Mobile Challenges and Opportunities for e-Government in Saudi Arabia

A Thesis Submitted for the Degree of Doctor of Philosophy

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ABSTRACT

This thesis analysed the challenges and opportunities associated with the implementation of mobile government services in Saudi Arabia using a mixed method approach combining surveys and semi-structured interviews with Saudi citizens and employees of the Ministry of Communications and Information Technology. Three studies were conducted for the purpose of achieving the aims and objectives of the thesis. The first study shows that the high level of mobile penetration in the country suggests that there is already a demand of a greater range of m-government services despite the fact that still a large proportion of the Saudi population who do not have access to mobile technologies. Nevertheless, the results suggest that there is still a strong desire among users for the provision of mobile government services and the majority of respondents were willing to use such services and understand the benefits of using m-government. This thesis also shows a strong consensus among both government employees and citizens that m-government implementation would contribute to the technological development of the country. The findings of the second study suggest that the high level of mobile penetration offers an opportunity for the Saudi government to offer mobile government services. However, a number of barriers to mobile government exist, including poor quality and speed of internet, lack of customisation of services and data security and privacy issues as well as infrastructural challenges and bureaucratic attitude of the government departments. The third study focussed on the practicality of a mobile phone application, and for this purpose a mobile application for utility bills was developed and evaluated in terms of its usability, reliability and validity of the service. The thesis revealed that the majority of respondents were satisfied with the service usage, as application was easy to use without complications. However, participants were not comfortable to leave their details pertaining to credit card or any personal information. Misuse of information was major threat to participants, which further added reluctance to usage of the application. Respondents were willing to provide financial details if the service was authorised by government agencies. By exploring the opportunities of, and challenges facing m-government in Saudi Arabia, this thesis contributes to the m-government literature on developing countries in particular. This thesis offers important lessons for the m-government policy makers in Saudi Arabia and around the developing world.

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LIST OF ABBREVIATIONS

CITC	Communications and Information Technology Commission
EJEG	e-Journal of e-Government
FTTH	Fiber to the Home
GCC	Gulf Cooperation Council
GPRS	General Packet Radio Service
GTP	GPRS Tunneling Protocol
HCD	Human-Centered Design
ICEG	International Conference on e-Government
ICLEGS	International Conference on e-Learning, e-Education and e-Government Systems
ICT	Information and communication technology
IJCST	International Journal of Computer Science and Technology
IJMHCI	International Journal of Mobile Human Computer Interaction
IJTHI	International Journal of Technology and Human Interaction
IOS	iPhone Operating System
IPTV	Internet Protocol TV
IT	Information Technology
KSA	Kingdom of Saudi Arabia
MAP	Mobile Application Protocol
PDA	Personal Digital Assistant
SIM	Subscriber Identification Module
SMS	Short Message Service
SPSS	Statistical Package for the Social Sciences
STC	Saudi Telecommunication Company
TTF	Task-technology Fit

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This work was produced by the author unless otherwise stated and duly acknowledged.

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1 INTRODUCTION

1.1 Background

The thesis explores the various aspects of mobile government (m-government) as implemented in Saudi Arabia. M-government is the extension of electronic government (e-government) and a step beyond it, consisting of electronic resources provided by governments extended to mobile platforms. M-government supports the use of government services and applications on mobile devices such as PDAs, laptop computers and mobile telephones or other devices such as tablets that use wireless internet infrastructure (Sheng and Trimi, 2008).

Proponents of m-government have argued that the using mobile devices to access government-related applications makes public information and government services available and accessible instantaneously on a ubiquitous basis (to anyone with a mobile device), thus it has been suggested that in addition to its functional efficiencies it could increase transparency in government (Emmanouilidou and Kreps, 2010). M-government means that governance objectives and directives are immediately available and accessible through mobile devices, without necessitating logging in on a regular computer. The ubiquity of these mobile devices mandates their use, acceptability and applicability in government functions (Cordella, 2007). An example of such beneficial use of mobile technologies could be sending mass alerts to registered citizens through mobile devices during emergencies such as natural disasters (Kushchu and Kuscu, 2003). To quote m-government theorist and proponent Ibrahim Kuchshu (2003), *"As e-business evolves towards m-business, e-government seems to follow the trend with a few but significant mobile government (mGovernment) applications"* (Kuchshu and Kuscu, 2003, 26). Mobile government can thus be defined as:

> *"A strategy and its implementation involving the utilisation of all kinds of wireless and mobile technology, services, applications and devices for improving benefits to the parties involved in e-government and e-governance including the citizens, businesses and all government units, thus public and private sector" (Kushchu and Kuscu, 2003, 12).*

The key features of m-government are: cost reduction for public services; increased efficiency of public sector organisations (Trimi and Sheng, 2008);

transformation/modernisation of public sector organisations (Misuraca 2007); added convenience and flexibility of public sector organisations (Hayes and Lemstra 2008); better services for citizens (Ishmatova and Obi, 2009; Misuraca et al., 2006); and the ability to reach a larger number of people through mobile devices than would be possible using wired internet or other internet devices only (Emmanouilidou and Kreps, 2010).

The advancement in information and communication technologies (ICTs) over recent decades has led to a revolution not only in the business world but also in mechanisms for the delivery of government and public services. Since the early 1990s public sector companies across the globe have been adopting and using internet technology to improve the delivery of services to stakeholders, which is commonly known as electronic government (Trimi and Sheng, 2008). The rapid improvements in ICT over recent decades have accelerated globalisation and the concept of the global village, enabling people to compare the availability of goods and services worldwide. Such awareness and comparison stimulates people to demand for more reliable and convenient services from public and private sectors. Although e-government has been a key tool in providing effective services for both public and private sector firms in most developing countries, such organisations are looking for new ways to improve service quality and to cater for the escalating needs of society for more convenient and mobile services, leading governments to provide m-government as a feature within their e-government frameworks (Ntaliani et al., 2008), and increasingly to shift from e-government to m-government to reflect the reality that mobile internet is more widely used by citizens than conventional PCs.

Moreover, the advent of mobile tools such as personal digital assistants (PDAs), laptops and mobile phones with wireless internet technology streamlines service provision for public agencies, removing physical and temporal barriers between government and citizens. M-government enables anytime-anywhere delivery of services in houses, streets, cars and during weekends, rather than people having to visit public offices to access facilities (Al Thunibat et al., 2011). Users of mobile technology can conveniently access real-time and personalised information, maximising the benefits of using mobile technology (Al Thunibat et al., 2011). Mobile internet devices enable ubiquitous access to online services due to their portable physical features, in so far as the internet infrastructure enables this to be done efficiently (Yu and Kushchu, 2004).

The anytime-anywhere aspect of m-government enables delivery of services to citizens in all times and places – the initial import of this may appear to be convenience for people too

busy to go to their local government office, but in developing countries with poor infrastructure such services can offer a vital lifeline and connection between governments and citizens, particularly in rural and remote areas (Gang, 2005). Mobile government provides and assures mobility for citizens, the corporate world and public agencies. Users of mobile technology can conveniently access real-time and personalised information with the assurance of maximising benefits of using mobile technology (Kim et al., 2004). Moreover, users can access information on their mobile phones anywhere with great convenience, due to the inherent amenities of commercially available mobile devices (Yu and Kushchu, 2004).

According to some research, initial e-government initiatives have been relatively unsuccessful in fulfilling public expectations; however, m-government has the capability to rebuild people's trust through quicker communication with others and delivery of effective and efficient services (Balan and Zegreanu, 2012; Song and Cornford, 2006). The steady interaction and well managed and flexible public agencies with great likelihood to accept vertical and horizontal integration can provide an appropriate basis for m-government initiatives (Gang, 2005). Mobile communication has become an integral part of mainstream society to communicate with public and private agencies, which facilitates people's interactions with location-based services. In Saudi Arabia, a significant proportion of the population has only partial or no access to the internet and computer systems, thus people (particularly younger citizens) consider their mobile phones to be their primary internet device and connection to the rest of the world.

Governments are primarily instituted to secure the basic needs, comfort and convenience of citizens in their personal, family and professional lives; in the modern world, this is facilitated by technological methods (Alsenaidy and Ahmad, 2012). A large amount of capital and time is being invested on technology to improve quality of life with respect to wealth creation, improving access to education, job skills, health care facilities, security and entertainment in a secure, reliable and comfortable way (Alsenaidy and Ahmad, 2012). Mobile and wireless communication technology can play a vital role in all areas of life for Saudi people. Such technologies can expand on the existing notion of anytime-anywhere practical convenience to a novel pattern that will focus on transformation of management processes and delivery of services via mobile and communication technologies for the comprehensive improvement of quality of life in Saudi Arabia. Such an improvement can also facilitate people's access to government content and information in an efficient and convenient way.

Provision of m-government services to the general public is not without challenges that hinder m-government performance, and these barriers must be handled carefully. These challenges include security and privacy issues; a variety of mobile platforms; and issues regarding usability (Mengistu et al., 2009). Privacy and security are major issues in wireless communication because one cannot connect to the wireless network anonymously (Al Thunibat et al., 2011). People want their government to ensure safety of their personal data so that it may be secured from unauthorised persons and hackers to prevent its misuse. For instance, payment through credit card is still not considered to be fully secure, and cases of credit card fraud can also be seen in digital platforms. Wireless network operators transport secured data through public airwaves, thus providing a chance for hackers to intercept and tamper with or misuse data (Mengistu et al., 2009). Therefore, governments should address this challenge and take proper measures to ensure the safety of public data.

In 1998 the national e-government program was initiated in Saudi Arabia (Al-Sobhi and Weerakkody, 2010). According to various authors, most of the challenges faced during the adoption and implementation of e-government are linked to service providers and users (Alshehri and Drew, 2010; Alshehri et al., 2012). Adoption and implementation of e-government provides numerous advantages to governments, businesses and citizens. E-government helps users to access to government services on a 24/7 basis (Balan and Zegreanu, 2012). Citizens are generally more concerned about the accessibility of government rather than the quality of the service; for effective implementation, service providers need to make sure that time is not an issue. The population size and distribution in Saudi Arabia fully supports the implementation and success of e-government (Zhang, Dawes and Sarkis, 2005), which has unique potential to minimise the physical and logistical distance between government agencies and citizens (Huang and Bwoma, 2003); in the Saudi context, this relates to the centralisation of most government ministries and agencies in Riyadh, and the arduous desert conditions and privations of travel under extreme weather. Through the use of mobile service, emails and video conferencing the cost of interaction among government agencies has been reduced significantly (Al-Khouri and Bal, 2007). E-government helps to achieve transparency of operations in the public sector, providing a huge amount of information that was not available in the past (Bertot et al., 2010).

However, the Saudi government faced difficulties in the application of e-government and many efforts and measures were taken to overcome these barriers (Alsenaidy and Ahmad, 2012). On the other hand, the situation for application of m-government is quite different

due to the relatively higher readiness level of public for m-government and the latent availability of required infrastructure (Alsenaidy and Ahmad, 2012). At present, effective mobile networks are not only available in cities but equally in the rural areas of Saudi Arabia. According to the World Development Indicators, mobile cellular subscriptions and internet users per 100 inhabitants in Saudi Arabia were 186 and 54 respectively for the year 2012 (Word Bank Indicators, 2012). The increase in mobile cellular subscriptions during the 2000s was around 10% annually, however it has stabilised since 2010 (with full market penetration). The increase in internet use from 2007 to 2014 was approximately 15% per year. Mobile communication has also emerged as an effective replacement to landline operators in recent years.

Governments in developing countries have invested substantially in the provision of communication facilities, in which context mobile phone technology is much easier to implement than traditional approaches (e.g. landline telephones) that require each user to be wired. Even in the most remote areas, citizens can purchase mobile SIM cards and a handset and thus be connected with the rest of the world (if they can pay the provider). Moreover, with the availability of broadband and Wi-Fi, people now enjoy mobile communication facilities that outstrip the performance of traditional land-based communication methods such as text messaging, map navigation and worldwide news in remote areas as well as in cities.

There are many internal and external challenges linked to the adoption and implementation of e-government in Saudi Arabia. According to previous studies (Al-Khouri and Bal, 2007; Alshehri et al., 2012; Huang and Bwoma, 2003), the major concern highlighted by citizens/users concerning the implementation of e-government is security and privacy. One of the important concerns during the implementation of e-government is the availability of proper infrastructure for effective implementation in developing countries. Other challenges include issues like trust, lack of accountability, authentication and availability of expertise during development and later the time of usage. Providing e-government services through different platforms like mobile services, internet, TV or other devices is a major issue faced by countries like Saudi Arabia, where people experience difficulty in making banking transactions via the internet, which is a key determinant for the growth of e-government activities among users (especially through mobile services).

Current agencies that regulate online money transactions do not have effective organisational and network structures that support payment transactions and limit business

activities that involve e-government in Saudi Arabia (Al-Sobhi and Weerakkody, 2010). Such facilities have key determinants for gaining consumers' trust and sense of security in using online banking facilities. Better online facilities motivate consumers to practice online purchase of goods and services. According to Alshehri (2012), slow and unreliable speed of broadband connection is one of the main reasons hampering the usage of e-government in Saudi Arabia. Association among the stakeholders and citizens should be prioritised and is known as a crucial aspect in improvement of e-government that enables efficient implementation and transformation of services (Al-Shehry et al., 2006). However, focus and development of the use of mobile services as a platform for e-government will not only revitalise the public sector by improving the interaction and communication among the government agencies and citizens, but also provide opportunities for economic growth, job creation and technological advancement. Saudi Arabia needs to develop strategies that encourage the growth of efficient implementation of e-government through various platforms, which will further lead to foreign investment and expertise that will help achieve growth and business competency.

E-government has faced a number of issues in developing countries including Saudi Arabia. For example, Alshehri (2012) reveals that slow and unreliable speed of broadband connection is an important factor that impeded the use and effectiveness of e-government in Saudi Arabia. However, this infrastructural issue can also harm the effective use of m-government services. That is, this problem is not particularly related to e-government; quality of internet is vital for the effectiveness of m-government too. In other words, good quality internet connect is necessary for e-government and m-government effectiveness in the country. The other issue that is particularly linked with e-government in Saudi Arabia and elsewhere is the lack of required flexibility when interacting with their government in many cases particularly emergency cases (Ishmatova and Obi, 2009). Ntaliani et al (2008) suggests that one of the key barriers that is linked with the implementation of e-government services lack of flexibility and availability in the case of emergency. In case of emergency, people may not have time to access the computer or may be in an area where access to computers is not available. This is a major issue that many governments have encountered, in that their focus on service delivery and the provision of e-government options has meant that they have failed to address this kind of issue. (Moon, 2010). While, it has been revealed that m-government can overcome such issues of flexibility and access of government services through the mobility that mobile devices offer (Zaharia et al., 2010).

Security issues are common in e-government services (Vincent and Harris (2008), but these issues are common in m-government services too (Zaharia et al., 2010). Vincent and Harris (2008) argue that one of the main issues is that people in many countries have no intention of accessing the internet, or signing up for any form of online services. This implies that these individuals must be reached by government if the latter is to maximise its own performance under the new public management concept. In this context, it is important to note that most countries also have more web-enabled mobile phones than PCs, which could indicate that mobile channels will have more success in encouraging citizens to take up electronic government offerings. However, this still requires governments to encourage their citizens in order to achieve the benefits of m-government and help them see their phones as a way to interact with the government and obtain services (Vincent and Harris, 2008).

1.2 Aim of the thesis

This thesis aims to analyse the challenges and opportunities associated with the implementation of mobile government services in Saudi Arabia for the purpose of increasing the effectiveness of future implementation of m-government as well as contributing to existing research literature.

1.3 Objectives of the thesis

This aim is met by fulfilling the following objectives:

1. To understand what kind of mobile government services people want and how they would like to access them.
2. To identify whether users would prefer to have a central portal providing them with access to all of their required mobile government services.
3. To understand citizens' perceptions of the benefits and challenges of m-government.

1.4 Research questions

The specific research questions to be addressed in this thesis are:

1. How popular is the use of mobile technology in Saudi Arabia?
2. What are the main opportunities of implementing m-government in Saudi Arabia?

3. What are the key challenges facing m-government in Saudi Arabia?
4. How does m-technology affect m-governance and what are the challenges and also the benefits of m-government?
5. What do the people and organisational employees like or dislike about m-government?

1.5 Contribution of the thesis

This research explored various challenges and opportunities facing m-government in the Kingdom of Saudi Arabia (KSA). Despite being the largest country in the Middle East, KSA has received relatively little attention in the literature in terms of m-government initiatives. Consequently, this thesis made valuable contributions to the literature on m-government in developing countries by applying the theories and principles behind e-government service provision to the context of Saudi Arabia. Three studies were conducted for the purpose of achieving the aims and objectives of the thesis. The first study shows that the high level of mobile penetration in the country suggests that there is already a demand of a greater range of m-government services despite the fact that still a large proportion of the Saudi population who do not have access to mobile technologies. Nevertheless, the results suggest that there is still a strong desire among users for the provision of mobile government services and the majority of respondents were willing to use such services and understand the benefits of using m-government. This thesis also shows a strong consensus among both government employees and citizens that m-government implementation would contribute to the technological development of the country. The findings of the second study suggest that the high level of mobile penetration offers an opportunity for the Saudi government to offer mobile government services. However, a number of barriers to mobile government exist, including poor quality and speed of internet, lack of customisation of services and data security and privacy issues as well as infrastructural challenges and bureaucratic attitude of the government departments.

Moreover, this thesis presents a prototype design to evaluate the understanding of the use and benefits of a mobile government services, focused on an m-government application for mobile payments of the utility bills; m-government services can be particularly useful for energy departments because energy, water and other utilities are essential amenities for every household (and thus every citizen). The development of this m-government service would save time and travelling hassles for individuals, while enhancing the overall economic and resource efficiency of KSA on the macro level. By exploring the

opportunities of, and challenges facing m-government in Saudi Arabia, this thesis contributes to the m-government literature on developing countries in particular. This thesis offers important lessons for the m-government policy makers in Saudi Arabia and around the developing world.

1.6 Structure of the thesis

This thesis consists of seven chapters. After this introductory chapter, the second chapter critically reviews literature on different aspects of m-government challenges and opportunities. Chapter 3 presents a general research methodology used in different studies presented in chapters 4, 5 and 6. Chapter 4 presents the first study conducted to explore different challenges and opportunities facing m-government in Saudi Arabia. Chapter 5 presents the second study that identifies challenges facing m-government in the country. Chapter 6 presents the third study that uses a mobile phone application development to help Saudi citizens understand the nature and benefits of m-government in the country. The final chapter concludes the thesis.

2 LITERATURE REVIEW

2.1 Introduction

This chapter analyses the existing literature conducted by various authors relevant to the area of research, which explains the opportunities and challenges associated with m-government as an e-government platform in KSA. This secondary research is based on marketing books, online academic journals and other online library sources. The review of the previous literature helps to develop the conceptual framework for study. The chapter starts with the discussion on the spread of m-government in KSA, then it explores challenges of m-government, and the cultural factors in m-government adoption in the country.

2.2 Mobile internet technology in the Middle East and Saudi Arabia

Recent data indicates that the fixed internet markets and infrastructure in the Middle East, such as broadband and cable, are relatively underdeveloped, with a lack of investment in infrastructure. The global financial crisis has also limited the development of these services in the private sector. However, the mobile telecommunications markets in the Middle East continue to grow, and have now reached very significant levels (Global Telecoms Business, 2009). The introduction of competition and liberalisation policies in the Middle Eastern economies has played a significant role in boosting market penetration. As more companies have entered the market, so consumers have gained access to a range of new products and services, making it more likely that they will find a service to suit them (Bertot et al., 2012; Nield, 2004). Of the Middle Eastern economies, *"Saudi Arabia has the biggest market with 52 million mobile subscribers, resulting in a penetrate rate in excess of 200 per cent"* (Hamid, 2011, 36). In other words, there are now two mobile telephones per person on average, largely due to a proliferation of business and personal lines, and also companies using mobile phones in place of fixed office lines. That market is healthy and competitive, with three main mobile operators, compared to four in the UK, which has over twice as many people (Hamid, 2011).

Current evidence indicates that whilst the telecoms market is currently dominated by mobile providers, over the next decade the variation in the different levels of products is expected to largely even out. Specifically, whilst mobile internet usage is likely to rise sharply, traditional services and virtualisation technology are also likely to emerge as

major trends, pushing Saudi Arabian adoption rates towards 100 per cent across the board (Jones, 2010; World Bank Indicators, 2012). This trend is being supported by changes in habits and improvements in the available technology. For example, whilst the iPhone and other smartphones are driving internet usage over fourth generation wireless technologies, internet-enabled mobile devices such as e-readers and tablet computers are also encouraging the spread of broadband and cable, which are able to deliver richer content (Hamid, 2010). However, at the same time the level of customer enthusiasm and acceptance for mobile technology and telephony is widespread across the whole of the Middle East, and thus is likely to continue to drive penetration and uptake rates in countries such as KSA (Meyer, 2007; Salem and Qudiah, 2014).

This implies that the Middle East is rapidly approaching the stage at which it will be a viable location for widespread e-commerce adoption, under the economic development, infrastructure level, and cultural acceptance criteria defined by Ferguson et al. (2006). This may thus indicate a high level of readiness for e-government as well.

2.3 The drivers of e-government and m-government

The increased level of wired and wireless connectivity offers the potential to transform the delivery mechanism of governmental services, and allows for new ways to engage the public and maximise efficiency (Gross et al., 2012). In spite of this transformation potential, the majority of the literature on e-government sees it as simply *"the next step in the rationalisation of government activities along the line of the new public management"* (Cordella, 2007, 265). In other words, e-government is simply seen as a way to provide a greater level of efficiency to government, in line with the conceptualisation of new public management as focused on four key aspects: efficiency, accountability, decentralisation and client-focused service delivery (Fountain, 2001; Margo, 2012). This simply holds that e-government represents the next step in optimising the procedures and services involved in running a government and interacting with citizens. However, this view has been criticised, particularly by Misuraca (2007), who notes that e-government operates on multiple levels and dimensions, and can be seen as part of the transformation of the state from an old style provider of services to a provider of capabilities to fit a globalised and multi-stakeholder world. This implies that e-government can be seen as operating along three main dimensions: as a tool for better and more efficient administration; as a tool to drive cooperation and relationships between government and citizens/ enterprises; and as a

way to provide citizens with a more transparent view of the political process (Misuraca et al., 2006; Zuiderwijk and Janssen, 2013).

In contrast to the debate on e-government, m-government is a very recent concept, and hence there is a lack of sound theoretical discussion relating to how the concept differs from that of e-government, and any specific advantages or features. It has been conceptualised as a strategy whose operationalisation involves the use of a range of different mobile and wireless devices, applications, services and ICTs in order to improve the advantages of e-government for different stakeholder groups (Arazyan, 2002). The implementation of the strategy also involves strategic utilisations of the mobile applications and services available for government services (Antovsyki and Gusev, 2003). This tends to imply that m-government simply represents either the extension of e-government into the mobile sphere, or the application of mobile technologies to the specific areas in which they are able to carry out e-government tasks (Kushchu and Kushchu, 2003). As a result of this, one of the main drivers of m-government adoption is that it provides citizens with greater mobility and flexibility when interacting with their government (Ishmatova and Obi, 2009).

However, more recent discourse on m-government has indicated that the recent level of development of mobile technologies and applications, particularly the rise of Web 2.0 technology, could drive a paradigm shift. In other words, rather than simply extending government services into the mobile environment as they were extended into the electronic environment, m-government could be used to transform the relationships a government has with its citizens and stakeholders and create new institutional paradigms (Basamh et al., 2014). This implies that mobile technologies will not simply play a substitutive role, but rather will create new offerings that are not found in standard online technology, thus creating a new mobile ecosystem in which government can operate (Hayes and Lemstra, 2008). This in fact implies that even if m-government does not represent a paradigm shift when compared to traditional forms of government, it can still create real change in governmental boundaries, social value chains and individual lifestyles (Misuraca, 2009). For example, in the case of Thailand, the government implemented a master plan to apply internet and mobile communication technologies for the development of a stronger interconnection between the government and society. This helped the country become more connected and thus drove the development of a knowledge-based society (Tubtimhin, 2009). This potential for service transformation is explored using surveys and interviews in this thesis with regard to KSA.

Another important driver of m-government is the potential improvements it can offer in the field of performance management. Specifically, the future role of performance measurement in developed nations is likely to be strongly reliant on m-government, and particularly its ability to be more mobile, responsive and flexible to performance management challenges (Phusavat et al., 2009). M-government potentially allows governments and public sector agencies to achieve better governance, transparency and accountability, all of which are key success factors in public sector performance. As such, it is clear that future m-government transformation initiatives are likely to be implemented with performance management criteria in mind, with a view to improving the delivery and efficiency of government services.

2.4 Approaches to maximising access to services

One of the key questions when considering the best approach to maximise the future performance of m-government and governments in general is the extent to which the mobile phone can be made a more effective tool for the interaction between the government and its citizens. According to Vincent and Harris (2008, 395), one fundamental issue in this area is that significant proportions of most countries' populations have no intention of accessing the internet, or signing up for any form of online services. This implies that these individuals must be reached by government if the latter is to maximise its own performance under the new public management concept. In this context, it is important to note that most countries also have more web-enabled mobile phones than PCs, which could indicate that mobile channels will have more success in encouraging citizens to take up electronic government offerings. However, this still requires governments to encourage their citizens in order to achieve the benefits of m-government and help them see their phones as a way to interact with the government and obtain services (Vincent and Harris, 2008).

One of the critical barriers that governments need to overcome is the level of worry that many individuals have about providing data over mobile or electronic channels with which they are unfamiliar. Specifically, governments need to consider the importance of security policies, risk assessments and security login requirements in order to ensure that m-government services are effective and safe for users, and that they are perceived to be so (Zaharia et al., 2010). In addition to being secure, the new mobile technologies must be compatible across a large number of platforms and systems, with many mobile phones having different operating systems and interfaces. M-government services will need to

work across all these options in order to obtain maximum effectiveness, efficiency, and responsiveness. Whilst this may indicate the need for a cross-platform framework, in reality most of these platforms are simply different variations on the same theme, which is the convergence towards smart phones. As such, an m-government system simply needs to be designed to work across the various platforms with similar degrees of functionality, and does not need to be a specific cross-platform system, as the fundamental mobile interface is likely to be similar on all phones (Consumer Reports, 2010).

In addition to this, the various government agencies will also need to learn to work together technologically, in order to maximise the level and consistency of service delivery (Karygiannis and Owens, 2003). In order to achieve this, governments will need to focus on two main areas. The first is to boost operational consistency, through ensuring that there are formal and informal networks set up to collect, develop and disseminate information throughout all agencies to ensure services are consistent. The second is to ensure software and hardware compatibility across the supply chain, operations and research, and thus that there is a consistent infrastructure to ensure effective information sharing (Landsbergen and Walken, 2001). For example, poor quality mobile infrastructure will discourage users from using m-government channels if they are constantly losing service coverage.

Consequently, governments should look to introduce mobile virtual private networks, which allow interactions and applications to persist through periods of disconnection and ensure users have consistent levels of service access (Hunsberger, 2011). In addition to this, governments need to ensure that there is clarity about factors such as statutory authority, transparency, trust, data protection and data sharing. All of these barriers can be addressed through the creation of healthy working relationships amongst the various parties operating in the government, including the various agencies, to ensure effective cooperation and thus effective promotion of e-government and m-government to the general populace.

Another significant barrier that can arise in the implementation of e-government and m-government, particularly in the provision of vital services such as emergency management, is a lack of financial resources. This is a major issue that many governments have encountered, in that their focus on service delivery and the provision of e-government options has meant that they have failed to allocate enough resources to m-government. As a result, one of the key options available to governments looking to promote the use of m-government is to provide the funding necessary for mobile-technology initiatives, to ensure

that the various benefits of the new technology will be achieved in a timely fashion. This is particularly important given that *"m-government requires a strategic long-term plan supported by substantial financial and personnel resources"* (Moon, 2010, 100). In other words, financial resources will need to be assigned over the long term to ensure the success of any m-government effort. This is particularly important for sectors such as agriculture, which has specific peculiarities, priorities, methods of interaction and information needs, and thus demands the development of individual channels of access (Ntaliani et al., 2008).

Improving channels of access to services can also be achieved through the implementation of usability driven m-government platforms. These platforms are designed to be focused on the needs of their users, and hence can help support and encourage the use of m-government services. However, in order to achieve high usability levels, governments need to engage in pilot schemes to gather feedback and input from users and potential users on what the ultimate system should look like (I-Ways, 2005). The final goal for maximising access to services is for these usability platforms to allow government, e-government and m-government to be combined into the concept of ubiquitous government, or u-government. Under this concept, government services will be made accessible to users through all available channels at the demand of the service user (Anttiroiko, 2005). This is the ultimate goal for m-government, and should be considered in light of any attempts to implement m-government in KSA or any other country. As part of the drive to u-government, the emergence of mobile technology has enabled governments to transform their operations from e-government to m-government, in which mobile technologies and systems have become the central aspect of governance (Sheng and Trimi, 2008).

Sheng and Trimi (2008) proposed a framework based on the theory of task-technology fit (TTF), which models the extent to which governments are adapted to technological advances in e-government and m-government. It also facilitates understanding of the implications of m-government frameworks and applications in all aspects of governance. The research reviewed current mobile technologies, categorizes e-government tasks, and summarizes existing m-government applications, enabling comparison of e-government features and demonstrating how these relate to m-government applications. It also facilitated a comparison between e-government and m-government directions and method of operation or outcomes. To measure how mobile technologies and government tasks are performed, the importance of such technologies in successful m-government implementation has to be considered, in addition to the benefits and challenges of m-government that have been discussed.

The rapid diffusion and popularity of mobile technologies has led to their ready acceptance and success in the public and private sectors. However, access to m-government services can reflect social inequalities, and accessibility remains a major challenge for m-government implementation; while those traditionally disadvantaged from accessing government services stand to gain the most from m-government, they are paradoxically often disadvantaged from using mobile technologies due to infrastructural or economic reasons. This is a fundamental challenge inherent in m-government adoption that governments should strive to overcome, considering that one of the central aims of m-government is to provide equal services to all citizens irrespective of their physical, mental and technical capabilities. Emmanouilidou and Kreps (2010) discussed the creation and popularity of m-government and emphasised that worldwide recognition of mobile technologies has given rise to particular challenges, including providing equal access to mobile technologies for all citizens. They compared six sample groups in relation to their use of mobile technologies: the visually impaired, hearing impaired, motor impaired, speech impaired, cognitive impaired and the elderly. M-government examples that focus on the needs of these groups are discussed and it was recognised that a framework for accessible m-government implementation would be necessary with reference to *Mobile Web Best Practices* (Al-Sobhi and Weerakkody, 2010).

Sharma and Gupta (2004) discussed how mobile technologies can help to increase service levels, government efficiency and citizen participation, as m-government enables users to engage with government services and information at any time or place through wireless networks. The web services-based framework that could be used to develop m-government applications could be obtained on audio, video or text in multilingual formats. Such applications could be used in government decision making (Sharma and Gupta, 2004).

2.5 Potential challenges in developing m-government services

Following Yu and Kushchu (2004), we understand m-government as an extension of, and complement to, e-government services and features accessed via mobile devices. In other words, m-government is understood as a complement to rather than a replacement of e-government services. The main focus of m-government is to provide government services to the citizens anytime, anywhere through any type of mobile device (Gross et al., 2012). According to Kushchu et al. (2007), m-government is about the provision of different government services and information to public, businesses and employees through mobile devices. Seen in this light, m-government is essentially about the practical issue of creating

and enhancing portability and mobility for government service users (both organisations and individuals). It is thus a tool to enhance the efficiency and effectiveness of government information and service provision (Yu and Kushchu, 2004).

The mobile device offers users the advantages that are difficult to achieve using static devices such as landline phones or computers. The small size of the mobile phones offers the users benefit of mobility. Thus, if government is able to offer services through mobile services, the public can use these services across time and space (Yu and Kushchu, 2004). Yu and Kushchu (2004) explained the importance of government services mobility by proposing a 3P model, the key components of which are explained in Table 2-1.

Table 2-1: 3P model by Yu and Kushchu (2004)

The components of 3P model	*Description*	*Examples*
Prime value	M-government fulfils the need of real-time information and solves problems	Warning against mobile phone theft SMS for those with special hearing needs
Pleasure value	M-government can strengthen public-government relations and make the interactions enjoyable by the provision of better services	Fight against crime Faster information sharing
Post value	Comparative relation between cost and benefits	M-voting Location identification

A plethora of studies have probed different aspects m-government services. For example, Jotischky and Nye (2012) suggest that the growth in the range of m government services which has occurred in many African countries in tandem with an increase in mobile penetration is likely to increase the transparency of political processes. Bhavnani et al. (2008) argued that the introduction of m-government services in India demonstrates the importance of it being rooted in existing government policy frameworks. In particular, it is suggested that the implementation of a Mobile Service Delivery Gateway acting as a bridge between the country's mobile service users and the existing e-governance infrastructure is highly effective at broadening the reach of m-government services to rural citizens.

There is a significant difference in the way in which the role of mobile services is perceived. According to researchers such as Hayes and Lemstra (2008), m-government services are perceived to be playing an important role in providing consumers with a range of services which are not available within standard offerings, thus contributing to the creation of a 'new mobile ecosystem'. Research which has been conducted into usability issues pertaining to mobile applications suggests that characteristics such as ease of

navigation, text source and colour rendering are important determinants of the usability of a mobile application (Shneiderman and Plaisant, 2010). This was expanded by Rabi'u et al. (2012), who suggested that it is fundamentally important to ensure that the speed of the internet is well managed in order to ensure consistent usability. This can be achieved by providing a software platform capable of supporting a display that is both vision- and speed-friendly. In short, it is important for the emphasis on the design of a usable mobile application to be on the provision of speedy and rapid display capabilities.

Garofalakis et al. (2007) suggested that the key characteristics to be considered in the development of a mobile application are those related to navigation, which they identified as the user-centred design of the interface and the extent to which it is both intuitive and usable. The usability of the interface depends on the extent to which the facilities of the application meet requirements of user interaction, help tools, operability, contextuality and learnability. A mobile application that is easily navigable is likely to be successful because it makes it easier for users to easily gain access to the information that they require.

Many other more specific contextual challenges can also be expected according to the case in question. In KSA, Alsenaidy and Ahmad (2012) argued that great economic inequality exists such that the adoption of m-government services in the country could result in a two-tier government service system whereby the more affluent sections of the population access m-government services (and its efficiencies), while the economically disadvantaged do not. Thus, one of the barriers is mobile internet subscription which is expensive. Government can make some kind of arrangements with the network providers in order to enable free access to government websites. This should be similar for the use of mobile devises to call emergency services without paying service providers.

The customisation of mobile services can offer a solution. Ho (2009) suggests that the increasing ubiquity and customisation of mobile channels for government services increases the effectiveness of personalisation. Ardissono et al. (2002) argued that the technology provider should ensure that they implement the necessary tools (including pattern recognition, collaborative technology, data mining and click stream analysis) to allow the web content to be manipulated in order to correspond with the results of real-time detection of user behaviour. Another relevant challenge is the provision of customised services (Al-Khamayseh et al., 2006). Al-Khamayseh et al. (2006) observed that customisation of mobile services is a key determinant of the success of the mobile government services; otherwise, customers will be loaded with the burden of unnecessary

information. This again suggests the importance of personalisation in effective m-government services. According to Ntaliani et al. (2008), m-government is not just a label to provide services; rather, it is the provision of facilities by offering them in a simplified way for all parties, people, businesses and the government itself. The customisation of services enhances acceptance by offering users ease of use, saving time and effort compared to traditional government service channels (i.e. the legacy system) and thus demonstrating the utility of the change (Shneiderman and Plaisant, 2010). Hayes and Lemstra (2008) suggested that personalisation of services results in enhancing the quality of the relationship between the country's citizens and its government.

Thus, we argue that the provision of mobile government services in such a tailored way can deliver targeted information to online users and avoid overload of information and spam, as well as the issue of sense of division amongst citizens. Ho (2009) argues that the personalisation of mobile services is also important source of competitive advantage. Al-Khamayseh et al. (2006) found that the personalisation of mobile services ensures that consumers are not overloaded with information, which functionally helps them to use government services more efficiently and frequently.

There are many barriers in the provision of m-government services to the general public, and these challenges must be handled carefully. Mengistu et al. (2009) explained that one of the hindrances includes the issues of privacy and security, issues regarding usability and a variety of mobile platforms. According to Al Thunibat et al. (2011), in the wireless communication era security and privacy issues are considered enormous, as one cannot connect to wireless networks or transfer data therein anonymously. Mengistu et al. (2009) explained that wireless network operators provide a chance for hackers to temper with, intercept and misuse public data being transported through public airwaves by wireless network operators. Hence, the government should address this challenge and proper measures must be taken to avoid any damage to public data.

Another key challenge faced by the Saudi government is the lack of readiness in the application of m-government. According to a report by the World Bank Group (2012), more than 50% of the population regularly use the internet, but most people are not able to utilise the benefits of m-government because they are not aware of the complete usage potential of mobile devices (before one considers the availability and suitability of m-government services themselves). According to Basamh et al. (2014), the government must develop and induce awareness among the population about the benefits of mobile

government, mobile usage and to ensure general public accessibility to mobile government services. It is the government's prime responsibility to ensure the credibility of the system and provide assurance to public users that their personal data is safe and that no one else can access it.

Mengistu et al. (2009) further elaborated that a lack of a comprehensive legislative framework regarding cyber-crimes, laws specifying the rights of citizens and responsibilities of government (the data holder), data privacy and information practices result in poor readiness. Lack of trust in the government's ability halts the readiness of acceptance among the people's usage of mobile government services (Al Gahtani et al., 2007).

Specifically, governments must formulate transparent regulations about online taxable and non-taxable transactions and an online signature is need of the time of transactions to improve the readiness of people to adopt mobile government practices. Mengistu et al. (2009) argue that lack of regulation creates issues of lack of trust amongst the users, which engenders non-acceptance (i.e. non-adoption) of m-government services. Al-Gahtani et al (2007) suggest that lack of trust further halts the readiness of the people to accept and use mobile government services.

Mobile communication between public agencies and citizens needs compatibility across public agencies (such as financial, IT and communications ministries) and mobile service providers, as well as global standardisation of content, semantics and interoperability across agencies and networks (Ntaliani et al., 2008). The variety of mobile devices with continuously changing technical capabilities needs to be addressed and the supply of standardised and sustainable technology should be ensured in order to cater for critical issues regarding measurability and interoperability (Roggenkamp, 2004).

Low bandwidth and poor download speed is also another key challenge governments face in the application of m-government. Compared to cable networks, wireless networks give lower bandwidth speed, which results in discomfort and inconvenience among users (Mengistu et al., 2009). Mobile applications have to be developed carefully to overcome the problem of download speed and bandwidth consumptions. Moreover, governments should ensure the availability of efficient wireless networks for public usage. Mengistu et al. (2009) also suggest that without the proper download speed and bandwidth, the acceptance and effectiveness of the mobile government services is not possible as these are the fundamental features of any mobile service; without these features the success of the

mobile government service is not possible. These are the key issues hindering the success of the mobile government services provision and acceptance in many of the developing countries (Ntaliani et al., 2008).

The challenge for m-government to be ‘always on’ in an ‘always on’ society with fluid personnel is even more difficult than e-government transformation (Di Maio, 2002). Government should not only assure the availability of infrastructure and services for the chosen region but also ensure its own mobility as well. Basamh et al. (2014) reported that conventional e-government infrastructure is insufficient to deal with the mobility of government and society for providing the smooth mobile government services; rather the onus is on government to become more mobile and responsive. Although governmental agencies are responsible to launch mobile government and to face its challenges and opportunities, a need for societal change and process re-engineering with mobile companies and mobile technologies cannot be ruled out. To be mobile, government should not only focus mobile technology, but also think to reshape itself and society as well.

Other challenges include the requirements of users and these are relevant to the use of mobile applications. For example, according to Ivan and Zamfiroiu (2011), mobile applications often do not meet some important standards of usability including operability and attractiveness. The government needs to ensure that these standards are met along with meeting other functional and the non-functional requirements of the mobile applications (Ivan and Zamfiroiu, 2011). Previous studies suggest that features including ease of navigation, text source and colour rendering are amongst the key determinants of usability (Shneiderman and Plaisant, 2010). Gafni (2009) argues that the long-term success of a government’s launch of m-government services will depend to a large extent on the provision of personalised mobile government services to users, instead of overloading them with unnecessary general information.

Alijerban and Saghafi (2010) identified a list of challenges facing m-government projects. One of these challenges is lack of mobile government laws, regulations, policy and rules relevant to the use of mobile technologies, especially in (financial) transaction stages. In some cases, legislatures do not recognise laws in mobile documents and transactions at all (Shneiderman and Plaisant, 2010). Another challenge identified by Alijerban and Saghafi (2010) is a lack of authentication and validity of mobile as well as other mobile devices. Moreover, for the specific mobile devices, such as mobile phones, users can easily change

their mobile phone number or mobile phones, which can cause information to be undeliverable.

Similarly, integrated technology is necessary for mobile access of government services. Communication channels in m-government are not just about mobile phones, but also other mobile devices and wireless technologies. The higher the maturity stages, the more sophisticated the tools needed. PDA, netbook, satellite, Wi-Fi-enabled devices and Bluetooth should also interact and possibly be integrated with the m-government infrastructure (Alijerban and Saghafi, 2010). Alijerban and Saghafi (2010) also noted that although uncertainty avoidance (i.e. fear of data theft using mobile internet for official business) is generally regarded as an effected phobia among populations in developing countries, in the security of mobile government services wireless networks *are* quite vulnerable, which has become a serious issue. This includes issues relating to data protection, email security, access of wireless tools, security management tools etc.

Ntaliani et al (2008) found that compatibility and synchronisation across various stakeholders is a prerequisite of mobile communication, such as mobile services providers, communication and IT ministries as well as global standardisation of contents across networks and agencies. According to Susanto and Goodwin (2010), in order to address the critical issues about the interoperability and measurability, the supply of sustainable and standardised technology must be ensured. Ever-changing technical capabilities of the organisation are considered and monitored continuously.

There could be a problem with poor networks or infrastructure while developing mobile networks or mobile facilities. Wireless and mobile networks and related infrastructure, as well as software and applications, must be developed for m-government (Kushchu, 2003), which means costs for developing the structure would be high.

M-government aims to increase citizen participation, as m-government facilities are provided to all citizens. These are essentially citizen-oriented services accessible to all who have access to mobile devices (Emmanouilidou and Kreps, 2010). Through mobile governments, government services offer easy access to information, and m-government information is usually available through mobile devices in many alternative forms (Sheng and Trimi, 2008). Some of the main risks associated with m-government are related to identity and security. Mobile phone numbers and mobile devices are relatively easy to hack, and wireless networks are vulnerable because public airwaves are used to send signals.

Many countries have not yet adopted legislation regarding m-government and have not put legal regulations in place for protecting data and information, which leads to security risks as mentioned above. It is necessary to clearly identify the rights of citizens and the responsibilities of the government as a data holder, and to have legal protections in place for users of m-government.

2.6 Impact of culture on behaviour of Saudi citizens

National culture affects the behaviour of individuals within a society and thus of that society as a whole. Resistance towards change varies from culture to culture. Some cultures are known to have traditional behaviour, being slow to accept change, and their level of resistance is high (Al-Sobhi and Weerakkody, 2010), while others are relatively open to change, although on some occasions a segment of the population might be resistant to drastic change as they might consider it a threat to their traditional values and core identity. Cultures that are highly resistant towards change, which completely resist it (e.g. feudal Japan under the Shoguns), are ultimately beaten into submission by the economic, cultural or military forces of globalisation (Treven and Treven, 2007).

This research also relates change to time orientation that determines the behaviour of people in particular. Trompenaars (1993) suggests that in some traditional cultures, a focus on the past and history prevails; this applies to the world of relationships. In traditional cultures, people conceptualise the present in light of previous principles, traditions and contexts. Some cultures are known to be present-oriented, living in the moment. For these types of societies history is not that relevant and long-term planning for the future is not a major concern; current utility is the greatest good. However, there are societies oriented primarily to the future, being intensively focused on development and setting targets for future growth and prosperity.

Theories suggest that more past-oriented cultures resist change as they consider it to be a danger to their traditions. Future-oriented cultures consider change desirable and unavoidable, so they are open towards it. Although both present- and future-oriented societies do show resistance to change, this is negligible in comparison to past-oriented cultures and is due to tangible uncertainties ancillary to the change, not the change per se. Change managers need to understand the whole matrix of factors involved in the context of a change, whether in individual organisations or in societies and nations, and devise appropriate strategies to facilitate innovation and improvement.

Trompenaars (1993) suggested that key barriers to change are attachment to traditional ways of doing things, repetitive habits, lack of resources, threat to authority and power and fear of unknown results; these are present to varying degrees in all societies. Different studies highlight different reasons behind resistance to change (Al-Sobhi and Weerakkody, 2010). Some suggest that social and personal economical factors influence resistance, while other suggests vague relations between personal and organisational goals. Resistance to change can be explained as a negative reaction exhibited by individuals towards change that they perceive to be against their personal interest and objectives. Resistance is a form of protection that individuals apply to their actual or assumed fear, which might affect their personal interest. Resistance can be in different forms and types. Change is known as an essential factor in the modern world due to increased competition, globalisation and environmental change (Al-Shehry et al., 2006).

There are a number of theories that can inform what factors can affect the m-government effectiveness concerning the factors that represent opportunities or challenges for m-government. There is insufficient engagement with the existing theories that are proposed to analyse how such factors systematically exert impacts on users' choices and adoption of particular technologies/services. Theories such as Expectation-Confirmation Theory (ECT) and the Unified Theory of Acceptance and Use of Technology (UTAUT) can be adopted to explain how users' choices are affected by the awareness of the technology/service, expectations and motivations of adoption, access and experience of usage, peer influence, technical features and usability, and providers' actions. ECT has been widely adopted in consumer behaviour studies and other marketing related research areas to understand consumer behaviour, intention, satisfaction and consumer post purchase intentions. This theory proposes that consumer has develop some initial expiations about the product and service performance before the purchase and then compares the expectations with the actual performance. ECT suggests that if the initial expectations meet or exceed the actual performance, the consumer can be satisfied and it can affect the future intentions of the consumers to buy this particular and service (Tarhini et al., 2015). In case of consumers expectations are not met, the experience can negatively affect the consumer buying behaviour and satisfaction and future buying intentions. Studies have also suggested that in the current era of social media and globalisation, the negative word of mouth can spread to a large number of people around the world within a very short time (Kaplan and Haenlein, 2010). In such a situation, meeting the expectations of the consumers become necessary and challenging given the increasing competition and awareness among customers (Kaplan

and Haenlein, 2010). It is argued in this thesis, the users of m-government also involve similar pre-use and post use behaviour. For example, they can have initial expiations about the m-government services based on aforementioned different factors such as data security, ease of use and so on. The use of the services may then lead to satisfaction and further use of these services or there can be a possible ex post reversal of the decision (Bhattacherjee, 2001). Building on the exiting studies, Bhattacherjee (2001) suggested an IS continuance model of expectation - confirmation. Bhattacherjee (2001) proposed that post acceptance and satisfaction of the users affect the continuance intentions; while the satisfaction of the users was determined by perceived usefulness and expectations' confirmation from prior use. Bhattacherjee and Premkumar (2004) posited another two stage model about change in attitude and belief of the consumers. This model links pre usage and usage attitudes and beliefs and posits that satisfaction and disconfirmation as constructs which affect post-usage attitudes and beliefs. These attitudes and beliefs in turn affect continuance intention of the users. UTAUT is one of the recently developed theory (Venkatesh et al., 2011) that suggests relationship between different predictors of this model including social influence, effort and expectancy effort as well as facilitating conditions observed at various points in time (Venkatesh et al., 2011). The model proposes that pre-usage belief can anchor post-usage belief because users are argued to relate their initial imprecision and beliefs with the future beliefs. It is likely that pre-usage beliefs are disconfirmed. Tarhini et al (2015) suggest that there are different factors such as environmental, organisational, cultural, social and personal that affect and shape expectations, experience and future behaviour of the users. Tarhini et al (2015) argue that the awareness of the technology/service, expectations and motivations of adoption, access and experience of usage, peer influence, technical features and usability, and providers' actions affect the behaviour of the users of IS. Therefore, it is argued that different predictors and factors included in ECT and UTAUT can affect m-government effectiveness.

Hossain and Quaddus (2012) analyse ECT and argue that one of the key limitations of ECM is the dominance of post usage behaviour as a main factor that affect the continuance behaviour. Hossain and Quaddus (2012) argue that both peruse expectations and post use experiences are important in this relation. Bhattacherjee and Lin (2014) extend ECT. Bhattacherjee and Lin (2014) suggests that in the post usage, a user relies on cognitive belief as well as affective experience while developing subsequent behaviour. Indeed, Bhattacherjee and Lin (2014) present an extension of the ECT by incorporating continuance behaviour by proposing that satisfaction affects continuance through direct

and indirect influences which are mediated by users' intentions. Bhattacherjee and Lin (2014) show users can continue the use of IT if they are satisfied with it without any positive expectations from future usage. Moreover, this extended model also incorporates habit as a key driver of continuance behaviour that can drive continuance behaviour even without the intentions to use IT. Habit also suppresses the role of intentional cognition in the use of IT. Thus, the key additions to ECM by Bhattacherjee and Lin (2014) are the incorporation of satisfaction without future expectations and habit as the key drivers of continuance behaviour.

UTAUT has also been used in a number of previous studies relevant to information technology system. For example, Tan (2013) explored the need for English E-learning websites for Taiwanese college students. Tan (2013) used UTAUT for this purpose. The results of this study demonstrated that social influence, effort expectancy and performance expectations positively affect behavioural intention and facilitating conditions. Tan (2013) found that behavioural intentions positively affect use behaviour. This study in this way confirms some of the key concepts of UTAUT including social influence, effort expectancy and performance expectations.

Zamzami and Mahmud (2012) found that information quality, perceived usefulness, perceived use of ease and perceived accessibility are amongst the key factors that affect m-government services. Content, context, communication and context also affect the satisfaction of the users and affect the m-government effectiveness (Zamzami and Mahmud, 2012). Abu-Tair and Abu-Shanab (2014) found that key challenges facing m-government is the lack of infrastructure and bureaucratic management style. Abu-Tair and Abu-Shanab (2014) also revealed that lack of awareness amongst the people is also a key challenge in this regard.

2.7 Theoretical framework

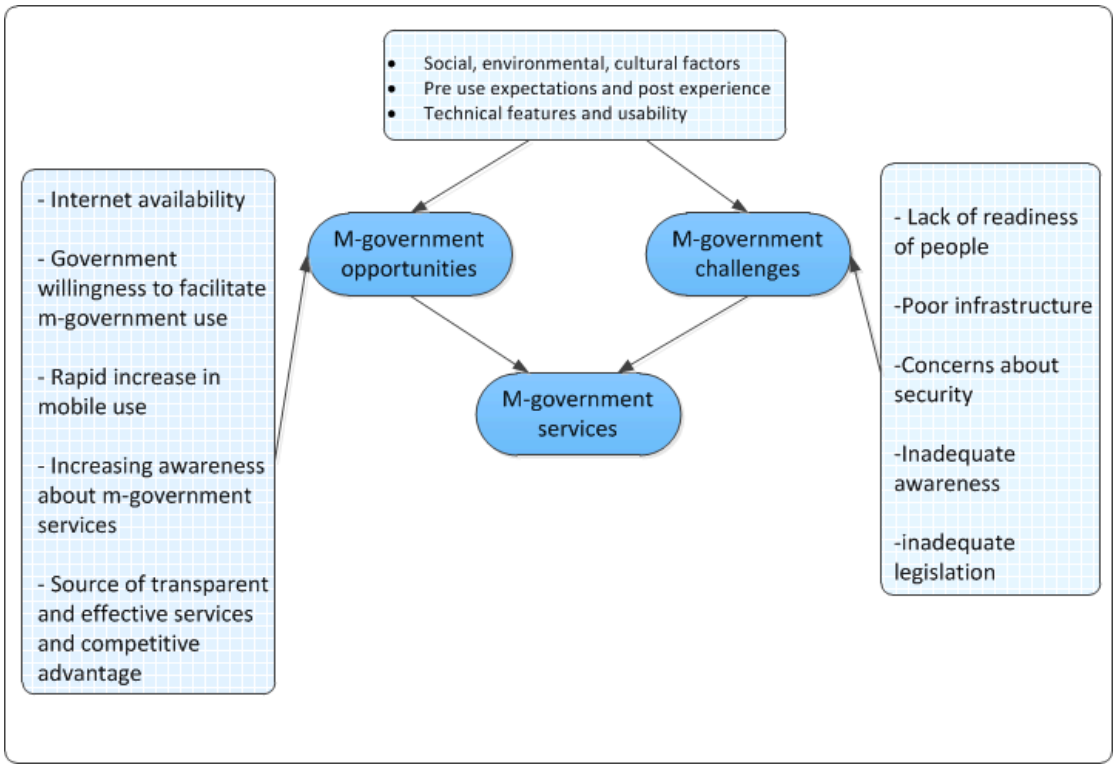


Figure 2-1 presents the theoretical framework based on the literature reviewed in the previous sections. This framework guides data collection as well as data analysis and findings of this thesis.

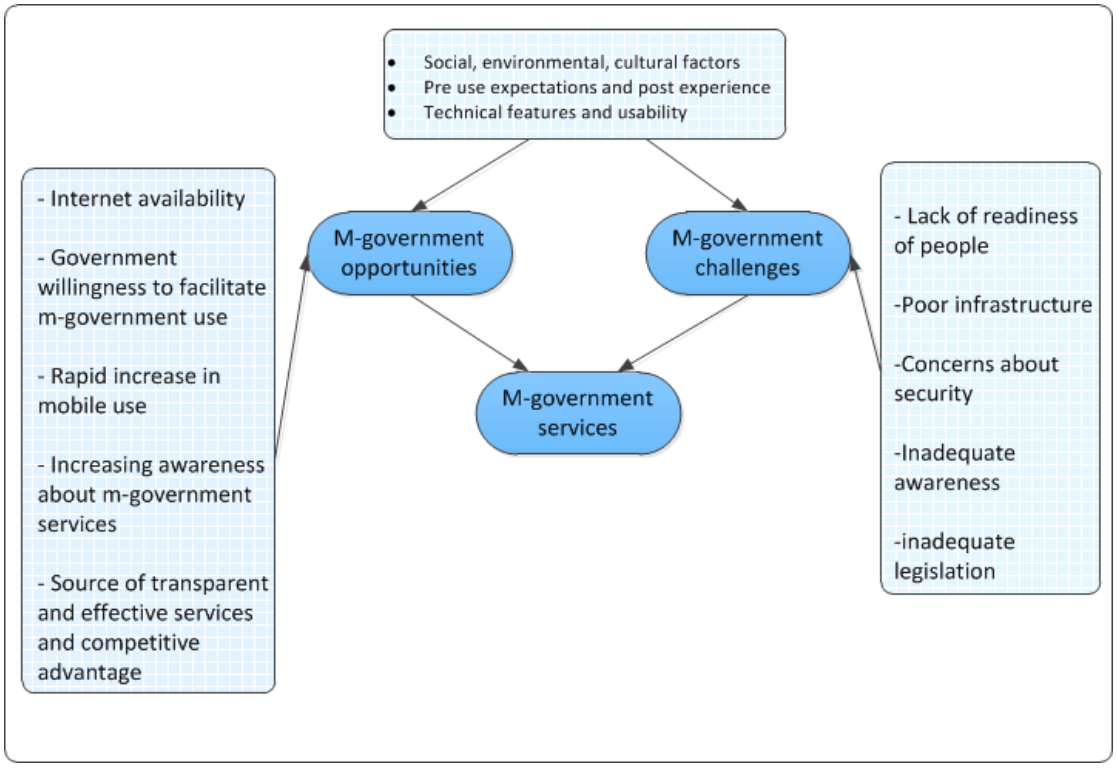


Figure 2-1: Theoretical framework: factors affecting m-government in Saudi Arabia

Previous studies have provided different challenges such as lack of customisation, security issues and different other challenges related to technology and bureaucratic administration. According to Al Thunibat et al. (2011), security and privacy issues are considered as key hindrances in the effectiveness of m-government services. Lack of availability of internet and access and lack of awareness are also the key issues in this relation. Basamh et al (2014) suggested that the government must develop and induce awareness among the population about the benefits of mobile government, mobile usage and to ensure general public accessibility to mobile government services. It is the government's prime responsibility to ensure the credibility of the system and provide assurance to public users that their personal data is safe and that no one else can access it. As mentioned in the framework, figure (2.1) a lack of a comprehensive legislative framework regarding cyber-crimes, laws specifying the rights of citizens and responsibilities of government (the data holder), data privacy and information practices impede the m-government effectiveness (Al Gahtani et al., 2007). Previous studies have argued that it is the responsibility of governments to formulate transparent regulations about online taxable and non-taxable transactions and an online signature is need of the time of transactions to improve the readiness of people to adopt mobile government practices (Al Gahtani et al., 2007; Al-Sobhi and Weerakkody, 2010; Alsenaidy and Ahmad, 2012). Low bandwidth and poor download speed is also another key challenge governments face in the application of m-

government (Alshehri et al., 2012). The lack of acceptance and effectiveness of the mobile government services is due to overall poor infrastructure (Al Thunibat et al., 2011). However, the framework, figure (2.1) also suggests that there are opportunities for m-government as well and these include willingness of the government to facilitate m-government, increasing awareness about m-government and the belief that m-government can enhance the transparency in government services as well as it can be a source of competitive advantage (Ivan and Zamfiroiu, 2011; Gafni, 2009; Alijerban and Saghafi, 2010). The above framework, figure (2.1) has offered guidance to develop and refine the research aims, objectives and questions as well as guided the development of the survey questionnaire and semi-structured interviews about the opportunities and challenges facing m-government in the country. These studies have informed the inclusion of the question in the questionnaire about specific challenges and opportunities relevant to security and privacy, awareness, infrastructure, government role and willingness, internet speed and so on.

This thesis is different from the previous studies in that this thesis include research design that is both qualitative and quantitative. Moreover, data have been collected from the Ministry of information technology and citizens as well. This research uses statistical tools as well as qualitative data analysis to bring to the fore both in-depth and traditional generalizable results. Also, a large proportion of these studies have focused on the introduction of mobile technologies within sectors including the banking industry and the healthcare industry, where such changes are predominantly driven by a desire to increase productivity and focus on the need to cater to consumers (Alsenaidy and Ahmad, 2012).To gain deeper insights into the challenges and opportunities for m-government services, this study used a prototype design to evaluate the understanding of the use and benefits of a mobile government services, focused on an m-government application for mobile payments of the utility bills; m-government services can be particularly useful for energy departments because energy, water and other utilities are essential amenities for every household (and thus every citizen). The development of this m-government service would save time and travelling hassles for individuals, while enhancing the overall economic and resource efficiency of KSA on the macro level.

2.8 Summary of literature review

Mobile communication has become an integral part of mainstream society to communicate with public and private agencies and to facilitate location-based services. In Saudi Arabia, many people consider mobile phones to be their primary internet device and the method by which they connect to the world. There is a high level of mobile penetration among Saudi citizens and mobile users there, as elsewhere in the world, are increasingly expecting provision of services regardless of time and space. At present, effective mobile networks are not only available in cities but equally in the rural areas of Saudi Arabia. Such indicators provide government with an opportunity to facilitate public access to m-government.

However, there are many challenges facing m-government in developing countries, including KSA. These challenges include security and privacy issues; a variety of mobile platforms; and issues regarding usability. Lack of population readiness is another key challenge the Saudi government is facing in the application of m-government, including lack of awareness of the government-related applications of mobile internet (which is chiefly used for entertainment and news) and the possibilities of mobile internet itself. Poor readiness is also the result of the lack of a comprehensive legislative framework concerning cybercrimes, data privacy, information practices and laws that specify the rights of subjects (citizens) and responsibility of data holders (government). Low bandwidth and poor download speed are also fundamental challenges governments face in the application of m-government.

Given the opportunities and challenges facing m-government in developing countries, this research intends to explore different challenges and opportunities faced by mobile government within KSA from the perspective of Saudi citizens. There is a need to understand the usefulness and challenges of mobile services for e-government in Saudi Arabia. KSA has a consumer-oriented society, with a lifestyle that is more focused towards consumption. This literature study helps as an addition to existing academic literature on the industry of e-government that exists in Saudi Arabia focusing on the challenges that it faces, how it interacts with consumer behaviour and what opportunities exist in the country for mobile service providers, including the government. Most existing research is focused on challenges of e-government in isolation from the quality of service provided by mobile service providers and how it has contributed to the overall operation of e-government. Therefore, this thesis aims to fill the gap in the literature.

3 RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodology used in this thesis. It presents the case study methodology, data collection and analysis and describes and justifies the approach taken to collect and analyse the data, which takes the form of interviews and survey responses. Ethical concerns of this research are also detailed in this chapter.

3.2 Case study as research methodology

According to Saunders et al. (2009, 124), there are four main methodological approaches that can be used by business researchers and students when attempting research: surveys, case studies, action research and experimentation. Of the four data collection methods, surveys are most often used for descriptive and exploratory research, as they make it possible for researchers to collect a large amount of data with relatively little direct involvement or observation. As a result of this, surveys are an ideal method for researchers and they act to support a range of analysis techniques. In contrast, case studies manage to combine both depth and breadth by carrying out a range of research at a distance (from a specific organisation). As such, they help provide richer data, but at the cost of breadth as the extra involvement on the part of the researcher means the research takes longer and thus covers a narrower area.

Action research is a highly involved methodology that requires the researcher to work closely with the target organisation to investigate an issue. This allows for maximum depth, but at the cost of breadth as the researcher only works with a single organisation and sphere of experience and hence does not achieve a broad point of view. Finally, experimentation involves setting up controlled conditions and then observing how a phenomenon unfolds in these conditions; it is associated with positivism and is generally used in the natural sciences (Saunders et al., 2009).

In this thesis, a case study methodology was used focused on Saudi Arabia. A case study is suitable for the present research because it allows for the collection of a sufficiently broad dataset whilst also enabling a rich analysis of specific research sites and sample populations. This enables examination of the case of Saudi Arabia in depth, whilst also considering the general case of e-government and m-government as a whole (Saunders et

al., 2011). This will make it the most effective method for addressing the research objectives as laid out above, and hence will be of great value when ensuring that this research is of academic and practical relevance.

Case study emphasises participants' own conceptions of e- and m-government, thus it is the most relevant approach to address the research question of this thesis. The case study, according to Saunders et al. (2009, 149), offers flexibility to generate rich insights into the social phenomena under study. Saunders et al. (2009, 150) also warn against the use of data collection methods that *"oversimplify the complexities of everyday life"*. They state that respondents must be chosen carefully, and the data collected in an appropriate setting, so as to gain participants' trust over the period of the thesis. In addition, prior to commencing data collection, gaining permission to participate in, observe and record participants' lives is crucial. Ritchie and Lewis (2010, 35) suggest that this requires that the researcher *"join the constituent study population, or its organisational or community setting, to record actions, interactions, or events that occur"*.

Hence, in order to carry out the thesis effectively, the researcher must set key criteria for the respondents, for instance the users, potential users and those not likely to use the services (users can be both the public as well as the government officials who provide the services) to determine the factors influencing use of e- and m-government services. Those in government who are responsible for initiating or recommending e- and m-government services must also be included. This is the first step in the investigation and must be planned carefully be for the investigation can proceed. A contact schedule should be drawn up and agreed with participants so that regular close contact can be maintained. If realistic, the researcher should spend time on a face-to-face basis with a selection of users and government officials. This strategy ensures that close contact is initiated and maintained over the period of the thesis, both while gathering information and verifying the findings with respondents after analysis has taken place. Since the researcher has worked in this sector and has contacts and confidence of working in the context, this strengthens the case for using a case study research methodology.

3.3 Data collection tools

The participants of this thesis were Saudi citizens and the employees working at the Ministry of Communication and Information Technology in Saudi Arabia. The decision to focus the research on this government department was due to the fact that the Ministry

established the country's first e-government program (*Yesser*) in 2005 (Saudi Government, 2012).

Data collection was conducted using interviews and surveys. The overall data collection approach in this thesis is similar to that taken by Phusavat et al. (2009), who used interviews with private sector executives and public sector administrators to understand m-government implementation in Thailand. Misacura (2009) also drew on interviews in an exploration of m-government in emerging and European countries, in addition to quantitative research via surveys. Along similar lines, Aboelmaged (2010) relied on questionnaires to investigate uptake of and attitudes toward e-procurement. These and other salient examples suggest that the use of interviews and surveys are well suited to a thesis on the uptake of and attitudes toward e-government and m-government in Saudi Arabia.

The data were also collected using published documents related to e- and m-government policies, their content and extent of use by the population. The details of data collection for each study completed as the part of this thesis will be detailed in the relevant study, as survey and semi-structured interview for all the three studies in this thesis serve related but different purposes. However, a general overview of the data collection tools is presented in the following two sections.

3.4 Interviews

For collecting qualitative data on the views and opinions of individuals, interviews were been conducted with individuals in Saudi Arabia who had some awareness of the issues around and changes taking place in regards to e- and m-government. The respondents knew the difference between these two forms of services before the researcher introduced the subject, and answered a series of questions on how they use e- and m-government services, as well as on what they perceive as the advantages and disadvantages of these services. Although interviews can be time consuming, they provide more in-depth insight about the issues under examination.

The interview questions for the first study were conducted with Ministry of Communication and Information Technology employees, while the interview for the second and third study were Saudi citizens. The questions were first translated into Arabic then back-translated by a second translator to check the veracity of the semantic rendering presented to the research participants; any inconsistencies were discussed by the translators

to result in the ultimate version used in the fieldwork (Brislin, 1986). Moreover, in the third study, prototype utility application was developed and was tested from the participants from Saudi Arabia. Data analysis procedure for the qualitative interviews will be detailed in each of the three studies. Qualitative studies are argued to be biased because of its heavy reliance on the skills of the researcher (Bryman and Bell, 2007). Moreover, it is difficult to assess and maintain rigidity in qualitative studies. The qualitative data collection and analysis are time consuming. The qualitative studies also face the challenges of confidentiality and anonymity. The qualitative research designs are argued to lack generalisation. That is, the findings of these studies are hard to generalise across contexts and research settings (Creswell, 2003).

However, the purpose of this thesis is not on only generalizable results. Rather, the purpose here is to generate rich insights into the phenomena understudy as well. The qualitative studies are argued to offer in-depth data (Bryman and Bell, 2007). Qualitative interviews such as semi-structured interviews do not confine the researchers to particular questions; rather, interview questions can be guided and redirected by the researcher in real time (Creswell, 2003). Therefore, semi-structured interviews have been used for the purpose of generating insights into the phenomena of challenges and opportunities facing m-government in Saudi Arabia.

3.5 Surveys

Data was also collected using surveys given the nature and purpose of the thesis and the advantages surveys offer. Surveys make it possible to collect a large amount of data at once. Given that the quality of the survey instrument has been established, surveys can provide precise and objective data on a range of topics. Quantitative questions are often supported or rounded out by free-form short-answer questions.

Some of the common survey methods are polls and news media reports. Surveys could also be for scientific purposes and could provide information on social issues, marketing research, health concerns, or people’s opinions on particular issues such as m-governance in this thesis (Bryman and Bell, 2007). Surveys are used in all fields of study and are effective for studying behavioural or lifestyle preferences. The validity of data interpretation depends significantly on how well the chosen sample reflects the characteristics of the population that it is intended to represent (Bryman and Bell, 2007).

Additionally, surveys require less time to administer than more personalised research methods, and their low cost makes them ideal for low-budget research. In general, researchers and other experts administer the surveys, and depending on the types of questions involved, interpret the data using both qualitative and quantitative methods. This increases the reliability of the results. As few surveys apart from national censuses are administered to entire populations, surveys are generally sent out to sample populations who, if rigorously selected, can be considered representative of a wider population. In other words, surveys typically aim to describe typical or common behavioural patterns of a large population, although in certain cases the results may not be absolutely generalisable (Cresswell, 2003) Very large samples are feasible for large-scale research studies, resulting in more statistically significant outcomes, although such studies have to be flexible.

Sample surveys help to collect data from groups and interpretations are done comparatively. Surveys help in collecting information from a large number of respondents, and samples large amounts of data and large sampling helps the statistical techniques to determine validity, reliability and statistical significance (Saunders et al., 2011).

Surveys study behaviours, values, opinions and attitudes, and gather a large amount of information from varied sources and the wide range of information makes surveys very flexible. Surveys are also standardised and free from errors and also easy and cheap to administer. Surveys are economical in data collection and provide standardised questions. Responses of interest to the researcher are recorded and can often be followed up in more depth for a more insightful analysis (Ader et al., 2008; Ornstein, 1998).

The subjects' motivation, honesty, memory and ability to respond could affect the data collected in the survey. However, participants may also give incorrect answers, or may give answers and manipulate responses that will present them favourably or which they believe are desirable to the researcher, while structured surveys may have low validity. Individuals in such surveys are randomly selected or sampled and errors may follow based on unfavourable response rates from such participants who lack interest in the survey (Ader et al., 2008; Ornstein, 1998). Additionally, people who respond to the survey may be emotionally and socially different from those who do not respond.

Thus, polls and surveys are usually conducted randomly, with respondents selected randomly. Participants may provide responses through various channels including the internet and telephone. Survey may include a disproportionate number of respondents who stay at home or are at work.

It is possible for survey results to be of low quality because survey questions are followed by too many possible choices; this can yield vague data sets. In surveys with open-ended questions, however, participants are encouraged to consider their own choices (Ader et al., 2008; Ornstein, 1998). Five-point Likert scales are more informative for participants, more commonly used and provide a wider range of choices than just 'yes', 'no' or 'can't tell' options. The Likert scale for this thesis is shown in Table 3-1.

Table 3-1: Likert scale options

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1	2	3	4	5

However, such options do enable more precise responses and are thus appropriate for this research in exploration of general parameters. However, as suggested by Cresswell (2003), none of the research methods is without flaws. The purpose is to use the research design that suits the purpose and nature of the thesis should be used (Cresswell, 2003). Thus, keeping in view the nature and purpose of this thesis, surveys have also been conducted.

3.6 Justification for using three studies in the thesis

This thesis is based on three studies. The aim of all the three studies is analyse different opportunities and challenges faced by m-government in Saudi Arabia. However, given the complexity of issues and presence of different stakeholders such as users, the government and different ministries. The choice of the Ministry of Communication and Information Technology for the first study because this ministry was expected to offer useful information into the challenges and opportunities as the ministry has been involved in e-government implementation in Saudi Arabia and also is the key responsibility towards the development of infra-structure and legislation about the m-government services. Therefore, it was hoped that this thesis, which focuses on the respondents form this ministry will be useful in foregrounding the challenges and opportunities because of the exposure and experience of the employees of the ministry and will be helpful in increasing the effectiveness of any future implementation, but will also be a valuable contribution to the existing body of research literature. Focussing on citizens was important because they are supposed to be the ultimate users of the e-government services and their views on challenges and opportunities facing m-government was likely to offer valuable relevant information that can help the government to consider in its endeavours to implement m-government services. In this study, surveys and qualitative research designs were used.

The second study conducted interviews from citizens. 12 semi-structured interviews were conducted over the phone and Skype. Semi-structured interviews are suitable for the present research because they allow for the collection of a sufficiently broad dataset whilst also enabling a rich analysis of specific research sites and sample populations. This enabled the in-depth exploration of the case of m-government in Saudi Arabia. The purpose was to have in-depth exploration of the challenges and opportunities from the perspective of the potential users and therefore, semi-structured interviews were used in this study. The first study helped to generalise the opportunities and challenges across contexts; on the other hand, the second study offered lessons for Saudi Arabia particularly.

The purpose of the third study was to understand and analyse the challenges and opportunities using prototype applications. The main aim and purpose of this research is to better understand the challenges and opportunities that mobile service creates for e-government in Saudi Arabia. The prototype by involving the respondents in some kind of experience of the services that they are supposed to be using in real scenarios. In this way, the prototypes offers some particular information about particular services.

3.7 Ethical considerations

Observing ethical considerations is the fundamental concern of all research involving human participants; ethical flaws undermine the validity and authenticity of research regardless of its empirical import (Sekaran, 2007). Many ethical issues could have been raised by conducting this research due to the sensitive political situation during the time of fieldwork (bearing in mind the research essentially concerns government policy), thus the researcher progressed with extreme care regarding moral and ethical considerations. Participants were informed beforehand about the nature of the research and its likely benefits, and they were assured from the beginning and throughout that their data would be anonymous; that their participation was voluntary; and that they could withdraw from the thesis at any time. The permission from each participant was taken before hand using a consent form shown in Appendix 7. The approval for all the three studies was taken from the University, as shown in appendices 8, 9 and 10 respectively. Approval from the Ministry of Communications and Information Technology was also taken to conduct interviews and surveys from its employees and access other forms of the data (see Appendix 11).

3.8 Summary of research methodology

This chapter explained the general research methodology adopted in this thesis. An overview of data collection tools used in this thesis has been provided, including surveys and semi-structured interviews. The chapter began by presenting the research methodology, then it described and justified the approach used to collect data, and finally explained the ethical considerations.

4 M-GOVERNMENT ADOPTION IN SAUDI ARABIA: CHALLENGES AND OPPORTUNITIES

4.1 Introduction

This chapter presents analysis of the range of different opportunities and challenges faced by m-government in Saudi Arabia. This analysis was conducted by focusing on the particular issues faced by the employees of the Ministry of Communication and Information Technology in Saudi Arabia, and the issues which need to be considered by Saudi Arabian citizens in deciding whether to make use of e government services.

The decision to research the issue of the provision of mobile government services in Saudi Arabia is based on the fact that mobile government services are likely to provide significant advantages for the Saudi Arabian government. It is therefore important to ensure that not only the opportunities, but also the challenges associated with their provision are fully understood in order to increase the likelihood that the introduction of such services will be as effective as possible. Research suggests that, like consumers elsewhere in the world, the high level of mobile penetration among Saudi Arabian consumers means that they are increasingly coming to expect services to be provided to them anywhere and at any time (Oxford Business Group, 2008). This expectation is likely to also apply to the services provided by the national government. Aside from the need to fulfil a growing consumer demand from its citizens, the provision of mobile government services is also likely to increase the level of visibility and transparency which characterises the nature of the relationship between the Saudi Arabian government and its citizens, and this in turn is likely to increase the effectiveness with which the services which are provided by the government can be fulfilled.

The majority of research conducted thus far into the opportunities and challenges are associated with mobile government has focused on its implementation within European countries, where the mobile penetration rate has reached 100 per cent (Public Services, 2011). Furthermore, a large proportion of the research has concentrated on countries where mobile government has already become an important part of the provision of services, in countries such as Hong Kong, Germany, Estonia and Singapore (Alshehri et al., 2012; Jotischky and Nye, 2012; Ntaliani et al., 2008). As a result, very little research has been conducted into the potential opportunities and challenges likely to be associated with the implementation of mobile services in countries where it has not yet been introduced.

Furthermore, the relevance of empirical studies focused on the topic of mobile services is further diminished by the fact that very few of them focus on the provision of mobile services by the government. Rather, a large proportion of these studies have focused on the introduction of mobile technologies within sectors including banking and healthcare, where such changes are predominantly driven by a desire to increase productivity and focus on the need to cater to consumers (Oxford Business Group, 2008). Such examples do not adequately reflect the increased level of complexity associated with the introduction of mobile services by the government, where the stakeholders involved are more complex (e.g. ethically and legally), involving citizens, government employees, public administrators, tourists and business partners (Bouwman, de Vos and Haaker, 2008).

These issues represent a significant gap in the research literature. Hence, it is hoped that this thesis, which focuses on critically analysing the various opportunities and challenges associated with the implementation of mobile government services in Saudi Arabia will not only be useful in increasing the effectiveness of any future implementation, but will also be a valuable contribution to the existing body of research literature.

4.2 Aim and objectives of the study

The aim of this thesis is to analyse the challenges and opportunities associated with the implementation of m-government services in Saudi Arabia.

This aim is met by fulfilling the following objectives:

1. To explore the benefits which are associated with m-government for both Saudi citizens and government employees.
2. To identify the key challenges which may prevent the uptake of m-government in Saudi Arabia.
3. To identify the steps which should be taken in order to increase the effectiveness of m-government.

4.3 Pilot study

4.3.1 Participants

Following Bryman and Bell (2007), survey method was used for the purpose of a small-scale pilot study, which included 21 citizens (11 males and 10 females, ages between 18 and 49) and 25 government employees (12 males and 13 females, ages between 18 and 49). This was carried out before conducting the main study. In order to test the questionnaire for the citizens for reliability and for validity, a pilot study was first conducted on a sample of individuals. Similarly, the questionnaire for the government employees was also tested.

4.3.2 Data collection

Survey questionnaire was used to collect data from the participants mentioned above. The questionnaire was answered by the citizens within 15 to 20 minutes. Furthermore, the majority of the respondents did not object to the two repetitive questions. Most of the respondents (over 60%) stated that they considered the questionnaire to be well structured, and the questions simple and easy to comprehend and understand. The answers were subjected to the Cronbach's alpha test, a measure for assessing the internal consistency of a psychometric test for a sample of respondents (Zinbarg et al., 2005).

4.3.3 Procedure

The operative part of the citizen questionnaire consisted of 25 closed- and three open-ended questions. The closed-ended questions were designed in accordance with the graded Likert scale and have been broken up into two sections, comprising of questions on (1) E-Government Services; and (2) M-Government Services. The former has four questions and the latter has 19.

Greater stress has been given to m-government services, which is the main focus of this research. Likert scales are very commonly used for psychological research and help in measuring attitudes, requiring people to respond to a sequential series of statements about specific topics, with regard to the extent to which they agree with them, thus helping researchers to tap into the affective and cognitive components of attitudes.

The Likert scale for the pilot study used a fixed choice response format and assumes that the intensity of experience will be linear and on a continuum from strong agreement to

strong disagreement with a choice of five pre-coded responses with the neutral point being not sure (Elaine and Seaman, 2007). Five-point Likert scale was chosen for the pilot study because it allows for degrees of opinion, as well as no opinion at all, and thus allows the data to be analysed with relative ease (Elaine and Seaman, 2007).

It is however very possible that the validity of a Likert scale can be compromised on account of inappropriate questionnaire formulation, specifically as this relates to generating false responses (Cresswell, 2003). The validity of the questionnaire used for the pilot study was thus assessed through various means. The sequence and construction of questions was in the first place been studied closely in order to assess validity. The scale of the questionnaire was judged for content validity. It was revealed that the section on e-government services was divided into two segments, with questions 1 and 2 assessing the computer-friendliness of the respondent and questions 3 to 6 focusing on the usage and convenience of e-government services.

The section on m-government was also segregated sequentially into questions that dealt with similar topics. Questions 7 and 8 dealt with the access and comfort of respondents with mobile platforms like cell phones or tablets. Questions 9 to 11 dealt with perceptions towards use of m-government services. Questions 12 to 15 dealt with reasons for not using m-government services. The balance sections concerned various aspects, both positive and negative about m-government services. These questions (namely 16 to 25) appeared to be arranged a bit haphazardly and were earmarked for rearrangement into a more logical sequence that guides the respondents from question to question. There was also some repetition in questions 22 to 25 concerning consensus that were flagged for removal.

Similarly, the questionnaire designed to conduct surveys from employees was also pilot-tested. This questionnaire has 19 closed-ended and three open-ended questions pertaining to m-government services. On the other hand, four questions concerned demographic information. The 26 questionnaires were completed by the employees of the Ministry of Information Technology who were satisfied with the use of language, structure and overall content of the questionnaire.

4.3.4 Pilot study results

The results of the Cronbach’s alpha test, which are above 0.7, reveal the consistency to be inadequate for a detailed confirmatory examination but adequate for a pilot or exploratory study. It is felt that the removal of the repetitive questions improved the consistency of the

test. The citizen questionnaire was thus felt to be appropriate for the conduct of the detailed final study. The answer to the questions included in the final questionnaire was also designed in order to increase their consistency in relation to the findings of Zinbarg et al. (2005). Tables 4-1 and 4-2 below display the results of the reliability test of the surveys conducted from citizens and employees.

Table 4-1: Reliability statistics – citizens

Cronbach's Alpha	*Cronbach's Alpha Based on Standardised Items*	*N of Items*
.744	.776	25

Table 4-2: Reliability statistics – employees

Cronbach's Alpha	*Cronbach's Alpha Based on Standardised Items*	*N of Items*
.713	.726	19

The reliability and validity test results show that questionnaire results are reliable for both employees and citizens (Zinbarg et al., 2005), thus the questionnaire can be used as a data collection tool in the main study.

4.4 Main study

4.4.1 Participants

The participants of the main study were citizen of Saudi Arabia and employees of Ministry of Communication and Information Technology. Key characteristics of the citizens included in the sample are shown Table 4-3, while key characteristics of the employees included in the sample are shown in Table 4-4. The demographic characteristics of the respondents who were interviewed through semi-structured questions are as shown in Table 4-5.

Table 4-3: Key characteristics of citizens in survey

Total	*Citizens (n=103)*
Gender	Male=65 and female=38
Age	Between 18 and 50+
Average age	Male=28 and female=25
Education	High school or less=9 Diploma=11 Bachelor degree=45 Higher education=38
Employment status	Employed=61 Unemployed=42

Table 4-4: Key characteristics of employees in survey

Total	*Employees (n=49)*
Gender	100% male, 0% female
Age	Between 18 and 50+
Average age	35
Education	Diploma=2 Bachelor degree=33 Higher education=14
Average length of professional experience	7 years

Table 4-5: Key characteristics of employees in semi-structured interviews

Total	*Employees (n=9)*
Gender	100% male, 0% female
Age	Between 18 and 50+
Average age	37
Education	Bachelor degree=3 Higher education=6
Average length of professional experience	7 years

4.4.2 Data collection

Surveys

Following Misuraca (2009), survey methods were used in this thesis. Multiple-choice surveys were administered to government employees and citizens. Two surveys were conducted as part of this thesis, which was administered to a sample of Saudi citizens concerning access of government services using mobile devices. The purpose is to understand different challenges they face while using services through mobile devices. The other survey was conducted with employees working at the Ministry of Communication and Information Technology. The purpose of this survey from employees was to gain further insights into why the challenges highlighted by the citizens sample exist.

The second survey was conducted among government employees focused on a sample of employees who were working at the Ministry of Communication and Information

Technology in Saudi Arabia. The decision to focus the research on this government department was due to the fact that the Ministry established the country's first e-government program *Yesser* in 2005 (Al-Sobhi et al., 2009). The electronic provision of government transactions and services was established by the 7/B/33181 Supreme Royal Decree. Hence, focusing the research on this Ministry made it possible to focus the questions which were asked on the particular challenges and advantages which Ministry employees had experienced concerning the implementation of this program. It is important to note that there are no women working within this department; hence, all of the respondents to the research conducted among employees were male.

The first survey targeted at citizens consisted of 25 questions about their attitudes towards current m-government services, problems they are facing and how these services could be improved. The survey aimed at employees consisted of 19 questions about the different benefits and challenges associated with the implementation of the m-government services and how these could be improved. More specifically, the content of the questionnaire was based on questions focussed on identifying challenges of m-government in Saudi Arabia by asking their agreement with statements, such as the following:

> *I frequently use m-government services; m-government services provide a more convenient way for me to access government services; I think m-government services would be more effective if they were personalised for me as an individual; I think e-government services will be very popular with citizens in the long term; I regularly have access to a mobile device, such as a mobile phone or tablet; I often access government services on my mobile device; I am familiar with the benefits of m-government services; m-government services are too inefficient to be of any use to me. I think mobile government services would be more effective if they were personalised for me as an individual; I think m-government services are the preferable option to help make political processes more transparent.*

These questions were derived from previous studies such as Bhavnani et al. (2008), Alsenaidy and Ahmad (2012), Ho (2009) and Al-Khamayseh et al. (2006). In total, 103 responses were obtained from citizens. The questionnaire designed to survey employees contained 19 closed-ended and three open-ended questions relevant to m-government services and the challenges facing their implementation. Four questions asked for demographic information. The employees' survey was conducted on a sample of 49

employees at the Ministry of Communication and Information Technology. The survey questionnaire is presented in Appendix 1. The survey was administered using the website: http://freeonlinesurveys.com.

Both surveys consisted of a series of multiple-choice Likert-type questions followed by a series of open-ended questions (Coolican, 2004). One of the limitations associated with the Likert technique identified by Kothari (2008) is the possibility of an acquiescence effect, where respondents are likely to give a positive bias to their answers. This was controlled for by including a mixture of both positive statements and negative statements within each of the attitude scales. The incorporation of open-ended questions was decided upon because it makes it possible to gain a deeper insight into the attitudes of the respondents rather than relying solely on multiple choice questions (Kothari, 2008).

Interviews

Following Vincent and Harris (2008), semi-structured interviews were also conducted with employees of the Ministry of Information and Communication Technology. The objective of using semi-structured interviews was to obtain a deeper insight into the viewpoints of the respondents by providing them with questions to encourage them to provide more detailed responses concerning different aspects of the research topic. The interview questions were therefore designed with this objective in mind; in particular, many of the questions aimed to elicit a broader perspective on the research topic from the interviewees on issues that could not easily be represented in terms of a Likert scale. An example of this can be seen in the inclusion of questions asking respondents about their opinion concerning the way in which the government's shift from e-government towards m-government should be managed. This question requires a response which is more complex in nature than could be included in a Likert scale. In addition, the inclusion of the question asking respondents about whether the transition to m-government would be lasting was also aimed at ascertaining the opinions of respondents about the extent to which the change would be effective. This is another example of the way in which the interview questions were designed in such a way that they would provide a larger perspective on the way that respondents thought about the introduction of m government as a whole, rather than focusing on the way in which it affected them as individuals. The set of semi-structured questions used in this thesis is presented in Appendix 2.

4.4.3 Procedure

In order to collect the data pertaining to the employees, letters were written to the Ministry of Communication and Information Technology explaining the aims and objective of the thesis and asking for consent to circulate surveys and interviews among the employees. In the communication sent to the Ministry, it was emphasised that all of the information obtained from employees would be kept strictly confidential, in-line with the provisions of the guidelines provided by different researchers such as Bryman (2012), and that responses would be kept anonymous. Once the necessary consent had been obtained, the researcher was provided with a list of email addresses of the employees within the Ministry of Information Technology and used this to email the questionnaires. The interview questions were also emailed to the selected employees. A total of 60 employees were initially contacted, of whom 49 responded (a high response rate of 81.6%).

With regard to the data pertaining to citizens, a list of contact details was obtained from a marketing agency in Saudi Arabia. This list of individuals was further whittled down based on the gender of citizens (given that the sample of employees in the Ministry of Communication and Information Technology was wholly male, an attempt was made to conduct research on a balanced sample of both male and female, and on employee status). Eventually, a sub-sample of 200 individuals was selected who were emailed with copies of the survey. A total of 103 responded, representing a response rate of just over 50%. Descriptive statistics and graphs were used to analyse the quantitative data using SPSS version 18. Descriptive statistics were used to show the overall response of the sample for each question.

Descriptive statistics and t-tests were used to analyse the quantitative data. Descriptive statistics were used to show the responses of the citizens and employees. The responses are also presented in terms of gender and employment. The descriptive statistics are presented in the next section in tables 4-6 to 4-9. Independent sample T-tests were used to examine differences between male and female, and employed and unemployed and the results are presented in tables 4-10 and 4-11 in the next section. Pallant (2010) suggests that independent sample t-tests are used when the purpose is to compare the means of two different groups in a sample. For this particular study, the purpose is to examine the statistical significance between the mean scores of male and female, and employed and unemployed.

Qualitative data was analysed using thematic analysis following the procedure proposed by Braun and Clarke (2006). Braun and Clarke's (2006) methods of qualitative data analysis are based on steps including examining the collected data using qualitative data collection methods, identifying main and sub-themes emerging from the data, and recording these themes. Braun and Clarke (2006) define themes as various patterns that emerge from qualitative data that are related to the research questions of the thesis and explain the phenomenon being explored. Overall, this data analysis method contains six interrelated steps in order to form various meaningful themes, make theories and link them to the previous theories. These steps are: getting familiarity with the data, creating preliminary codes, looking for patterns amongst the generated codes, revisiting themes, naming and defining themes and preparing report on the basis of meaningful themes which are relevant to the research aim and objectives.

4.5 Results

4.5.1 Results of questionnaire: citizens' responses

Table 4-6 shows the responses of the citizens about the key statements concerning mobile government services included in each of their questionnaires. It can be seen that a large percentage of responses lies under strongly agree and agree. However, drawing conclusions from these responses is not possible without using independent sample t-test.

Gender wise responses of the citizens are shown in Table 4-7. This table provides data about total number of males and females who responded each question. The mean and standard deviations are also shown in the same table. There are differences in means but this cannot be concluded to be significant at this stage.

Responses of citizens in terms of employed and unemployed of the citizens are shown in Table 4-8. This table provides data about total number of respondents who are employed and unemployed. The mean and standard deviations are also shown. There are differences in the means of respondents who are employed and unemployed. However, whether there is a significant difference between the means cannot be concluded at this point. The purpose of dividing the sample into employed and employed would offer insights, if any, into the difference in their approach while using technology.

4.5.2 Employee responses to Likert questions

Table 4-9 shows the responses of the employees about the key statements relevant to mobile government services included in each of their questionnaires. A large percentage of responses lies under strongly agree and agree.

Table 4-6: Citizen Likert scale responses (%)

Questionnaire statement	*Strongly agree*	*Agree*	*Not sure*	*Disagree*	*Strongly disagree*
'I consider myself to have good technology skills'	32	62	6	2	1
'I regularly have access to a mobile device such as a mobile phone or tablet'	51	32	4	1	3
'I prefer to access web services on my mobile phone instead of on my computer'	18	36	16	18	2
'I would like to have a more effective way of interacting with government services'	41	37	10	2	0
'I often access government services on my mobile device'	10	31	17	25	8
'I am familiar with the benefits of m-government services'	29	38	23	10	3
'M-government services are too inefficient to be of any use to me'	8	30	22	28	15
'My friends, colleagues and/or family members use m-government services'	9	26	44	7	2
'I would not use m-government services because of religious reasons'	1	12	34	49	1
'I have used m-government services in the past, but I don't anymore'	5	14	18	33	18
'On the whole, I have had a positive experience with m-government services'	12	42	26	8	3
'I would use mobile government services more often if they were improved'	34	34	9	4	2
I think mobile government services are more useful than e-government services	18	18	32	8	3
'I feel concerned that my personal data is not secure when accessing a government service on my mobile device'	20	38	11	23	3
'I would feel confident that I knew how my data would be handled technologically and understand any encryption devices'	18	40	20	2	0
'I think m-government services would help make political processes more transparent'	15	36	23	4	2

Table 4-7: Gender wise responses of citizens

	Sex	*N*	*Mean*	*Std. Dev.*	*Std. Error Mean*
I consider myself to have good technology skills.	M	56	1.84	.804	.107
	F	47	1.79	.587	.086
I regularly have access to a computer equipped with internet access.	M	55	1.47	.742	.100
	F	47	1.45	.619	.090
I frequently use e-government services	M	56	1.95	.840	.112
	F	47	1.85	.747	.109
E-government services provide a more convenient way for me to access government services.	M	53	1.72	.794	.109
	F	44	2.02	.876	.132
I think e-government services would be more effective if they were personalised for me as an individual.	M	54	2.04	1.045	.142
	F	44	2.09	.960	.145
I think e-government services will be very popular with citizens in the long term.	M	52	1.54	.699	.097
	F	44	1.68	.771	.116
I regularly have access to a mobile device, such as a mobile phone or tablet.	M	50	1.54	.885	.125
	F	41	1.66	.911	.142
I prefer to access web services on my mobile phone instead of on my computer.	M	49	2.33	1.107	.158
	F	41	2.66	1.063	.166
I would like to have a more effective way of interacting with government services.	M	49	1.65	.751	.107
	F	41	1.73	.775	.121
I often access government services on my mobile device.	M	50	2.84	1.299	.184
	F	41	2.98	1.060	.166
I am familiar with the benefits of m-government services.	M	56	2.23	1.079	.144
	F	47	2.19	1.014	.148
M-government services are too inefficient to be of any use to me.	M	56	3.21	1.261	.168
	F	47	3.02	1.132	.165
My friends, colleagues and/or family members use m-government services.	M	48	2.73	.893	.129
	F	40	2.50	.816	.129
I would not use m-government services because of religious reasons.	M	53	4.43	.797	.109
	F	44	4.30	.734	.111
I have used m-government services in the past, but I don't anymore.	M	48	3.65	1.313	.189
	F	40	3.40	.928	.147
On the whole, I have had a positive experience with m-government services.	M	50	2.34	1.022	.145
	F	43	2.53	.827	.126
I would use mobile government services more often if they were improved	M	45	1.76	.933	.139
	F	38	1.84	.789	.128
I think mobile government services would be more effective if they were personalised for me as an individual.	M	45	1.98	.839	.125
	F	38	1.95	.695	.113
I think mobile government services are more useful than e-government services.	M	42	2.36	1.055	.163
	F	37	2.62	1.089	.179
I feel concerned that my personal data is not secure when accessing a government service on my mobile device.	M	54	2.46	1.270	.173
	F	42	2.55	1.041	.161
I would be likely to access government services on my mobile device, if such services were available.	M	44	1.70	.701	.106
	F	37	1.78	.712	.117
I would feel confident that my personal data would be secure when accessing a government service on my mobile device.	M	44	2.25	1.164	.175
	F	37	2.19	.877	.144
I would feel confident that I knew how my data would be handled technologically and understand any encryption devices.	M	44	2.14	.702	.106
	F	36	2.08	.806	.134
I think m-government services would help make political processes more transparent.	M	43	2.14	.861	.131
	F	37	2.43	.959	.158
I think m-government services are the preferable option to help make political processes more transparent.	M	43	2.19	.824	.126
	F	37	2.43	.867	.143

Table 4-8: Citizens' employment status

	Employed or unemployed (E/U)	*N*	*Mean*	*Std. Dev.*	*Std. Error Mean*
I consider myself to have good technology skills.	E	65	1.88	.761	.094
	U	38	1.71	.611	.099
I regularly have access to a computer equipped with internet access.	E	64	1.47	.712	.089
	U	38	1.45	.645	.105
I frequently use e-government services	E	65	2.15	.870	.108
	U	38	2.24	.786	.128
E-government services provide a more convenient way for me to access government services.	E	60	1.85	.860	.111
	U	37	1.86	.822	.135
I think e-government services would be more effective if they were personalised for me as an individual.	E	61	2.08	1.053	.135
	U	37	2.03	.928	.152
I think e-government services will be very popular with citizens in the long term.	E	59	1.61	.720	.094
	U	37	1.59	.762	.125
I regularly have access to a mobile device, such as a mobile phone or tablet.	E	56	1.64	.980	.131
	U	35	1.51	.742	.126
I prefer to access web services on my mobile phone instead of on my computer.	E	55	2.51	1.103	.149
	U	35	2.43	1.092	.185
I would like to have a more effective way of interacting with government services.	E	55	1.73	.781	.105
	U	35	1.63	.731	.124
I often access government services on my mobile device.	E	56	3.02	1.286	.172
	U	35	2.71	1.017	.172
I am familiar with the benefits of m-government services.	E	65	2.35	1.082	.134
	U	38	1.97	.944	.153
M-government services are too inefficient to be of any use to me.	E	65	3.12	1.166	.145
	U	38	3.13	1.277	.207
My friends, colleagues and/or family members use m-government services.	E	54	2.61	.920	.125
	U	34	2.65	.774	.133
I would not use m-government services because of religious reasons.	E	62	4.42	.780	.099
	U	35	4.29	.750	.127
I have used m-government services in the past, but I don't anymore.	E	54	3.67	1.197	.163
	U	34	3.32	1.065	.183
On the whole, I have had a positive experience with m-government services.	E	56	2.38	1.019	.136
	U	37	2.51	.804	.132
I would use mobile government services more often if they were improved	E	51	1.88	.931	.130
	U	32	1.66	.745	.132
I think mobile government services would be more effective if they were personalised for me as an individual.	E	51	1.98	.812	.114
	U	32	1.94	.716	.127
I think mobile government services are more useful than e-government services.	E	47	2.53	1.018	.149
	U	32	2.41	1.160	.205
I feel concerned that my personal data is not secure when accessing a government service on my mobile device.	E	61	2.41	1.189	.152
	U	35	2.66	1.136	.192
I would be likely to access government services on my mobile device, if such services were available.	E	49	1.80	.707	.101
	U	32	1.66	.701	.124
I would feel confident that my personal data would be secure when accessing a government service on my mobile device.	E	49	2.33	1.162	.166
	U	32	2.06	.801	.142
I would feel confident that I knew how my data would be handled technologically and understand any encryption devices.	E	48	2.23	.751	.108
	U	32	1.94	.716	.127
I think m-government services would help make political processes more transparent.	E	48	2.38	.937	.135
	U	32	2.13	.871	.154
I think m-government services are the preferable option to help make political processes more transparent.	E	48	2.31	.879	.127
	U	32	2.28	.813	.144

Table 4-9: Employee Likert scale responses (%)

Questionnaire statement	*Strongly agree*	*Agree*	*Not sure*	*Disagree*	*Strongly disagree*
'I consider myself to have good technology skills'	51.1	46.7	2.2	0	0
I regularly have access to a computer equipped with internet service.	66.6	33.3	0	0	0
'I regularly have access to a mobile device such as a mobile phone or tablet'	71.1	26.7	0	2.2	0
E-government services have helped me to do my job more effectively.	34.1	52.3	11.4	2.3	0
I think e-government services would be more effective if they were personalised for users as individuals.	31.1	57.8	8.9	2.2	0
I think government e-services will be very popular with citizens in the long term.	46.4	31.1	4.4	0	0
I think the government is taking an effective approach to getting people to use e-government services.	37.8	51.1	11.1	0	0
'M-government services have affected the way I do my job'	25.6	48.7	17.9	7.7	0
'I think that developing m-government services would help Saudi Arabian government services to become more efficient'	43.6	48.7	7.7	0	0
'I think there will be enough uptake of m-government services to justify the time and expense required to develop it'	31.6	42.1	23.7	2.6	0
'I think that developing m-government services would help Saudi Arabia become more of a 'knowledge based society'	25.6	61.5	10.3	2.6	0
'I think that the infrastructure exists so that mobile communication can be easily improved'	20.5	53.8	25.6	0	0
'I think mobile government services are more useful for citizens than e-government services'	23.1	35.9	25.6	15.4	0
'I think that m-government services would help make political processes more transparent'	25.6	43.6	23.1	7.7	0
'I think m-government services will be very popular with citizens in the long term'	43.6	46.2	10.3	0	0
'I think that m-government services are important enough to dedicate significant government funding to'	33.3	56.4	7.7	2.6	0
'I don't think that m-government services have too many drawbacks to be worth developing'	18.4	42.1	18.4	21.1	0
'I think the government is taking an effective approach to getting people to use mobile government services'	24.4	42.2	28.9	4.4	0

4.6 Results of data analysis on questionnaire responses

4.6.1 Results of independent sample t-tests based on gender for citizens

Independent sample t-test results show that there is no difference between the perceived benefits associated with m-government as examined in terms gender. It can be seen in Table 4-10 that p values for all questions >0.05. Therefore, there is insufficient statistical evidence to conclude that there is difference between the perceptions of male and female about the benefits of m-government.

4.6.2 Results of independent sample t-test based on employment for citizens

Independent t-test results show that there is no difference between the perceived benefits of m-government as examined in terms employed and unemployed people. It can be seen from Table 4-10 that the p value for all the questions >0.05. Therefore, there is insufficient statistical evidence to conclude that there is difference between the perceptions of employed and unemployed about the benefits of m-government.

Table 4-10: Independent sample t-test gender wise for citizens

	T	*Df*	*Sig. (2-tailed)*
I consider myself to have good technology skills.	.369	101	.713
	.379	99.220	.706
I regularly have access to a computer equipped with internet access.	.190	100	.850
	.192	99.951	.848
I frequently use e-government services	-3.299	101	.078
	-3.333	100.639	.085
E-government services provide a more convenient way for me to access government services.	-1.802	95	.075
	-1.786	87.855	.078
I think e-government services would be more effective if they were personalised for me as an individual.	-.263	96	.793
	-.265	94.591	.791
I think e-government services will be very popular with citizens in the long term.	-.955	94	.342
	-.947	87.820	.346
I regularly have access to a mobile device, such as a mobile phone or tablet.	-.627	89	.532
	-.625	84.544	.533
I prefer to access web services on my mobile phone instead of on my computer.	-1.443	88	.153
	-1.448	86.293	.151
I would like to have a more effective way of interacting with government services.	-.487	88	.627
	-.486	84.224	.628
I often access government services on my mobile device.	-.537	89	.592
	-.548	88.999	.585
I am familiar with the benefits of m-government services.	.196	101	.845
	.197	99.677	.844
M-government services are too inefficient to be of any use to me.	.810	101	.420
	.818	100.514	.415
My friends, colleagues and/or family members use m-government services.	1.246	86	.216
	1.256	85.230	.212
I would not use m-government services because of religious reasons.	.883	95	.379
	.890	93.946	.376
I have used m-government services in the past, but I don't anymore.	.995	86	.323
	1.026	83.915	.308
On the whole, I have had a positive experience with m-government services.	-1.000	91	.320
	-1.016	90.678	.312
I would use mobile government services more often if they were improved	-.451	81	.653
	-.458	80.999	.648
I think mobile government services would be more effective if they were personalised for me as an individual.	.178	81	.859
	.181	80.978	.857
I think mobile government services are more useful than e-government services.	-1.095	77	.277
	-1.093	75.076	.278
I feel concerned that my personal data is not secure when accessing a government service on my mobile device.	-.350	94	.727
	-.359	93.715	.720
I would be likely to access government services on my mobile device, if such services were available.	-.503	79	.616
	-.502	76.217	.617
I would feel confident that my personal data would be secure when accessing a government service on my mobile device.	.261	79	.794
	.268	78.123	.790
I would feel confident that I knew how my data would be handled technologically and understand any encryption devices.	.314	78	.754
	.310	69.965	.757
I think m-government services would help make political processes more transparent.	-1.439	78	.154
	-1.428	73.140	.158
I think m-government services are the preferable option to help make political processes more transparent.	-1.302	78	.197
	-1.296	74.903	.199

Table 4-11: Independent sample t-test employed and unemployed citizens

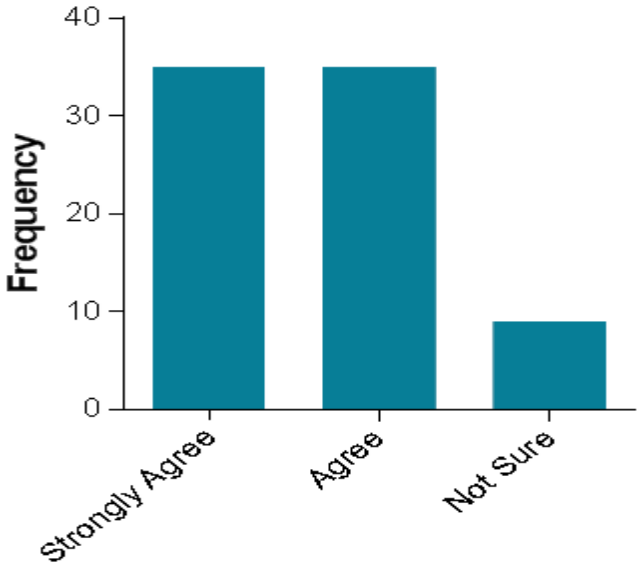
	T	*Df*	*Sig. (2-tailed)*
I consider myself to have good technology skills.	1.210	95	.253
	1.216	91.142	.227
I regularly have access to a computer equipped with internet access.	.152	100	.880
	.156	84.060	.877
I frequently use e-government services	-.484	101	.630
	-.497	84.054	.621
E-government services provide a more convenient way for me to access government services.	-.084	95	.933
	-.085	79.041	.932
I think e-government services would be more effective if they were personalised for me as an individual.	.262	96	.794
	.270	83.649	.788
I think e-government services will be very popular with citizens in the long term.	.101	94	.920
	.100	73.276	.921
I regularly have access to a mobile device, such as a mobile phone or tablet.	.665	89	.508
	.709	85.620	.480
I prefer to access web services on my mobile phone instead of on my computer.	.339	88	.736
	.340	73.085	.735
I would like to have a more effective way of interacting with government services.	.599	88	.551
	.608	76.037	.545
I often access government services on my mobile device.	1.183	89	.240
	1.249	84.050	.215
I am familiar with the benefits of m-government services.	1.802	101	.075
	1.867	86.219	.065
M-government services are too inefficient to be of any use to me.	-.034	101	.973
	-.034	71.971	.973
My friends, colleagues and/or family members use m-government services.	-.189	86	.850
	-.197	78.926	.844
I would not use m-government services because of religious reasons.	.822	95	.413
	.830	72.981	.409
I have used m-government services in the past, but I don't anymore.	1.365	86	.176
	1.402	76.324	.165
On the whole, I have had a positive experience with m-government services.	-.696	91	.488
	-.730	88.072	.467
I would use mobile government services more often if they were improved	1.160	81	.249
	1.220	76.139	.226
I think mobile government services would be more effective if they were personalised for me as an individual.	.245	81	.807
	.252	72.141	.802
I think mobile government services are more useful than e-government services.	.509	77	.612
	.496	60.785	.621
I feel concerned that my personal data is not secure when accessing a government service on my mobile device.	-.997	94	.321
	-1.009	73.649	.316
I would be likely to access government services on my mobile device, if such services were available.	.873	79	.386
	.874	66.811	.385
I would feel confident that my personal data would be secure when accessing a government service on my mobile device.	1.122	79	.265
	1.210	78.728	.230
I would feel confident that I knew how my data would be handled technologically and understand any encryption devices.	1.734	78	.087
	1.751	68.755	.084
I think m-government services would help make political processes more transparent.	1.202	78	.233
	1.220	69.868	.226
I think m-government services are the preferable option to help make political processes more transparent.	.160	78	.873
	.163	70.095	.871

4.6.3 Belief in the benefits of m-government services among employees

As far as employees are concerned, as shown in Seen through the lens of ECT, the expectations of citizens however can result into a positive or negative effect on their use of m-government services. ECT proposes that consumer has develop some initial expiations about the product and service performance before the purchase and then compares the expectations with the actual performance. For example, if the initial expectations are met, this can affect positively the consumer future use of m-government services. Otherwise, there can be a negative effect on the users and the effectiveness of m-government can impede (Tarhini et al., 2015).

Figure 4-1, the vast majority of employees are convinced that m-government will benefit the country and the people (i.e. that m-government initiatives would enhance the efficiency of Saudi government services). In contrast, citizens appear to be less sure of the benefits of m-government services and in particular of the way in which they are likely to result in long term benefits for them.

'I think government e-services will be very popular with citizens in the long term'



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use of m-government services. Otherwise, there can be a negative effect on the users and the effectiveness of m-government can impede (Tarhini et al., 2015).

Figure 4-1: Employees' beliefs about long-term popularity of m-government services

4.6.4 Lack of certainty among citizens about m-government services

Despite the fact that 64% of citizens surveyed were familiar with the benefits of m-government services, a third of individuals stated that m-government services were too inefficient to be useful. Overall, the answers suggested a lack of familiarity with the usability of m-government services, with 50 per cent of citizens stating that they were 'unsure' of whether their friends, colleagues or family used m-government services (Figure 4-2). This lack of familiarity with m-government services is emphasised by the fact that 40 per cent of those surveyed were 'not sure' of whether m-government services were more useful than e-government services. This finding seems to concord with the report of World Bank Group (2012) that suggests that almost half of the population in the country are not aware of the complete usage potential of mobile devices and availability and suitability of m-government services. Thus, following Basamh et al. (2014), it is suggested that the government must develop and induce awareness among the population about the benefits of mobile government, mobile usage in order to overcome this challenge.

'My friends, colleagues and/or family members use m-government services'

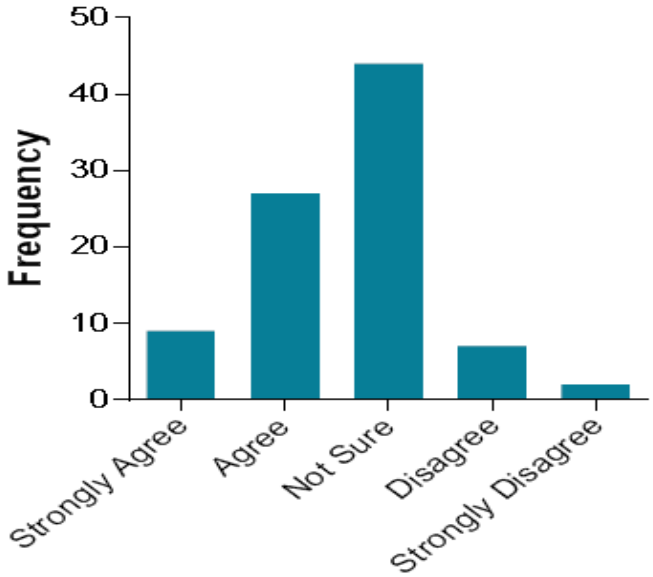

Figure 4-2: Uncertainty about use of m-government services by others

4.6.5 Issues with m-government services

Almost 70% per cent of citizens agreed that the effectiveness of m-government services would be increased if they were personalised to the requirements of the individual. This is also reflected in the responses to the survey provided by employees, more than 80% of whom stated that the effectiveness of m-government services would be increased if they were more personalised. Besides the concern about personalisation, another issue that appeared to be an obstacle to the uptake of m-government services was the fact that more than 60% of consumers were not confident about the security of their personal data when using a mobile device. Indeed, it appears that if these issues were addressed, the uptake of m-government services would be increased (Figure 4-3). Other areas for improvement identified in the answers to the open-ended questions were to develop applications for smart phones, and to increase awareness through broader advertising campaigns, suggesting that the tactics currently used to promote awareness of m-government services are insufficient.

This was expanded upon by the surveyed employees, who argued that the government needs to invest more money on improving the quality of the existing iPad app for government services in order to improve the quality of the interface. Current iPad apps for Saudi Arabian government services were described as being ‘clunky’ and as being purely cosmetic applications that failed to work properly.

Another issue which was raised by respondents in the answers to the open-ended questions about possible improvements to mobile government services was to improve the infrastructure which was involved in the provision of mobile services so that it would increase the security of the data and to increase the speed with which services could be accessed. This would help to assuage any concerns that people have about the security of their data. An example of a possible improvement to infrastructure suggested as an improvement that could be made by the government in order to increase the uptake of mobile government services among the general population was to construct and centralise a database within a government agency, which would then make it possible for electronic channels to be quickly utilised. Further to the need specified for the government to improve its infrastructure and the quality of its services, it was also suggested that the government needed to expend more effort in understanding the needs of their customers in order to improve the user friendliness of their interfaces, the range of services and the availability of services, since without ensuring that the services which are provided cater

adequately to the needs of customers, the uptake of such mobile services would inevitably be limited.

A further suggestion made by one of the employees was that the government should establish a framework, which would involve the participation and the alignment of all government services. Such a framework would be designed in a way to ensure that all government sectors developed their mobile services in a similar, centralised way in order to ensure that there were no significant disparities between different government sectors. The same employee also suggested that the effectiveness of implementing mobile services by the government could also be increased if the government developed a workspace on the national portal and listed all mobile government services on it to allow for easier government access. It is also essential for the government to engage in close communication with the public to ascertain their opinions is on the value and usability of the mobile government services, and to then incorporate these opinions into improvements.

'I would use mobile government services more often if they were improved'

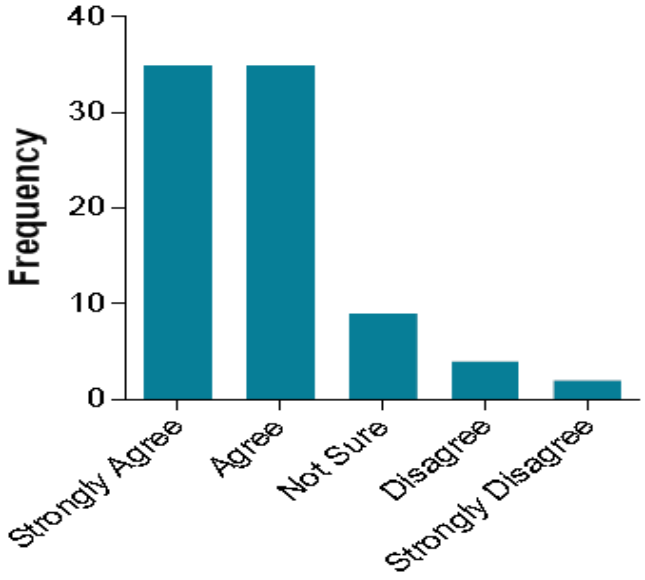

Figure 4-3: Improvements to m-government services

As highlighted previously, one of the key issues which needs to be addressed in order to ensure the effectiveness of mobile applications is the usability of the interfaces. This is particularly important with respect to the quality of the iPad applications previously developed, given that the current range of applications has been criticised as being 'clunky'. The range of mobile devices are now available to individuals in Saudi Arabia, thus the quality of a particular mobile application is a concept which is multidimensional in nature, with key dimensions including flexibility, portability, maintainability, functionality,

accessibility, efficiency, responsiveness and usability. In order to ensure that these requirements are met, the design of the mobile application should be iterated several times in line with the requirements of users (Rabi'u, Ayobami and Hector, 2012).

The demands and requirements of users represent a key challenge to the developers and the designers of all mobile applications, and these issues represent significant constraints to issues pertaining to usability in the field of mobile applications. In order to address the problems of usability, it is important for the government to ensure that all of the applications developed meet key standards of usability such as learnability, understandability, operability and attractiveness. Ensuring that these issues are met requires a robust analysis of the system in order to ensure that the needs of all of the service users are met and to ensure that both the functional and the non-functional requirements of the mobile applications are given sufficient attention (Ivan and Zamfiroiu, 2011). Research conducted into usability issues pertaining to mobile applications suggests that characteristics such as ease of navigation, text source and colour rendering are important determinants of the usability of a mobile application (Shneiderman and Plaisant, 2010).

This corroborates previous literature, as explained in the literature review. Rabi'u et al. (2012) suggested that it is important to ensure that the speed of the internet is well managed in order to ensure usability. This can be achieved by providing a software platform capable of supporting a display that is both vision- and speed-friendly. In short, it is important for the emphasis on the design of a usable mobile application to be on the provision of speedy and rapid display capabilities, under the navigation parameter of Garofalakis et al. (2007).

4.6.6 Mobile government services in Saudi technological advancement

The responses received from citizens to the open-ended questions in the survey shed some light into their opinions about the contribution of m-government services to their country's technological advancement. The overwhelming consensus among citizens was that the provision of mobile services would help to increase the technological advancement of the country and that the improvement of the government's service infrastructure would have a positive spill-over effect for other sectors of the economy. The majority of respondents to the survey were of the opinion that the provision of mobile government services would help to improve the country's rate of technological progress by improving levels of

communication, thus increasing the level of communication and efficiency within the country. Secondly, many of the respondents also highlighted the fact that many developed economies throughout the world were frequently using mobile government service, and that it was necessary for Saudi Arabia to ensure that they also offered mobile services in order to remain competitive. Finally, it was commented on by participants that the high degree of mobile penetration within the Saudi Arabian population meant that the introduction of mobile services was a logical next step.

However, despite the generally positive consensus among respondents, some of the research participants did state that they were unsure about whether the introduction of m-government services would actually be beneficial for Saudi Arabia's technological advancement. Some of the concerns raised centred around the fact that the effectiveness of the program would depend to a large extent on the effectiveness of the implementation. One of the respondents also highlighted another concern about implementation by pointing out that they were not confident that e-government services had been implemented effectively, and that this did not bode well for the likely success of mobile government services.

The responses received from employees to the open-ended questions concerning the extent to which mobile government services would contribute to the technological advancement of Saudi Arabia were similarly positive. The majority of employees highlighted the fact that the high mobile penetration among the Saudi Arabian population meant that the introduction of mobile services was likely to be highly effective. Furthermore, it was argued that the introduction of mobile services would make such services accessible 24/7, which would enable people to use a wider range of services with a greater level of ease. One of the respondents described the provision of mobile services as part of a long-term 'e-transformation', which the entire country needed to go through in order to ensure that it kept up with the technological standards of developed economies.

A couple of respondents however voiced concern about the fact that not all citizens had adequate access to mobiles in order to benefit from these services (despite the high level of mobile penetration which existed throughout the general population). Furthermore, it was emphasised that in order to be truly effective in contributing to the technological advancement of the country, it was necessary to ensure that the government's mobile services provided a real benefit to users, which could only be achieved by making sure that they were sufficiently personalised.

4.7 Results of interviews

The aim of conducting interviews was to gain a more in-depth insight into the various benefits and challenges identified by employees as being associated with the introduction of m-government services. The key advantages associated with interviews are that it makes it possible to question and to explore in greater depth the opinions of the respondents (Seidman, 2006). With semi-structured interviews in particular it is possible to deviate from any prepared script to identify areas of interest, which can be pursued in further detail (Chapman, 2005). However, it should be noted that there are various issues with the use of semi-structured interviews that may limit the extent to which their findings can be generalised. These include the fact that the size of the sample is limited, and that the potential for deviation in the interviews means that it may be difficult to easily categorise interview responses without reflecting bias.

However, according to Seidman (2006), conducting interviews is a highly effective complement to conducting a multiple-choice survey, since it makes it possible to question respondents in greater detail about their responses, although the sample of people who can be questioned is more limited. Indeed, Cresswell (2003) suggests that the combination of both qualitative data (interviews) and quantitative data is considered to be best practice in research methodology, due to the complementary nature of both types of data. The questions presented to individuals in the interview were aimed at elucidating their opinions about the long-term benefits associated with m-government, the benefits of greater personalisation, and whether they were of the opinion that Saudi Arabian citizens were likely to embrace m-government services.

All of the responses collected during the interview were recorded, fully transcribed. The initial set of semi-structured questionnaire is shown in Appendix 2. At this point, all of the responses were categorised according to the various themes explored below.

4.7.1 The benefits of m-government services

Two-thirds of the employees interviewed (six out of a total of nine) stated that m-government services increased the efficiency of their job by reducing the amount of time taken to complete tasks through automation. It was commented by one interviewee that *"M-government is helping me to decrease the time and cost wasted in traditional government services"*.

It was also remarked that the availability of m-government services made it possible for employees to plan more effectively, since the instant notification of issues such as traffic violations made it easier for longer-term strategies to be formulated more effectively. The findings of the research also suggest that the primary way in which most users will access mobile government services will be by means of their existing mobile devices. The majority of users who were surveyed were owners of smart phones with internet access, and they stated that they were most likely to access government services through these mobile devices. In particular, users stated that they would 'use their iPhone to get access to government services' because this would make it easier for them to access important government services when they were *"on the move"*. Indeed, the use of existing mobile devices for the easy access of m-government services was highlighted as being one of the key advantages which they perceived to exist with respect to m-government services, with one respondent stating that:

> *"I think that I would definitely use government services more if I could just download an app on my phone. This is because I am out and about a lot, so relying only on e-government services wouldn't fit well with my type of lifestyle"*.

With respect to issues of usability and the personalisation of m-government services to the needs of users, it is important to ensure that all mobile applications are designed in a manner that reflects the constraints that may be imposed by the mobile device used.

4.7.2 The likelihood of success associated with a shift to m-government services

The responses of employees towards the likely success of the transition from e- to m-government services were mixed. The majority of respondents commented that it would be successful due to the high levels of mobile penetration in the country and the availability of the internet on smart phones. One of the respondents attributed the likely success of the introduction of m-government services to the fact that the *"mobile penetration in Saudi Arabia is far more than internet"*; this was confirmed by another respondent who claimed that the *"availability of internet on all smart and featured phones"* meant that a large proportion of the Saudi Arabian population was likely to have access to such services. However, concerns that were raised were that access to mobile devices was still expensive for large proportions of the population and that the majority of mobile users were attached to their current Nokia handsets. According to one respondent, the effectiveness of a switch

towards m-government services was likely to benefit those members of the population who had access to internet on their phones, but it was possible that such services might result in a disparity in the way in which the more *"literate, well-off level of society"* was likely to benefit from the services when compared to those of lower socioeconomic status who were likely to have limited access to such services.

Furthermore, it was stated by one respondent that internet access in Saudi Arabia was very expensive compared to the cost associated with equivalent services in the UK, with many providers over-charging for their data services:

> *"The cost which you have to pay in order to get mobile services in Saudi Arabia is very high… this means that you are only able to access government services on your mobile if you can afford to pay those costs. This is probably a big disadvantage for some poorer members of society who cannot afford these costs"*.

One of the respondents stated that the success of the transition was likely to be limited because m-services did not have the full functionality of e-government services, and therefore a full transition might take longer time. The complementary nature of both m-government and e-government led some respondents to stress the importance of government services being made available in all channels, such that both e-services and m-services are available.

Besides continuing to make government services available in electronic channels, it was also emphasised by one respondent that a mobile channel was only one out of several different channels through which government services would be offered, with other channels including kiosks, customer centres and IPTV as well as the web. One interesting insight which was highlighted in the interviews was the necessity for effective change management, which would need to be coordinated in order to alter the cultural attitudes of the population and to ensure that they would be more open to the concept of using m-government services. This is exemplified by one respondent's statement that, in order to be successful, it was necessary to *"change the culture of using e-government services"* before shifting to the provision of m-government services. These findings are supported by the conclusions which were drawn by Alsenaidy and Ahmad (2012), who argued that given the current economic inequality which exists in Saudi Arabia, the roll out of further m-government services in the country is likely to result in a division between the more

affluent sections of the population who have access to m-government services, and the less affluent citizens who do not.

4.7.3 Expected sustainability of transition to m-government services

Just over half of the interview respondents believed that the shift towards m-government services would be a lasting one, due to the prevalence of mobile phones and the range of different features were available on smart phones. One respondent commented that the popularity of m-government services was likely to last as long as technological safeguards emerged to earn public trust. It was also pointed out by the interviewees that the longevity of the introduction of m-government services was due to the fact that:

> *"The society [of Saudi Arabia] is very advanced in using smart phones and new technologies based on mobile phones… no one now can live without his mobile phone".*

However, the remaining respondents did not believe that it would result in lasting change, or that it would take a significant amount of time and investment in the infrastructure of m-government in order to effect lasting change. In other words, a rapid shift towards the provision of m-government services was much less likely to result in lasting change. One interesting insight obtained from respondents was that rather than viewing m-government services as a replacement to e-government services, it might be more valuable to view them as both being complementary:

> *"M-government will have no correlation or dependency with the success of eGov".*

> *"If the government doesn't handle the introduction of m-government services properly, they risk having a negative impact on both the launch of new m-government services and the provision of existing e-government services. It is very important that they spend a lot of time and money to ensure that the m-government and e-government services which are developed both fit well together and are tailored to the needs of the people".*

4.7.4 Saudi population acceptance of m-government initiatives

The majority of the respondents did not believe that the Saudi population was likely to be open to the m-government initiatives. In particular, it was stated that careful change

management needed to be instigated by the government in order to increase the public's level of confidence in the security of electronic transactions. It was suggested that people were likely to manifest the same levels of resistance to m-government services as to e-government services, although one of the respondents stated that if the government was able to apply the lessons learnt from the introduction of e-government services then *"we might be able to shorten the acceptance curve"*. However, this was contradicted by some of the respondents who argued that Saudi citizens would be willing to accept m government initiatives because they were generally *"very open and not afraid of trying and using m-government"*. One respondent also commented that the increasingly sophisticated nature of smart phone technologies were instrumental in *"helping governments and companies to establish services based on mobile phones"*, and that this was likely to result in lasting popularity among the Saudi Arabian population as it represents *"newer, better ways of getting things done"*.

The general consensus, however, was that the process of transition towards the provision of new services would need to be carefully managed by the government in order to increase the likelihood that it would be accepted. As one respondent put it:

> *"The idea of m-government services is great because it means that it will be easier for a lot of people in Saudi Arabia to access government services when they are on the move, but the success of m-government services will depend on the implementation, and the way that the government handles the introduction of these services. For example, how useful will these services be? How tailored will they be to user requirements? And how quickly or how slowly will these services be provided?"*

4.7.5 The personalisation of m-government services

All of the respondents stated that the personalisation of m-government services would be of benefit in increasing the effectiveness of m-government services. This is due to the fact that greater personalisation was believed to result in greater *"simplicity, more awareness and training"*. However, one of the respondents emphasised that this would depend largely on defining what *"personalisation"* means, and on identifying the extent to which such personalisation could be translated into tangible services. Indeed, it appears that although the concept of personalisation appeared likely to be a useful way of increasing the appeal and the effectiveness of m-government services for citizens, the extent to which such

personalisation could actually be implemented was likely to be limited by restrictions of mobile technology. This was emphasised by one of the respondents who commented that the personalisation of services was limited by the *"restrictions of mobile technology"*, although he conceded that *"if it is achievable it would be a huge jump"*.

One way in which m-government services could be personalised for users would be to ensure that the government develops systems that facilitate analysis of user behaviour. For example, if it is clear that a particular mobile service user frequently uses one particular type of government service, it would be highly effective for the government provided that user with tangible offers and benefits associated with the use of that service. Different user interfaces could also be developed in order to reflect the fact that the user is more likely to use certain types of government services. Such a feedback loop would be similar in structure to the way in which online retailers and supermarkets provide a range of targeted offers to their consumers on the basis of their historical purchasing history. Such a system of personalisation is frequently referred to as structured network data, which refers to the fact that the use of mobile networks facilitates the collation of data by means of media packets and signalling (Popa, 2010).

The effectiveness of Saudi Arabia's m-government services therefore depends on the extent to which it is possible for the government to efficiently use the data which is available to them not only in a way which is necessary for the operation of the mobile network, but also in a way which makes it possible to more effectively tailor their services to citizens. The technological capabilities required to capture this information rely on the establishment of various probes that can interface to streams of MAP and GTP data and to present this to the final application. This range of capabilities is responsible for the transfer of the data required by the various applications.

It is clear, therefore, that in order to be successful at meeting the needs of users, the launch of m-government services needs to be underpinned by signalling probes or GTP technologies, which can be used in the mobile network and will form the basis for the establishment of a more personalised experience for consumers. Hence, the long-term success of the government's launch of m-government services will depend to a large extent on the availability of processing engines and high speed probes (Gafni, 2009).

4.7.6 The importance of shifting from e- to m-government services

The responses received to the question of whether the shift to m-government from e-government services was important were mixed in nature. Two of the respondents emphasised the fact that it was wrong to perceive the situation in terms of a *"shift"* from e-government towards m-government. Rather, the respondents stated that they saw *"mgov as a complementary channel to egov"*. One of the respondents stated that they were concerned that the implementation of m-government services would be limited in terms of its effectiveness due to the characteristics of the Saudi Arabian population, given that it requires a *"level of literacy, option to open a bank account, access to newer devices etc. which the common man still doesn't have free access to"*. Further doubts about the importance of the provision of m-government services concerned the necessary precondition that e-government services should first be fully completed and implemented (i.e. used) in an effective manner as a precondition for effective m-government deployment. It was also stated that the importance of the provision of m-government services would be diminished by the fact that mobile channels would never be the only channels which would be used for the provision of government services, rather they would be one of a range of different services including *"kiosks (self-service machines), IPTV, customer service centres"*.

Furthermore, it was stated that even after mobile government services were introduced, regularly accessing traditional internet channels in order to utilise government services would still remain the principal means of access for a large proportion of the population. This was likely to continue to be the case due to the fact that internet access in Saudi Arabia is *"still extortionate when you compare to equivalent services in the UK"*. Finally, in conjunction with the emphasis on the importance of change management mentioned regarding the interviews, it was stated that in order to be effective, *"you need to change the culture of using e-government services then you have to shift to m-government"*. This suggests that the process of providing m-government services is not entirely straightforward and that it requires a fundamental shift in the cultural attitudes of the population in order to result in a change that is both important and long lasting.

4.8 Critical analysis of the results

This research finds that that there are many opportunities for the introduction of mobile government services in the country. There is a high level of mobile penetration among the Saudi population and latent demand for broader provision of a greater range of instant

(mobile) services. However, the results of this thesis shows that the respondents are not satisfied with these services and there is a lack of certainty amongst the citizens who are using these services about the advantages of m-government services. This is line with the Sheng and Trimi (2008), who found that lack of awareness is one of the key issues in the success of m-government. Moreover, many respondents thought that the use of m-government services was prohibitively expensive (due to the costs of getting an internet-enabled mobile device and a mobile internet provider in Saudi Arabia).

There also appears a lack of consensus among both employees and citizens who participated in the research about the potential effectiveness of m-government services implementation in Saudi Arabia. Employees see it as a viable option in the future, but citizens were more sceptical and did not foresee it being beneficial or long lasting. There does not appear to be a sufficient level of understanding among the Saudi Arabian citizens about the benefits associated with mobile government services. This is surprising in the context of the previous research indicating that literacy and awareness are important factors in the success of m-government (Basamh et al., 2014).

Secondly, the results suggest that in order to be successful, the implementation of the services needs to be closely tailored and personalised to the individual needs of target users. As a result, the government needs to ensure that it clearly understands the needs and preferences of its target users (Kushchu et al., 2007). Finally, it was found that while the concept of mobile government services is appealing to users, the extent of its uptake will ultimately depend on the way in which it is implemented. One possible way in which this could be achieved would be through communicating closely with target users to understand what they are looking for from implementation, and by possibly establishing a framework with other sectors of the government in order to ensure that the mobile services introduced by different sectors are rolled out in a timely and organised manner (Emmanouilidou and Kreps, 2010).

As there is lack of infrastructural facilities, such as lack of speed of internet, availability of internet and data security issues, to implement the m-government services effectively it is essential to ensure that the introduction of mobile services is perceived to be a complement to, rather than a substitute for, the e-government services which were previously introduced (Bertoot et al., 2012). Thus, the features of the rollout of mobile government services should be tailored so that they fit seamlessly into the existing structure of e-government services, by expanding on existing strengths and on addressing any

weaknesses within the existing e government service structure (Glinert, 2010). Thus, one of the key findings was that it was important for the mobile government services to be perceived as a complement, rather than as a substitute to, the previously introduced range of e-services. This concurs with the findings of Bertot et al. (2012), which suggested that m-government is an enhancement of the existing e-movement in government. It would therefore be worthwhile to identify the process the Saudi government followed when introducing e-services (particularly in terms of successes and failures) in order to guide the successful implementation of m-government.

Furthermore, conducting a detailed analysis of the process of introducing e-services would also help to identify the strengths and weaknesses which exist in the current framework of government e-services and would make it possible to formulate a range of criteria which must be met by the rollout of new mobile services in order for it to be an effective complement. This would provide a much more rigorous yardstick against which the success of the implementation of mobile services could be usefully measured. The criteria which emerge from this research could also be useful in establishing recommendations that the Saudi Arabian government should follow when deciding upon how to introduce its range of mobile services.

4.9 Results summary

The research conducted in this chapter suggests that there are a number of benefits associated with the provision of m-government services for both employees and citizens. For employees, such services are likely to significantly increase the efficiency with which they can complete their jobs and engage in long term planning. The high levels of mobile penetration in Saudi Arabia mean that the provision of m-government services is likely to increase the number of Saudi Arabian citizens with access to key government services. The advanced level of mobile infrastructure and the proliferation of smart phones among the Saudi Arabian population means that there is a solid framework available for the mass uptake of this technology. However, there are a number of challenges that need to be overcome before m-government services are likely to be widely accepted by Saudi Arabian citizens.

Firstly, it is suggested that m-government services need to be more closely personalised to the needs of specific users through the development of specific apps. Secondly, it is suggested that the government needs to implement significant programmes of change

management aiming to educate Saudi Arabian citizens in more detail about the benefits associated with m-government. This is especially important given that the results of the survey suggest that the majority of Saudi Arabian citizens lack familiarity with m-government and are not sure whether these services are used by their friends and family. Thirdly, it is argued that, rather than being viewed as being a transition from e-government services, the introduction of m-government services is complementary to e-government services, and should be rather perceived as being one of several channels through which government services may be operated.

4.10 Discussion

The results of the primary research conducted within this chapter demonstrate a number of similarities and differences with the results of the literature review. Firstly, there is high level of agreement concerning the fact that the high level of connectivity, and the high degree of mobile penetration among consumers in Saudi Arabia will aid in the provision of mobile government services. It is suggested in both the primary research findings and the literature review that this will provide a technological platform to facilitate the provision of mobile government services as a lasting change. Secondly, both the reviewed literature and the primary research suggest that the provision of mobile government services will help to increase the transparency of politics in Saudi Arabia and will contribute to the transition of Saudi Arabia into a more modern state, able to compete more effectively with other technologically developed countries. One important disparity between the results of the literature review and the primary research is that the findings of literature review suggest that the introduction of m-government services is likely to result in a significant paradigm shift.

The importance of the introduction of m-government services is emphasised by Emmanouilidou and Kreps (2010), who argue that it will result in a complete reconfiguration of the relationships that exist between the country's citizens and its government. This perception is challenged by the findings of the primary research, which suggest that the majority of those interviewed have a rather different view. In particular, it is suggested that there are a number of practical barriers likely to restrict the significance of the launch of such services. These barriers include the fact that a sizeable proportion of the Saudi Arabian population does not have access to the necessary technology in order to be able to access these services, that m-government services will be offered in conjunction with a range of other channels such as kiosks and IPTV, and that in reality, many citizens

are still likely to rely on the use of e-government services. Thus, the key difference between the primary research results and the findings of the literature review seems to be a greater recognition of the extent to which practical feasibility is likely to limit the uptake of m-government services. This is also manifested in the fact that a large proportion of the answers received to the survey and the interview indicated the belief that the introduction of m-government services should be complementary to the array of e-government services already available. It was further commented that the extent to which the introduction of m-government services is likely to result in significant, long lasting change is dependent on the extent to which the government is able to manage the process of change. This finding confirms the results of the existing research literature since it implies that, while the provision of m-government services is by itself likely to be advantageous to users by making it possible for them to access government services in a more convenient manner while they are on the move, much of its effectiveness will depend on the quality of its implementation.

There are also various differences and similarities which exist with regard to the different challenges that the government needs to overcome in order to increase the effectiveness of the introduction of m-government services. Both the primary research and the results of the literature review suggest that the government needs to deal with consumers' concerns about the safety of their electronic transactions, and to increase the range of channels by which consumers can gain access to such services. However, an important obstacle identified within the primary research not highlighted in previous literature is the need for the personalisation of government services to target users. Specifically, the consensus among a large proportion of those who were surveyed and interviewed within this paper suggests that the government needs to ensure that a wide range of different m-government services are offered in order to ensure that the needs of different individuals are catered for.

A concern was raised that, if this is not the case, there is a probability that the mobile services offered will cater only to the technologically literate, higher income and young section of the society, without catering for others (particularly individuals of lower socioeconomic status). These findings largely correspond to the results of secondary research conducted by Ho (2009), which argues that the increasing ubiquity of mobile channels for government services has resulted in the increased effectiveness of personalisation. In particular, Ardissono et al. (2002) argued that the technology provider needs to ensure that they implement the necessary tools, including pattern recognition, collaborative technology, data mining and click stream analysis to allow the web content to

be manipulated in order to correspond with the results of real-time detection of user behaviour.

If it is possible for the Saudi Arabian government to design the provision of its mobile government services in such a tailored way, it will thereby be able to deliver targeted information to its online users and to protect them from an overload of information and spam, which would cause them to become disillusioned with the services. Hence, the responses received from those primary research respondents suggest that the government should use the appropriate technologies in order to ensure that the right content is provided in a suitable format to users who are in a particular location. According to Ho (2009), the personalisation of mobile services is not only important in the provision of government services but is also a source of sustainable competitive advantage among commercial firms. Al-Khamayseh et al. (2006) also asserted that the personalisation of mobile services is essential in ensuring that consumers are not overloaded with information, that they are capable of streamlining the information they receive, and that they are more likely to use government services more frequently as a result.

However, it is important to note that while much research has been conducted into the importance of the personalisation of mobile services, and the different ways in which the quality of mobile applications can be improved, the majority of this research has focused on the way in which such personalisation can be achieved by online retailers rather than by governments. This reduces the extent to which the findings of the existing research are applicable within the context of this thesis. Specifically, the fact that the government-provided mobile services may lack personalisation options available to retail operators. For example, one of the suggestions with regards to the personalisation of m-government services was that the behavioural patterns of users should be analysed and that the operator could provide users with a range of targeted offers on the basis of these behavioural patterns; however, it is difficult to study user behaviours in non-consumer contexts (e.g. private organisations profiling customers according to purchase history).

Hence, it is likely to be more effective for the Saudi Arabian government to resort to other means of personalisation such as assessing the service use history or root demographic characteristics of different users to target knowledge delivery (e.g. women cannot drive in Saudi Arabia, thus it would be pointless to send them information concerning motor vehicles; however, young women comprise a large proportion of postgraduate students, thus it would be suitable to target information to them from the Ministry of Education).

This might also involve adding the users of particular government services to the relevant mailing lists in order to ensure that they receive regular notifications of any updates to the services they use most regularly. The use of such techniques of personalisation, if successful, would be useful in ensuring that users are only informed of changes to the government services which are most relevant to them and that they have easy access to the government services which they use most frequently. Taking such steps to increase the personalisation of m-government services to the needs of users would be instrumental in increasing the benefits which are derived by users and might ultimately increase the frequency with which they access such services.

A range of research has been conducted into the development of m-government services in other countries. For example, Jotischky and Nye (2011) suggest that the growth in the range of m-government services which has occurred in many African countries in tandem with an increase in mobile penetration is likely to increase the transparency of political processes. However, Bhavnani et al. (2008) argued that the introduction of m-government services in India demonstrates the importance of it being rooted in the existing government policy framework.

Finally, there is a significant difference in the way in which the role of mobile services are perceived. According to Hayes and Lemstra (2008), m-government services are perceived to be playing an important role in providing consumers with a range of services that are not available within standard offerings, thus contributing to the creation of a new mobile 'ecosystem'. It is argued that this is likely to result in real change in mode of individual lifestyles and government boundaries; hence, it is perceived as being much more important than simply being a substitute, or a complement, to existing electronic government services. In contrast, the relationship between the existing range of e-government services and the new e-government services is perceived to be much closer in the results of the primary research.

The Saudi government is likely to face the same challenges in the provision of m-government services as it did in e-government services. It is therefore suggested that the government's experience of e-government services should provide useful lessons for its launch of m-government services. Furthermore, a general theme mentioned by the individuals interviewed and surveyed was that in order to be successful the new m-government services should be viewed as an extension of the existing e-government services. It is suggested that, rather than resulting in a fundamental paradigm shift, the new

m-government services are likely to co-exist side by side with e-government services so that it is important that the mode of providing m-government services is complementary.

This insight into the importance of ensuring that m-government and e-government services are both complementary in nature, rather than representing substitutes to each other, is very interesting and provides a research insight which is not currently available in the existing research literature. This is due to the fact that the majority of extant research studies focus solely on the challenges, advantages and disadvantages associated with the introduction of mobile services alone, failing to consider the practical implications associated with such a roll out of mobile services in conjunction with an existing range of electronic services. Hence, the fact that this paper considers the practical implications which are associated with the roll out of m-government services within a framework of existing e-government services is a valuable addition to the existing research literature.

In conclusion, the results reported in this chapter give much deeper insight into the practical challenges which are likely to be associated with the launch of m-government services in Saudi Arabia, and it identifies that the long-term success of the launch of m-government services is likely to be directly related to the effectiveness of its implementation. Emphasis is also placed on the extent to which the effectiveness of the implementation is also likely to be related to appropriate investment in the necessary infrastructure and to the personalisation of services to the needs of individual consumers. In contrast, many of these issues of practical feasibility are largely overlooked in the reviewed literature, which assumes that the introduction of m-government services is likely to represent a fundamental paradigm shift that significantly exceeds the range of services currently on offer in the e-government services of the legacy system. Limitations such as the costs involved and the access to technology among the general population are largely ignored.

4.11 Conclusion of the chapter

The aim of this study was to analyse the challenges and opportunities associated with the implementation of m-government services in Saudi Arabia. This research finds that that there are many opportunities for the introduction of mobile government services in the country. Firstly, the high level of mobile penetration which exists within the Saudi Arabian population means that there is already a demand for consumers for a broader provision of a greater range of services which are instantly available. Although there are still various

members of population who do not have access to such technologies, the results suggest that there is still a strong desire among users for the provision of mobile government services, with the majority of both employees and citizens stating that they would be willing to use such services based on their understanding of its benefits.

Secondly, there appears to be a strong consensus among both the employees and citizens who participated in the research that effective implementation of mobile government services would help to increase the technological development of Saudi Arabia as a country, thus allowing it to keep up with the technological progress which can be seen in developed economies such as the USA. Although the results of the t-tests did suggest that there was some disparity in the answers provided according to the gender and employment status of the citizens who were canvassed, this only appeared to have an effect with relation to certain issues. In the majority of cases, the employment status and the gender of respondents did not have any significant impact on the answers provided, suggesting that the consensus among the Saudi Arabian public about the usefulness of mobile government services is more or less uniform.

However, despite the obvious opportunities that exist with relation to mobile government services, there are also various challenges that may prevent the effective implementation of such services. Firstly, there does not appear to be a sufficient level of understanding among the Saudi Arabian population about the benefits associated with mobile government services. Secondly, the results suggest that in order to be successful, the implementation of the services needs to be closely tailored and personalised to the individual needs of target users. As a result, the government needs to ensure that it clearly understands the needs and preferences of its target users.

Finally, it was found that while the concept of m-government services is appealing to users, the extent of its uptake will ultimately depend on the way in which it is implemented. It is argued that the government needs to learn from its experience of implementing e-government services in order to ensure that the introduction of m government services is as organised and as cohesive as possible. One possible way in which this could be achieved would be through communicating closely with target users to understand what they are looking for from implementation, and by possibly establishing a framework with other sectors of the government in order to ensure that the mobile services which are introduced by different sectors are rolled out in a timely and organised manner.

Furthermore, it is essential to ensure that the introduction of mobile services is within the existing framework of e-government services.

The next chapter explores different challenges and opportunities faced by m-government in Saudi Arabia with regard to challenges from the perspectives of Saudi citizens. It critically analyses the various opportunities and challenges associated with the implementation of mobile government services in Saudi Arabia, which is useful in increasing the effectiveness of any future implementation and a valuable contribution to the existing body of research literature.

4.12 Future Research

The next chapter explores different challenges and opportunities faced by m-government in Saudi Arabia with regard to challenges from the perspectives of Saudi citizens. It critically analyses the various opportunities and challenges associated with the implementation of mobile government services in Saudi Arabia, which is useful in increasing the effectiveness of any future implementation and a valuable contribution to the existing body of research literature.

5 CITIZENS' PERSPECTIVES ON M-GOVERNMENT IN SAUDI ARABIA

5.1 Introduction

The previous chapter identified some challenges that may prevent the effective implementation of such services. First, there does not appear to be a sufficient level of understanding among the Saudi Arabian population about the benefits associated with mobile government services. Secondly, the results suggest that in order to be successful, the implementation of the services needs to be closely tailored and personalised to the individual needs of target users. Hence, understanding the perspectives and needs of citizens and employees is obviously necessary. Finally, the lack of access to mobile technologies would be a challenge. In order to have an in-depth understanding of these opportunities and challenges, semi-structured interviews were conducted.

Semi-structured interviews offers flexibility and hence, opportunities to gain in-depth information about the phenomenon under investigation (Cresswell, 2003). The aim is to generate in-depth knowledge from detailed and information-rich answers (Bryman, 2012). Therefore, by implementing the semi-structured approach interviews have room to be flexible; they can easily respond to the direction in which the interviewee wishes to take the interview (Bryman and Bell, 2007).

M-government as an extension of and complement to e-government services on a mobile platform necessitates an understanding of the conventional e-government services through wired networks with interactive and relatively intelligent web applications (Basamh et al., 2014), and the way in which this is enhanced by m-government, which supports the mobility of citizens, businesses and internal government operations (Ntaliani et al., 2008). The main focus of m-government is to provide e-government services to citizens anywhere, anytime through mobile devices (Ntaliani et al., 2008).

Previous studies provide evidence that there is a high level of mobile penetration among Saudi Arabian citizens and the mobile users in Saudi Arabia (Oxford Business Group, 2008). Other than from the need to fulfil a growing consumer demand from its citizens, the provision of mobile government services is also likely to increase the level of visibility and transparency which characterises the nature of the relationship between the Saudi Arabian

government and its citizens, and this in turn is likely to increase the effectiveness with which the services which are provided by the government can be fulfilled.

Previous studies exploring the opportunities and challenges associated with mobile government have mainly been in a European context, where mobile penetration had already reached 100 per cent by the 2000s (Haaker et al., 2006). Furthermore, a large proportion of the research has concentrated on countries where mobile government has already become an important part of the provision of services, in countries such as Hong Kong, Germany, Estonia and Singapore (Haaker et al., 2006).

The development of e-government is relatively well-established in many countries, in some cases with great success, while m-government is still in an early stage of development. Indeed, it can be understood more broadly as a new strategy to utilise all kinds of mobile devices, applications and services in government service provision (Alsenaidy and Ahmad, 2012). M-government provides additional features for the integration and exchange of data communication, especially for countries that have made a lot of investment in e-government implementation. The synergy between both of them may become a new method for the interaction and communication between governments and citizens (Alsenaidy and Ahmad, 2012).

The World Bank (2012) reports that the use of internet and mobile internet is increasing rapidly in developing countries, including Saudi Arabia. In some developing countries, m-government has the potential to deliver information on demand and create real-time communications to satisfy public needs. Therefore, the Saudi Arabian government has big opportunities to create a synergy between e-government and m-government plans to accelerate and facilitate citizens' needs due to high penetration of mobile phone users within the country.

Besides the benefits of m-government implementation, there are some challenges faced by the government in implementing it, which are mostly similar to the barriers to e-government adoption (e.g. related to infrastructure, human resources and management). However, there are some challenges specific to mobile technologies, such as security and privacy issues (Susanto and Goodwin, 2010).

Very little research has been conducted into the potential opportunities and challenges faced with the implementation of mobile services in countries where it has not yet been introduced. Furthermore, the relevance of empirical studies which have focused on the

topic of mobile services is further diminished by the fact that very few of them focus on the provision of mobile services by the government (as opposed to private e-commerce). Rather, a large proportion of these studies have focused on the introduction of mobile technologies within sectors including the banking industry and the healthcare industry, where such changes are predominantly driven by a desire to increase productivity and focus on the need to cater to consumers (Alsenaidy and Ahmad, 2012). Such examples do not adequately reflect the increased level of complexity associated with the introduction of mobile services by the government, where the stakeholders involved are more complex, involving citizens, government employees, public administrators, tourists and business partners (Bouwman et al., 2008). These issues represent a significant gap in the research literature.

5.2 Aim an objectives of the study

This research intends to explore different challenges and opportunities faced by mobile government within Saudi Arabia. This focus is on exploring the challenges from the perspective of Saudi Arabian citizens.

This aim is met by fulfilling the following objectives:

1. To understand what kind of mobile government services people want and how they would like to access them.
2. To identify whether users would prefer to have a portal that provides them with access to all of their required mobile government services.
3. To understand the perceptions of citizens about the benefits and challenges of m-government

5.3 Pilot study

5.3.1 Participants

For the purpose of pilot testing, 12 interviews were conducted over the phone and by Skype with 12 participants aged between 20-45 years. The sample contained eight males and four females. Five of the males were employees and three had their own businesses. Three of the four female respondents were employees and one of them was a student.

5.3.2 Data collection

For the purpose of pilot testing, in total, 12 semi-structured interviews were conducted over the phone and Skype. All the interviews were recorded and transcribed. Each interview lasted 50-60 minutes.

Data was analysed using thematic analysis (Braun and Clarke, 2006), which focuses on examining, identifying and recording themes emerging from the data. Themes are different patterns emerging from the data that are relevant to the research aim, describing the phenomena under exploration. This analysis is based on six different but connected steps for the purpose of creating meaningful patterns: getting familiarity with the data, creating preliminary codes, looking for patterns amongst the generated codes, revisiting themes, naming and defining themes and preparing report on the basis of meaningful themes which are relevant to the research aim and objectives. The findings are presented in the following sections.

5.3.3 Procedure

A set of semi-structured questions was first emailed to the respondents. Permission was sought and the time and data of interviews were scheduled with them respondents. All the respondents came up with queries about certain questions they were unable to understand in terms of content or purpose.

5.3.4 Findings of the pilot study

The initial line of questioning suggests that the internet is available in almost all areas of Saudi Arabia except some remote terrain. Furthermore, people using mobile phones can also access the internet through Wi-Fi, 3G or broadband connections. Hence, it is easy and practical to launch e-government services.

M-government or e-government services are appreciated by most people and they are willing to use these services due to their great convenience in terms of time and space. People can access e-government services from anyplace, anytime. Furthermore, these services are considered a convenient way to access government services, particularly if various government departments are also integrated with this system, which means that people do not need to go to offices of various government departments for numerous needs. This facility goes a little further by customising it according to general public

requirement. This implies that there is no need to clutter the page with numerous services, rather only frequently required and used services should be presented.

Many people are of the view that these services should be customised and tailored according to requirements of individual users. Services like renewing ID cards, traffic tickets, education etc. are commonly required, and a lot of time and hassle in performing these tasks can be avoided through the utilisation of e-government services. In general, this initiative form of government is considered to help reduce the burden on people as well as on government departments. This system is designed to provide quick, easy and controlled access to the public, with flexibility and convenience of customising it according to their requirements.

5.4 Main study

The main aim of the research is explore different challenges and opportunities faced by mobile government within Saudi Arabia. Since the thesis concerns the cultural and social context of the Saudi society, an interpretivist approach is adopted. Interpretivist philosophy considers reality to be socially constructed and situated, therefore it is considered relative to specific contexts. Cresswell (2003) argues that interpretivists consider individuals' experiences and meanings about their situations essential. As such the research favours a naturalistic inquiry, with the fieldwork being done in the natural environment and thus emphasising qualitative data.

One of the major paradigms in the interpretivist approach is the constructivist paradigm, which argues that reality is a socially constructed phenomenon thus it has multiple constructions, and numerous 'realities' can exist (Bryman and Bell, 2007; Creswell, 2003). Constructivists, in terms of their methodological assumptions, believe that the phenomenon should be studied in the field where it actually occurs. In accordance with Bryman and Bell (2007), the researcher argues that this is important as such an approach recognizes the cultural aspects, practices and the meanings that people bring to a research context. The constructivist paradigm can be further classified into two: one focusing on individuals personal constructions (cognitive constructivists), and the other on shared meanings, reflecting socially constructed realities (social constructivists) (Cresswell, 2003). Personal constructions relate to individuals' interpretations of the world, while social constructions are developed through human interactions and the impact of language, society, culture, religion and the environment on individuals.

5.4.1 Participants

The demographics of research participants are summarised in Table 5-1.

Table 5-1: Demographic characteristics of research participants

Total	*Participants (n=77)*
Gender	Male=41, female=36
Average age	Male=27 and female=24
Education	Diploma=1 High school or less=3 Bachelor degree=39 Higher Education =34
Employment status	Employed=68 Unemployed=9

5.4.2 Data collection

Interviews are widely used as a fundamental data collection tool in qualitative research in education (Bryman and Bell, 2007; Cresswell, 2003). The extensive use of interviews is due to their quality of leading to elicitation of in-depth perspectives from participants, thus enabling researchers to develop rich, thick description and foreground different perspectives about social phenomena (Cresswell, 2003). Interviews are conducted in many different formats (e.g. face-to-face, by telephone, online and via email) and forms (e.g. structured, semi-structured, unstructured and informal). As stated above, the main aim of the research reported in this study is to explore different challenges and opportunities faced by m-government within Saudi Arabia.

In the current inquiry, semi-structured interviews were used. Bryman (2012) describes semi-structured interviews as a set of preliminary questions on a particular topic to be asked from most of the respondents who agreed to respond. Cresswell (2003) observed that semi-structured interviews are particularly useful in providing a diverse set of opportunities for interviewee and interviewer to negotiate their perspectives in a more contextualised and non-standardised fashion.

The set of semi-structured questions used for interview purpose was generated from a diverse set of distinct yet connected sources including a priori questions brought to the research context from the previous studies (e.g. Margo, 2012; Mengistu et al., 2009), such as:

> *What are the main challenges you are facing in using m-government services? Are you willing to use m-government services? Are there any issues relevant to security and privacy? Do you have access to the internet on your*

mobile? Do you face any issues related to low bandwidth or speed of the internet on your mobile device?

The above questions offered guidance to conduct interviews without missing any important points. Many other questions were raised by participants themselves, and spontaneous concepts and questions emerged. A set of semi-structured questions is presented in Appendix 3. In this way, the use of semi-structured interviews enabled the researcher to be responsive to the situation and discussion, and helped to explore the challenges and opportunities of m-government in KSA.

During the interviews, field notes were made both to inform the current flow of the interview and to facilitate post-interview analysis. A range of interviewing tactics was employed including prompts, probes and silences. In addition, Wengraf's (2001, 194) 'double attention' concept was influential as informants' responses were listened to in order to understand their message while simultaneously trying to make sure that every question was adequately addressed. Note-taking before, during and after the interview, post-interview reflection and immediate transcribing served as ways to pay double attention to participants' responses.

The interviews were digitally audio-recorded and immediately transcribed verbatim subsequently, in accordance with transcription conventions and preparation for data analysis elaborated by Bryman (2012), to enable subsequent data immersion through techniques such as transcription, reading, reflecting, evaluating and elaborating (Cresswell, 2003). Additionally, field notes were made during the interviews both to inform the contemporaneous flow of the interview and to facilitate post-interview analysis.

Data was analysed using thematic analysis (Braun and Clarke, 2006). This analysis focuses on examining, identifying and recording themes emerging from the data. Themes are different patterns emerging from data relevant to the research aim that describe the phenomena under exploration. This analysis is based on six different but connected steps for the purpose of creating meaningful patterns.

In qualitative research, data collection and analysis are interconnected, and therefore occur in a simultaneous fashion (Miles and Huberman, 1994). In this analysis, I used thematic analysis method suggested by Braun and Clarke (2006) and thus followed the following data analysis steps:

1. Preliminary acquaintance with data through exploring the verbatim transcripts and field notes;
2. Initial open-coding of the data by breaking them down to meaningful, recurring units;
3. Making connections across similar codes to develop themes;
4. Sorting and connecting interconnected themes;
5. Developing the thematic analysis for each program, entailing:
   a. identifying themes or patterns of meaning,
   b. coding and classifying data according to themes, and
   c. interpreting the resulting thematic structures by seeking commonalties, relationships, overarching patterns, theoretical constructs, or explanatory principles; and
6. Synthesising and reporting lessons learned.

In essence, data was analysed thematically (Braun and Clarke, 2006) to focus on examining, identifying and recording emergent themes (different patterns emerging from data relevant to the research aim and describing the phenomena under exploration). Themes which emerged from the data are the availability and quality of the internet, security and safety issues, customised m-government services, awareness and intention to use the m-government services and lack of required infrastructure.

5.4.3 Procedure

For the purpose of data collection, respondents were reached through social media sites and once they agreed to take part in the research as research participants, they were taken online through digital means. The set of semi-structured questions was sent to them, and interview times were decided. Before starting every interview, the respondents were informed regarding the confidentiality of their answers and that the information would only be used for the purpose of this research and other educational research. They were also assured regarding the anonymity of their contributions. Interviews were held with 77 participants who were citizens of Saudi Arabia using the semi-structured interview guide. The selection of 77 respondents for interviews was considered to be enough and justified considering the depth of study as other studies focusing on m-government and its aspects; for example, Al-Hujran (2012) utilised a considerably smaller selection of respondents.

5.4.4 Results

The data analysis from 77 respondents began with verbatim transcription of the interviews. In the next step, open coding was used to categorise main themes and sub-themes. For instance, themes such as availability of internet, security and safety issues and infrastructural issues were identified as main themes. Many sub-themes, for instance slow speed of internet and quality of service, were identified under the main theme of availability of internet. These different themes and sub-themes were then connected, relationship were sought and explained using axial coding. In the selective coding, main themes were linked and their comparisons were made with the literature. At the end, as suggested by Braun and Clark (2006), conclusions were drawn.

Before analysing the challenges and opportunities for m-government, it was important to analyse the perception of respondents regarding m-government services and the impact they have in their lives and also to understand the kind of services people wanted and their accessibility and the preferences regarding service provision.

Perception regarding m-government services

The majority of participants linked m-government services and their use with internet availability. Although they understood the great convenience of m-government services in theory, they suspected that the poverty of internet infrastructure and internet penetration (related to costly service) would impede adoption and use. Being a method to communicate government information and services promptly through mobile technology, many respondents thought that though m-government brings public closer to the government, the costs associated with this are huge. According to one respondent:

> *"M-government technology is at an early stage in Saudi Arabia and only SMS service is inexpensive these days due to which most of the public is only reliant on this source to access information available from Government. Only information like high-school exam notifications, occasional messages for congratulations and weather notifications is available at a mass level"* (Respondent 22).

Service preferences and availability

The overwhelming majority of the respondents (over 96%) have internet access. More than 93% had the availability of internet access on their mobile devices. This presents an

opportunity for m-government service provision. However, the availability of the internet is not the same for all the respondents. The respondents shared their preferences for internet service and their current availability. According to the majority of participants, they needed fast, 24/7 internet service availability, and they were sorely disappointed with the limited speed and access or prohibitive expense of internet provision in KSA. Many respondents expressed that they face difficulties in accessing the internet on their mobiles:

> *"Yes I can access the internet on my mobile; however accessing the internet outdoors is hard because Wi-Fi is often not available. Additionally, accessing the internet indoors sometimes is not easy because of low speed"* (Respondent 12).

Almost half of respondents suggested that the speed of the internet depends on the mobile internet package (i.e. that quality and speed depend on how much money a user pays to get a package):

> *"I'm using a monthly package from Zain [a telecommunication company in Saudi Arabia] - it doesn't cost me a lot but the speed of the internet depends on the amount of money; you pay extra to get a higher speed"* (Respondent 25).

Participants used various internet packages, but most were unsatisfied with them due to the poor quality of service. Even the most expensive mobile packages do not deliver the required speed and consistency of service. One participant revealed that:

> *"I use volume-based data packages from Aljawal Telecom. I'm not satisfied using most of the internet packages because the speed and performance is not that good. Also, these packages are slightly expensive. I'm using a Blackberry bundle, but it is very bad to connect the internet, as well as it is a very slow connection"* (Respondent 53).

Security and safety issues

Data security and privacy is a serious challenge. Most interviewees suggested that they are unsatisfied with data security in mobile internet. This presents a challenge for m-government, as data involved in citizens' interaction with the government requires

particularly high security. Obviously potential users will be hesitant to use m-government services if they fear certain personal information and details they disclose (or indeed access) from m-government applications is not secure. Users related their data security concerns to particular operating systems. Participant 53 expressed:

> *"There are a lot of issues of securities especially with those who are using Android systems".*

Respondent 64 described her experiences about data security as follows:

> *"I faced many problems with data security and safety despite the fact that I am using the internet behind firewalls as well as antivirus software. However, as an Apple user; I am totally protected because of their security systems. In brief, yes there is an issue with the data security, but I am out of it".*

Hence, respondents are of the opinion that data security and safety is a critical issue and this is a challenge that needs to be addressed so that people can make use of and benefit from the m-government initiatives. On the other hand, smart phone users do not perceive security threats to the same extent. However, since not all mobile internet users have smart phones, and not all smart phones provide the same security to customers, security concerns remain important (even if not perceived as such). Moreover, as implicit in the previous quote, there is confusion between security and viruses; the more pertinent concern with regard to mobile internet security is data security, not viruses.

Another vulnerability which mobile phones users are facing is that mobile phones can be stolen more easily than personal computers. Mobile users carry the phones with them and there is always a chance that they can be lost and their personal data can be accessed by others, thus making the mobile phone users susceptible to huge losses. These security issues are a key challenge to fully fledged use of m-government services in Saudi Arabia.

Lack of required infrastructure

As intimated with regard to the availability and quality of internet access, a key obstacle to m-government adoption is the lack of suitable infrastructure, including applications and mobile networks not supporting all devices. As already stated, data security issues are a key challenge. Moreover, the bureaucratic attitude of the government departments has also been cited as a significant barrier to m-government deployment and use. A few of the problems were highlighted by the following participant 34:

> *"1- Availability of suitable infrastructure, especially in rural areas (mobile devices, internet coverage); 2- security and privacy of data; 3- awareness and motivation for the public people about the benefit of m-government; 4- lack of customisation to meet customer needs".*

Another respondent's views are as follows:

> *"Its really a problem. You can use a few applications and a few devices. All mobile devices that I have don't run very well".*

Thus, lack of infrastructure is a challenge for the successful implementation of m-government services.

Awareness and intention to use the m-government services

The interview data shows that most of the interviewees are aware of the government initiatives of m-government services. This offers an indication of an attractive opportunity for the provision of e-government services. They have also shown strong intention to use m-government services. Many interviewees are already using a few of the available m-government services, offering a major opportunity for the government to take initiatives to capture the trend and provide m-government services. The results suggest similar intentions to use m-government among respondents. Participant 37 said that:

> *"Yes, because it takes less time to do any service. Also my friend recommends using e-government, it's better than going directly to the government and showing up, which takes time to finish service that I want".*

Most of the respondents showed similar intentions to use m-government services. One of the respondents already using e-government suggested that it is preferable to traditional government delivery. Respondent 11 expressed:

> *"Yes, because of three reasons: 1- to help people get fast service and avoid crowds of people in any government organisation; 2- less people in government organisations and less time from employees to see customers in the organisation means the process will be faster for whatever services people want; 3- customers avoid traffic to go to any organisation for services. E-government helps them to get services faster from their homes, with no need to see employees and employees have no need to see customers".*

This suggests that people are using e-government services and also have intention to use such services. Although interviewees are unsatisfied with slow internet speed, high costs and lack of data security, users with different mobile bundles (such as 2G from STC, 5G from STC, 5kd bundle from Zain telecom etc.) are still willing to take risks and use m-government service due to the convenience it offers. Participant 71 expressed:

> *"Yes, I think there is always risk in using the internet, no matter when or where. However, life has become so much easier with the internet that we are now willing, more than ever, to take the associated risks".*

Many of them, however, were unsatisfied with the e-government services currently available. Respondent 12 revealed:

> *"Yes, mainly to pay for government fees and traffic tickets. I think they still have long way to go before the claim to be an e-government".*

One interviewee (respondent 64) was aware of numerous government departments and institutions providing mobile services in the country:

> *"Many agencies are providing mobile services, such as the Ministry of Higher Education, Ministry of Commerce and Industry, Ministry of Interior, a lot of governmental universities…"*

However, respondents are generally unsatisfied with the services and desire an enhancement in quality. Respondent 15 revealed that:

> *"Yes I'm using it, but I believe it needs more enhancements".*

One of the reasons is the security issues, as suggested by respondent 74:

> *"No, I don't trust the implementation of such services by the government. The contracts go to the lowest bidder and then data is at risk. Government employees are the worst when comes to data security".*

Nevertheless, from the response of the interviewees about the awareness and intention to use, it can be concluded that the provision of m-government services would be a success in the country. This conclusion can be further supported through the awareness of the people about the benefits of using m-government services in Saudi Arabia. Additionally, as suggested by one participant cited previously, the adoption of m-government by some

users (e.g. educated regular internet users) would relieve the struggling bureaucracies of the burden those users would otherwise comprise, making access to traditional services easier for those not using m-government.

As mentioned previously, the fundamental advantage of m-government is the convenience it offers, not only in terms of accessing particular government services, but also in relieving citizens of the whole tortuous process of travelling to such offices (the main cities in Saudi Arabia, Riyadh and Jeddah are characterised by traffic congestion) and having their processes delayed by inefficient government employees. Participant 52 revealed that:

> *"Yes it does [offer convenience], instead of using the car and getting stuck in the traffic and instead of the long line waiting I believe it is more convenient".*

Thus, although a small minority of respondents were unsure of the benefits of the government, and the majority had some concerns about data security, many already use e-government applications, and most expressed awareness of government initiatives in mobile services and willingness to use them. In conclusion, Saudi Arabia is a country in which m-government services would be welcome, especially as respondents were positive about the provision of better services due to the availability of better technologies. Participant 37 revealed:

> *"I think with this remarkable improvement in the mobile technologies, the government needs to take this into consideration and to help citizens to achieve their interests easily".*

To conclude the findings, it can be suggested that overall, informants think that m-government is beneficial for them.

Customised m-government services

Although there is a general readiness for m-government, and this can be achieved with necessary coordination among stakeholders, the provision of mobile service faces another challenge, which is the demand from the customers for customised services. Most of the respondents showed a strong desire to have in place customised mobile services which means that the government needs to focus on the availability of the customised services keeping in view the requirements of different individuals and groups. The data suggest that the respondents have a strong desire that the government should provide customised

services to meet different needs of different government services. Respondent 11 revealed that:

> *"Yes this way will be easier on a person to look for what they exactly need without considering other services he is not in need for".*

Respondent 70 suggested:

> *"It will be good to have what I need instead of getting everything from the vast world of information. It's quite a burden, seriously".*

The semi-structured interviews revealed that interviewees perceive m-government is at an early stage of development in Saudi Arabia. One of the key issues that can be seen to develop this perception is the lack of internet accessibility. In other words, people would use m-government services if they have easy access of information and facilities and a better infrastructure. The interviews results also suggests that another key challenge is the data security and privacy concern. Interviewees were not satisfied with the data security and this suggests that government needs to develop legislation to overcome this issue in order to eliminate the risks of cybercrimes, data privacy and lack of fair information. Thus, in addition to adequate internet speed, privacy and data security, effective provision of m-government services requires a better administrative style from government departments.

The majority of respondents also showed a strong desire for the availability of customised mobile services. This suggests that the government needs to make sure that people are getting customised services. The personalisation of government services is thus an important element of m-government to save the people and organisations from the burden of over-information.

Therefore, there is a need that government agencies need to maximise the level and consistency of service delivery. For this purpose, they need to focus on boosting operational consistency by ensuring the availability of good quality internet, a comprehensive legislation, software and hardware compatibility across the supply chain and an overall good infrastructure to ensure the effectiveness of m-government.

5.5 Discussion

The results reveal that availability of the internet presents an opportunity for m-government service provision. However, internet availability is not the same for all

respondents. The respondents shared their preferences for internet service and their current availability. Participants used various internet packages, but most were unsatisfied with them due to the poor quality of service. Thus, although the internet is ubiquitously available on mobile phones, users are not satisfied with the quality of internet access provided. Therefore, although there is an opportunity for the government to take m-government initiatives, this is dependent on addressing the disparity in speed and quality of service on different internet packages and in different areas. This comes under the auspices of internet providing companies, who currently charge premium rates for faster internet speeds. Slow internet speed means issues of download speed and problems in navigation for the users. This is one of the main obstacles for the users and this will impede the effectiveness of the m-government plan.

This finding is in keeping with previous studies suggesting that slow internet, limited download speed, and poor navigation are amongst the key challenges in this regard. For instance, according to Mengistu et al. (2009), slow internet speed, low bandwidth and poor download speed are the key challenges governments facing the provision of m-government services. Many previous studies (Basamh et al., 2014; Mengistu et al., 2009) found that the lack of required internet speed impedes the proper download and bandwidth, ultimately hindering the acceptance and effectiveness of the m-government services.

As Mengistu et al. (2009) suggest, lower speed and bandwidth result in inconvenience and discomfort amongst the service users. Lack of download speed can result in slow navigation, long waits for the users and can result in hindering the success of the m-government services provision and acceptance in many developing countries. The slow speed issue of the wireless internet in developing countries has also been observed by Al Thunibat et al. (2010) as a key obstacle in the development of the m-government services in developing countries. Our data suggests that even the most expensive mobile internet service packages in Saudi Arabia do not offer sufficient speed for comfortable mobile internet use, and users are constantly discomforted by the knowledge that even the slow-speed internet access provided can be disconnected at any time and its availability will be very limited (or nil) in many areas of the country. Therefore, it is suggested that without good internet availability, speed and proper download features, the effective and successful provision and acceptance of m-government service is not possible. These challenges need to be kept in mind to enable the provision of m-government service.

Hence, the provision of m-governmental services to the general public is not without security challenges, as affirmed by Mengistu et al. (2009), who found evidence about such challenges resulting from the limitations of the mobile devices as well as from the departments providing the mobile services. Al Thunibat et al. (2010) also suggested that privacy and security are amongst the key issues affecting mobile communication, because other people can also get connected to the network anonymously. Thus governments must ensure secure m-government services that provide safety of personal data and protection from unauthorised persons and hackers. This suggests the need for the formulation of clear regulations about the safety and security of data of the users; otherwise, as suggested by Mengistu et al. (2009), lack of trust would fundamentally block m-government adoption and impede the readiness of the people to use such services (Ivan and Zamfiroiu, 2011). A similar conclusion was reached by Mengistu et al. (2009), who argued that the lack of legislation relating to cybercrimes, data privacy, fair information practices and laws that specify the rights of citizens and responsibility of data holders impede the adoption and use of online services.

Security issues offer a serious challenge for m-movement in Saudi Arabia. Security lapses in mobile internet applications present an opportunity for malevolent cyber attackers. Conventional security software such as encryption firewalls and antivirus used in PCs which can prevent hackers from their malicious activities are not similarly effective in smart phones. Mobile phones, including smart phones, are more vulnerable compared to PCs as mobile phones are being used for many personal and private tasks. People use phones to exchange emails, social networking, download third-party applications and use them for making payments for online shopping. These transactions and activities can be tracked and personal data can be attacked by the hackers. Money transactions including redemption of tickets and coupons, point of sale monetary transactions and banking transactions are usually the target of the cyber criminals. Thus, mobile phones require much more security than they currently do if online provision of m-government services is to be effected in Saudi Arabia. Thus, in addition to the development of legislation for data protection (which must be effected by the government), mobile devices must evolve more secure protections for users (which must arise from the electronics industry).

One of the key obstacles to m-government adoption is the lack of suitable infrastructure, including applications and mobile networks not supporting all devices. This finding is in keeping with Ivan and Zamfiroiu (2011), who reported that conventional e-government infrastructure is inadequate to ensure effective m-government service delivery to society.

The successful provision of m-government services requires good technologies providing adequate speed, privacy and data security. The government should not only assure the availability of infrastructure and services for chosen region, but also ensure its own mobility as well. The government should also improve (i.e. change) the style of government departments and make them more user-friendly instead of obstructively bureaucratic. One of the largest hindrances in the implementation of m-government service is thus lack of infrastructure. This dimension includes the adoption of middleware technologies, software availability and integration and m-government standards. However, the development of required infrastructure is prohibitively expensive and complicated (Shneiderman and Plaisant, 2010). One impediment is the lack of shared standards and infrastructure amongst different government departments supposed to provide mobile services. Thus, there is a need of a common infrastructure and technical standards. Moreover, another key challenge is ever-changing technologies and mobile phone applications. Hence, government may face challenges to meet the changing needs of the users and to keep pace with innovative technologies while ensuring common standards across departments, all within the framework of a legislative environment protecting users. Thus addressing the infrastructure problem may need flexibility in regulations, technological expertise and many private-public partnerships.

The existing situation can be considered favourable to initiate m-government services in Saudi Arabia. People (i.e. the relatively well educated but representative sample) are aware of m-government services and intend to use them due to the convenience they offer. Most of them are already using some kind of e-government services, which is a good indication about the readiness of the people to use m-government services in the country and offers an opportunity for the government to take the initiative. However, regular internet users only comprise about 54% of the total population (World Bank, 2012). Therefore, it can be said that many people are still unaware about the usage of mobile devices in order to get the benefits of m-government. Hence, the government needs to create awareness among general public about mobile usage and about the benefits of m-government and to ensure accessibility to the whole public (Al-Gahtani et al., 2007).

To conclude the findings, it can be suggested that overall, informants think that m-government is beneficial for them. This agrees with Ntaliani et al. (2008), who suggest that m-government is a key tool to offer services for both public and private sector firms in most developing countries, and it is one of the most convenient ways to offer such services. Trimi and Sheng (2008) suggested that the widespread availability of the internet

and its increasing ubiquity over the last decade has primed the mass of people around the world to seek the easiest and most convenient ways to access and use a range of different services, including e-government and m-government. The easy availability of many mobile tools with the wireless internet technology strengthen readiness for e-government generally and m-government in particular.

5.6 Conclusion of the chapter

This chapter has revealed the features of m-government and their usefulness as perceived by the interviewees to an extent where it is easy to conclude that m-government is at an early stage of development in Saudi Arabia. This is linked to the perception of public that the m-government facilities are useful however they are linked directly to the use of internet, which limits accessibility. It is clear from the responses generated by the thesis that people are likely to use the m-government services to gain easy access of information and facilities which are otherwise difficult to attain, however it is currently not possible due to the current infrastructure capacity.

Therefore, there is a range of challenges facing m-government initiative in Saudi Arabia. One of the challenges is the lack of uniform availability of internet for all users. Mobile internet users are facing difficulties in internet access and issues of quality and speed. This finding is in agreement with previous literature (e.g. Basamh et al., 2014; Mengistu et al., 2009), which found that the lack of required internet speed impedes the proper download and ultimately results in hindering the acceptance and effectiveness of the m-government services. Mengistu et al. (2009) also suggested that lower speed and bandwidth result in inconvenience and discomfort amongst the service users become obstacles for the success of the m-government services.

Data security and privacy is another key challenge. Interviewees were not satisfied with the data security and this adds to the challenges of m-government, as data security and safety issues can hamper the willingness of the people to adopt the services. This finding concords with Ivan and Zamfiroiu (2011), who revealed that issues resulting from cybercrimes, data privacy and lack of fair information practices and laws impede the adoption and use of online services.

Other than these concerns mentioned in the literature, an additional structural challenge faced by m-government adoption and deployment in Saudi Arabia is the obstructive and bureaucratic attitude of government departments. The problems associated with physically

interfacing with government bureaucracy (i.e. going to offices), which are a fundamental reason most participants are willing to use m-government despite their security concerns, must be addressed to facilitate m-government adoption, because while automated processes such as those involved in current e-government facilities for paying fines (as cited above) clearly favour m-government use, processes that require a human response from the government end will be hampered by the same inefficiencies of the traditional office environment. Thus, in addition to adequate internet speed, privacy and data security, effective provision of m-government services requires a better administrative style from government departments.

Another challenge is the issues of customisation of m-government services. The majority of respondents showed a strong desire for the availability of customised mobile services, which means that government needs to focus on the availability of the customised services, keeping in view the requirements of different individuals and groups. There can be challenge of understanding the requirements of the different users and then making available different services, contents and delivery according to those requirements. This is keeping with Ntaliani et al. (2008), who argued that personalisation of government services is an important element of m-government to save the people and organisations from the burden of over-information. Basamh et al. (2014) suggest that the customisation of these services is vital for the success of m-government initiatives.

The availability of the internet on mobile devices as well as awareness amongst the customers about the availability and benefits of mobile government services are the key opportunities for Saudi Arabian government m-government initiatives. This finding is in contrast with the literature (Al Thunibat et al., 2010; Basamh et al., 2014), which suggests that a lack of awareness and unwillingness of people about m-government is a key challenge facing m-government initiatives in the developing countries.

5.7 Future Research

The purpose of the next chapter is to use a prototype design to help respondents understand the use and benefits of m-government services. The findings of this thesis would help the government to develop and implement mobile internet services to facilitate the lives of citizens. The research will focus on mobile government application for mobile payments of utility bills, because this department has not implemented the mobile government services. The availability of the mobile government services is very important for energy

departments because energy, water and other utilities are essential amenities used in every household. The development of this mobile government service would save time, travelling hassles and offer other benefits to users, including familiarising them with the concept and use of e-government in general.

6 EVALUATING THE MOBILE UTILITY BILLS PAYMENT APPLICATION USING PAPER SKETCHED PROTOTYPE

6.1 Introduction

The findings stated in the previous chapters show that there are many opportunities for the introduction of mobile government services in the country, but it is facing a variety of different challenges. Nevertheless, it was found that the users who understand the benefits of m-government's uses and benefits have found it to be an appealing idea. One possible way in which services can be improved to meet the target users' needs is through consulting and communicating closely with them to understand what they are looking for from implementation.

The purpose in this chapter is to evaluate a prototype design to help respondents to understand the use and benefits of m-government services. The findings of this study can aid the development and implementation of m-government services. The research will focus on mobile government application for mobile payments of utility bills, which has not been implemented in KSA previously. The availability of the mobile government services is very important for the Energy Department, which is particularly suited to m-government applications (as explained previously).

E-government is expanding globally due to its economies of scale, better services, time saving and effectiveness in delivery of public sector services. ICT is of utmost importance in the transition and modernisation of organisational practices and operational functions in the public and private sectors (Beynon-Davies, 2005). ICT acts as a bridge among stakeholders for communication and interaction (Grimsley, Meehan and Tan, 2007; Zhang, Dawes and Sarkis, 2005). According to Fang (2002), the implementation of e-government is highly influenced by citizens' global awareness and demand for better, efficient and transparent services to interact and operate with government departments by the use of the internet. Change in technology is market-driven, and consequently rapid, difficult and expensive to keep up to date with (Al Nagi and Hamdan, 2009). Bertot, Jaeger and Grimes (2010) described e-government as technology that facilitate government to provide better services to public and enhance their efficiency in interaction among themselves, businesses and government agencies. KSA implemented e-government with relative success in the

Yesser project (Al Nagi and Hamdan, 2009) in terms of control of procedures, legislation and activities related to its implementation. This supports the fact that the government of KSA understands the potential of ICT to make operations easier and simpler.

This service facilitates interaction between the users and agencies and also among agencies as well. In order to provide better, reliable and competitive services to their citizens, governments across the world, especially in Middle East, are taking advantage of technology and change their current traditional procedures. It is further supported by authors like Bloch, Pigneur and Segev (1996), who suggested the utility of digital infrastructure in facilitating business interactions. Despite the increasing level of electronic service in different business sectors, some researchers still show concern about how this will help companies to achieve competitive advantage (Gross et al., 2012). The online environment is considered a successful medium for spending as technological advancement provides better facilities than traditional methods in terms of delivery, credit card facilities, after sale service and detailed product or service information.

To achieve growth and awareness of technology use among users for better exchange of goods and services, it is highly important for companies to understand consumer behaviour and challenges of electronic services that make them behave in certain ways. Time is the main factor that is considered a positive driving force based on the belief that individuals will spend more time online than opting for traditional methods. However, the complexity of websites (which tends to increase as they try to offer more services and functionalities) can limit the adoption and use of the technology, as many users cannot find the exact product or service they require. Indeed, many users find online buying procedures complex and difficult, thus limiting impulse purchasing online (Hunt, 2000).

Consumer trust is one of the important factors that have a huge impact on their behaviour and attitude towards product and service that aim to use. According to different scholars, trust is the *"willingness of one party to take risk and be part of other party actions based on their expectation and having little or no control over others' actions"* (Davis and Cheung, 2000, 124). Individuals' buying decisions are based on their trust levels in certain products or services. Moreover, online trust is essential for building long-term relations with customers, however trust levels in online interactions are lower than in face-to-face interactions (Cassell and Bickmore, 2000). There is a direct positive relationship between electronic service and trustworthiness and privacy security provided by the companies. High technical competence highly influences the trustworthiness of individuals.

There are multiple factors faced by the country that slow the growth of e-government. Most factors include difficulty in bank transactions, transfer of payments and the more general challenges of poor access and speed of internet. Furthermore, unclear regulations, lack of trust and under-developed after-sale and customer services hamper online services. Despite so many challenges, there are many supportive drivers that exist in the Saudi market which support the growth of e-government and its effective adoption. There is strong support in the government itself for ICT technologies; it is a growing sector, with a favourable and strong foundation among e-government agencies (Salem and Qudiah, 2014).

This thesis focuses on different challenges and opportunities mobile service provides to e-government in Saudi Arabia. The thesis highlights the opportunities that exist in Saudi Arabia and how consumer behaviour has evolved over time to adopt new changes, with particular emphasis on cultural considerations. It explains the implementation and development of e-government through recent practises and highlights challenges that affect implementation.

The present research work adds to existing academic literature on the industry of e-government in Saudi Arabia, focusing on the challenges and opportunities that use mobile service provide to e-government and impact the users. However, previous researchers have ignored the perspectives of citizens, which shed light on issues like reliability, accessibility and usability in both the public and private sectors. The majority of research done in this regard is related to functional and technical issues related to technology, service delivery and implementation. This research contributes to literature related to the impact of e-government usage through mobile service on users and how the cultural characteristics of Saudi Arabia further affect operations. Finally, the thesis suggests ways in which these challenges can be effectively addressed.

6.2 Aims and objectives

The main aim and purpose of this research is to better understand the challenges and opportunities that mobile service creates for e-government in Saudi Arabia and how these challenges and opportunities impact on Saudi citizens. The following are the objectives of the research:

1. To investigate the key aspects of e-government in Saudi Arabia.

2. To study the challenges associated with use of mobile in e-government in Saudi Arabia.
3. To investigate how these challenges impact the user experience of e-government through mobile service in Saudi Arabia.
4. To understand how the behavioural aspect of consumers are affected due to e-government challenges in Saudi Arabia.

To make the research more refined, different factors that influence the use of mobile service in e-government in Saudi Arabia are also considered, such as the influence of Saudi culture on the operations of individuals and society as a whole and how it has impacted on consumer behaviour.

6.3 Sketching

Acceding to Preece et al. (1994), sketching is amongst the Human-Centred Design (HCD) techniques used for the purpose of the receiving feedback from users about design ideas. The feedback received through these sketches help the designers to organise an application design metaphor. Visual representations in the form of paper sketches are used as one of the essential mechanisms of different scientific, engineering and software solutions (Rosson and Carroll, 2002). Sketching is a source of representing mental models (Glinert, 2010). Consequently, sketching can facilitate users to develop a mental model about the design and the use of mobile phone application (Billinghurst and Weghorst, 1995).

6.3.1 Prototype development

Prototypes are of different types developed for different purposes. Prototypes can range from successive swift sketches on paper to complex and interactive computer simulations. Depending on their purpose and nature, prototypes help in different ways. Two fundamental types of prototypes are online and offline; the latter are used in this thesis and termed as ‘paper prototypes’ (Arvola, 2006). These offline prototypes do not require computers or computer simulations; rather they can be cardboard mock-ups, illustrated storyboards or simple sketches on a paper. The paper prototypes usually are used in the initial phases of a design of an application and can be used to communicate with different stakeholders, including users or prospective users (Arvola, 2006).

Paper prototypes can be used as user interfaces in the form of drawing or sketches on paper to demonstrate how prospect users of the application would perceive the design and

application (Olilla, 2008). Interface sketches predetermine that detailed questions can be made specific in the form of presented design (Arvola, 2006). In this way, sketches extensively contribute to facilitate communication between designers and clients.

In this study, the mobile government service is for paying utility bills, electricity, water, phone and internet was used. The prototype was developed keeping in view the issues revealed in the previous two studies. The first two study showed some of the issues are relevant to usability, reliability and validity of service. Therefore, this prototype was developed mainly for the purpose of assessing the usability, reliability and validity of the service of mobile application for utility bills.

Figure 6-1 is an opening screen about the first step to pay the bills.

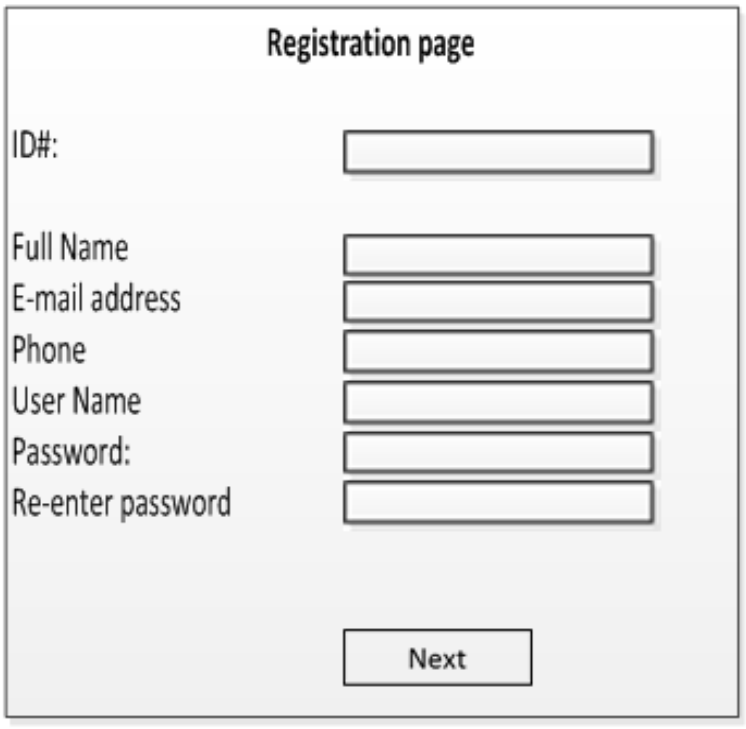

Figure 6-1: First screen in bill payment

In this step, users will have to register themselves online. It is necessary for all the users that they register online to use this service. If they are not already registered, they will have to register first. There will be two options. Registered users will use their unique user name and password to login to their account and proceed further for making online payment. However, the users who are not registered will have to register themselves by entering their full name and address, after which the system will generate available user names. A user can choose appropriate user name and set the password. After successful login in the system, the following screen will appear.

Figure 6-2: Language selection

There are two buttons showing on the screen offering English or Arabic language. Selection takes the user to the next step, shown in Figure 6-3.

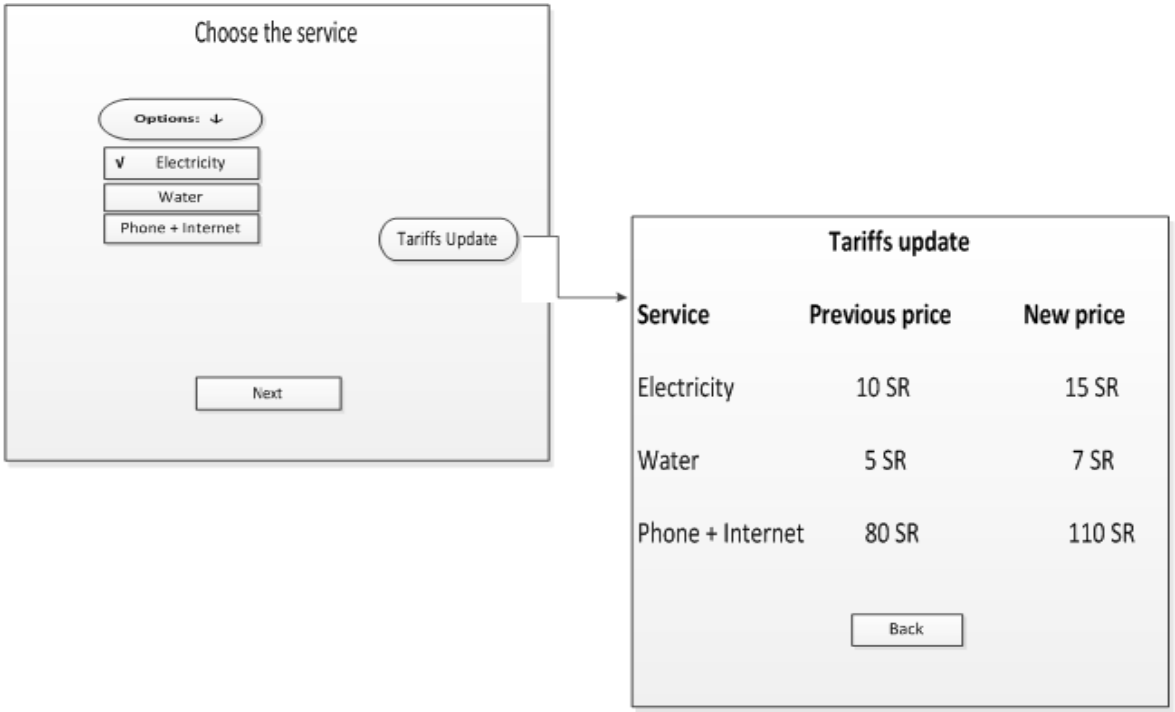

Figure 6-3: Service and tariffs

As shown in Figure 6-3, there is a main button of options, which provides them with the choice of which utility bill they want to see and pay. Underneath the options button, there are three other buttons showing the options of electricity, water and phone and internet. By checking the appropriate button and entering the reference in the reference space, the users, by clicking the view button, will be able to see the amount of bills against their name for the particular service. The window shown in Figure 6-4 will open.

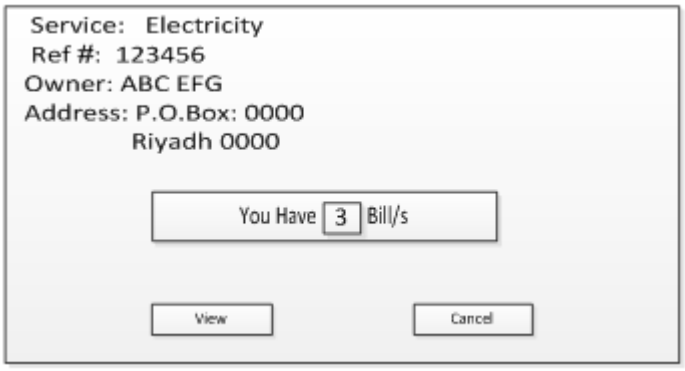

Figure 6-4: Customer account info

If a user chooses electricity service, the above screen will show the number of bills against his/her name. The user can choose to view the detail of the bills by choosing the view button, which will take him/her to the next screen. However, the users can opt to cancel and exit. By choosing to view the details of the bills, the user will see the screen shown in Figure 6-5.

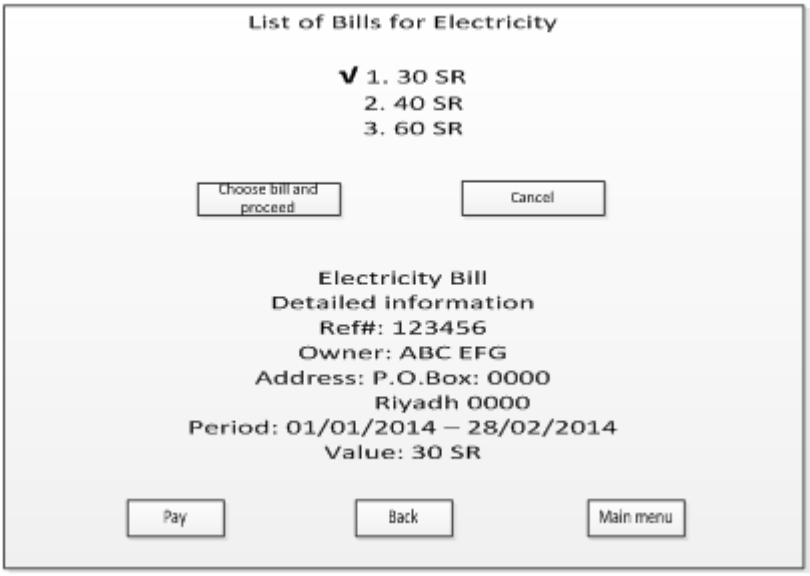

Figure 6-5: Billing info

This screen provides details of the bill including the amount to be paid, the owner's name, address and period for which the bill is generated and due. The users will have five different options on this screen: choose bill and proceed, cancel, pay, back and main menu. The clients can choose to scroll back and go to the main menu as well. However, if they choose bill and proceed or select the 'pay' button, they will see the screen shown in Figure 6-6.

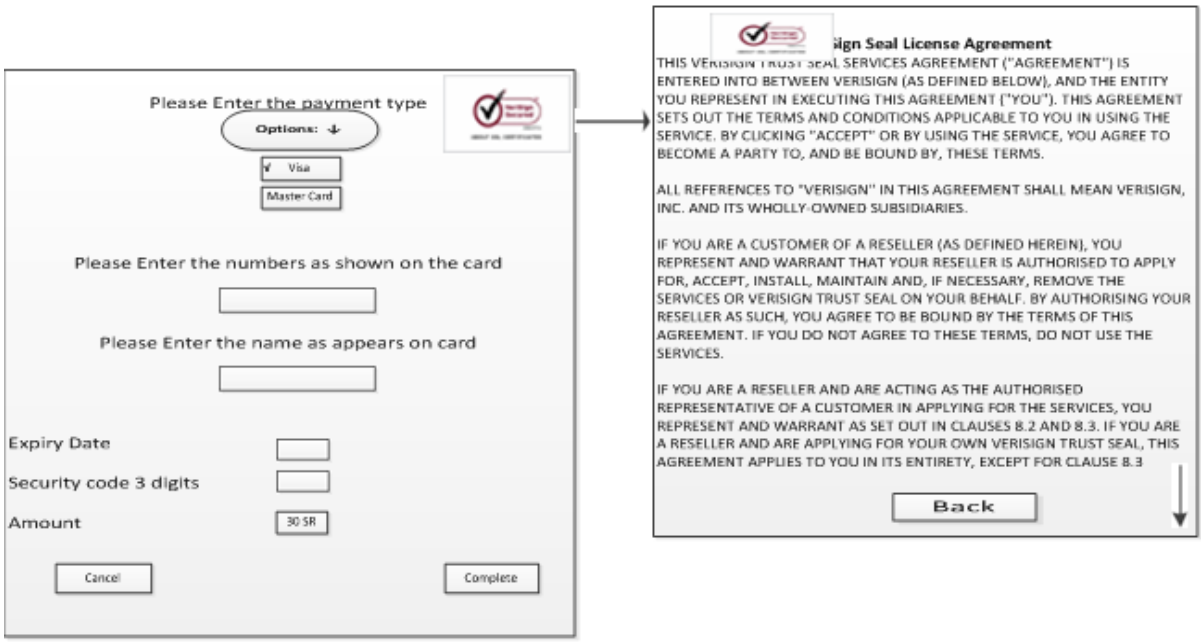

Figure 6-6: Payment terms and conditions

This screen is about making the payments. The users will have options of selecting the payment type of credit or debit card. By entering the card number, name, expiry date and security code, and then by choosing the ‘complete’ button the users will make the payment for the chosen service, which in this particular example was electricity. To complete the transaction, the user will also have to sign the agreement as shown in the above sketch. After making the payment, the users will see the message shown in Figure 6-7.

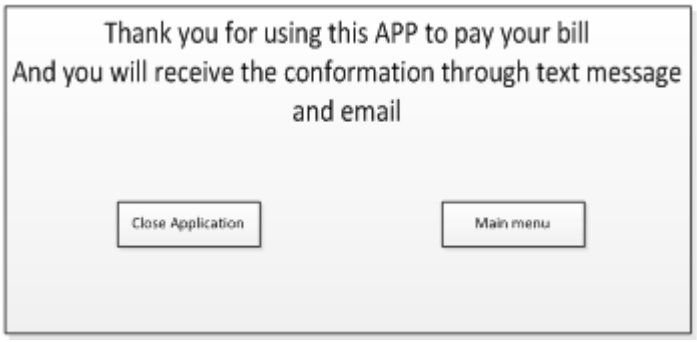

Figure 6-7: Payment confirmation

The above screen has two buttons and they can close the application or opt to enter the main menu. This is the final step for paying the bills.

Eclipse Classic Version was used to develop this prototype. Eclipse is a program that has been used by millions of developers around the world. It was created by hundreds of expert developers to accommodate most of the difficulties they faced, especially when Android became one of the most powerful platforms. The application was designed on Eclipse using a Windows operating system platform. As soon as the development tool was downloaded along with its Android plugins, the development process started. The

application was downloaded on an Android phone selected specially for the purpose of this thesis. The mobile handset chosen for the thesis were Samsung and iPhone devices with the latest Android version and IOS respectively. Guide for users to use the application is presented as Appendix 5 and Screen shots of application windows on IPhone are presented in Appendix 6.

6.4 Pilot study

The purpose of this pilot study was to evaluate test a prototype design developed for paying utility bills using mobile phone and to detect difficulties that participants may face while using mobile phone application in order to make the design more usable and appropriate for the users to understand and use.

6.4.1 Task

In this thesis, the mobile government service was used for paying utility (electricity, water, phone and internet) bills. Initially, the user taps on the application icon located at the home screen on the Android smart phone provided. The first screen appears as shown in Figure 6-8.

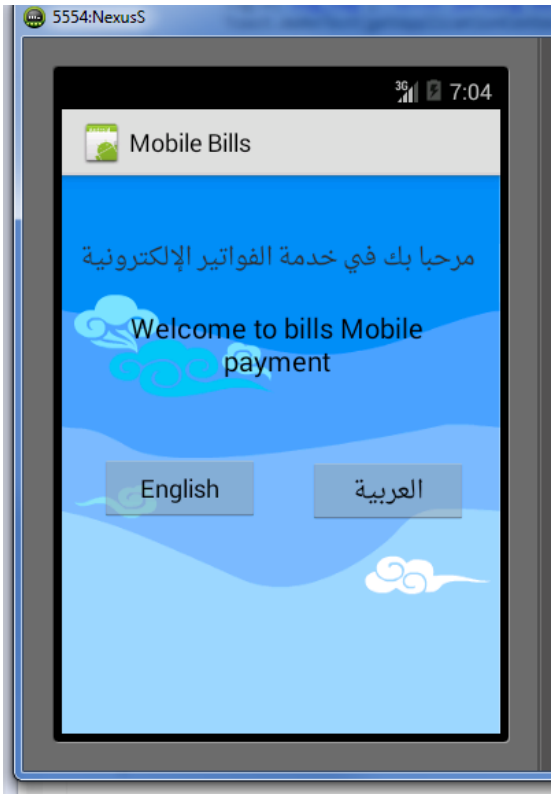

Figure 6-8: Welcome page

There are two buttons on the screen for language selection. By clicking or touching on any of these buttons, the users can select the language and this will take them to the next step of registration shown in Figure 6-9.

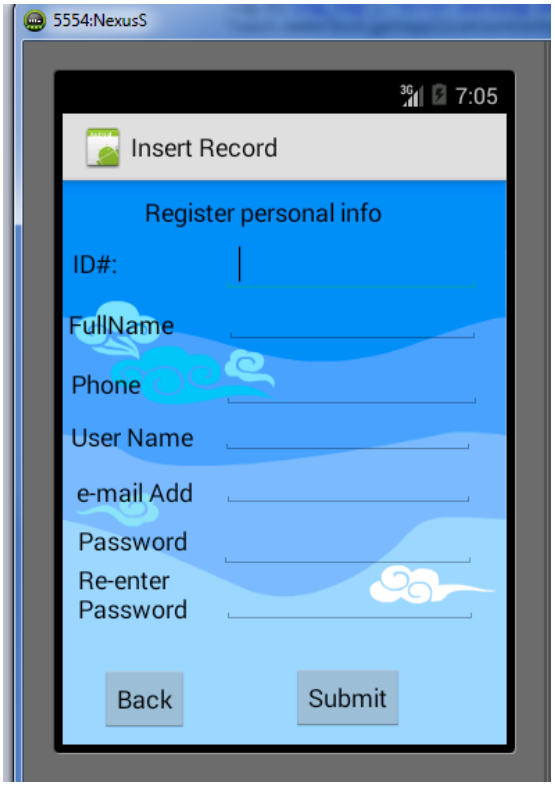

Figure 6-9: Registration

In this step, users will have to register themselves online. It is necessary for all the users that they register online to use this service. Already registered users will use their unique user name and password to login to their account and proceed further for making online payment. Registration involves entering the full name and address; the system will generate available user names. A user can choose an appropriate user name and set the password. For the registered users, the screen shown in Figure 6-10.

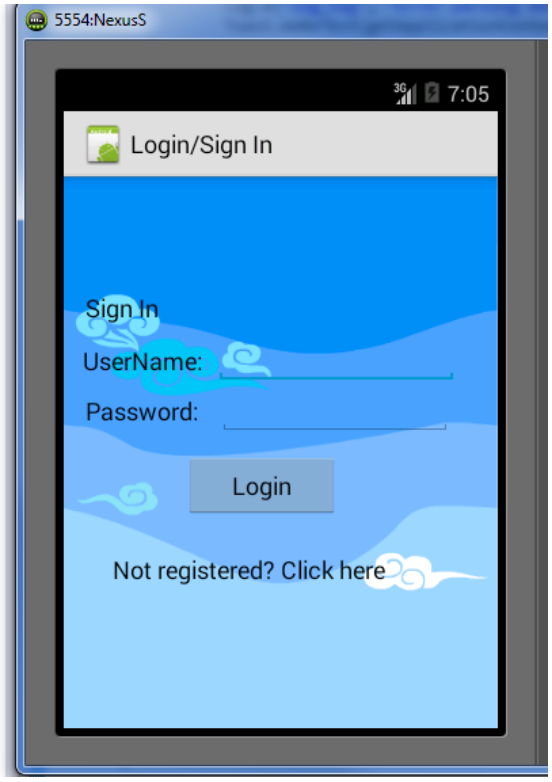

Figure 6-10: Login page

After successful login in the system, following screen appears (Figure 6-11).

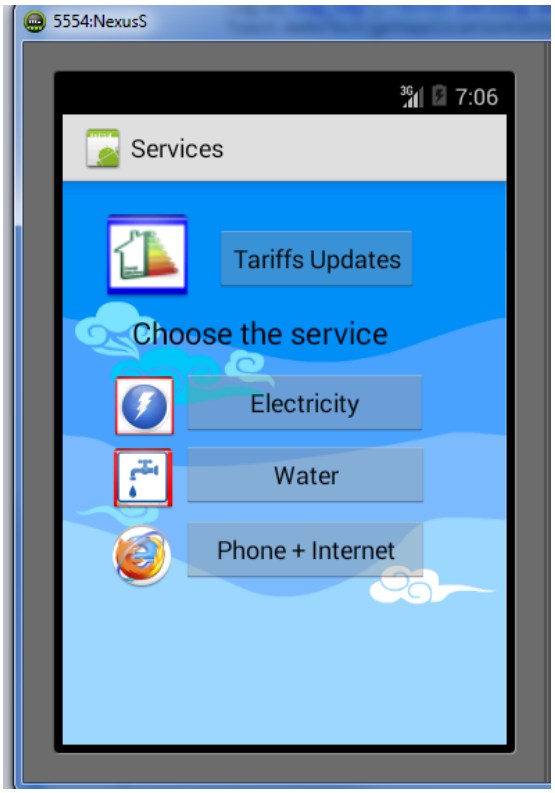

Figure 6-11: Service selection

There is a main button of options, which provides them with the choice of which utility bill they want to see and pay. Underneath the options button, there are three other buttons showing the options of electricity, water and phone and internet. By checking the

appropriate button and entering the reference in the reference space, the users, by clicking the view button, are able to see the amount of bills against their name for the particular service. The window shown in Figure 6-12 opens. This screen provides updated information about the prices of the utilities.

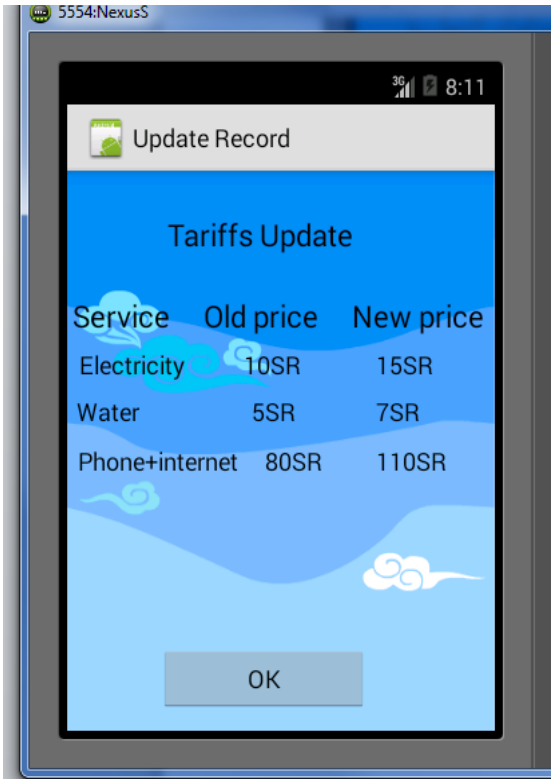

Figure 6-12: Price display

After pressing the OK button, the previous window opens again to choose the service (Figure 6-13).

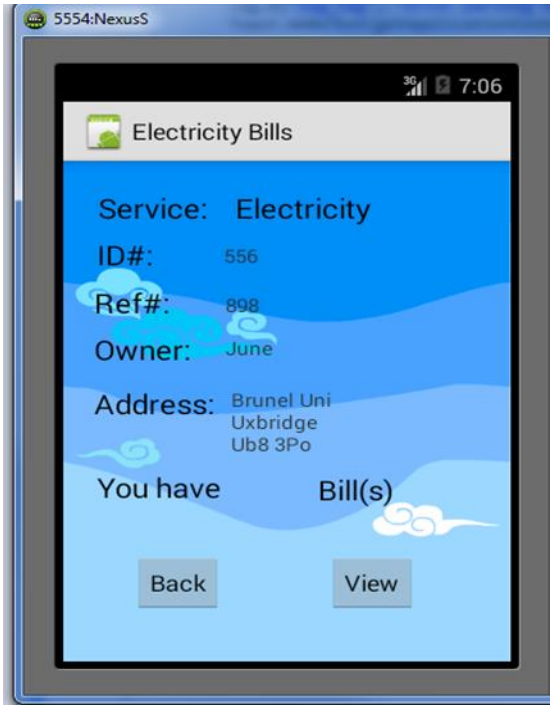

Figure 6-13: List of bills

In this case, a user chose electricity service, then the screen above will show the bills against his/her name. The user can choose to view the detail of the bills by the view button, which will take him/her to the next screen. However, the users can go to main menu as well. By choosing to pay a particular bill, the user will see the following screen (

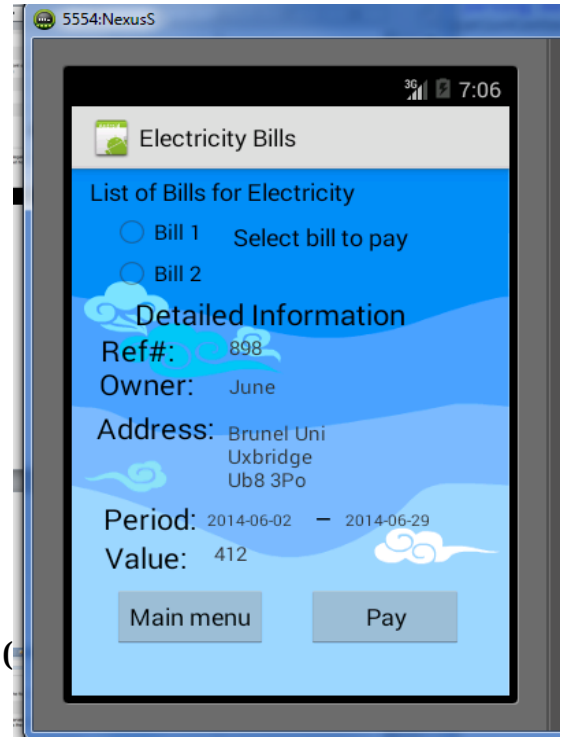

Figure 6-14).

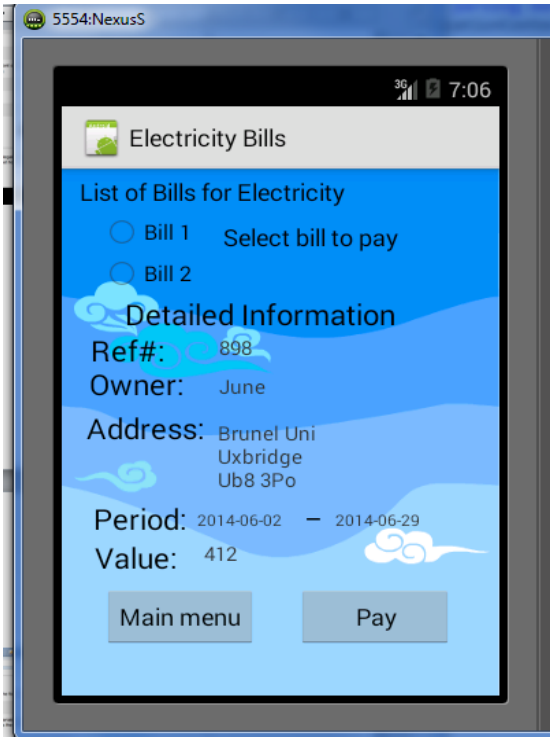

Figure 6-14: Customer ID for bill

This screen provides details of the bill including the amount to be paid, the owner's name, address and period for which the bill is generated and due. The users have two different options on this screen: pay or main menu. If they choose the former the following screen appears (Figure 6-15).

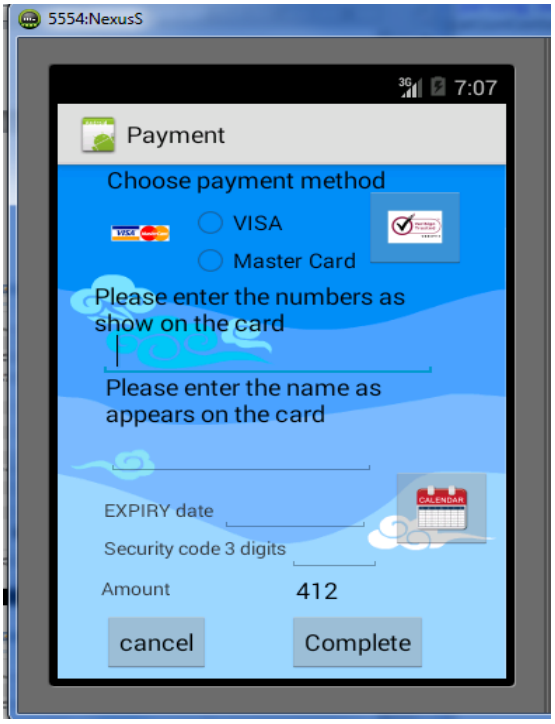

Figure 6-15: Choose payment method

This screen is about making payments. The users will have options of selecting the payment type, such as Visa or MasterCard. By entering the card number, name, expiry date and security code, and then by choosing the ‘complete’ button users will make the payment for the chosen service, which in this particular example was electricity. As the users press the complete button, the following screen about payment confirmation appears (Figure 6-16).

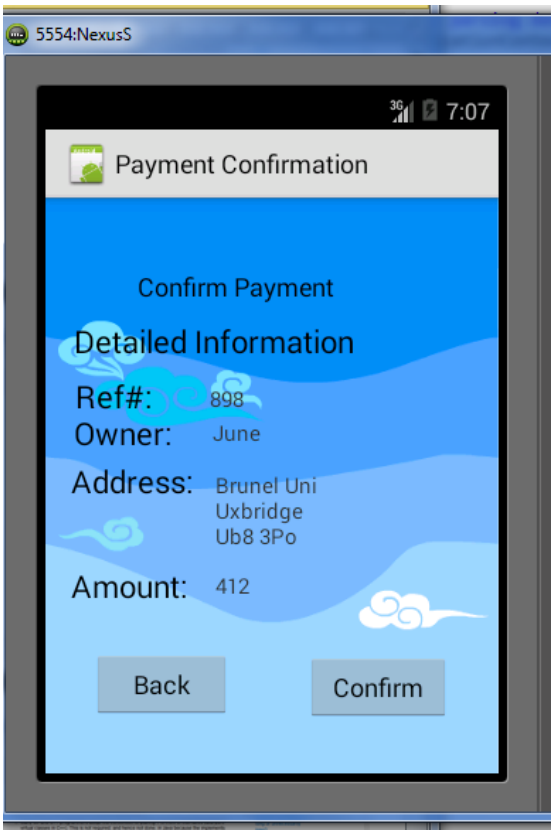

Figure 6-16: Payment confirmation

If the user presses the confirm button, the next screen which appears is about the license agreement. To complete the transaction, the user will also have to sign the agreement as shown in Figure 6-17.

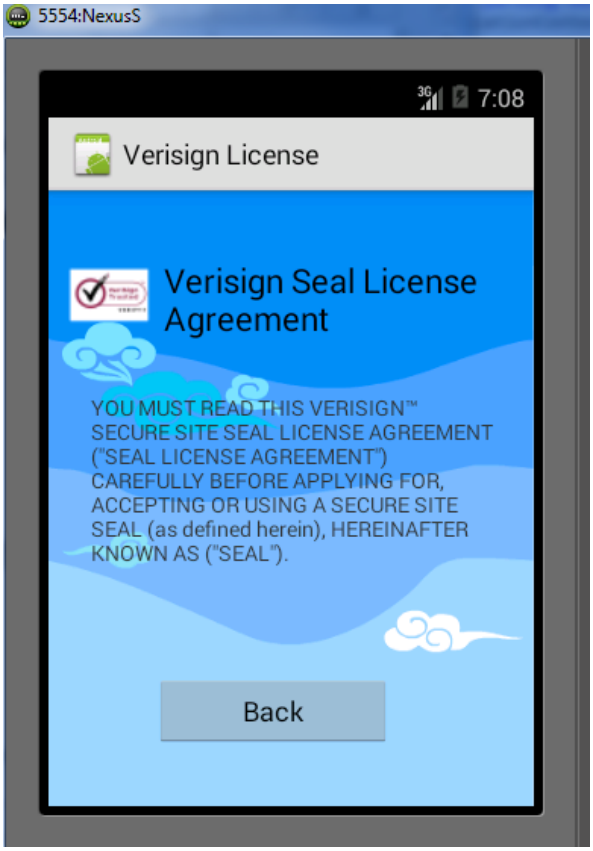

Figure 6-17: Licence agreement

After making the payment, the users will see the following message (Figure 6-18).

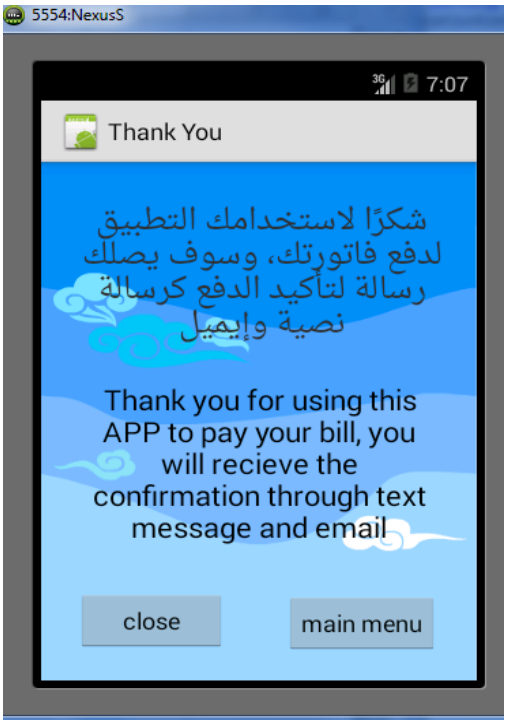

Figure 6-18: Thank you and confirmation

The above screen has two buttons enabling users to close the application or opt to enter the main menu. This is the final step for paying the bills.

6.4.2 Participants

A small-scale study with 15 participants (9 male and 6 female), aged between 18-50 years was carried out. The guide for users to use the applications is shown in Appendix 5.

6.4.3 Data collection

The research purpose was to understand what the respondents think about the payment of utility bills to be made using mobile phones. This helped to receive feedback from the respondents as well as understand the willingness of the respondents to use this service on their mobile phones. This study also provides data about any concerns of the users about the use of this service, including the ease of use, any security concerns they have about their personal and credit or debit card information or any other issues relevant to paying bills through mobile. In other words, this prototype study brings to the fore opportunities and challenges of the mobile government services particularly utility bills services using the online system.

Primary data was collected using thinking aloud technique. This enables the researchers to observe first-hand the task completion process instead of looking at the final outcome. Researchers are expected to take notes of verbal behaviour of the respondents without trying to interpret words and actions. The sessions were video and audio recorded. The aim of this method was to create explicit reports of the implicit processes and practices involved in the actual practice and performance of a task. Thinking aloud paradigm was used with 15 Saudi citizens were observed for this purpose. This facilitated the understanding of the users' mental model about the design and the use of mobile phone application along with understanding any issues they foresee in the use of this application.

This thinking aloud method was followed by the use of a qualitative research design. To achieve the aim, this thesis used qualitative research design for the purpose of generating in-depth data about the willingness of the people to use this service, their concerns of safety and security and the overall process of making payments. Data was collected using semi-structured interviews, which initially asked questions about each of the above steps involved in the bill payments using mobiles. The potential users research was conducted face-to-face and they were presented the complete Mobile Application drawn prototype on a paper and were explained the purpose.

6.4.4 Procedure

A set of semi-structured question was used as a research instrument (Bryman, 2012). Thus, data was collected using semi-structured interviews asking about the use of different steps involved in the bill payments using mobiles. The participants were to explain the purpose through testing prototype design and features in order to improve the features and make it easier for the users. After the test, people were asked questions about each different steps of the online payment system and main focus was to understand what kind of issues they face in every step. Questions were also asked about different any issues in order to understand the perceptions of the respondents about this overall service. The test was video recorded and they were informed about video recording and permission was taken from them.

Initially, primary data was collected using 'thinking aloud' technique, in which respondents are asked to think aloud while thinking about solving problem or making any decision (Ericsson and Simon, 1993). This enables the researchers to observe first-hand the task completion process instead of looking at the final outcome. Researchers are expected to take notes of verbal behaviour of the respondents without trying to interpret words and actions. These sessions are also video and audio recorded. The aim of this method is to create explicit reports of the implicit processes and practices involved in the actual practice and performance of a task. Thinking aloud method is based on the assumption that human brain works like an automated information processing system, which involves *"a memory containing symbol structures, a processor, effectors and receptors"* (Newell and Simon, 1972, 20).

Newell and Simon (1972) suggest that human memory comprises distinct short- and long-term memories. Short-term memory contains information instantly available to be used by the problem solver. However, this memory is temporary and has limited application but can be appropriate in particular situations. On the other hand, long-term memory is stored in a large number of integrated nodes. To use long-term memory, it needs to be converted into short-term memory. Randomly selected respondents were observed for this purpose to facilitate understanding of users' mental model about the design and the use of mobile phone application, along with any issues they foresee in the use of this application.

The purpose is to understand what the respondents think about the payment of utility bills to be made using mobile phones. This will help to receive feedback from the respondents as well as understand the willingness of the respondents to use this service on their mobile

phones. This study also provides data about any concerns of the users about the use of this service, including ease of use, any security concerns they have about their personal and credit or debit card information or any other issues relevant to m-payment of bills. In other words, this prototype study will also bring to the fore opportunities and challenges of the mobile government services particularly utility bills services using online system.

This thinking aloud method was followed by the use of a qualitative research design. To achieve the aim, this study used a qualitative research design for the purpose of generating in-depth data about the willingness of the people to use this service, their concerns of safety and security and the overall process of making payments. Data was collected using semi-structured interviews that initially asked questions about each of the above steps involved in the bill payments using mobiles. The potential users were interviewed face-to-face, during which procedure the complete Mobile Application drawn prototype on paper was presented and its purpose explained. They were informed that their participation was to test the prototype design and features in order to improve the features and make it easier for users. The purpose of using simple and basic design was to make sure that the users are at ease while using the application. Ease of use is argued to be a key factor that positively affect the m-government effectiveness (Zamzami and Mahmud, 2012). Abu-Tair and Abu-Shanab (2014) the simple design of the mobile applications positively affect the users' intentions to use m-government services. Therefore, a simple application design was used.

The pilot study involved 15 users. The test was video recorded (with the appropriate ethical procedures and permissions). After the test, participants were asked questions about each different step of the online payment system with the main focus on understanding what kind of issues they face in every step. After the pilot study, necessary changes were made in the prototype and data was collected from a sample of 15 people through semi-structured interview. Questions were asked about different issues in order to understand the perceptions of the respondents about this overall service. Data were analysed using open, axial and selective coding.

Thus, a prototype design for the mobile utility bill payments was designed to evaluate and help the respondents to understand the use and benefits of a mobile government services as well as to bring to the fore opportunities and challenges for this mobile government service. Prototypes are of different types developed for different purposes. The steps involved in the bill payments have been sketched on a paper. These different sketches provide the respondents with visuals of the steps that can be involved in the mobile bill

payments. The development of this mobile government service would save time, travelling hassles and offer other such benefits to the users. This study will highlight different challenges and opportunities about the use and benefits of the mobile government service of utility bill payments in particular and overall mobile government services in general. The set of semi-structured questions is presented in Appendix 4.

A total of 22 questions were developed in the form of open-ended questions with some explanations of answers. Questions were framed on following dimensions:

1. Usability or ease of use of application (questions 1, 2, 3, 5, 6, 7, 12, 13, 14, 15, 17 and 18).
2. Security/misuse of data and personal information (questions 4, 8, 16 and 19).
3. Information on currently available mobile services and government (questions 9, 10, 11, 20, 21 and 22).

Translation and back-translation methods were as described in Section 3.4.

6.4.5 Results

After the competition of the question development, the data was collected from the participants using semi-structured questions about both the usability of application and any other concerns regarding mobile bill payment as the thesis is conducted on finding out the applicability or practicality of a mobile phone application for certain government services encompassing the user friendliness, purposeful, non-cumbersome and effectiveness of the service.

Participants' overall response towards this application was positive. They approved of the usability and easy of navigation of this application through mobile government services. Some of the main features that are liked by participants were its user-friendly approach, simplicity and effectiveness. Responding to the disliked features, most of the participants are content with using it, but some suggested improving the interface and physical appearance of the application. Almost 50% of participants (8 of 15) are not aware of the availability of other m-government services, hence they are not using these services, but all of them expressed intention to use such services if provided.

Some of the participants expressed concern about the security of their personal data and information, but they mentioned that with the sound and reliable service provider they are

willing to use this service. Many participants are of the view that their personal information will not be misused while few showed concern over this issue.

Security, internet charges and people who are not good at using smart phones were tagged as challenges that need to be surmounted for the success of this application. It was also found that speed, availability and expense of using the internet are also concerns. There are places that are not yet properly covered by internet service providers, which hampered the use of this application.

Participants consider time-saving and convenience to be main advantages of this application and it provides access to government services with less effort. Keeping in view the current usage of mobiles, most of the respondents consider this idea as good option.

The results of the thesis clearly indicate that the service is liked by the participants, with a few concerns over security and the reliability of services. These concerns can be addressed through better and experienced service providers with control over personal data. Though most of the participants showed trust over the proper use of their personal and financial data, some are indecisive. Strict laws and regulations are also required to win the trust of users and protect them from fraudulent activities.

Overall, this service is appreciated and respondents show willingness to use this service as it saves them time compared to going to the bank to pay their bills for utilities. The recommendations emerged from the thesis are the improvement of security and reliability features backed by legally developed framework.

The participants did not show concern about the overall prototype and they were satisfied with the overall design of the prototype. The majority of the participants found the application easy to use and contain all the relevant information about the payment of the utility bills.

6.5 Main study

Following the pilot study, the main study aimed to investigate users' attitudes towards using the mobile payment for utilities. This section consists of findings and their interpretation from the main study conducted in order to evaluate the mobile utility bills payment application using paper sketched prototype. An analysis of the responses gathered from the 42 respondents from Saudi Arabia is given below followed by discussion of the results and the conclusion of the chapter.

6.5.1 Task

The task was designed to get participants to use the mobile government service for paying utility bills (electricity, water, phone and internet). At the start of the study each participant was handed an information sheet that explained how the application works in order to assist participants in easy completion of the task. First the user taps on the application icon located at the home screen on the Android smart phone provided. The sequence of screens is similar to that previously explained in the pilot study, as shown in the following sequence of illustrations. The first screen that appears is the welcome screen as shown in Figure 6-19.

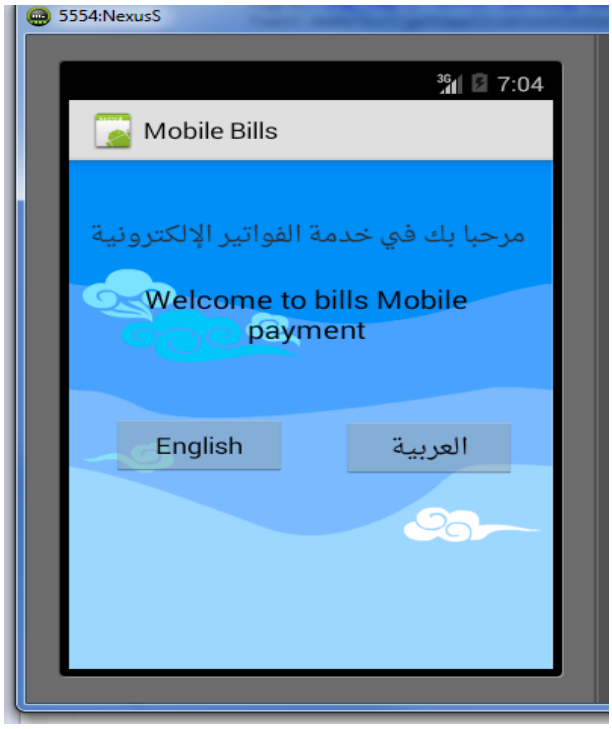

Figure 6-19: Welcome screen

The next screen that appears is about the registration, as shown in Figure 6-20. Following this, the user logs in (Figure 6-21) then selects the required service (Figure 6-22).

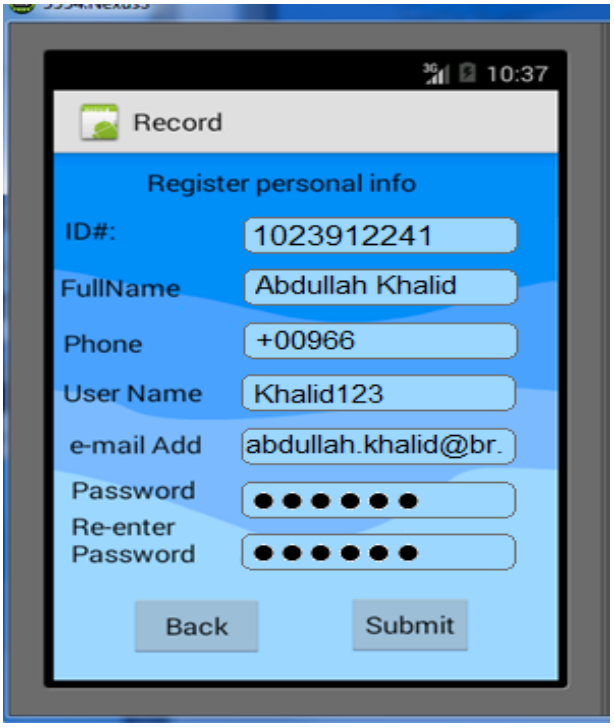

Figure 6-20: Registration

Figure 6-21: Logon

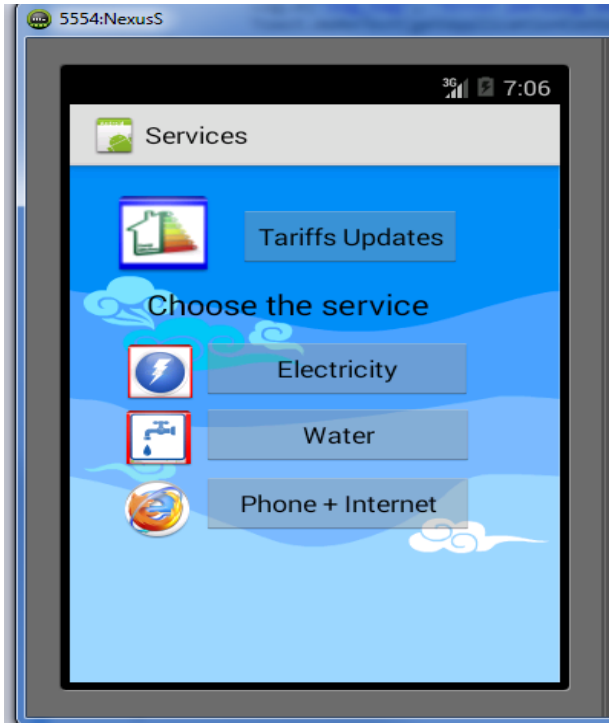

Figure 6-22: Service selection

There is a main button of options, which provides them with the choice of which utility bill they want to see and pay. Underneath the options button, there are three other buttons showing the options of electricity, water and phone and internet. By checking the appropriate button and entering the reference in the reference space, the users, by clicking the view button, are able to see the amount of bills against their name for the particular service. The window shown in Figure 6-23 providing updated information about the prices of the utilities. After pressing the service Electricity button, the subsequent window opens for customers to review the bill information before proceeding to payment, then the same procedure is followed as in the pilot study. In the subsequent screen (Figure 6-24), customers enters their information, then payment information (Figure 6-25). They are then asked to confirm the payment details (Figure 6-26) and then accept the terms and conditions of the licence agreement (Figure 6-27), after which payment confirmation is presented (Figure 6-28).

Figure 6-23: Tariffs update

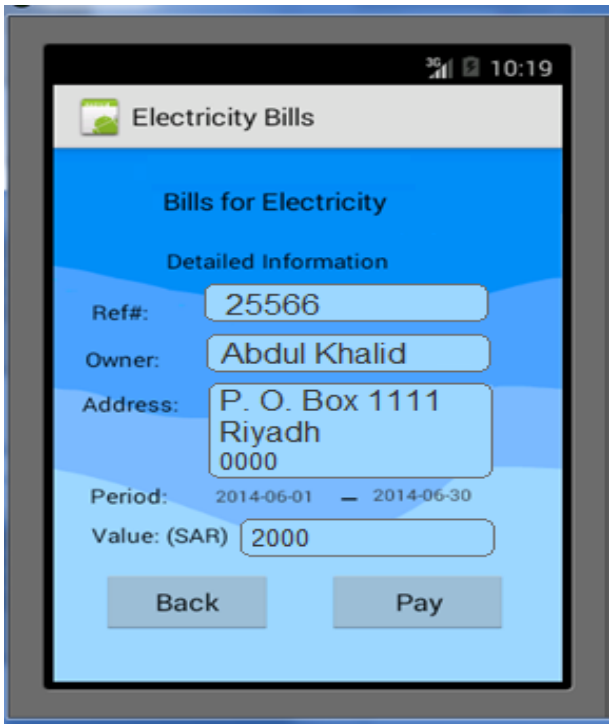

Figure 6-24: Customer information

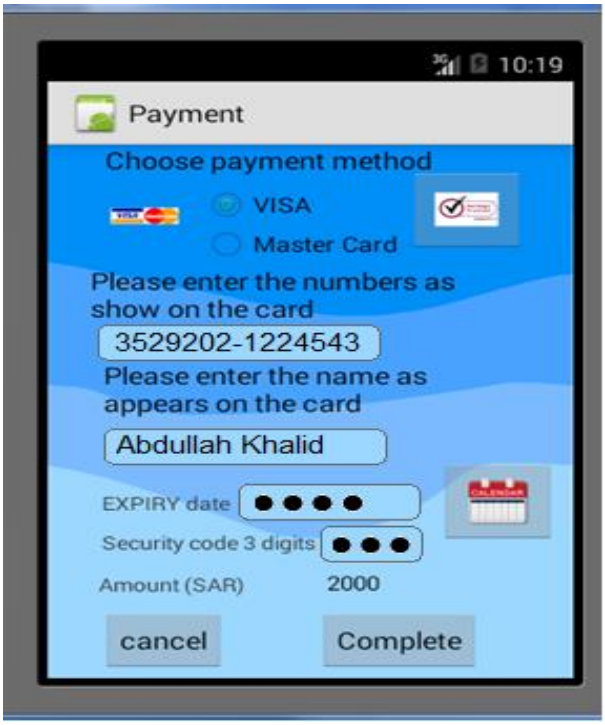

Figure 6-25: Payment screen

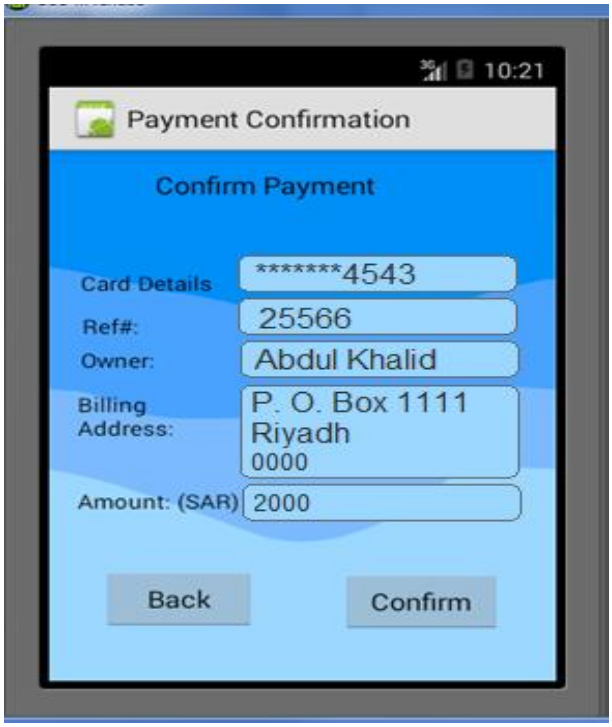

Figure 6-26: Payment confirmation

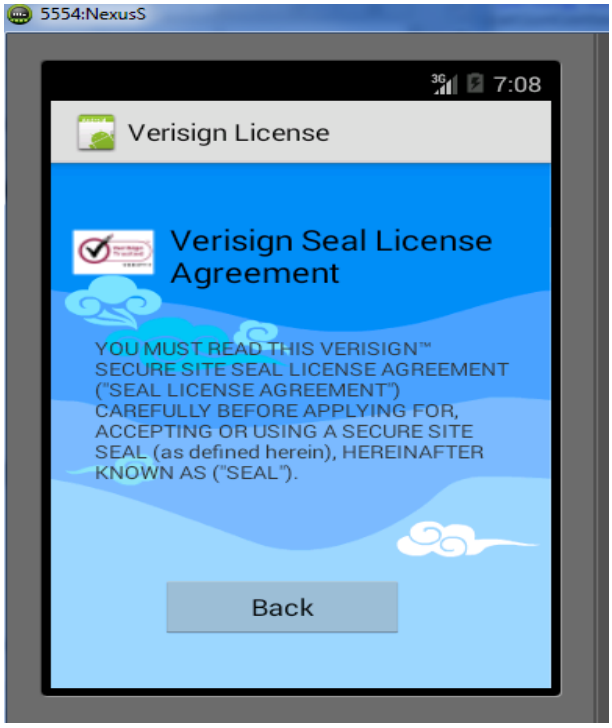

Figure 6-27: Licence agreement

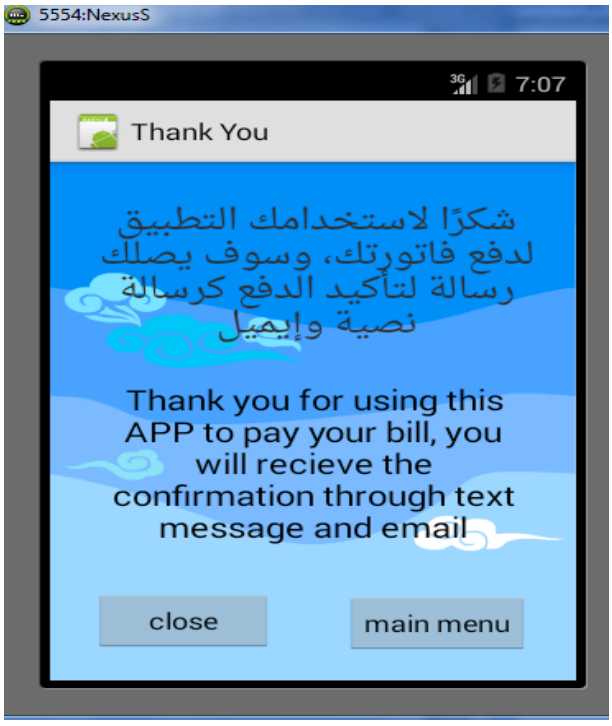

Figure 6-28: Payment confirmation

The above screen has two buttons enabling users to close the application or opt to enter the main menu. This is the final step for paying the bills. These screenshots are for the Android mobile.

6.5.2 Participants

All participants (n=42) were citizens of Saudi Arabia specifically selected for this thesis, aged 18-49 years, comprising both males and females.

Demographic data of participants

Gender

The first question in the questionnaire was to let participants choose their gender. About 66 percent of the participants were males and 34 percent of them were females (Figure 6-29).

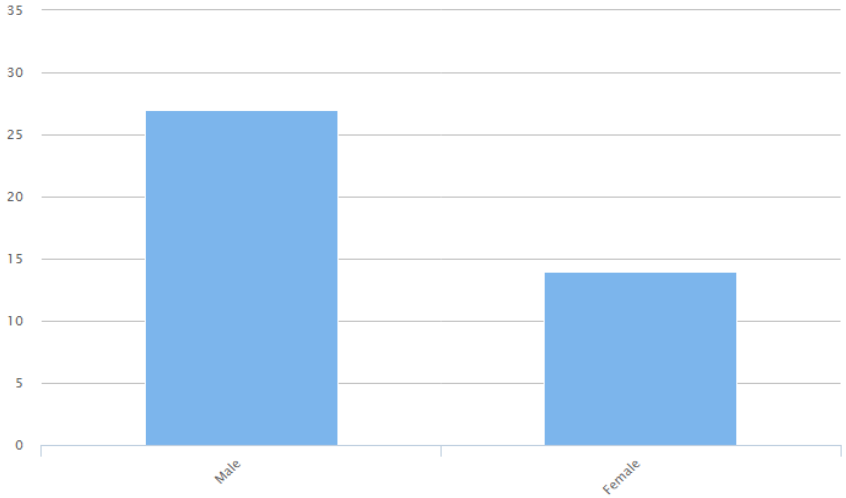

Figure 6-29: Number of participants by gender

Age

The second question asked participants to choose the age bracket they belong to. The participants' ages ranged from 18-50, which was divided into five groups: 18-25, 26-33, 34-41, 42-49 and 50 years plus. 46.3% of the participants fall in the age range of 26-33 years followed by 31.4% aged 34-41 years. Only 14.6% of the participants were of the age group of 18-25 years. None of the participants were 50 plus (Figure 6-30).

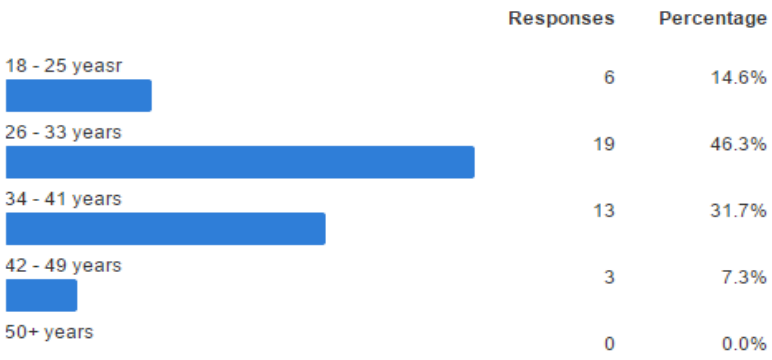

Figure 6-30: Age distribution

Education

The third question was about participants' level of education. In this question education level was divided into four levels: high school or less, diploma, Bachelor degree and higher education. The majority of the participants belonged to higher education level (73.2%). 14.63% of the participants were Bachelor degree, 9.76% had diplomas and only 2.44% of the participants stated high school or less level (Figure 6-31).

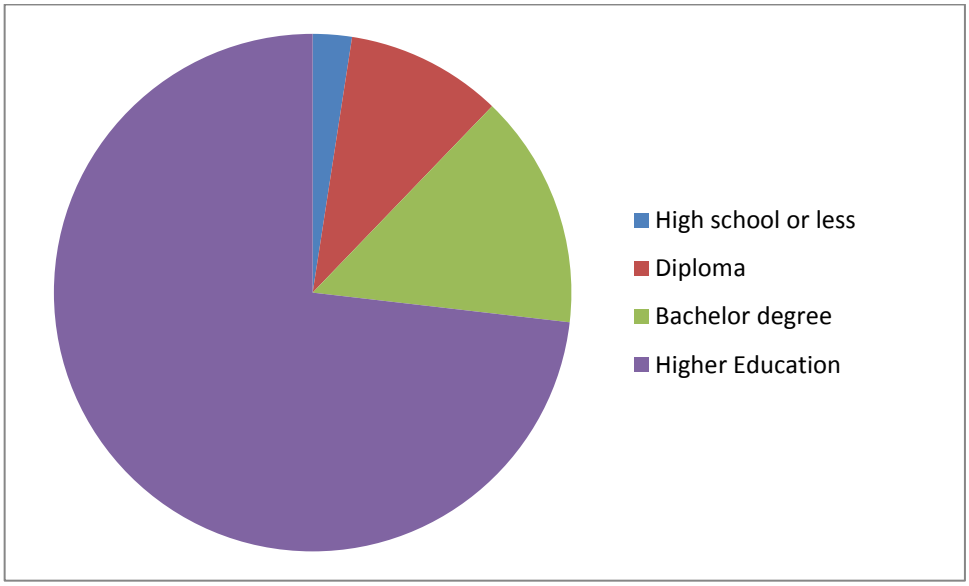

Figure 6-31: Level of education

Position

The fourth question was related to the employment status of participants in the society (employed, unemployed or other). 61% of the participants are employed while 5% of participants who marked themselves in the 'other' category were also employed, describing themselves thus: one as a lawyer, two in the police, one self-employed and one was a student. This 4% variation or confusion may be due to lack of understanding of the question among participants. However, 26.8% of the participants are unemployed (Figure 6-32).

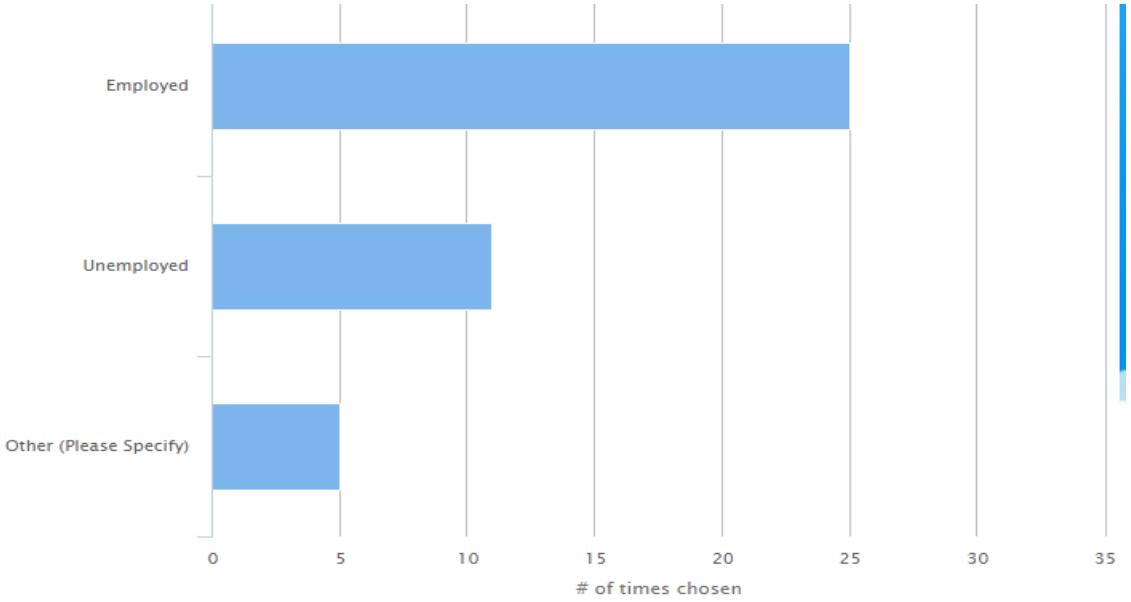

Figure 6-32: Employment status

Type of phone

Finally, in order to see participants' awareness and selection of smart phone, the fifth question was about which phone participants were currently using: IPhone or Android? It was found that about 64.1% of the participant use iPhone while 35.9% use Android (Figure 6-33).

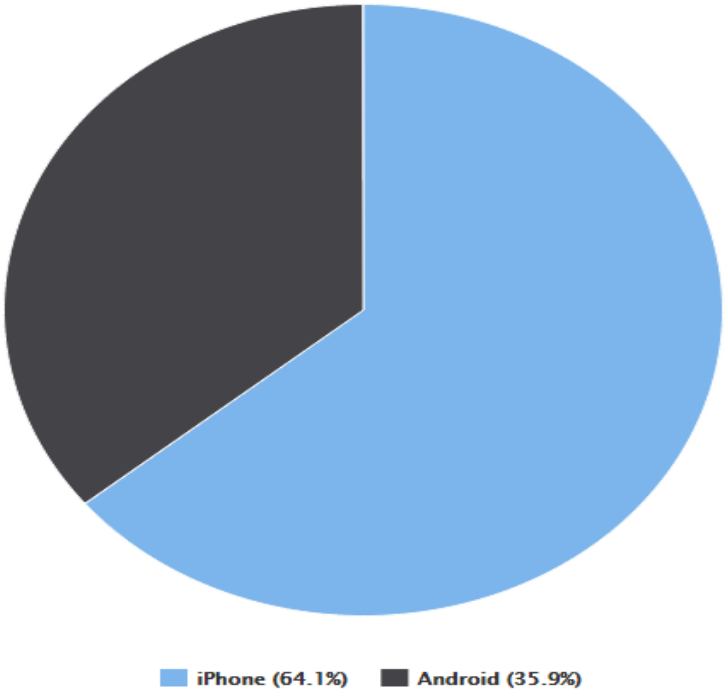

Figure 6-33: Type of phone currently used

6.5.3 Data collection and analysis

The 42 interviews were conducted face-to-face. All the interviews were recorded and transcribed. Each interview lasted 50-60 minutes. Permission was sought and the time and data of interviews were scheduled with the respondents. The interviewees were the people who have used the prototype. The prototypes have certain limitations particularly in the context of this study. For example, the prototypes do not reveal the security and privacy issues relevant to the use of these services in the real situation. The issues of speed and internet connectivity as well as the availability issues are hard to determine using prototype. These issues can result in frustration of the users and negatively affect their future intentions of using the services. Thus, prototype may not reveal the key issues. However, the purpose of this study has been to analyse at least some of the issues that are relevant to usability of the m-government service. Therefore, despite issues and limitations of the prototype, this study has brought to the fore a few of the important concerns of the users about the use of m-government services. They were allowed to use the application once for 15 minutes. As mentioned in chapter 5, qualitative data was analysed using thematic analysis (Braun and Clarke, 2006), which focuses on examining, identifying and recording themes emerging from the data.

6.5.4 Procedure

After performing the task in which participants' behaviour was fully noticed, these participants were interviewed face-to-face. In order to get feedback of participants with their opinions, semi-structure questions were used. All these participants were iPhone or Android users. The guide for users to use the applications is shown in Appendix 5.

6.5.5 Results of the main study

The key themes emerged from the data are summarised in Table 6-1 and discussed below.

User friendly service

In order to get a clear response and participants' opinions about the use of the application as to how user-friendly and convenient it was, an open-ended question was asked. About 99% of the participants were of the opinion that usage of the application was really easy, simple and direct. Its simplicity, user-friendly approach and step-by-step guidance were highly appreciated. Participants were of the opinion that the application is an effective tool to help users pay utility bills and also keep track of them.

Table 6-1: Key themes

Themes	*Quotes (respondents)*
User friendly	It has a good, easy to read interface, although it is slow. If you shift to a different window and switch back to the app, the questions revert back to the first one (2). Yes, clear and simple (29). Very easy to use and updates are the best (35)
Availability of information	Yes, very structured, links for everything available (4) It was easy to find the information I was looking for (18) Not always. Sometimes I find it difficult to get the required service due to unavailability (27)
Future intentions of using service	Yes, because I think it would make a payment for such service much easier (24). Yes, it's easy to use it and save time and effort (27) Of course, it saves time and effort, you only need to add the tracking of previous bills, that would be useful (37).
Trust in system for providing financial details	Actually no, I think it still needs data security (13) No, I would recommend that payment goes through iTunes payment if the credit card is registered, iTunes provides continuous security support for their application and they've been in the business for years (39). If this service is provided to me through a trusted company of government agencies then that should be ok (42).
The most liked features	Moving from one step to another was easy (25) The concept of its procedures was clear and easy to learn and use (24). The simplicity in working with the application. Gathering different services in one application (37). User friendly (1)
Disliked features	Nothing, the app looks fine to me (20) Nothing to be disliked (22). The security (19) Data security - not sure about it (15) Slow speed (3)
Using service at different locations	Yes, if additional security measures are in place, e.g. additional password or security question for registration and usage abroad (17) Yes, to make the life easy (3) Yes, whenever internet access is available in any location I will use this service (6)
Safety of personal information	I don't think it will be a problem, but I have doubts about its security (9) I don't think it's safe, the government who designs this application needs to keep the personal information for its customers, otherwise the data will be confused and end up making problems with the clients (24)
Awareness about the services	Yes, the government provides many services payable through mobile (27) As they provide the mobile services I must be aware of the payment system. It's usually via debit card or Master and Visa cards (41). Yes, I've used some of them (27)
E-government service users	Yes, because it is easy and quick service (30) Yes, in the Ministry of Higher Education, Absher service (33) Yes, to check traffic fines, apply for a new job, apply for scholarship, apply for free land from the government (37) Not really (13)
Convenience of using m-government services	Yes, it allows the user to access the services from any place anytime of the day (11) Yes, because it is available 24/7 (15) Yes, but you need to improve it (23) Yes, if organised by government laws (25)
Obstacles	It might be the security issue (9) Data security and safety issues (13) Internet speed, prices (expensive), trust and security (1)
Personalisation of services	Definitely yes. Whenever the services are individually designed, they reflect the comfort and safety when used (27). Yes, as I'll customise it to suit my needs (29) Yes, of course because every user has special needs and requirements (41)

Themes	*Quotes (respondents)*
Needs for regulations	Definitely yes in order to protect the user data and privacy (41) Yes, the government must do great effort and effective work to introduce laws and regulations that regulate electronic and mobile data transfer between the following stakeholders. In order to protect users' data and to make users more confident when using m-government services (42) Yes, regulation of the mobile data is very important to encourage people to use the services (31)
Internet access	Yes, nowadays with technology (9) No, some places are not covered very well by 3G (6) No, some rural areas, 3G is not working there, as well as in major cities, the coverage of 3G is not good in some areas (7).
High internet cost	Yes, it is slightly more expensive compared with other countries (21) I think cellular data prices in Saudi Arabia are still relatively high (29).

According to participants, the guided transition of the application from one step to another was very easy and smooth. For example, two respondents said:

> *"It has a good easy to read interface although it is slow. If you shift to a different window and switch back to the app, the questions revert back to the first one"* (Respondent 2).

> *"Very easy to use and updates are the best"* (Respondent 35).

However, one participant was of the opinion that application is slow, as going back to the previous window brings the user to the very initial phase of questioning that has already been answered, which is considered time-consuming.

> *"The process is time-consuming and slow. Going back to the previous window brings the user to the very initial phase"* (Respondent 15).

In fact, user-friendliness and ease of use with clear instructions were highly appreciated. Some participants stated that this service was much better than banking portals they had experienced. Some participants stated that this service is cost effective in terms of saving time and money. The initial download is free on smart phones, plus it minimizes the physical effort of paying utility bills. Different utilities are combined under one application, which reduces the time that would otherwise have been required to pay the bills. Some participants cited the ease with which users find all their billing history with new tariff rates. In short, user-friendly approach, layout of the application, collective data and cost effectiveness were the main attributes of the services that were highly regarded by the participants.

Availability of information

About 92% of users are of the opinion that finding information is very easy and simple, with the clarity of instruction and design offering great support. According to the participants, the previous record and history of payment transactions makes record-keeping and tracking payment easy. As participants are provided with various internet packages with different features, updating participants about the current tariff rates is very helpful and highly appreciated among the users. The availability of different utility providers under same one application has lessened the hassle of bill payers, hence having a positive impact on a major chuck of the Saudi population. This application was referred to by some participants as an information clearing house, as all the relevant latest information is easily available.

> *"It was easy to find the information I was looking for:* (Respondent 18).

Participants appreciated the layout structure as being simple and very clear:

> *"Yes, very structured, links for everything available"* (Respondent 4).

The majority of the participants stated that ease of use and convenience are the prime reasons for using mobile government services. Respondents were of the opinion that such services save time and cost. The key reasons for not using mobile government services were mainly security concerns. These respondents showed lack of trust in such applications.

However, participants did express some concerns about connecting to phone and internet services being difficult at times, and potential hurdles in knowing the individual bill or utility to be paid. 7.3% of the participants were of the opinion that finding information was not easy. However, these users did not state any particular reason behind their negative response, with only one stating that at times it is difficult to get required service due to unavailability of information, which is contradictory to the majority response and opinion.

Future intentions of using m-government services

Almost all (99%) participants showed positive attitudes towards the use of service again. Participants are willing to trust certified applications they consider reliable. Such applications are considered cost-effective and they save time. As the usage of smart phones and gadgets like iPads and Galaxy tablet etc. have increased among the population of

Saudi Arabia, people increasingly appreciate the use of such applications. The application was considered simple to use as the language was very easy to understand. For instance, one of the respondents stated:

> *"Yes, because I think it would make a payment for such service much easier"* (Respondent 24).

Another respondent said:

> *"Yes, I will use in future, as it's easy to use it and save time and effort* (Respondent 27)

Thus, a huge percentage of the participants show strong desire to use such services, which is a sign of opportunity for the providers and developers. These respondents are looking forward for these services as they are cost effective, easy to use without any hassle and they save time. Participants suggested that the services should be readily available on smart phones, and that they should be well structured and secure to attract users and increase usage. However, it was advised that such applications need to be more comprehension to enhance usage and reliability. Participants felt encouraged to use this application for all government agencies to pay bills as it is easier and more convenient.

Trust in the system for providing financial details

About 70% of the participants were willing to provide financial details if the service was provided by a trusted company or a government agency with a strong security program. Certification of application was highly recommended and in demand to build users' trust and confidence. Some participants had already used such services in reality and thus they had disclosed their financial details to service providers, so they consider it safe and reliable with no security problems. Moreover, the majority of participants were interested in knowing the security plans and measures that would be taken by the services provided in order to keep their financial details secure and safe. Payment through companies like PayPal or VeriSign secured payments are trusted by the participants. The following responses of the respondents offer such examples. According to a respondent,

> *"If this service was provide to me through a trusted company of government agencies then that should be ok"* (Respondent 42).

30% of the participants were reluctant to give away the financial details because they had some security issues. For example, a respondent said:

> *"Actually no, I think it still needs more data security"* (Respondent 13).

Some participants recommended that payment should be through the use of credit card, like the iTunes payment facility, as they believe that it is a tested and widely accepted way of payment worldwide with minimal security concerns:

> *"No, I would recommend that payment goes through iTunes payment if a credit card is registered, iTunes provide continuous security support for their application and they've been in the business for years"* (Respondent 39).

A few participants gave examples of past bad experiences with providing financial details, which further suggests that authentic and tested websites and agencies will be trusted. Furthermore, some of the participants were not concerned about the security concerns while providing the financial details as they considered it as a trail, and they did not pay attention to this particular point of concern.

Disliked features: security and speed

About 30% of the participants were of the opinion that there is nothing in particular that they disliked about using the service. For example, the two of the respondents respectively suggested:

> *"Nothing , the app looks fine to me"* (Respondent 20)

> *"Nothing to be disliked"* (Respondent 22).

However, 50% of the participants were not comfortable with the security in regard to personal and financial information. Participants were not comfortable to leave their credit card details and personal information. Misuse of information was major threat to participants, which further added reluctance to usage of the application. For instance, one of the respondents suggested: *"The security is the main issue"* (Respondent 19). Another respondent (15) stated that: *"Data security is the key problem"*. Slow speed was also mentioned as a key issue too.

Furthermore, 10% of the participants said that application should be providing some more services offered by other government agencies in KSA, such as the ministries of Interior,

Foreign Affairs, Labour and Social Affairs. These participants were of the opinion that the application lacked some important and common services that must be included to make it more appealing and attractive.

The remaining 10% of the participants had concerns with the format, speed and colour of the application. Participants disliked the blue colour of the screen, the small size of the text box and problems with scrolling. These participants believed that there is no facility in the application for reporting problems, such as technical problems, and the application did face speed issues; it is considered slow, which further halts application's performance and efficiency.

Use of the service at different locations

Of the participants who had security concerns, 30% were not in favour of using the service in different locations as they had trust issues in regard to their personal and financial information. These participants were reluctant to take risks and they said that they are convinced with traditional methods used for paying bills in different locations. Lack of trust in different location is primary reason for their rejection to service use in different locations. One of the respondents said:

> *"Yes if additional security measures are in place, e.g. additional password or security question for registration and usage abroad"* (Respondent 17).

> *"Yes, whenever internet access is available in any location I will use this service"* (Respondent 6)

However, 69% of the participants were willing to use such services in different locations as well because it is convenient, user-friendly and saves time. For example one respondent said: *"Yes, to make the life easy"* (Respondent 3).

Indeed a vast majority of the participants were of the opinion that mobile services are convenient to access government services however there is still of improvement demanded by the users of the service. Participants were of the opinion that service providers must work of the payment procedures, tight security measures taken to gain trust and enhance the speed of the service.

However, a few participants specified that this usage was highly dependent on the authenticity of the provider (i.e. company name or government support being available).

11% of the participants were indecisive about the trying the services in different locations as they believed that the availability of service and Wi-Fi was important. These participants were not sure about using it in different locations.

Safety of personal information

70% of the participants were of the view that as long as government official agencies are involved their personal information will remain protected. In Saudi Arabia the government has laws and legislation designed to protect users' data and information. Participants demanded that service providers need to assure their clients by providing a clear disclaimer. Participants, being citizens of KSA, fully trusted the authenticity of the Ministry of Communication and Information Technology in supporting data security. One of the respondents said. *"I think its secure and the ministry is taking care of it"* (Respondent 5).

20% of the respondents were not sure whether their information would be kept in safe hands. These respondents said that all these security concerns depended on the type of service provider used. Participants were of the view that after using the application one can clearly give feedback and share their true experience. 10% of the participants were clearly of the opinion that their personal information would be misused and they have clear security concerns while using these applications. For example, one respondent said: *"I have doubts about its security"* (Respondent 9)

Awareness of mobile payment system of different government services

About 77% of the participants were fully aware about the mobile payment systems provided by different government agencies. For example, one of the respondents stated:

> *"Yes, the government provides many services that pay through mobile"* (Respondent 27)

Another respondent said:

> *"As they provide the mobile services I am aware of payment system. it usually via debit card or master and visa cards* (Respondent 41).

However, participants were of the view that these applications are not user-friendly and need a lot of amendments. They stated that they normally use their cards for payment. Some participants suggested that as a large proportion of Saudi citizens do not have credit

cards to make such payments, these services should introduce applications like Sadad service (direct debit/bank transfer to service providers). A few participants, being the users of such services, were not fully satisfied with the usage due to security concerns. 23% of the participants were not aware of any such bill payment service provided by the government.

Using e-government services

Surprisingly, 76% of respondents reported that they used e-government service, mainly to pay fees, renew licenses and passports, and to check tariffs and utility bills. *Absher* service (provided by the Ministry of Interior) was commonly used by the participants. This service is considered easy to use. The following statements of the respondents supports this finding.

> *"Yes, because it is easy and quick service"* (Respondent 30)
>
> *"Yes, in the Ministry of Higher Education, Absher service"* (Respondent 33)
>
> *"Yes, to check traffic fines, apply for a new job, apply for a scholarship, apply for free land from the government"* (Respondent 37)

However its access though smart phones and gadgets is slow, and so participants are required to use laptops. Again, 24% of the respondents expressed security and trust issues in using e-government services and preferred not to use them until such concerns are resolved.

Obstacles facing m-government services

About 70% of the participants were of the opinion that lack of trust and security is the main obstacle in m government service. Respondents do not trust this technology for payment, as it is considered less reliable and have complex procedures. One respondent stated that *"it is the security issue"* (Respondent 9). Another statement of a respondent highlighted the same issue of *"data security and safety issues"* (Respondent 13).

Thus, a huge percentage of the respondents were of the opinion that data security and safety issues are the main concerns when using such services. Participants expressed the fear of misuse of information, leakage of confidential financial data through hacking and scam threats. Providers are advised to have certified trusted protection system of the information that is built in users' confidence and trust. Only a few participants were of the

opinion that currently security of data is not an issue but developer and government should keep working on improving and making security system stricter with zero loopholes. Thus, security is amongst the key issues.

30% of the respondents stated that lack of network coverage in certain locations results in disconnection and also leads to corruption of any process with the mobile. On smart phones and gadgets like iPad the service is not very good as the speed is slow. The available internet infrastructure in KSA was criticised by the participants in terms of speed and cost. The issue of network and internet speed can be understood from the following statement of a respondent

> *"Internet speed and lack of network are the key issues"* (Respondent 1)

Many of the participants said that they do have internet access everywhere and face no particular issue. A large percentage the respondents stated that the internet is not readily available in all areas. The latter were generally of the opinion that internet service is not readily available, and if weak signals are available somewhere they are not free of charge. These participants were of the view that network problems with coverage are due to a lack of proper internet infrastructure within the country.

However, the internet providers such as the telecommunication companies are trying to upgrade the internet speed by using *Fiber to the Home* (FTTH). 14.6% of the respondents were of the opinion that there is no problem with the speed and availability of the internet. Moreover, 9.7% of the respondents suggested that the speed and availability issue is there but sometimes not all the time.

Another obstacle is the cost of internet. While 22% of participants said that it is not expensive to get mobile internet due to the many packages available, the vast majority (78%) of respondents stated that it is expensive. Most of the respondents were of the opinion that internet service on mobile phones is relatively expensive in Saudi Arabia compared to other countries:

> *"Yes it is slightly expensive compared with other countries"* (Respondent 21).

> *"I think cellular data prices in Saudi Arabia are still relatively high"* (Respondent 29).

Although some recent comparisons show some relative drops in the price, overall mobile internet remains prohibitively expensive in KSA even for the relatively affluent and privileged sample.

Personalisation of m-government services

This was a very generic question to investigate individual feedback towards more personalised m-government service for individuals. Most of the participants gave positive feedback, as personalised services will cater personal needs and requirements. Personalisation of the service will make it more cost effective for the users, will save time and will remove unwanted information. However, participants did showed concerns about its possibility and demanded more correct layout and backed by government agencies for this effectiveness and efficiency. The following statements of the respondents highlight the importance of this:

> *"Definitely yes. Whenever the services are individually designed, they reflect the comfort and safety when used"* (Respondent 27).

> *"Yes, as I'll customise it to suit my needs"* (Respondent 29).

> *"Yes of course, because every user has special needs and requirements"* (Respondent 41).

Need for laws and regulations

97.6% of the participants were of the opinion that the government should introduce laws and regulations for electronic and mobile transfer data among the stakeholders. It was considered as initial milestone in order to build people's trust and encourage the usage of the service. This step would increase the privacy of information, which is considered essential when financial data is involved. This precaution will help Saudi government provide protection to users and save their existing data. Moreover, services controlled by governmental laws and regulations would help avoid tricky and messy situations in future that might affect the credibility of the service providers. The following quotes from the interview data suggests the importance of stricter regulations:

> *"Definitely yes in order to protect the user data and privacy"* (Respondent 41).

"Yes, the government most make great effort and effective work to introduce laws and regulations that regulate electronic and mobile data transfer between the following stakeholders. In order to protect users' data and to make users more confident when using m-government services" (Respondent 42).

"Yes, regulation of the mobile data is very important to encourage people to use the services" (Respondent 31).

Despite all the issues and challenges, according to the participants, the following benefits were expected from m-government service: easy to use, cost effective, user-friendly, accessible, excellent speed, informative, reliable and certified with secure system that save data and personal information. Almost all the respondents were of the opinion that the current m-government service is not so inefficient that it cannot be used, but they suggested that further development is a prerequisite to meet the rising needs of the users. Moreover, participants emphasised the need for faster internet speeds and better network coverage all over the country.

6.6 Discussion

These results focus on the practicality of a mobile phone application for certain government services encompassing the usability, reliability and validity of the service. Understanding of the application attributes and its usage was an imperative component of the research. Also, comparison of the current findings is made with the existing literature.

In the frenzy of economic diversification throughout the GCC in preparation for a post-oil economy, one of the biggest oil producers, Saudi Arabia, is investing substantially in the promotion of a knowledge economy, aiming to develop knowledge workers facilitated by a well-built infrastructure of the built environment, transport, communications and ICT (Word Bank Indicators, 2012). Mobile technology is particularly popular in the country, with 132% mobile phone penetration by the early 2010s (Word Bank Indicators, 2012). The Telecom Agency of Saudi Arabia reports that in 2011 mobile subscriptions were held by 54.8% of the population. Moreover, strong enablers like Facebook, YouTube and Google+ have facilitated maximum growth in internet, mobile service and social media platform adoption and use in KSA.

However, existing literature suggests that to encourage and provide easy and secure online facilities in Saudi Arabia, there is need for improvement in the key factor of e-commerce

activity relating to online payment and transactions. This will help Saudi Arabia to expand internationally and cover global markets successfully as well. Although healthy e-government can develop in Saudi Arabia, it requires professional expertise for ICT tools and overall consensus and acceptance from the organisations and consumers to have proper conduct and competitive prices similar to that available in the market. Many incentives and strategies have been introduced in the Saudi market to encourage organisations to adapt to the online business code of conduct and policies introduced worldwide. However, this can be effectively achieved by support of government in development and expansion of strong IT infrastructure. There is a need for change to implement strategies and facilities that support technologies by use of professional technologies that are efficient for portals and websites and contain the whole e-commerce cycle.

Data security and privacy is a huge challenge. Respondents were clearly concerned about data security, which adds to the challenges of m-government, as data security and safety issues can hamper the willingness of the people to adopt the services. This finding concords with Ivan and Zamfiroiu (2011), who revealed that issues resulting from cybercrimes, data privacy and lack of fair information practices and laws impede the adoption and use of online services. Thus, security of the personal and financial information was the key issue.

The lack of uniform availability of internet for all users is a big obstacle. Mobile internet users are facing difficulties in internet access and issues of quality and speed. This finding concurs with Basamh et al. (2014) and Mengistu et al. (2009), who revealed that that a lack of required internet speed impedes the proper download and ultimately results in hindering the acceptance and effectiveness of the m-government services. Mengistu et al. (2009) also suggested that lower speed and bandwidth result in inconvenience and discomfort amongst the service users, becoming obstacles to the success of the m-government services.

One of the important issues that needs to be addressed is the issue of customisation of m-government services. Most participants wanted to have customised mobile services, which means that government needs to focus on the availability of the customised services, keeping in view the requirements of different individuals and groups. However, understanding the requirements of the different users and then making available different services, contents and delivery according to those requirements is a challenge. This is in line with Ntaliani et al. (2008), who found that personalisation of government services is an important element of m-government to save the people and organisations from the

burden of over-information. Many researchers including Basamh et al. (2014) suggest that customisation of these services is vital for the success of m-government initiatives.

The availability of internet on mobile devices as well as awareness amongst the customers about the availability and benefits of mobile government services are the key opportunities for Saudi Arabian government m-government initiatives. This finding is in contrast with the literature that suggests that lack of awareness and unwillingness of people about the m-government is a key challenge facing m-government initiatives in the developing countries (Al Thunibat et al., 2010; Basamh et al., 2014).

There is need for better training and education for the workforce in to provide effective customer service and incentives to the customers that are currently lacking. Development of employees is very important for continuous improvement and development. The core concern of any business is to provide secure and efficient payment methods. The Saudi governments can contribute to the economic development of the country by spearheading e-government and associated e-payment, which ultimately enhances user behaviour regarding e-commerce. According to Emmanouilidou and Kreps (2010), government and service users need to recognise and appreciate the impact of service on business corporations, preparing for and facilitating change and focusing most importantly on stakeholder interest with appropriate procedures and strategies.

The current findings are supported by the existing literature. As the usage of mobile and different services has increased over time, consumers are willing to try and use new services (Susanto and Goodwin, 2010). This thesis revealed that the majority of respondents were satisfied with the service usage, as the application was found to be easy to use and participants were comfortable interacting with the application without any complications. The majority of respondents positively agreed that the application was user-friendly, although the service they used was only a prototype.

It was found that the service was appreciated for its simplicity, user-friendliness and step-by-step guidance. The guided transition through the application from one step to another was very easy and smooth. Participants were of the opinion that application is an effective tool to help user pay its utility bills and also keep track of them. The language used was very easy to understand both in Arabic and English. The clarity of instructions and design were considered key supports.

The thesis suggested that participants' previous record and history of payment transaction is availability made record keeping and tracking of payment easy. The service provides participants with information concerning various internet packages which helped them to keep posted with current tariff rates while making payments, which is very helpful and highly appreciated among the users. Different utilities are combined under one application, which reduces the time that would otherwise have been required to pay the bills.

6.7 Conclusion of the study

This thesis found that most of the respondents were satisfied with the service they were using and they found the application easy to use. Participants were comfortable interacting with the application without any complications. This thesis found that this kind of application is an effective tool to help user pay its utility bills and also keep track of them. Different utilities combined under one application reduces the time that would otherwise have been required to pay the bills. However, participants showed concerns over data security and were not comfortable to leave their details pertaining to credit card or any personal information. Misuse of information was major threat to participants, which further added reluctance to usage of the application.

It is clear from the findings and existing literature also supports the facts that participants were concerned about security and safety of information. Participants were not comfortable to leave their details pertaining to credit card or any personal information. Misuse of information was major threat to participants, which further added reluctance to usage of the application. Respondents were willing to provide financial details if service is provided through some trusted company or government agencies with advanced security programs. Certification of the application was highly recommended and in demand to build users' trust and confidence (Margo, 2012). Moreover, these users were interested in knowing the security plans and measures that would be taken by the services provided in order to keep their financial details secure and save. Payment through companies like PayPal or VeriSign secured payments are trusted by the participants. Participants trusted government agencies and recommended the support of Ministry of Communication and Information Technology in data security. However, these findings should be seen in relation with the limitations of prototypes and these include inability of prototypes to reflect the real scenario where a number of issues such as internet speed, security and privacy issues could not be revealed. Moreover, in this study the focus has only been on m-government services and the comparison with e-government have not been done. This comparison can reveal the

common challenges of both e-government and m-government as well as issues particularly associated with e-government and m-government

7 CONCLUSION OF THE THESIS

7.1 Overview of the thesis

It is argued that the use of m-government can help make public information and government services available on many mobile devices and accessible instantaneously on a ubiquitous basis and to anyone with a mobile device (Emmanouilidou and Kreps, 2010). The use of m-government services is argued to support modernisation of public sector organisations better services for citizens (Misuraca, 2007; Ishmatova and Obi, 2009). Moreover, through m-government, the services can reach a larger number of people (Emmanouilidou and Kreps, 2010). Users of mobile technology can conveniently access real-time and personalised information with the assurance of maximising benefits of using mobile technology (Kim et al., 2004). Given the advantages of m-government and the trend of it around the world, the Saudi government has been making huge investment in the implementation of m-government services to improve quality of life with respect to wealth creation, improving access to education, job skills, health care facilities, security and entertainment in a secure, reliable and comfortable way (Alsenaidy and Ahmad, 2012).

However, the implementation of m-government in Saudi Arabia is not without difficulties (Alsenaidy and Ahmad, 2012). The literature suggests that like in other developing countries, Saudi Arabia is also facing infrastructural issues as well as issues due to lack of awareness (Alsenaidy and Ahmad, 2012). Nevertheless, mobile cellular subscriptions and internet users per 100 inhabitants in Saudi Arabia are 186 and 54 respectively for the year 2012 (Word Bank Indicators, 2012). The increase in internet use from 2007 to 2014 was approximately 15% per year, thus, there are opportunities for m-government application, but they are not without challenges. Keeping in view the importance of m-government and the lack of empirical studies in Saudi Arabian context, this thesis explored the opportunities and challenge facing m-government in Saudi Arabia.

7.2 Research findings

Three studies were conducted for the purpose of achieving the aims and objectives of the thesis (Sections 1.2 and 1.3). The first study used surveys and semi-structured interviews with citizens and employees. It revealed that there are many opportunities for the introduction of mobile government services in the country. The high level of mobile penetration in the country suggests that there is already a demand of a greater range of m-

government services, despite the fact that a large proportion of the Saudi population do not have access to mobile internet. Nevertheless, the results suggest that there is still a strong desire among users for the provision of mobile government services and the majority of respondents were willing to use such services and understand the benefits of using m-government. This thesis also shows a strong consensus among both government employees and citizens that m-government implementation would contribute to the technological development of the country.

However, the first study found that m-government in Saudi Arabia faces different challenges such as poor quality and speed of internet, lack of customisation of services and data security and privacy issues. The m-government in the country is also facing issues related to infrastructure and bureaucratic attitude of the government departments, which are notable barriers to m-government in developing countries. The lack of customised services to the people is amongst the key obstacles in this regard. This thesis suggests that people intends to have closely tailored and personalised to the individual needs of target users. Close interactions and communications with the target users would help understand their needs. Establishing a framework with other sectors of the government can ensure that the mobile services introduced by different sectors are rolled out in a timely and organised manner. This thesis also shows that the introduction of mobile services should be perceived to be a complement to, rather than a substitute for, the e-government services.

The first study contributes to the existing literature (Al Thunibat et al., 2010; Mengistu, et al., 2009; Ntaliani et al., 2008) showing different challenges facing m-government in developing countries and reveals particular opportunities for m-government initiatives in Saudi Arabia. These opportunities include the awareness amongst the people about the government initiatives of mobile government services and willingness of the people to use these services conditioned by the security and safety of their data and other aforementioned challenges. This thesis highlights the challenges and opportunities of m-government in Saudi Arabia and offers lessons for the government to focus on to overcome these challenges.

It is likely that government is already working on conquering these challenges in Saudi Arabia given the focus of government of the country on the m-government initiatives. The implementation and sustainability of their efforts is an area for future exploration. As the results of this thesis are not specific to any cultural set or population, they can be generalised to other countries. Therefore, this is an opportunity for developing countries to

conduct similar research in their set up and explore the perspective of m-government and the associated opportunities and challenges that they may face. Also, this thesis serves as a baseline for countries (especially developing countries) to utilise the findings in order to be more specific in their intentions for implementing m-government services and the planning mechanism behind the program.

The second study explored different challenges and opportunities faced by m-government within Saudi Arabia. This focus is on exploring the challenges from the perspective of Saudi Arabian citizens. The thesis reveals features of m-government and their usefulness as perceived by the audience to an extent where it is easy to interpret that m-government is at an early stage of development in Saudi Arabia. This is linked to the perception of public that the m-government facilities are useful however they are linked directly to the use of internet, which therefore limits the accessibility of m-government because of the poor internet availability and speed in the country. It is clear from the responses generated by the thesis that people are likely to use the m-government services to gain easy access of information and facilities which are otherwise difficult to attain, however it is currently not possible due to the current infrastructure capacity.

Therefore, there is a range of challenges facing m-government initiative in Saudi Arabia. One of the challenges is the lack of uniform availability of internet for all users. Mobile internet users are facing difficulties in internet access and issues of quality and speed. This finding is in agreement with the literature (e.g. Basamh et al., 2014; Mengistu et al., 2009) which found that a lack of required internet speed impedes the proper download and ultimately results in hindering the acceptance and effectiveness of the m-government services. Mengistu et al. (2009) also suggested that lower speed and bandwidth result in inconvenience and discomfort amongst the service users, becoming obstacles to the success of the m-government services.

Data security and privacy is another key challenge. Interviewees were not satisfied with the data security and this adds to the challenges of m-government, as data security and safety issues can hamper the willingness of the people to adopt the services. This finding concords with Ivan and Zamfiroiu (2011), who revealed that issues resulting from cybercrimes, data privacy and lack of fair information practices and laws impede the adoption and use of online services.

Other than these concerns mentioned in the literature, an additional infrastructural challenge that m-government service in Saudi Arabia is facing is the obstructive and

bureaucratic attitude of government departments. The problems associated with physically interfacing with government bureaucracy (i.e. going to offices), which are a fundamental reason most participants are willing to use m-government despite their security concerns, must be addressed to facilitate m-government adoption, because while automated processes such as those involved in current e-government facilities for paying fines (as cited above) clearly favour m-government use, processes that require a human response from the government end will be hampered by the same inefficiencies of the traditional office environment. Thus, in addition to adequate internet speed, privacy and data security, effective provision of m-government services requires a better administrative style from government departments.

Another challenge is issues of the customisation of the m-government services. The majority of respondents showed a strong desire for the availability of customised mobile services, which means that government needs to focus on the availability of the customised services, keeping in view the requirements of different individuals and groups. There can be challenge of understanding the requirements of the different users and then making available different services, contents and delivery according to those requirements. This is in keeping with Ntaliani et al. (2008), who argued that personalisation of government services is an important element of m-government to save the people and organisations from the burden of over-information. Basamh et al. (2014) suggest that customisation of these services is vital for the success of m-government initiatives.

The availability of internet on mobile devices as well as awareness amongst the customers about the availability and benefits of mobile government services are the key opportunities for Saudi m-government initiatives. This finding is in contrast with literature suggesting that a lack of awareness and unwillingness of people about the m-government is a key challenge facing m-government initiatives in the developing countries (Al Thunibat et al., 2010; Basamh et al., 2014).

The third study focussed on the practicality of a mobile phone application for certain government services encompassing the usability, reliability and validity of the service. Recapitulating the whole discussion, the thesis particularly emphasised finding out whether mobile users in Saudi Arabia perceive the use of mobile internet applications as useful or not and whether participants were willing to performed traditional tasks such as paying utilities bills using mobile internet in fewer steps. In order to serve this purpose, a

prototype m-government application was developed that dealt with important aspects of billing related activities appropriate to Saudi citizens.

It was clear in the thesis that the application was considered easy to use, user-friendly and convenient. It was considered efficient in terms of time and money. One application containing different utility departments with information of different tariff rates was attractive for participants. However, issues of trust and security were repeatedly highlighted by them as barriers to adoption. As the result, many of the participants were reluctant to use such services in the near future as financial and personal information is involved. These participants are following uncertainty avoidance in a very direct matter.

The results of the different studies helped to do better analysis. The first study focused on the usage and validity of mobile government service to pay bills in Saudi Arabia, while the second analysed existing m-government services already operating in Saudi Arabia. This comparison helped understand the usability and familiarity issue that might arise with new upcoming services. It also helped in a better understanding of the Saudi internet and mobile market.

This thesis suggests that the existing market gap can be converted into market opportunities that will later contribute to economic condition of the country and lead to job creation and new offerings in the form of new business models. In today's world, electronic services are required and desirable for all the stakeholders. E-government through mobile service helps to re-generate the existing business model, diversifying and bringing management changes throughout organisations. However, organisational culture and strong resistance to change within limit growth and hamper development. According to Braganza (2000), government and service users need to recognise and appreciate the impact of service on the business corporations, prepare users and facilitators for change and most importantly focus on and tailor towards stakeholder interest with appropriate procedures and strategies.

The current findings are supported by the existing literature and findings of previous authors. As the usage of mobile and different services has increased over time, consumers are willing to try and use new services. The thesis revealed that the majority of respondents were satisfied with the service usage, as the application was easy to use, without complications. The majority of respondents positively agreed that the application was user friendly, although the service they used was a prototype only. The results suggest that the

availability of users' previous records and history of payment transactions would make record keeping and tracking of payments easy and improve trust in the system.

Different utilities are combined under one application, which reduces the time that would otherwise have been required to pay the bills. It is clear from the findings (and supported by previous studies) that participants were concerned about the security and safety of information, and there was a marked reluctance among many of them to share details pertaining to credit card or personal information online. The perceived danger of the misuse of information was considered a major threat, which compounded latent reluctance to use the novel application. Respondents were willing to provide financial details if the service was authorised by government agencies. Certification was highly recommended and in demand to build users' trust and confidence. Moreover, these users were interested in knowing the security plans and measures that would be taken by the services provided in order to keep their financial details secure and safe. Payment through companies like PayPal or VeriSign secured payments are trusted by the participants. Participants trusted government agencies and recommended the support of ministry of communication and information technology in data security.

7.3 Contribution of the thesis

By exploring the opportunities of, and challenges facing m-government in Saudi Arabia, this thesis contributes to the m-government literature on developing countries in particular. This thesis offers important lessons for the m-government policy makers in Saudi Arabia and around the developing world. This thesis suggests that infrastructure, internet speed, bandwidth, awareness and security of users' data are amongst the key factors that affect the m-government services success. Thus, this thesis proposes that policy makers should create awareness amongst the users, offer them m-government services for minimal cost and provide necessary infrastructure to achieve the desired outcomes of the m-government implementation. Data security was a major concern. This thesis brings attention of the policy makers towards this issue and asks for the legislation to ensure the secure provision of the m-government services.

7.4 Limitations and future research directions

This thesis is based on surveys and interviews with relatively small samples. In order to be able to draw further rigorous conclusions on the issue of mobile government services, it is

recommended that further research within Saudi Arabia be carried out in this area with larger samples, and with more diverse participant groups. It is recommended that research be conducted to analyse the process of introducing m-services in detail to identify the strengths and weaknesses in the current framework of m-government to enable m-government to effectively complement it. This would provide a much more rigorous yardstick against which the success of the implementation of mobile services could be usefully measured. The criteria which emerge from this research could also be useful in establishing recommendations that the Saudi Arabian government should follow when deciding upon how to introduce its range of mobile services.

The research focussed on an m-government application for mobile payments of utility bills. Further studies can focus on different other m-government services to enhance the understanding of the issues and opportunities of m-government in the country. The availability and exploration of practical aspects of m-government services would help understand the perceptions of people about the use of m-government services in the country.

Further, the third study of this thesis used prototype for assessing the challenges associated with the use, reliability and validity of a particular m-government service. However, prototype cannot reflect the real situation and therefore, the issues relevant to infrastructure, security and safety issues and other such challenges are hard to be revealed through prototypes. Thus, action research that uses real application can enhance the significance of the results. This study focussed on m-government services. The comparison of m-government services with e-government services can be helpful to make the e-government more effective.

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APPENDICES

Appendix 1: Survey questionnaire of Chapter 4

M-Government Adoption in Saudi Arabia - Challenges and Opportunities

Participant Information Sheet

My name is Anan Alssbaiheen. I am a PhD degree in the Information Systems and Computing Department at Brunel University, London, UK. My research is about *"Mobile challenges and opportunities for e-government in Saudi Arabia"*.

This research will consider the various challenges and opportunities that mobile technology offers to efforts to improve the uptake and use of e-government services in Saudi Arabia. Mobile government/ mGovernment, is the extension of eGovernment to mobile platforms, as well as the strategic use of government services and applications which are only possible using cellular/mobile telephones, laptop computers, personal digital assistants (PDAs) and wireless internet infrastructure. Also, it can help make public information and government services available *"anytime, anywhere"*. I have chosen this topic because I am very interested to work for the government sector and at the same time to improve the m-government and e-government in Saudi Arabia.

The participants will be the Saudi citizens. Participants are expected to answer the Interview questions based on their experience with the designed mobile application.

It is not compulsory for someone to take part and that they can withdraw at any time without consequence.

The participants' personal details will be kept anonymous.

If you have any concerns or complaints regarding the ethical elements of this project please contact:

siscm.srec@brunel.ac.uk

Or

Professor Zidong Wang,
Tel. No. 01895 266021

I. Filter Questions

1. Please indicate your age group:

- ☐ 18-25 years
- ☐ 26-33 years
- ☐ 34-41 years
- ☐ 42-49 years
- ☐ 50+ years

2. Please indicate your gender:

- ☐ Male
- ☐ Female

3. Please indicate your education level:

- ☐ High school or less
- ☐ Diploma
- ☐ Bachelor degree
- ☐ Higher education

4. Please indicate your position (For Citizens Only):

- ☐ Employed
- ☐ Unemployed

5. How many years of professional experience do you have? (For Employees Only):

- ☐ 0-2 years
- ☐ 3-5 years
- ☐ 6-10 years
- ☐ 11+ years

II. Citizens

Closed-ended questions

Instructions: Please indicate the extent to which you agree or disagree with each statement below by selecting *strongly agree, agree, not sure, disagree,* or *strongly disagree*.

1. I consider myself to have good technology skills.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

2. I regularly have access to a computer equipped with internet access.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

3. I frequently use e-government services

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

For respondents who have used e-government services:

4. E-government services provide a more convenient way for me to access government services.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

5. I think e-government services would be more effective if they were personalised for me as an individual.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

6. I think e-government services will be very popular with citizens in the long term.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

M-government services

7. I regularly have access to a mobile device, such as a mobile phone or tablet.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

8. I prefer to access web services on my mobile phone instead of on my computer.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

9. I would like to have a more effective way of interacting with government services.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

10. I often access government services on my mobile device.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

11. I am familiar with the benefits of m-government services.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Not Sure
- [ ] Disagree
- [ ] Strongly Disagree

Please explain your answer:

12. M-government services are too inefficient to be of any use to me.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Not Sure
- [ ] Disagree
- [ ] Strongly Disagree

Please explain your answer:

13. My friends, colleagues and/or family members use m-government services.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Not Sure
- [ ] Disagree
- [ ] Strongly Disagree

Please explain your answer:

14. I would not use m-government services because of religious reasons.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Not Sure
- [ ] Disagree
- [ ] Strongly Disagree

Please explain your answer:

15. I have used m-government services in the past, but I don’t anymore.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Not Sure
- [ ] Disagree
- [ ] Strongly Disagree

Please explain your answer:

For respondents who have used m-government services:

16. On the whole, I have had a positive experience with m-government services.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

17. I would use mobile government services more often if they will be improved.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

18. I think mobile government services would be more effective if they were personalised for me as an individual.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

19. I think mobile government services are more useful than e-government services.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

20. I feel concerned that my personal data is not secure when accessing a government service on my mobile device.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

For respondents who have not used m-government services:

21. I would be likely to access government services on my mobile device, if such services were available.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

22. I would feel confident that my personal data would be secure when accessing a government service on my mobile device.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

23. I would feel confident that I knew how my data would be handled technologically and understand any encryption devices.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

24. I think m-government services would help make political processes more transparent.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

25. I think m-government services are the preferable option to help make political processes more transparent.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

<u>b. Open-ended questions</u>

26. To what extent has the availability of e-government and m-government services affected how much you access government services?

27. Do you think mobile government services are important for making Saudi Arabia a more technologically advanced country? Why or why not?

28. What improvements do you think could be made to mobile government services to get more people to use them?

III. Government employees

a. Closed-ended questions

Instructions: Please indicate the extent to which you Agree with each statement below by selecting *strongly Agree, Agree, Not Sure, Disagree,* or *strongly Disagree*.

General

1. I consider myself to have good technology skills.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

2. I regularly have access to a computer equipped with internet service.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

3. I regularly have access to a mobile device, such as a mobile phone or tablet.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

E-government services

4. E-government services have helped me to do my job more effectively.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

5. I think e-government services would be more effective if they were personalised for users as individuals.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

6. I think government e-services will be very popular with citizens in the long term.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Not Sure
- [ ] Disagree
- [ ] Strongly Disagree

Please explain your answer:

7. I think the government is taking an effective approach to getting people to use e-government services.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Not Sure
- [ ] Disagree
- [ ] Strongly Disagree

Please explain your answer:

M-government services

8. M-government services have affected the way I do my job.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Not Sure
- [ ] Disagree
- [ ] Strongly Disagree

Please explain your answer:

9. I think that developing m-government services would help Saudi Arabian government services to become more efficient.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Not Sure
- [ ] Disagree
- [ ] Strongly Disagree

Please explain your answer:

10. I think m-government services would be more effective if they were personalised for users as individuals.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Not Sure
- [ ] Disagree
- [ ] Strongly Disagree

Please explain your answer:

11. I think there will be enough uptake of m-government services to justify the time and expense required to develop it.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

12. I think that developing m-government services would help Saudi Arabia become more of a 'knowledge-based society'.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

13. I think that the infrastructure exists so that mobile communication can be easily improved.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

14. I think mobile government services are more useful for citizens than e-government services.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

15. I think that m-government services would help make political processes more transparent.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

16. I think m-government services will be very popular with citizens in the long term.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

17. I think that m-government services are important enough to dedicate significant government funding to.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

18. I do not think that m-government services have too many drawbacks to be worth developing.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

19. I think the government is taking an effective approach to getting people to use mobile government services.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Not Sure
- ☐ Disagree
- ☐ Strongly Disagree

Please explain your answer:

<u>b. Open-ended questions</u>

20. In what ways has the availability of e-government and m-government services affected how well you are able to perform in your public service role?

21. Do you think mobile government services are important for making Saudi Arabia a more technologically advanced country? Why or why not?

22. What improvements do you think could be made to mobile government services to get more people to use them?

Appendix 2: Set of semi-structured interview questions of Chapter 4

I. Filter Questions

1. Please indicate your age group:

- ☐ 18-25 years
- ☐ 26-33 years
- ☐ 34-41 years
- ☐ 42-49 years
- ☐ 50+ years

2. Please indicate your gender:

- ☐ Male
- ☐ Female

3. Please indicate your education level:

- ☐ High school or less
- ☐ Diploma
- ☐ Bachelor degree
- ☐ Higher education

4. How many years of professional experience do you have?

- ☐ 0-2 years
- ☐ 3-5 years
- ☐ 6-10 years
- ☐ 11+ years

II. Interview Questions
The interview questions were as follows:

1. Do you think the changes from e-government direction to m-government approaches will be successful for the government of Saudi Arabia? Why?

(The purpose of this question is to understand the awareness of people about m-government initiatives. It enhances our understanding about the opportunities and challenges faced by m-government services. If people are not aware, it will pose a challenge to the success such initiatives and vice versa).

2. Would you consider the shift to m-government from e-government as an important change? Please explain your answer

3. Do you think this sort of change from e-government to m-government will last in the Saudi public sector? Was this done at a good time (was the timing correct)?

4. Are people open to accepting m-government initiatives of the government?

(Questions 2, 3 and 4 ascertain the existing use of mobile government services by the people to understand what they perceive about the change and how much understanding they have about it. Moreover, it explains what type of services they are using and what type challenges they are facing. Hence, overall, this question also helps to understand what improvements are needed in the provision of such services).

5. Do you think m-government is a fleeting concept and its popularity or applicability would not last?
(This question explores the desires of people about whether they intend to use mobile government services. This question also helps to understand the challenges and opportunities. For example, if people show strong desire to use such services, it will be an opportunity; otherwise it is a challenge. This also helps to have information on key aspects of motivating the use of m-government services, and if they are not using them, what is hindering them from doing so).

6. What about personalisation of m-government? Do you think it would be more effective when optimised or personalised for users?
(This question helps understand whether the use of m-services is convenient for the users, and if it not, what challenges they face. In other words, this question identifies what needs to be improved).

Appendix 3: Set of semi-structured interview questions of Chapter 5

CITIZENS' PERSPECTIVES ON M-GOVERNMENT IN SAUDI ARABIA

Participant Information Sheet

My name is Anan Alssbaiheen. I am a PhD degree in the Information Systems and Computing Department at Brunel University, London, UK. My research is about *"Mobile challenges and opportunities for e-government in Saudi Arabia"*.

This research will consider the various challenges and opportunities that mobile technology offers to efforts to improve the uptake and use of e-government services in Saudi Arabia. Mobile government/ mGovernment, is the extension of eGovernment to mobile platforms, as well as the strategic use of government services and applications which are only possible using cellular/mobile telephones, laptop computers, personal digital assistants (PDAs) and wireless internet infrastructure. Also, it can help make public information and government services available *"anytime, anywhere"*. I have chosen this topic because I am very interested to work for the government sector and at the same time to improve the m-government and e-government in Saudi Arabia.

The participants will be the Saudi citizens. Participants are expected to answer the Interview questions based on their experience with the designed mobile application.

It is not compulsory for someone to take part and that they can withdraw at any time without consequence.

The participants' personal details will be kept anonymous.

If you have any concerns or complaints regarding the ethical elements of this project please contact:
siscm.srec@brunel.ac.uk

or

Professor Zidong Wang,
Tel. No. 01895 266021

I. Filter Questions

1. Please indicate your age group:

- ☐ 18-25 years
- ☐ 26-33 years
- ☐ 34-41 years
- ☐ 42-49 years
- ☐ 50+ years

2. Please indicate your gender:

- ☐ Male
- ☐ Female

3. Please indicate your position:

- ☐ Employed
- ☐ Unemployed

4. Please indicate your education level:

- ☐ High school or less
- ☐ Diploma
- ☐ Bachelor degree
- ☐ Higher education

II. Interview Questions
The interview questions were as follows:

1. Can you access the internet easily everywhere? Please explain your answer.

(The purpose of this question is to understand the availability of the internet to enhance our understanding about the opportunities and challenges m-government services face. If it is not available, it will pose a challenge to the success such initiatives and vice versa).

2. What interface do you use to access the internet? (e.g. laptop, office computer, i-pad, mobile phone).

(The question ascertains the availability of internet for different devices. This explores what type of devices they are using and what type challenges they are facing. Hence, overall, this question helps understand what improvements are needed in the provision of such services).

3. Can you access the internet on your mobile? Do you face any difficulty?

(This question ascertains the existing use of mobile devices and availability of internet on them. This explores what type of mobile devices and what internet services they are using and what type challenges they are facing. Hence, overall, this question enables understanding what improvements are needed in the provision of such services).

4. Which service bundle you use on your mobile to access the internet and are you satisfied with its speed and performance? Please explain.

(This question solicits information about key challenges resulting from network availability and speed).

5. Do you think that there is any data security and safety issues on internet? Please elaborate.

(This question explores any security issues of concern to users).

6. Are you aware of e-government services initiatives of the government?

(If people are not aware, it can create challenges for the m-government implementation).

7. Do you use e-government services? What is your opinion about these services?

8. How many departments are providing mobile services?

9. Have you used m-government services before? If yes please state the agencies.

(Questions 7, 8 and 9 highlight the experiences of the users about different m-government services and their feedback is important to improve the services).

10. Do you intend to use mobile government services? Please explain you answer.

11. Do you think that mobile-government services provide a convenient way to access government services? Please explain your answer.

12. What kind of services you would like to use and why?

13. Do you think that there is a need of customised and personalised mobile government services? If so, what is the key reason?

14. What is your overall opinion about the benefits of mobile government services?

15. What are the obstacles in m-government services?

(The questions from 11 to 15 particularly enhance our understanding about challenges m-government services are facing).

Appendix 4: Set of semi-structured interview questions of Chapter 6

EVALUATING THE MOBILE UTILITY BILLS PAYMENT APPLICATION USING PAPER SKETCHED PROTOTYPE

Participant Information Sheet

My name is Anan Alssbaiheen. I am a PhD degree in the Information Systems and Computing Department at Brunel University, London, UK. My research is about *"Mobile challenges and opportunities for e-government in Saudi Arabia"*.

This research will consider the various challenges and opportunities that mobile technology offers to efforts to improve the uptake and use of e-government services in Saudi Arabia. Mobile government/ mGovernment, is the extension of eGovernment to mobile platforms, as well as the strategic use of government services and applications which are only possible using cellular/mobile telephones, laptop computers, personal digital assistants (PDAs) and wireless internet infrastructure. Also, it can help make public information and government services available *"anytime, anywhere"*. I have chosen this topic because I am very interested to work for the government sector and at the same time to improve the m-government and e-government in Saudi Arabia.

The participants will be the Saudi citizens. Participants are expected to answer the Interview questions based on their experience with the designed mobile application.

It is not compulsory for someone to take part and that they can withdraw at any time without consequence.

The participants' personal details will be kept anonymous.

If you have any concerns or complaints regarding the ethical elements of this project please contact:
siscm.srec@brunel.ac.uk

or

Professor Zidong Wang,
Tel. No. 01895 266021

I. Filter Questions

1. Please indicate your age group:

- ☐ 18-25 years
- ☐ 26-33 years
- ☐ 34-41 years
- ☐ 42-49 years
- ☐ 50+ years

2. Please indicate your gender:

- ☐ Male
- ☐ Female

3. Please indicate your position:

- ☐ Employed
- ☐ Unemployed
- ☐ Other (Please Specify)

4. Please indicate your education level:

- ☐ High school or less
- ☐ Diploma
- ☐ Bachelor degree
- ☐ Higher education

5. Which phone do you use?

- ☐ Android
- ☐ IPhone

II. Interview Questions

Section 1: Design of the application
1. Did you find the service easy to use? (please explain your answer).

2. Was it is easy to find information you were looking for? (please explain your answer).

3. Would you be happy to use a service like this again? (please explain your answer).

4. Did you trust the system with your financial details? (please explain your answer).

5. What did you particularly like about the service? (please explain your answer).

6. What did you particularly dislike about using the service? (please explain your answer).

7. Would you use a service like this in different locations? (please explain your answer).

8. Do you think that the personal information you provided to use this service will be misused?

(These questions aim to understand the suitability of the design of application for mobile payment system as well as bringing to the fore any concerns of the respondents about the design features).

Section 2: Challenges
9. Are you aware of mobile payment system of different government services?

(The purpose of this question is to understand the awareness of people about m-government initiatives. It enhances our understanding about the opportunities and challenges m-government services are facing, as if people are not aware, it will pose a challenge to the success such initiatives and vice versa).

10. Do you use e-government services?

(The question ascertains the existing use of mobile government services by the people. This explores what type of services they are using and what type challenges they are facing. Hence, overall, this question also helps to understand what improvements are needed in the provision of such services).

11. Do you intend to use mobile government services? Why?

(This question explores the desires of people about whether they intend to use regarding mobile government services. This question also helps to understand the challenges and opportunities. For example, if people show strong desire to use such services, it will be an opportunity; otherwise it will be a challenge. This also yields information about key aspects motivating the use of m-government services (or lack thereof).

12. What is the key reason of your desire to use mobile government services?

(This question extends the previous one to facilitate a deeper understanding of key aspects motivating the use of m-government services).

13. Do you think that mobile-government services provide a convenient way to access government services?

(This question explores whether m-services are convenient for the users and if it not, what challenges they face).

14. What is your overall opinion about the benefits of mobile government services?

15. What are the obstacles in m-government services?

(These questions offer information about the key challenges facing the provision of mobile government services to improve the services).

16. Do you think that there are any data security and safety issues? (This question explores any security issues and would help to improve on them).

17. Do you think m-government services are too inefficient to be of any use to you? Please explain your answer.

18. Do you think m-government services would be more effective if they were personalised for you as an individual? Please explain your answer.

19. Do you think the government should introduce laws and regulations that regulate electronic and mobile data transfer between the following stakeholders? Please explain your answer.

20. Can you access the internet in everywhere? If no, why?

21. Do you find any issues of internet speed and availability?

22. Is it expensive to get internet on mobile phones?

(These questions particularly enhance our understanding about the service-related challenges m-government services are facing).

Appendix 5: Guides for user intention to use the application

For iPhone users click the link:

https://itunes.apple.com/gb/app/sps-mobile-utility-bill-payment/id908293425?mt=8

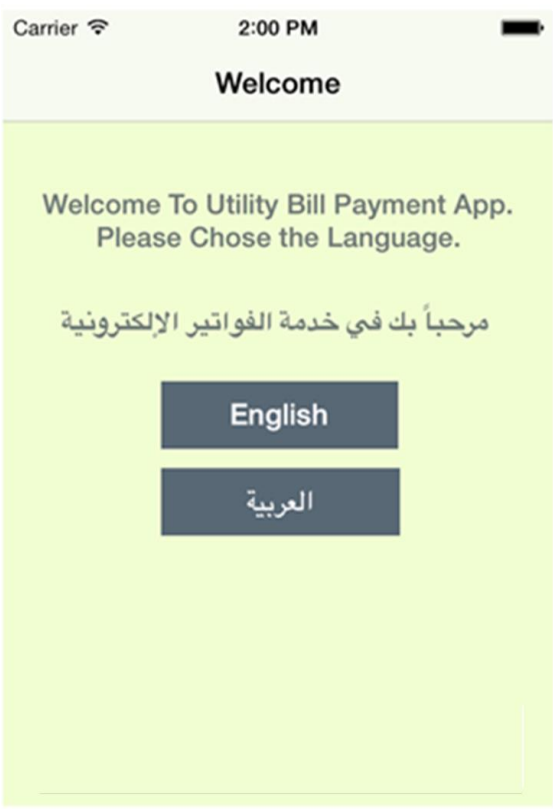
1. Choose English language.
2. Click register as a new user (you can write fake information for the names and numbers).
3. Choose one of the services (electricity, water, or phone and internet), then click on Check Bill, then Pay the Bill.
4. In the payment screen you can write fake numbers and names as well.

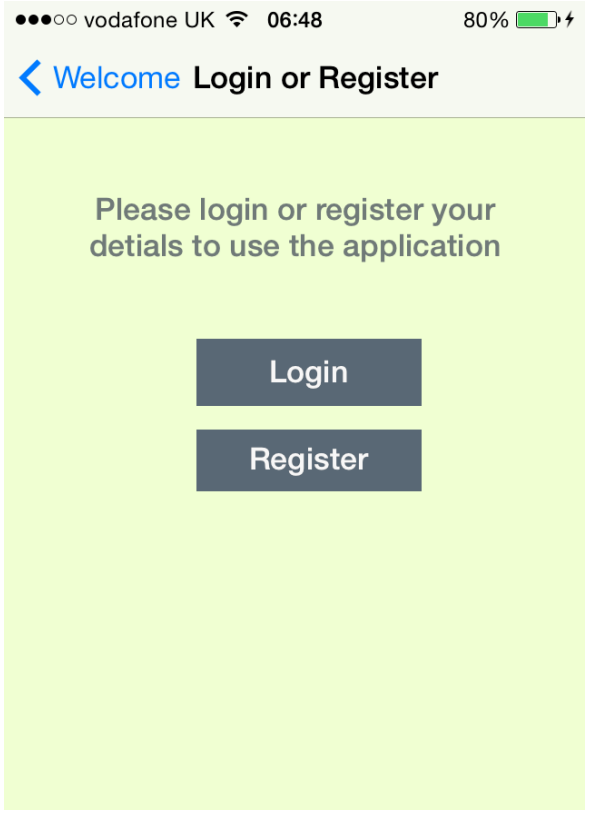
For Android users click the link:

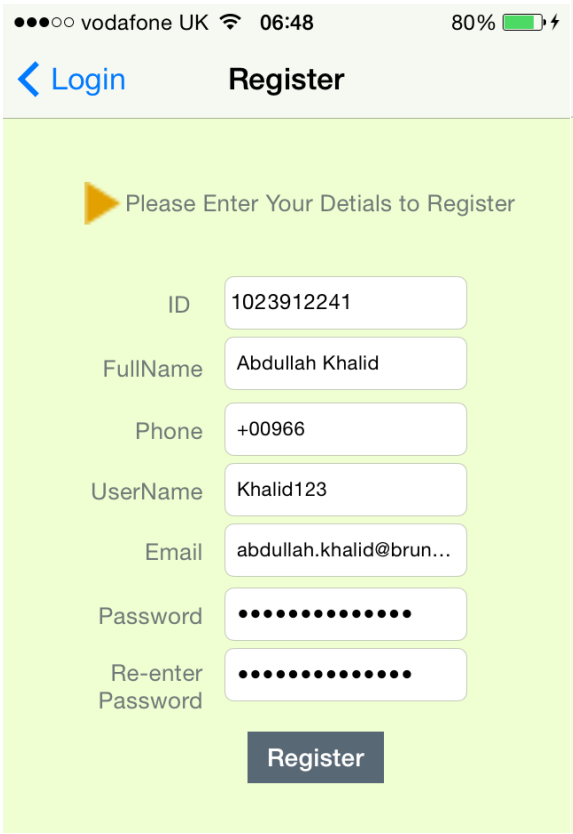
http://people.brunel.ac.uk/~cspgbbs2/AnanMobileBills.apk

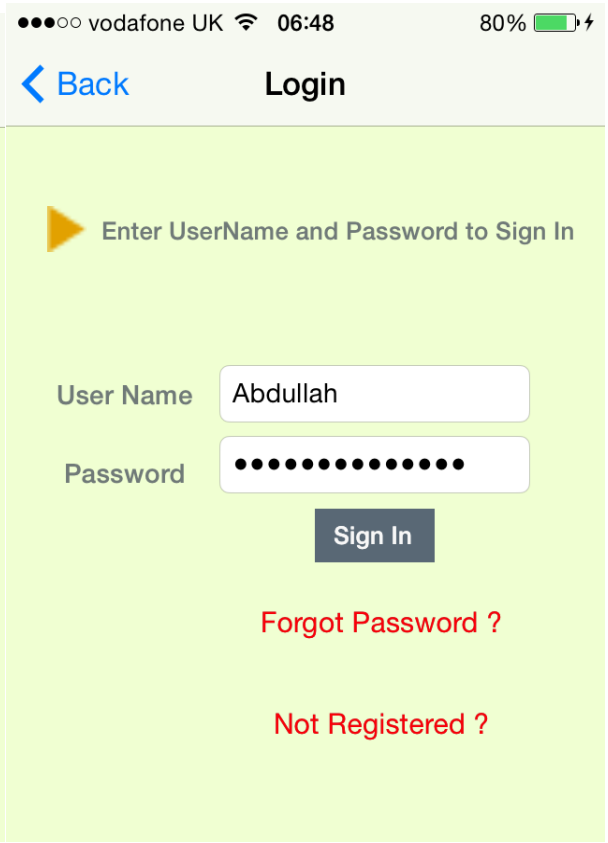
1. When you click the link the app will automatically download to your phone (check downloads folder to install it).
2. Choose English language.
3. Click register as a new user (you can write fake information for the names and numbers).
4. Choose one of the services (electricity, water, or phone and internet).
5. In the payment screen you can write fake numbers and names as well.

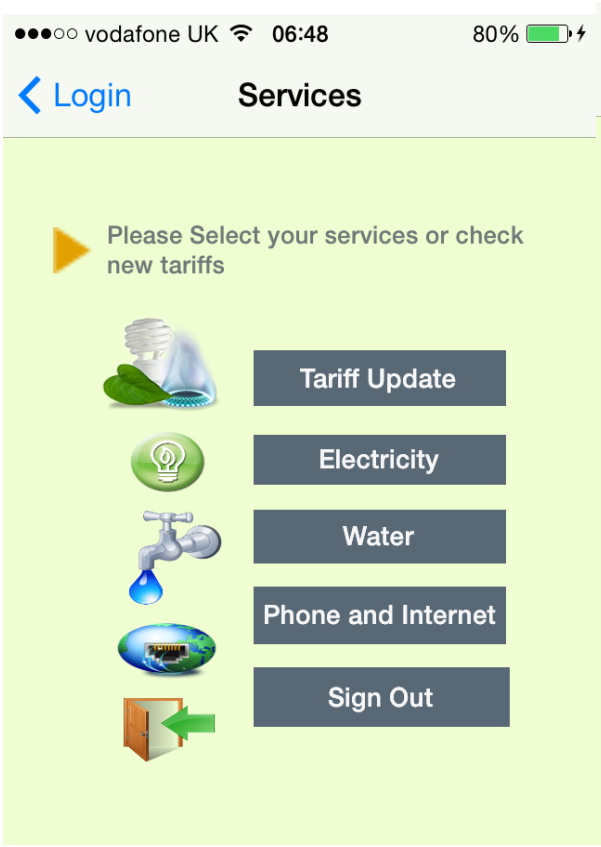
Appendix 6: Screen shots of application windows on IPhone

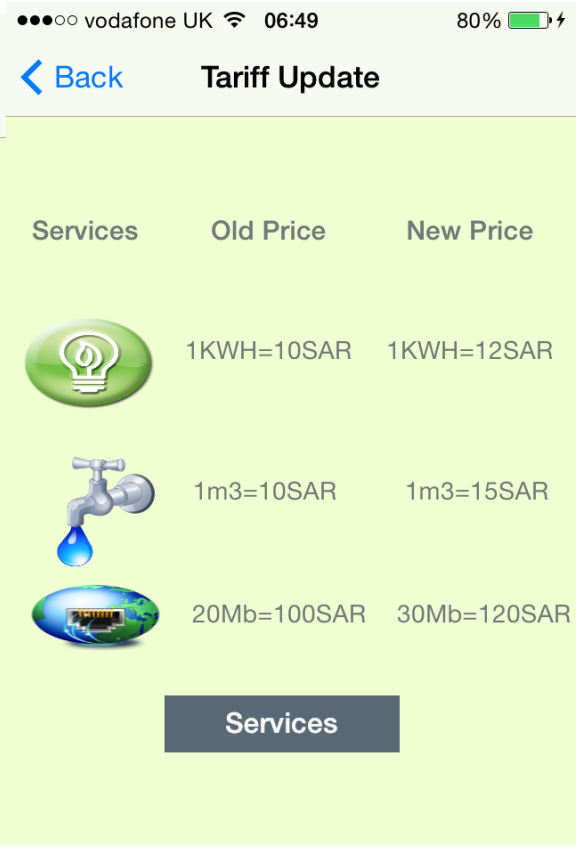









vodafone UK 06:48 80%
Login
Services
Please Select your services or check new tariffs
Tariff Update
Electricity
Water
Phone and Internet
Sign Out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Back
Tariff Update
Services
Old Price
New Price
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1KWH=12SAR
1m3=10SAR
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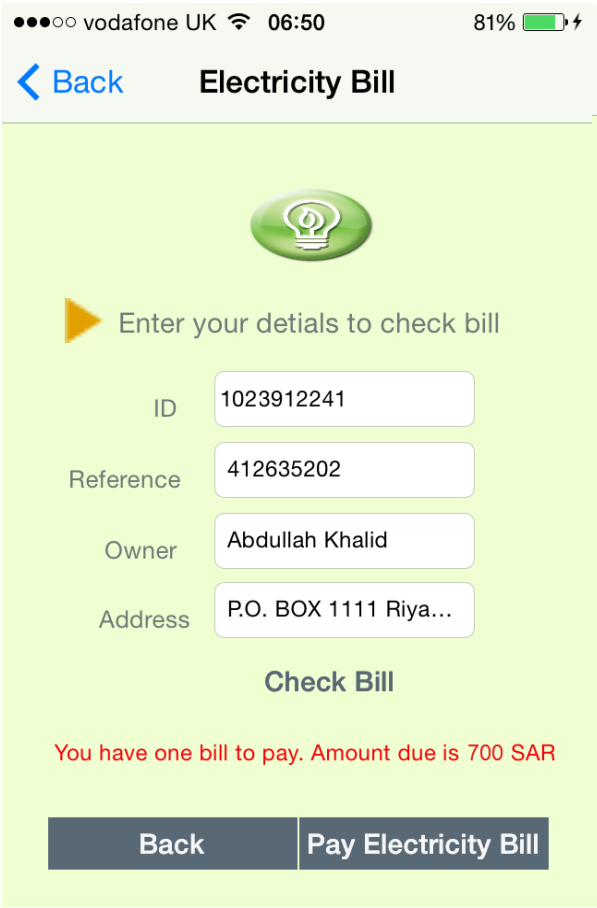
20Mb=100SAR
30Mb=120SAR
Services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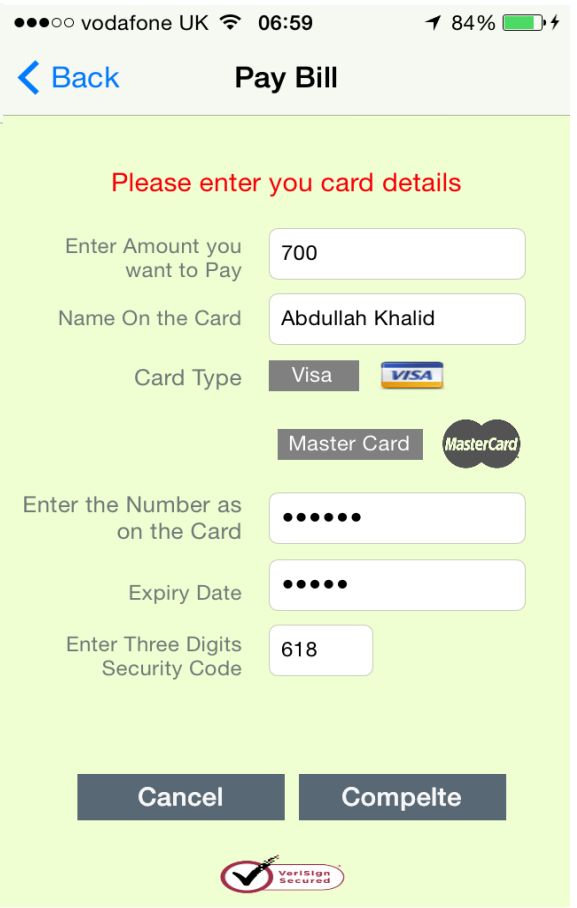
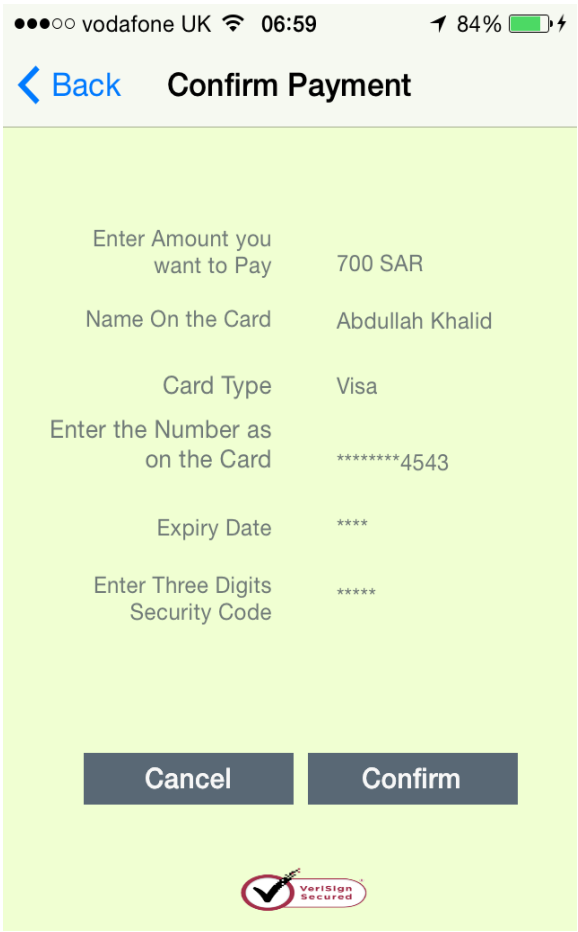
Electricity Bill
Enter your detials to check bill
ID
1023912241
Reference
412635202
Owner
Abdullah Khalid
Address
P.O. BOX 1111 Riya...
Check Bill
You have one bill to pay. Amount due is 700 SAR
Back
Pay Electricity Bill


vodafone UK 06:59 84%
Back
Pay Bill
Please enter you card details
Enter Amount you want to Pay
700
Name On the Card
Abdullah Khalid
Card Type
Visa
Master Card
Enter the Number as on the Card
Expiry Date
Enter Three Digits Security Code
618
Cancel
Compelte


●●●○○ vodafone UK 06:59 84%
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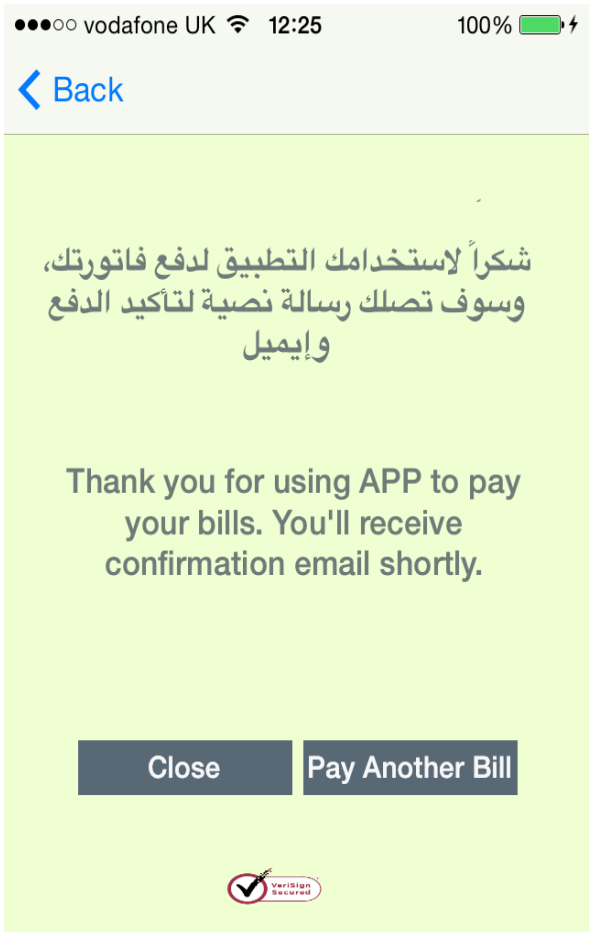
Confirm Payment
Enter Amount you want to Pay
700 SAR
Name On the Card
Abdullah Khalid
Card Type
Visa
Enter the Number as on the Card
********4543
Expiry Date
****
Enter Three Digits Security Code
*****
Cancel
Confirm


●●●○○ vodafone UK 12:25 100%
Back
شكراً لاستخدامك التطبيق لدفع فاتورتك،
وسوف تصلك رسالة نصية لتأكيد الدفع
وإيميل
Thank you for using APP to pay your bills. You'll receive confirmation email shortly.
Close
Pay Another Bill

Appendix 7: Model consent form used in all of the studies conducted in this research

The participant should complete the whole of this sheet him/herself
Please tick the appropriate box

	Yes	No
Have you read the Research Participant Information Sheet?		
Have you had an opportunity to ask questions and discuss this study?		
Have you received satisfactory answers to all your questions?		
Who have you spoken to?		
Do you understand that you will not be referred to by name in any report concerning the study?		
Do you understand that you are free to withdraw from the study: at any time		
without having to give a reason for withdrawing?		
(Where relevant) I agree to my interview being recorded.		
(Where relevant) I agree to the use of non-attributable direct quotes when the study is written up or published.		
Do you agree to take part in this study?		

Signature of research participant:
Name in capitals: Date:
Witness statement
I am satisfied that the above-named has given informed consent.
Witnessed by:
Name in capitals: Date:

Appendix 8: Ethical approval for First Study

School of Information Systems, Computing and Mathematics
David Gilbert, Head of School, Professor of Computing
Jasna Kuljis, Head of Information Systems and Computing, Professor of Computing
Tony Rawlins, Head of Mathematical Science, Professor of Mathematics

Brunel UNIVERSITY WEST LONDON

Brunel University, Uxbridge,
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Telephone: +44(0) 1895 274000
Fax: +44(0) 1895 251686
Emails:
Yongmin.Li@brunel.ac.uk
Annette.Payne@brunel.ac.uk
Lampros.Stergioulas@brunel.ac.uk
Zidong.Wang@brunel.ac.uk

Date: 18th June 2012

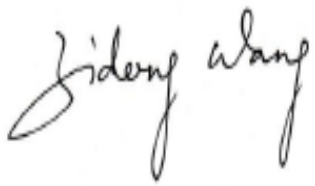
STATEMENT OF ETHICS APPROVAL

Proposer: Anan Mohammad A Alssbaiheen

Title: Mobile challenges and opportunities for e-government in Saudi Arabia

The school's research ethics committee has considered the proposal recently submitted by you. Acting under delegated authority, the committee is satisfied that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that you will adhere to the terms agreed with participants and to inform the committee of any change of plans in relations to the information provided in the application form.

Yours sincerely,



Professor Zidong Wang
Chair of the Research Ethics Committee
SISCM

Appendix 9: Ethical approval for Second Study

School of Information Systems, Computing and Mathematics
David Gilbert, Head of School, Professor of Computing
Jasna Kuljis, Head of Information Systems and Computing, Professor of Computing
Tony Rawlins, Head of Mathematical Science, Professor of Mathematics

Brunel UNIVERSITY WEST LONDON

Brunel University, Uxbridge,
Middlesex UB8 3PH, UK
Telephone: +44(0) 1895 274000
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Emails:
Yongmin.Li@brunel.ac.uk
Annette.Payne@brunel.ac.uk
Lampros.Stergioulas@brunel.ac.uk
Zidong.Wang@brunel.ac.uk

Date: 25th September 2013

STATEMENT OF ETHICS APPROVAL

Proposer: Anan Mohammad A Alssbaiheen

Title: Mobile challenges and opportunities for e-government in Saudi Arabia

The school's research ethics committee has considered the proposal recently submitted by you. Acting under delegated authority, the committee is satisfied that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that you will adhere to the terms agreed with participants and to inform the committee of any change of plans in relations to the information provided in the application form.

Yours sincerely,

Zidong Wang

Professor Zidong Wang
Chair of the Research Ethics Committee
SISCM

Appendix 10: Ethical approval for Third Study

School of Information Systems, Computing and Mathematics
David Gilbert, Head of School, Professor of Computing
Martin Shepperd, Head of Information Systems and Computing
Steven Noble, Head of Mathematical Science, Professor of Mathematics

Brunel UNIVERSITY LONDON

Brunel University, Uxbridge,
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Annette.Payne@brunel.ac.uk
Lampros.Stergioulas@brunel.ac.uk
Zidong.Wang@brunel.ac.uk

Date: 22/07/2014

STATEMENT OF ETHICS APPROVAL

Proposer: Anan Mohammad A Alssbaiheen

Title: Mobile challenges and opportunities for e-government in Saudi Arabia

The school's research ethics committee has considered the proposal recently submitted by you. Acting under delegated authority, the committee is satisfied that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that you will adhere to the terms agreed with participants and to inform the committee of any change of plans in relations to the information provided in the application form.

Yours sincerely,

Zidong Wang

Professor Zidong Wang
Chair of the Research Ethics Committee
SISCM

Appendix 11: Approval letter from Ministry of Communication and Information Technology in Saudi Arabia

Dr. Steve Love
Brunel University
Uxbridge
Middlesex UB8 3PH
United Kingdom

The Saudi eGovernment Program (Yesser) extends its welcome and support in assisting the Doctoral candidate Ms. Anan Alssbaiheen, conduct her research in "***Mobile challenges and opportunities for eGovernment in Saudi Arabia***".

Ms. Alssbaiheen can coordinate with Mr. Mustafa Khan (mkhan@yesser.gov.sa), the Director of Center of Excellence for Research & Development for any information or assistance that she may require in regards to her research.

Best regards

Ali Al Soma
Director General
Saudi eGovernment Program (Yesser)
Ministry of Communications & Information Technology
Riyadh 11112
Kingdom of Saudi Arabia