **E-mail template to invite Saudi citizens (public users) to participate in this questionnaire**

(E-mail template will be translated into the Arabic language since it is the native language of the participants)

**Dear XXX,**

I am a PhD student at Sussex University, Informatics Department, United Kingdom; and I am conducting my PhD research into “Factors Affecting the Adoption and Utilization of Mobile Government in Saudi Arabia.”.

I am carrying out a field study in Saudi Arabia to collect data from Saudi citizens (public users). You are invited to participate in this research if you are a Saudi citizen (18 years or over) whether you are currently using mobile government services or not.

The main aim of this research is to examine and determine factors that could affect citizens’ adoption and use of mobile government services in Saudi Arabia. Your participation in the study is greatly appreciated and will contribute to an understanding of citizens’ concerns about mobile government services.

Participation in the questionnaire is voluntary, meaning that you can decide not to continue with the questionnaire at any time. In this study, all data and information will be kept strictly confidential. The data and information in this study will be analyzed only for educational purpose, and the results of the study will be used in my research thesis. More details about the research will be given at the start of the survey.

If you would like to participate in this study, please click on the survey link.

<http://.....>

Thank you

Mohammed Alonazi

#### **Appendix J: Twitter template to invite Saudi citizens (English Version)**

##### **Text template to invite Saudi citizens (public users) to participate in this questionnaire through Twitter:**

“I am Mohammed Alonazi, a PhD student at Sussex University. I am inviting you to participate in a study about Mobile Government Services in Saudi Arabia, for full information click this link”

#### **Appendix K: WhatsApp template to invite Saudi citizens (English Version)**

##### **Text template to invite Saudi citizens (public users) to participate in this questionnaire through WhatsApp:**

“I am Mohammed Alonazi, a PhD student at Sussex University. I am inviting you to participate in a study about Mobile Government Services in Saudi Arabia, for full information click this link.”