A Model of Intention to Use Mobile Government Services

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Abstract

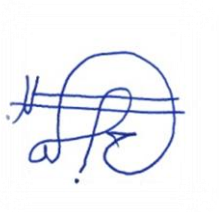
The aim of this research was to develop and validate a model which was designed to be useful for many countries considering delivery of mobile government (m-Government) services as the literature had not revealed any comprehensive model that is specifically used in the m-Government services context. The existence of this gap encouraged this research to empirically test and validate the combination of the Diffusion of Innovations (DOI) model and the Technology Acceptance Model (TAM) as well as external variables including Perceived Security, Perceived Trustworthiness, Perceived Enjoyment and Personal Innovativeness. Therefore, in order to fill the gap, this research developed a validated Model with relevant hypotheses which was tested for its predictive value.

Two stages of data collection were used in this research; firstly large scale survey questionnaires for the quantitative stage and secondly semi-structured interviews for the qualitative stage. The former were used to test the model and confirm the hypotheses, whereas the latter were used to elaborate findings from the survey questionnaires and provide further confirmation for the research model and hypotheses. The data were gathered from Oman and specifically Muscat the capital as the researcher is from Oman and could easily have access to relevant data. The advanced technique of Structural Equation Modeling (SEM) was used for the data analysis.

The key finding of this research is that Personal Innovativeness is considered to be the most influential variable on the Intention to Use, whereas, Perceived Ease of Use is the least significant variable. Overall, amongst the nine variables tested against the Intention to Use m-Government services, only five variables were found to be significant and therefore these five variables were incorporated in the Intention to Use proposed model. These variables were Personal Innovativeness, Compatibility, Perceived Trustworthiness, Observability and Perceived Enjoyment.

Student Declaration

"I, Hamed Al-Busaidi, declare that the PhD thesis entitled 'A Model of Intention to Use Mobile Government Services' is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work".

Signature  Date: 29 June 2012

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I would like to dedicate this thesis to my beloved country, Oman and His Majesty Sultan Qaboos bin Said, The Sultan of Oman

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List of Publications

ALBUSAIDI, H. & ALSHIHI, H. M-Government Initiatives in Oman: Technology Acceptance and Dissemination. *In:* KUSHCHU, I., ed. mLife 2009: Exploring the influence of mobile technologies on life 2009 Barcelona, Spain. mGCI Mobile Government Consortium International.

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Definitions of Terms and Acronyms

AVE	Average Variance Extracted. This is a measure of the shared or common variance in a Latent Variable (LV), which is the amount of variance that is captured by the LV in relation to the amount of variance due to its measurement error (Fornell & Larcker 1981).
Beta Value (β)	Beta is a quantitative measure of the volatility (riskiness) of a given share.
Bootstrapping Analysis	This is a computer-based method for assigning measures of accuracy to sample estimates (Efron & Tibshirani 1994).
CR	Composite reliability is a measure of the internal consistency of the indicators, depicting the extent to which they indicate the common latent construct (Hair, Anderson, Tatham & Black 1998).
CT	Complexity refers to 'the degree to which the users perceive an innovation relatively difficult to understand and use' (Rogers 2003, p.16).
COM	Compatibility is 'the degree to which an innovation is perceived by users as consistent with their existing values, past experiences, and the needs of potential adopters' (Rogers 2003, p.15).
DOI	Diffusion of Innovations is a theory that seeks to explain how, why, and at what rate new ideas and technology spread through cultures.
GPRS	General Packet Radio Service.
GDP	Gross Domestic Product.
ITA	Information Technology Authority. This is responsible for implementing national IT infrastructure projects and supervising all projects related to implementation of the Digital Oman Strategy while providing professional leadership to various other e-Governance initiatives of the Sultanate of Oman.
ITTS	Information Technology Technical Secretariat.
Latent Variables	Variables or constructs that are not directly observed, for instance, preferences, attitudes, behavioural intentions and personality traits.
NITC	National Information Technology Committee.
Nawras	The second internet and mobile service provider in Oman.
NVivo	The NVivo program is used for the analysis of both unstructured and semi structured interviews in qualitative research.

Nomological Method	It is a method that is used for formative models in order assures the validity of constructs (Jarvis et al 2003).
OmanTel	Oman Telecommunication, the first official internet and mobile service provider in Oman.
OBSV	Observability is 'the degree to which the results of an innovation are visible to others and how easily the benefits can be communicated to others (Rogers 2003, p.16).
PENJ	Perceived Enjoyment is 'the extent to which the activity of using a certain technology is perceived as being enjoyable in its own right, apart from any performance consequences that may be anticipated '(Davis, Bagozzi & Warshaw1992, p.1113).
Positivism	Positivism is a philosophy, which suggests that a single reality exists, which is objectively measurable, inherently understandable and outcome oriented (Kuhn 1996).
PEOU	Perceived Ease of Use is 'the degree to which a person believes that using a particular system would be free from effort' (Davis 1989, p.320).
PINOV	Personal Innovativeness is 'the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system'(Rogers 2003, p.22).
PCI	Perceived Characteristics of Innovations. These include, Relative Advantage, Compatibility, Complexity, Trailability and Observability.
PTT	Perceived Trustworthiness is defined, as 'the perception of confidence in the electronic marketer's reliability and integrity' (Bélanger, Janine, & Wanda 2002, p.252).
PDAs	Personal Digital Assistant, also known as Personal Data Assistance that works as a personal information manager.
PLS	Partial Least Squares is sometimes called 'component-based SEM'. It is a predictive technique, which can handle many independent variables, even when predictors display multicollinearity.
RA	Relative Advantage is 'the degree to which an innovation is perceived by users as better than the idea it supersedes' and can be measured in terms of economic and social factors' (Rogers 2003, p.15).
SPSS	Statistical Package for the Social Sciences. This is a computer program used for survey authoring and deployment, data mining, text analytics, statistical analysis,

	and collaboration and deployment (batch and automated scoring services).
SEM	Structural Equation Modeling is a technique for analysing data that is confirmatory in nature and where the variables interact simultaneously with each other (Kelloway 1998).
T-Statistics	A ratio of the departure of an estimated parameter from its notional value and its standard error used in hypothesis testing.
TRA	Telecommunication Regulatory Authority. This is responsible for the provision and promotion of telecommunication services in Oman.
TRI	Trialability is degree to which an innovation may be experimented with prior to adoption (Rogers 2003, p.16).
Wi-Fi	Wireless Fidelity is a local area network that utilizes high frequency radio signals in order to transmit and receive data over distances.
WAP	Wireless Application Protocol.

Chapter 1.

Research purpose and Research Outcomes

1.1. Research Purpose

Mobile Government is the application of new mobile technologies in developing countries, in contrast to western countries where it has existed for a relatively long time. It aims to improve the quality of life. However, despite the essence of technology being to make people's lives easier, new mobile technologies are not always accepted, especially in developing countries. This may be due to poor education, the high cost of technology, its complexity of use, or its incompatibility with values and beliefs. Therefore, in order to overcome these barriers, governments in developing countries need to implement mobile services that are seen to be directly in accordance with their citizens' needs.

The purpose of this research is to develop and validate a model of intention to use mobile government (m-Government) services as the literature has not revealed any comprehensive model that is specifically used for m-Government services. The existence of this gap in the adoption and intention to use m-Government services context encouraged this research to empirically test and validate the combination of the Diffusion of Innovations (DOI) model and the Technology Acceptance Model (TAM) as well as external variables including Perceived Security, Perceived Trustworthiness, Perceived Enjoyment and Personal Innovativeness. These variables were then synthesised into a conceptual model and then the model is tested for its predictive value. Therefore, in order to fill the gap, this research develops a validated model with relevant hypotheses. This is to define what factors influence/impact on the intention to use m-

Government services. The proposed model of this research is intended to be a useful model for many countries considering delivery of m-Government services in order to explain the factors that influence/impact the intention to use m-Government services. The proposed model will contribute to the existing knowledge because it incorporates many unexplored dimensions that influence/impact the intention to use m-Government services. The decision makers who are involved in m-Government services projects need research that can assist the provision of relevant guidelines for implementation of comprehensive m-Government services. Based on knowledge gained from this research, the decision makers will better understand the challenges they will face in the implementation of m-Government services and the implementation of these services will be more effective.

1.2. Research Aims and Questions

The major aim of this research is to develop and validate a model, which is designed to be useful for many countries considering delivery of m-Government services, which can assist any decision makers who are involved in m-Government services projects to better understand the factors influencing the intention to use m-Government services. This study uses models of DOI and TAM as well as external variables including Perceived Security, Perceived Trustworthiness, Perceived Enjoyment and Personal Innovativeness in order to test its applicability in the context of the intention to use m-Government services. Specifically, the research aims to:

- Examine the factors influencing the intention to use m-Government services;
- Examine the perceived characteristics of m-Government services as perceived by users and non-users, including relative advantage, compatibility, complexity, trialability, and observability;
- Examine the perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment of m-Government services as perceived by users and non-users towards their intention to use; and

- Examine the influence of demographic variables including, gender, age and education, of users and non-users in their intention to use m-Government services.

Accordingly, the following research questions are identified:

- What are the critical adoption factors to the use of m-Government services?
- How could these factors influence intention to use m-Government services?

To answer the previous research questions, several related questions are recognized as follows:

- How could DOI and TAM models contribute to the development of a model of intention to use m-Government services?
- What are the other factors that contribute to the intention to use m-Government services?
- How do demographics variables influence intention to use m-Government services?

1.3. Contribution to Knowledge

The proposed study will contribute to knowledge through the application and testing of the applicability of an important diffusion of innovations' theory. The theory is based on the seminal work of Rogers' Diffusion of Innovations and tested for its predictive values of intention to use m-Government services. The study will be the first to present an integrated model of Diffusion of Innovations (DOI) and Technology Acceptance Model (TAM) as well as external variables including perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment into one single model.

1.3.1. Contribution to Theory

Theoretically, this study examines the applicability of the DOI model, TAM model as well as external variables including perceived trustworthiness, perceived security,

personal innovativeness and perceived enjoyment in order to determine the most predictive variable in explaining the impact of intention to use m-Government services. It therefore the feedback from this research provides more insights to the researchers to determine the most important variable if any that will influence the intention to use m-Government services. In addition, testing the characteristics of the individual (e.g. personal innovativeness) will assist researchers in the field of m-Government services to better understand the characteristics of individuals who are more willing to use m-Government services. Further, external variables have been derived from the literature that seem to be critical variables in the adoption of m-Government services and these will be used in this study as an extension of Rogers' model. Ultimately a newly developed model of Intention to Use m-Government services has been produced where future m-Government services can be tested. This model is believed to be the first adoption model in this domain which combines factors from seminal works (DOI and TAM) and technology specific factors drawn from the literature.

1.3.2. Contribution to Practice

In practical terms, this study will assist the decision makers who are involved in m-Government projects in general and mobile service providers in particular to better understand the applicability of these variables of the DOI model and implement m-Government services successfully. In addition, the study will assist other stakeholders in the m-Government services field to better understand and implement m-Government applications in order to realize the benefits of m-Government services and fulfil the needs of citizens. The findings of the study provide insights to future and current m-Government adopters where initiatives can be evaluated. The case study was based on a leading m-Government service which has won several international awards and recognition. Accordingly, m-Government adopters may treat it as a benchmark/best practice for future initiatives.

1.4. Research Method

The data collection technique utilized in this study is the mixed method technique. It has the advantage that one approach builds on the results from the other, which in turn provides strength to the findings and further confirmation of the hypotheses. Thus, two stages for data collection were used in this research; firstly large scale survey questionnaires for the quantitative stage and secondly semi-structured interviews for the qualitative stage. The former were used to test the model and confirm the hypotheses, whereas the latter were used to elaborate findings from the survey questionnaires and provide further confirmation for the research model and hypotheses. The data were gathered from Oman and specifically Muscat, the capital, as the researcher is from Oman and had easy access to relevant data and had knowledge and familiarity with the system. For testing the model and hypotheses, the advanced technique of Structural Equation Modeling (SEM) was used for the data analysis.

The most common and earliest m-Government service being utilized in Oman is the Mobile Parking Service. This m-Government service has attracted international recognition through several international awards (Muscat Municipality, 2009) and hence, was selected as an exemplar for m-Government. Further, Oman happened to be one of the early adopters of this service where this service has first been introduced. Oman has experienced this service for a quite long time which makes it suitable to provide better understanding of the service. The Mobile Parking Service enables motorists to reserve and pay for car parking using their mobile phones by messaging their vehicle's plate number and the intended duration to a predefined number. This service is the first to be implemented as an m-Government service in Oman and is being used only in the capital Muscat. Although the DOI theory has been applied and adapted in various domains, such as internet use and e-business adoption (Rogers, 1995; Zhu and Kraemer, 2005), the scope of this study is to investigate the use of this m-Government service from the citizens' perspective only; business units and government units are outside this scope.

In addition, m-Government services in Oman are provided to all people and no distinction is made between nationals and non-nationals in terms of service provision or

government aims. However, there is a government policy strategy of Omanisation. This program intends to replace expatriates with trained Omani personnel. Thus, the data that will be gathered in this study will only focus on nationals. A more detailed discussion regarding the Research Method can be found in Chapter 4.

1.5. Research Outcomes

The study aims to investigate the factors affecting the intention to use m-Government services. Accordingly, it produces the following:

- A validated model of the intention to use m-Government services. This is the major expected outcome of this research as it is anticipated it will assist the decision makers in the government who are involved in m-Government projects in introducing and implementing m-Government services throughout their countries with some considerations of the important predictive values;
- The strongest and weakest predictive value that will influence/impact on the intention to use m-Government services;
- A comparison between males and females and their relationships with all the measured variables including relative advantage, compatibility, complexity, trialability, and observability, perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment;
- A comparison between young and old citizens and their relationships with all the measured variables including relative advantage, compatibility, complexity, trialability, and observability, perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment; and
- A comparison between highly-educated and less-educated citizens and their relationships with all the measured variables including relative advantage, compatibility, complexity, trialability, and observability, perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment.

1.6. Thesis Structure

This thesis is divided into seven chapters as follows:

Chapter One: This chapter presents the introduction, which provides the research purpose, the research aims and their significance, the research contribution to knowledge, the research method, the research outcomes, and the structure of this thesis.

Chapter Two: This chapter reviews the relevant literature in order to establish the conceptual context of this research and identify the gap that this study fills. It includes an overview of the nature of mobile government as well as overview of adoption theories including the DOI, TAM.

Chapter Three: This chapter introduces the research model used as a basis for understanding the factors influencing the intention to use m-Government services as well as the proposed hypotheses.

Chapter Four: This chapter introduces the research method used to collect the required data, which involves mixed methods; the quantitative study (questionnaire) followed by the qualitative study (interviews) as well as the case study used in this research. The data collection, an analysis of both the quantitative and the qualitative data and the findings from both sets of data are also discussed.

Chapter Five: This chapter presents the validation of the research model. This includes the data analysis of the data collected in Chapter 4.

Chapter Six: This chapter presents the results and discussion of both the quantitative and qualitative data that were collected from Chapter 4 and analysed in Chapter 5.

Chapter Seven: This chapter draws a conclusion and discusses the limitations of the research and suggestions for future research. It also presents a summary of the objectives, activities and main findings of this study, as well as the contributions to theory that this study makes.

Chapter 2.

Mobile Government Theory and Practice

2.1. Introduction

This chapter aims to explain the major concepts and issues around m-Government dissemination and implementation. It begins with a general overview about m-Government in Section 2.2; this includes its connection to e-Government and discusses the definitions of m-Government followed by a description of applications and classifications, m-Government enabling technologies, adoption and dissemination and the drivers and barriers of m-Government services. Section 2.3 presents examples of leading m-Government applications/services from around the world. Then, in Section 2.4 a critical review and empirical work of the DOI model is provided followed by an overview of the TAM model in Section 2.5.

2.2. Mobile Government

There is some argument about whether there is a substantial difference between e-Government and m-Government. Several scholars as Kushchu (2007) believe m-Government subsumes e-Government. In other words, m-Government and e-Government are not two separate entities. This is because e-Government includes the usage of all technologies in order to deliver services to citizens as well as to improve the activities of government whereas m-Government is an extension to e-Government which is limited to the use of mobile technologies (e.g. mobile phones, Personal Digital Assistance (PDAs), Wireless Fidelity (Wi-Fi) enabled devices, Bluetooth, wireless networks in delivering services). Further, m-Government is considered a better option

compared to e-Government in delivering services and public information to citizens. This is because it is available anywhere, anytime and from any internet enabled device (Lallana, 2008). According to Kushchu (2007), m-Government is an extension of e-Government which allows it to provide new mobile services. M-Government mainly deals with mobility in the context of delivering m-Government services but not primarily with mobile technologies.

Further, e-Government is the applications of Information and Communication Technology (ICT) by government agencies with the aim of enhancing information or services delivery to citizens. It provides services to citizens through wired network such as the internet, and fixed telephones. The internet nowadays has become the cheapest and most effective channel that is being utilized by governments in order to deliver information and communication services to citizens. However, in order to make use of a certain type of government service (e.g. exam notification) resources such as a computer, telephone, and internet connection are required which may not be available to citizens. Nevertheless, the existence of advanced technology such as wireless mobile communication infrastructure is pushing governments to utilize this technology in order to better deliver its service to citizens anywhere and anytime with satisfaction. Furthermore, due to the increase of wide wireless coverage in rural and remote areas, the penetration of mobile phones in developing countries is higher than landline.

Kushchu (2007) also argues that m-Government is the application of new mobile technologies in developing countries, in contrast to western countries where it has existed for a relatively long time. It aims to improve the quality of life. However, despite the essence of technology being to make people's lives easier, new mobile technologies are not always accepted, especially in developing countries. This may be due to poor education, the high cost of technology, its complexity of use, or its incompatibility with values and beliefs. Therefore, in order to overcome these barriers, governments in developing countries need to implement mobile services that are seen to be directly in accordance with their citizens' needs (Kushchu, 2007). As Sandy and McMillan (2005) argue, m-Government uses Information and Communication Technologies (ICTs) to

improve the activities of public sector organizations and provide ‘anytime’ and ‘anywhere’ services to both citizens and public officials. They point out that the availability of technology such as pocket PCs, tablets, handheld terminals, Short Message Services (SMS), Personal Digital Assistants (PDAs), and mobile or cellular phones, offers the public many benefits. These include increased channels for services’ interactions, and instant updates to information and data - hence increasing the productivity of public servants in particular.

Notably, governments in the developing countries are expanding the infrastructure of mobile networks at a fast pace in order to provide m-Government services to citizens anywhere and anytime, although m-Government services in the developing countries are still in their infancy and have not been exploited (Mengistu, Zo, & Rho, 2009). However, due to the increase of wide wireless coverage in rural and remote areas, the penetration of mobile phones in developing countries is higher than landline and is considered the best manner to reach citizens in remote areas of rural regions through the implementation of m-Government services (Kushchu & Kuscu, 2003; Wireless Intelligence, 2005). Furthermore, in cases of natural disaster such as a cyclone or flood causing billions of dollars of damage to landline and mobile network infrastructure (Hossan, Chowdhury & Kushchu, 2005), m-Government services can rapidly provide safety warnings to remote areas before the disasters occur (Kushchu & Kuscu, 2003).

In 2000, the former Prime Minister of the UK, Blair stated that new digital channels could be used to deliver better quality services to citizens in the United Kingdom (UK). These channels would be available 24 hours a day and would be faster and more convenient thus stimulating the market for e-Commerce by encouraging the widespread adoption of technologies and creating new business opportunities (Blair 2000). Blair has pointed that in order to achieve this aim and deliver better quality services to the citizens anytime and everywhere, a new digital channel should be utilized. This new digital channel operates using wireless devices, such as Pagers, Personal Digital Assistant (PDA), and Cellular phone (Antovski & Gusev, 2005).

Tozsa and Budai (2005) argue that accessibility anywhere and anytime is the great advantage of m-Government applications and has the potential to make the administration more productive and efficient. They also state that the Short Message Service (SMS) is an important tool for m-Government as it is one of the best ways to reach a vast number of citizens in a short time. Further, Heeks and Lallana (2004) argue that in addition to improving the delivery of information and services to citizens, m-Government applications increase the productivity and effectiveness of public servants.

According to Carroll (2005), Success of e-government requires active engagement by both government and its citizens. 'A greater challenge may be achieving acceptance and widespread, persistent use of e-government by citizens'(p.79). Carroll in 2006 suggests that the principle drivers (success factors) of m-Government services are to increase the efficiency, effectiveness and availability of such services anytime and anywhere (Carroll, 2006). Further, the success of mobile government depends mostly on the number of its users; the citizens (Kushchu, 2007). However, a less visible issue influencing the success of m-Government applications is that the citizens' needs to access public sector services via mobile technology are being overlooked (Carroll, 2005). Although much research has focused on e/m-Government technologies, less attention has been paid to what citizens actually need. In this situation, one of the aims on this study is to fill the gap by focusing on the needs citizens in terms of m-Government services. This is done through utilizing the Diffusion of Innovations Model (DOI) and Version 1 of the Technology Acceptance Model (TAM) developed by Davis (1989) as well as other variables that seem to be important such as perceived trustworthiness, perceived security, perceived enjoyment and personal innovativeness in order to assist their government in achieving the successful implementation of m-Government services (see Chapter 3). In addition, it aims to understand the users of m-Government services in order to assist the government to smooth the introduction of m-Government services. The scope of this study is to investigate the use of these m-Government services from the citizens' perspective only; Government to Citizen (G2C). The business units, Government to Business (G2B) and government units, Government-to-Government (G2G) are beyond the scope of this study.

It is clear from the argument above that e-Government differs from m-Government; the former provides services to the citizens, business, and governments through wired network with interactive and intelligent web applications, whereas the latter uses wireless devices as cellular phones, PDAs, and pagers to communicate with the relevant parties.

2.2.1. Definition

Mobile Government is defined as a ’strategy and its implementation involving the utilization of all kinds of wireless and mobile technology, services, applications, and devices for improving benefits to the parties involved in e-Government including citizens, businesses, and all government units‘ (Kushchu, 2007, p.3). This definition places core ICT components such as the mobile network as imperative factors that would enhance the utilisation of m-Government services. Additionally, Moon describes m-Government as ’government’s effort to provide information and services to public employees, citizens, business, and non-profit organizations through wireless communication networks and mobile devices such as pagers, PDAs, cellular phones and their supporting system’ (Moon, 2004). Other authors have also described e/m-Government as:

> *Electronic government (eGovernment) refers to the provision of government services through the use of information and communication technologies (ICTs). Mobile government (mGovernment) can be seen as a subset of eGovernment; it refers to the provision of government services via wireless technologies, anywhere, anytime, employing a diversity of mobile devices (El-Kiki, Lawrence & Steele, 2005, p.1).*

This is in agreement with Kushchu’s definition that the use of wireless devices would enhance the utilisation of m-Government services and m-Government can be seen as the way future governments deliver government services to citizens, companies and within government institutions via wireless devices anytime and anywhere.

Previous authors have described m-Government in a broad and general view. For instance, Rossel, Finger and Misuraca, (2006) state that ’m-Government developed as a

natural spin-off expression of e-Government in the wake of a generic technological deployment (the supporting 'mobile' systems) and its societal evolution (being mobile as a must)' (p.79). This is in agreement with Tozsa and Budai (2005), who argue that accessibility anywhere and anytime is the great advantage of m-Government applications which makes the administration more productive and efficient.

On the other hand, Rainer and Cegielski define mobility as the users' ability to be reached anytime and anywhere (Rainer & Cegielski, 2011). This is true in the m-Government domain and hence the 'm' prefix. It should be noted that the term 'mobile' and the 'wireless' could be used interchangeably in this domain because m-Government relies heavily on wireless infrastructure.

In this research we acknowledge the widespread use of modern mobile devices (smart phones and tablet PCs) and the obsolescence of some older wireless devices (pagers and PDAs) in defining m-Government as follows: '*the utilization of a diversity of modern mobile devices (e.g. Cellular Phones, Tablet PCs, Laptops) in order to provide information and services anytime and anywhere to citizens, businesses, government units, and non-profit organizations to gain benefits such as cost reduction, greater work efficiency, effectiveness, and faster access to public services'.*

2.2.2. Applications and Classifications

Similarly to e-Government, m-Government operates on four different applications. These applications are as follows:

- Mobile Government to Government (mG2G), referring to the interaction between governmental agencies;
- Mobile Government to Business (mG2B), referring to the interaction between government and private sectors;
- Mobile Government to Employee (mG2E), referring to the interaction between government and its employees; and

- Mobile Government to Citizen (mG2C), referring to the interaction between government and citizens (Heeks & Lallana, 2004).

The most developed level that is being operated globally is mobile Government to Citizen (mG2C) (Ntaliani, Costopoulou & Karetsos 2008). Therefore, as mentioned earlier, the scope of this study is only to investigate the use of this kind of m-Government services from the citizens' perspective mobile Government to Citizen (mG2C); the business units (mG2B) and government units (mG2G) are outside this scope. Heeks and Lallana (2004) argue that in addition to improving the delivery of information and services to citizens, m-Government applications increase the productivity and effectiveness of public servants. According to Trimi and Sheng (2008), m-Government is classified into three classifications. These three classifications are as follows:

- Informational: one-way transmission where government sends alerts, notifications or broadcasting to users via emails or SMS (Push services);
- Transactional: two-way transmissions of information from government to users and vice versa, where users are able to interact with m-Government systems such as online procurement and payments (Pull services); and
- Operational: where all the internal governmental operations occur by enabling the government employees to access the required information from remote locations via their mobile devices.

The use of mobile technologies differentiates m-Government from e-Government. There are many other factors to distinguish m-Government from e-Government in terms of accessibility and availability, better precision and personalization in targeting users and delivering information. These factors are as follows:

Pull services in terms of accessibility and availability:

- m-Government improves the adoption of online services by citizens through the accessibility and availability of information anytime and anywhere;
- As mobile devices are designed to be portable and handy, the application can be designed to provide instant information to users (e.g. send warnings during emergencies); and
- Users usually keep their mobiles on, so they can receive Short Message Services (SMS) anytime and anywhere, which is different from a personal computer. Therefore, this is different from e-Government applications.

Push services in terms of better precision and personalization in targeting users and delivering information:

- Mobile devices are designed to be used by a single user unlike a personal computer, which can be shared by different users. Thus, there is better precision and personalization in targeting the same user anytime through their mobile device; and
- M-Government increases the adoption of online services by reaching its citizens through a more personal, familiar, and friendly device (Kushchu, 2007).

In order for citizens to utilize all mobile government services, enabling technologies must be used which are discussed in detail in the next Sub-Section (2.2.3).

2.2.3. Enabling Technologies

There is a greater range of enabling technologies, other than those directly impacting on m-Government, are excluded from the scope of this research. According to Trifonova and Ronchetti (2006), a mobile device can be any small and portable device that can be handled everywhere and at anytime. Mobile devices would be the best technology channel that can achieve delivery of governmental services and support users' mobility. Enabling technology channels that are used in m-Government must be able to deliver governmental services to citizens and support citizens' mobility. Trimi and Sheng (2008)

have categorized the enabling technologies for m-Government services into the following categories:

- Personal Digital Assistant (PDA): this is a small handheld device which contains some personal computer and telephone capabilities, for instance, calendar, multimedia, voice recorder and the ability to get connected to the internet in order to check emails or for browsing;
- Cellular Phones: Previously, cellular phones had limited functionalities, for instance, voice and short text messages only. Nowadays, these devices have more advanced functionalities such as third generation (3G) and more network connectivity which enable the user to connect to the internet and send emails and browse;
- Smart phones: These devices include both PDAs and cellular phones functionalities that can be used for text messages and voice communication, sending emails, browsing the internet and multimedia; and
- Tablet PCs or Slates such as iPads and the like. These have transformed the way people interact with PCs and are triggering higher adoption in the mobile commerce/government world (Fenn, 2010).

Naturally there are several drivers and barriers during the introduction and implantation of m-Government services that the governments and service providers might face. These are discussed in detail in the following sub-section (2.2.4).

2.2.4. Drivers and Barriers

Kushchu (2007) has identified some prerequisites and recommendations that would assist in implementing m-Government services. They are as follows:

- Decentralization for local m-Government diffusion;
- Central government support to local projects in order to promote standardization;
- Soft skills, in particular leadership and communication;

- Skills enhancement on the job rather than formal training;
- Horizontal organizations and bottom-up approaches, but with strong commitment of top management; and
- Early involvement of people both internal and external (Kushchu 2007).

Khare, Dixit and Chaudhary (2011) have also identified several drivers in order to assist developing countries to shift from e-Government to m-Government services. These drivers are as follows:

- High penetration rate of mobile users in developing countries enables them to use of m-Government services;
- Increasing number of people using mobiles to connect to the internet via Wireless Application Protocol (WAP) services provided over General packet radio service *(*GPRS*)*;
- Mobile phones networks/coverage is easier to lay down to reach remote areas where it is difficult for the infrastructure for the internet to be implemented. Therefore people who live in the rural areas are able to access m-Government services via mobile phones;
- Mobile phones are mostly affordable and this due to the low cost compared to the internet technology;
- Mobile phones are simple to use and this will encourage many people to adopt mobile phones devices easily; and
- m-Government would extend the operations of e-Government to some new areas like e-Democracy, e-participation, e-voting and other forms of communication between the citizen and the government.

As Ghyasi in 2009 argues that the Governments can begin implementing m-Government services in three different stages. Firstly, in order for the governments to reach the citizens anywhere and anytime to warn them about such events as earthquake, fire, floods, etc, the governments should develop m-services that can be pushed to citizens.

These types of m-services are informational services, which are government to citizen (mG2C). Secondly, citizens can interact with government services in order to encourage them to enhance democracy and bring accountability. These types of m-Government services are transactional or pull services (mG2C and vice versa). Finally, citizens can interact with government using more advanced applications such as payment transactions, bills and inquiries. Therefore, mobile phones are not only meant for making calls but also as an identification card, payment wallet, driving license, and health insurance (Ghyasi, 2009). Other driving factors will affect the citizens attitude towards m-Government such as their socio-economic characteristics, income, education level, age, gender, and language difference (Kushchu 2007).

As mentioned above, if citizens can use m-Government services easily, then a vast number of citizens will adopt those m-Government services. Therefore, governments should consider ease-of-use when providing m-Government services to citizens. M-Government services should be provided in many different forms like video and voice communication in order to increase people's perception of using m-Government services because the main driver for the success of m-Government services is user acceptance (Kushchu, 2007). Kushchu and Kuscu (2003) have also argued that the level of mobile device penetration is considered a key driver for m-Government and ubiquitous access is somehow being overlooked as a side acquisition. In addition, Campbell (2005) claims that young people consider mobile phones as their most important possessions, and this is an agreement with Mitra and Rana, (2001) who argue that young people seem to understand technology better than older people.

When it comes to mobile commerce activities, many people hesitate to buy/pay online because they do not trust mobile phones or the internet and they are worried that their credit card details will be stolen. However, the Perceived Security of m-payment using mobile phones is greater than the wired systems (Antovski & Gusev, 2003). In addition, most citizens are very concerned about privacy and Perceived Security when using m-Government services. They fear that their mobile phone numbers will be traced when they send inquires to the government. Therefore, the government should gain the

citizens' trust and insure that their information is secure and will not be disclosed to any third party by any means. A wireless network is still considered vulnerable because the signal is sent through microwave or radio signals. Consequently, there is an opportunity for any external attacker to intercept the information (Antovski & Gusev, 2003). According to El-Kiki, Lawrence and Steele, (2005) there are many challenges and opportunities in adopting and using wireless technologies. These could be political, cultural, structural, social, legal and administrative and would represent pressures and challenges to the government. The decision makers who are involved in wireless technology projects should deal with these challenges and opportunities by identifying the type of challenge, determining the risk and responding accordingly. If the government does not have a plan for the identified risk, this may lead to the failure of the government's projects. Therefore, in order to mitigate risks and have a proper government response, a management framework has to be developed and implemented (El-Kiki, Lawrence & Steele, 2005).

In 2004, Moon has also identified some barriers that would slow the adoption of m-Government services. These barriers are security, interoperability, privacy, the high cost of implementing mobile technologies, and a lack of resources. He stated that a wireless network is more vulnerable and unstable than a wired network (Moon 2004). Many people still hesitate to use m-Government applications due to a lack of trust in technology, which has a negative effect on the rate of adoption. This is in agreement with previous researchers who argue that Perceived Security and privacy are the most important issues affecting the adoption of m-Government services (Chang & Kannan, 2008). They have also added that various studies have included trust in broader adoption models, for instance the Technology Acceptance Model and the Diffusion of Innovations theory. However, few have focused exclusively on the implications of trust on e-government adoption (Change & Kannan, 2008). According to Bélanger, Hiller & Smith (2002, p.252) trustworthiness is 'the perception of confidence in the electronic marketer's reliability and integrity'.

In order to implement successful m-Government services, government agencies should first understand the citizen's requirements. This will make their performance more effective in delivering better services to their citizens. This is an agreement with John Alford who argues that 'Agencies may find that they need certain things from service-recipients – such as information, co-operation, compliance and co-production – which are crucial for effective organizational performance (Alford, 2002, p.2). Mobile government in the developing countries is still in its infancy, although globally mobile government services have been available for quite a long time. Therefore, the developing countries should consider shifting to mobile government in order to step forward into the digital era. Examples of leading m-Government services globally including in the developing countries are discussed in the next Section (2.3).

2.3. M-Government Worldwide

In 2010, The International Telecommunication Union (ITU) reports that the growth of mobile phone is increasing in the developing countries. India and china have the highest penetration rate of mobile phones; for instance, in 2010, new 300 million subscribers were recorded in these two counties (ITU, 2010). Table 2.1 shows the Key Global Telecom Indicators for the World Telecommunication Service Sector in 2010.

	Global	Developed nations	Developing nations	Africa	Arab States	Asia & Pacific	Europe	The Americas
Mobile cellular subscriptions (millions)	5,282	1,436	3,846	333	282	2,649	741	880
Per 100 people	76.2%	116.1%	67.6%	41.4%	79.4%	67.8%	120.0%	94.1%
Fixed telephone lines (millions)	1,197	506	691	13	33	549	249	262
Per 100 people	17.3%	40.9%	12.1%	1.6%	9.4%	14.0%	40.3%	28.1%

Table 2.1 Key Global Telecom Indicators for the World Telecommunication Service Sector in 2010

Source: International Telecommunication Union (October 2010)

2.3.1. Developed Countries

In Australia, in particular in the Sydney Region of New South Wales (NSW), the MGM Wireless Company provides SMS and other mobile services that may benefit parents and students. These mobile services offer the school administrator or teachers appropriate privileges to be able to use the web services of the school in order to provide alerts to parents (e.g. important school event reminders, late breaking school news and attendance and safety related matters). In addition, in Australia there is the Fire-watch SMS based service, which is a system that sends SMS alerts to citizens whenever there is a fire within fifteen kilometres (Rannu, Saksing & Mahlakõiv, 2010).

In the United States of America (USA), m-Government projects have increased at a fast pace. For instance, 'My Mobile Virginia' is the first m-Government application to be implemented in the USA by the government of Virginia State. Therefore, Virginia has been the leader in implementing m-Government applications in the States. In the USA, this application was the first wireless state portal being utilized via mobile and wireless devices provided by the government. It provides plenty of m-services such as information about emergency weather conditions, legislative information, lobbyist lists, election notices, tax-related information, and tourism information. The US government is also utilizing text messages to communicate with their citizens, such as on street cleaning schedules. In addition, in Iowa the Parking Day Text Service sends messages to their citizens to remind them to shift their cars, which will help drivers to avoid getting tickets. Another wireless application, which was introduced in July 2001 by the US government in California State, was 'My California on the Go'. This m-Government service allows the citizens to receive instant updates on energy warnings, traffic jams, state lottery results, and press releases from the governor's office. In addition to these applications, the Global Positioning System (GPS) was introduced in Seattle to assist commuters to save driving time. This m-Government service provides instant updates to drivers about traffic slowdowns, traffic lights, and traffic flows **(**Trimi & Sheng, 2008). Besides these services, the United States Government has launched seventeen new mobile applications throughout the country (Gahran, 2010).

One of the leading countries globally in m-Government services is Estonia, where the mobile penetration exceeds 100 per cent. The government in Estonia has adopted a powerful and convenient way in order to provide information and communication from government and office, which is the SMS tool (Rannu, Saksing & Mahlakõiv, 2010). According to a KPMG (a global network of professional firms providing Audit, Tax and Advisory services) survey in 2009, in Central and East Europe, Estonia is considered the most advanced mobile payments (m-payment) market (KPMG, 2009). In addition, the M-parking service is considered a very useful and popular service in Estonia since its introduction in 2000 (Rannu, Saksing & Mahlakõiv, 2010). According to Rain and Maarja (2005), as of December 2005, the following mobile services are available in Estonia in particular in Tartu, which is considered the leading city in Estonia in introducing m-services. These services are as follows:

- Mobile Parking: This application enables clients in Estonia to pay for parking using their mobile phone;
- Mobile Bus Ticket: This application also enables clients to pay for bus tickets using their mobile phone;
- T-number: T-number is a service that permits individuals to receive information on tourism in Tartu via their mobile phone;
- Mobile Payment: individuals use their Mobile phone in order to make a payment when buying any products or services such as in shops or restaurants, etc;
- Tartu city short code 1789: this service allows citizens to send information to the city about traffic lights or street lamps, damaged traffic signs, and stolen park-benches etc;
- M-neighborhood watch: The Police control centre sends SMS notifications to all taxis and drivers, Perceived Security companies, and other people on issues such as missing persons, stolen cars that require watchful eyes; and
- M-library: Tartu City library sends notifications about waiting lists to the readers' mobile phones who want to borrow a book, movie or audiotape that is currently not available.

In Canada, the Canadian government has also introduced a project called 'Government of Canada Wireless Portal'. This project allows the citizens to get access to government information via their mobile devices. The m-Government services introduced in this project include; members of the parliament contact information, border wait time, economic indicators, passport services, and Canadian government news releases. Further, Canadian police officers are using mobile devices in order to issue tickets, access databases, access the record-management system, and check vehicle registrations and license tags **(**Trimi & Sheng, 2008).

Europe is considered to be more advanced in terms of m-technology. This is because the penetration rate of mobile phones has increased swiftly during the period 2004 to 2007 from 90 per cent to 100per cent **(**Trimi & Sheng, 2008). They also added that the wide acceptance of m-technology has expedited the acceptance of m-government services. For instance, citizens in London who have subscribed with the London Police Department can receive SMS about Perceived Security threats and emergency alerts from the London Police Department. In addition, bus drivers who subscribed with Bus Operator Metroline can receive SMS about their timelines to speed up or slow down and maintain an even interval between buses. They receive this SMS from the Bus Operator Metroline where they send SMS to the bus drivers after monitoring the status and location of buses via a mobile tracking system.

In Austria, the parking inspectors use a portable device that connects to the central parking database to check whether the driver has paid for the parking slot or not **(**Trimi & Sheng, 2008). Sweden also is considered to be one of the leading countries in the world with regard to m-technology because the penetration of mobile phones in Sweden is extremely high with over 95 per cent of the population owning a mobile phone. Many m-government services are available throughout the country. For instance there are SMS applications for city job postings in Stockholm, a mobile parking fee payments system, a government inspector service, tax services, mobile healthcare providers, and MapMate as a wireless map system, among others (Ostberg 2003).

In Finland, the Finnish telecommunication firm Sonera has developed advanced application that has the ability to turn any mobile phone into an identity. Since every mobile phone has a unique Subscriber Identification Module (SIM) card code, personal identification can be fixed in the card code in the SIM and thus make it the same as the current paper passport system. In addition to the electronic passport instead of a paper passport, the citizens in Finland can make secure transactions over mobile phones **(**Trimi & Sheng, 2008).

In Japan, people are able to receive information from the Vehicle Information and Communication System (VICS) about services such as traffic congestion, roadwork, car accidents, availability of parking lots, and weather information. M-Government in Japan is considered to be an old-fashioned term, and now the government's strategy is to move ahead with u(ubiquitous)-Japan to connect everyone and everything, anytime, anywhere **(**Trimi & Sheng, 2008).

In Korea, there is a project called 'M-police'. This project enables the police officers to retrieve information on missing vehicles, driver's licenses, vehicles' histories, and pictures of suspects via mobile devices. Therefore, it will assist them to find suspects and missing cars very quickly. In Anyang City, parking inspectors are using PDAs and small printers to collect information and then print receipts on the spot. In Uijeongbu and Kunsan Cities, the m-local Tax Management System enables officers to access information on car taxes, obtain data on delinquent taxes, and immediately transfer data to the local tax database (Jeong & Kim, 2003).

In Singapore, the government aims to increase the dissemination of m-services provided to the public. Currently, individuals and businesses are able to get access to a wide range of government information and services via their mobile devices. These mobile government services are available anytime, anywhere via mobile phone and are discussed below (Singapore Government, 2008):

- CPF (Central Provident Fund) board members are able to view their CPF account information on using their mobile phones. For instance, they can check their Account Balances, Contribution History, Property, and Investment;
- HPB (Health Promotion Board) Mobile Portal – individuals can get health information and travel tips;
- CPF e-Appointment SMS Alert – people can receive an SMS from the hospital one day before their appointment if they have provided the hospitals with their mobile phone number;
- Police Crime Alerts Service: The police centre sends notifications to people who have already subscribed with the following Singapore Telcos (M1 and SingTel only) to receive notifications on crimes that have occurred in the neighbourhood via SMS; and
- Supreme Court Mobile Information Service – people can request information on trials and hearings before judges and registrars through their SMS.

Further, citizens in Singapore are able to receive text messages from government agencies regarding parking ticket reminders, national service obligations, and passport renewal notifications **(**Trimi & Sheng, 2008).

It is clear that the advantages of implementing m-Government services in all countries and the ability to deliver integrated services from a single point, create opportunities and co-operation between governments, the private sector, and individuals. Therefore, these m-services projects reduce administrative problems on a global scale.

2.3.2. Developing Countries

In Asia there were 1.1 billion mobile subscribers in 2007. Therefore, Asian countries have a high potential with regard to m-technology. For instance, some of the highest rates of mobile phone usage in the world are amongst the industrialized countries in the Asian region, such as Japan, South Korea, Hong Kong, Taiwan, and Singapore.

In the Philippines Ghayasi and Kushchu (2004), have also discussed the following mobile services, which have been launched:

- TXT CSC: This service allows citizens to send complaints to government agencies, in particular the Civil Service Commission (CSC) in the Philippines in order to increase the efficiency and speed of service delivery (Lallana, 2004).
- Reporting Criminal Offences: citizens and police officers can send SMS to the relevant authorities about any criminal offences in order for authorities to take action.

In Dubai, in 2003 the Dubai Government introduced its SMS services. These are Push SMS services that are accessible for driving license renewals, traffic jam information, health card renewals and trade license renewals. In addition, there are Pull services available in Dubai. These include flight information, the payment of traffic fines and information pertaining to trade license status. Further, in September 2005, Dubai government launched the mobile portal which is a single point for accessing all public services. This has assisted the Dubai government and the citizens to reduce the complexity and delays of routine procedures. In addition, the advantage of the single point portal is that it allows individuals to access visa information, police services, such as traffic fine enquiries and payments, and obtain prayer timings as well as searching for hotels, checking arrivals and departures from Dubai airport and obtaining entertainment information and financial services data (Ewan, 2006). Another, important application introduced by the Dubai government is m-Dirham. This application or service allows people to deposit money in a third party financial institution in order to be able to use it for paying different municipal services (Ewan, 2006).

In Jordan, the Jordanian government started to plan seriously for e-government when the Program Management Office was established under the Ministry of Information and Communication Technology. However, within one year, the Jordanian government was able to accomplish 13 e-government initiatives and 30 separate related projects. These included the development of an e-government operations centre linking several

ministries to a secure government network and email. In addition, it built many online services such as company registration and income tax filing (Samer & Mohammed, 2008).

In Oman, His Majesty Sultan of Oman has a long-term vision of Oman to encourage the Omani government to move forward rapidly in terms of ICT provision. An Information Technology Authority (ITA) was created in 2006 by a Royal Decree to plan for and oversee national ICT projects (ITA, 2010). These projects include the implementation of e/m-Government services throughout the entire country of Oman. According to the (ITA) in 2010, Oman's e-government strategy was unveiled on May 7th 2003, followed by several modernizing projects aimed to enhance the ICT sector and improve digital awareness and capacity (ITA, 2010). Table 2.2 below summarizes all mobile Government services in Oman. They are as follows:

m-Government Services	Description	Target Audience	Operator	Source
Apply Job Ministry of Civil Service	This is a Push and Pull SMS service for candidates who are searching for a job.	Job Seekers	Oman mobile, Nawras	Ministry of Civil Service, 2006
Mobile Parking Service	This is a Push and Pull SMS Service to send a request to Muscat Municipality to reserve a car parking using Short message Service.	Citizens/residents	Oman mobile, Nawras	Muscat Municipality, 2007
SMS Exam Grades	This is a Push and Pull SMS to request the final exam grades.	Students	Oman mobile, Nawras	Ministry of Higher Education, 2007
Jawab SMS Service	This is a Push and Pull SMS services to notify subscribers of completion of transactions, their cost and any other important information needed.	Citizens/residents	Oman mobile, Nawras	Ministry of Manpower, 2010
SMS Violation Enquiry	This is a Push and Pull SMS to enquire about traffic offences by sending SMS.	Citizens/residents	Oman mobile, Nawras	Royal Oman Police, 2010
SMS Tender Announcement Notification Service	This is a Push and Pull SMS to receive SMS about announcements of new tenders, award of tenders and tender amendment notifications to unsuccessful applicants.	Citizens/residents	Oman mobile, Nawras	Tender board Oman, 2004
SMS Telephone Regulatory Authority (TRA)	This is a Push and Pull SMS to inform customers about whether their transaction is ready to be collected or not complete.	Citizens/residents	Oman mobile, Nawras	Telephone Regulatory Authority, 2009

Table 2.2 Mobile Government Services in Oman

Many organizations both private and public have decided to open new mobile channels and provide mobile services to communicate with their clients anywhere at any time. These services are categorized into two groups - Push and Pull. The former is where clients receive notifications from organizations about specific events, and the latter is where clients have more privileges in receiving, responding, and / or initiating services with organizations.

According to the latest United Nations (UN) e-Government readiness report published in (2008), the Oman e-readiness rank has improved by 28 points to reach the 84th position in 2008 from 112th position in 2005 (UN, 2008). This indicator shows good progress and the commitment of the Omani government in driving improvements to the ICT sector although when compared to other GCC countries (Bahrain, Kuwait, Qatar, Saudi Arabia, and UAE), it lags behind them all. In addition, in 2011 among 138 countries, Oman was in the 41st position in the Networked Readiness Index (NRI). The Networked Readiness Index (NRI) examines how well the countries are prepared to use ICT effectively (Global Information Technology Report, 2011). It can be noticed when compared to previous years Oman has witnessed a great development in ICT provision.

2.4. Diffusion of Innovations (DOI)

'This study applies Rogers' Diffusion of Innovations theory as a base model because it is well established and has been extensively used in research on information technology diffusion (Prescott & Conger, 1995; Braak & Tearle, 2007; Choudhury & Karahanna, 2008; and Conrad, 2009). In addition, this theory fits well with peoples' understanding of the adoption of technology (Conrad, 2009), particularly in the context of developing countries (Prescott & Conger, 1995). Further, the Diffusion of Innovations theory is one of the earliest technology adoption theories used in Information System (IS) research (Rogers 1995). Additionally, when it comes to both the organisational and individual levels, Rogers is considered the only innovation scholar to pose diffusion theories (Conrad, 2009).

This study uses Diffusion of Innovations (DOI) as the main model in order to test its applicability in the context of the adoption of m-Government services. It uses the first three stages of DOI model; Knowledge, Persuasion, and Decision (Rogers 2003). However, in examining Mobile Parking Services, the remaining two stages, Implementation and Confirmation, will be left for future investigation. This is because the former occurs when an individual actually puts an innovation in use (Rogers 2003). It means until the implementation stage, the innovation-decision process goes through a thinking process whether an individual decide to adopt an innovation or rejects it. Hence, this study aims to determine the factors that affect the individuals' intention to use Mobile Parking Service. Those individuals may be users or non-users of Mobile Parking service. It means they are still in the thinking process of innovation-decision process whether to decide to adopt the Mobile Parking Service or rejects it. Rogers (2003) also states that in the innovation- decision process a decision of individual to adopt or reject a new idea is usually not the terminal stage. For instance, Mason in 1962 found that:

> *Oregon farmers he studied sought information after they had decided to adopt, as well as before. At the confirmation stage the individual seeks reinforcement for the innovation-decision already made, and may reverse this decision if exposed to conflicting messages about the innovation. At the confirmation stage, the individual seeks to avoid a state of dissonance or to reduce it if it occurs* (Rogers 2003, p.189).

The decision stage is defined by Rogers as 'the process through which an individual or other decision making unit passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision'(Rogers 2003, p.168). This process consists of the following five stages as shown in Figure 2.1.

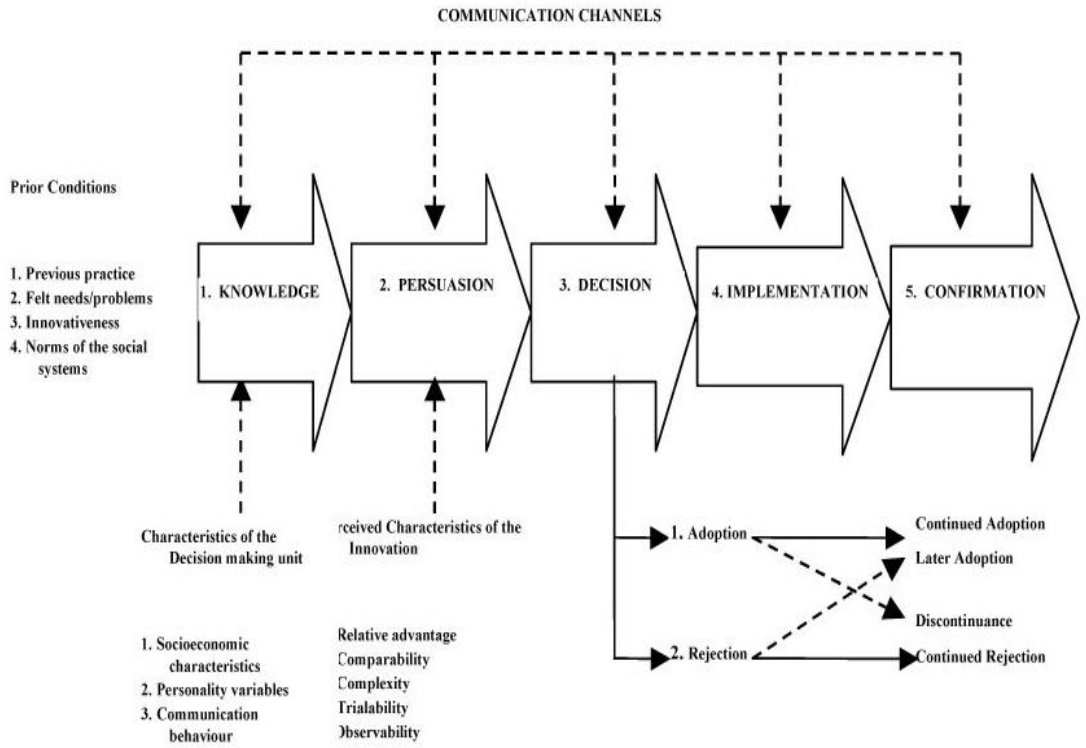

Figure 2.1 A Model of five stages in the innovation-decision process

Source: Rogers (2003)

- **Knowledge-** individuals become familiar with the innovation's functionality. The type of communication involved in this stage is mainly mass media communication;
- **Persuasion-** individuals form favorable or unfavorable attitudes toward the innovation. This type of communication mainly involves interpersonal media communication;
- **Decision**- individuals make a decision to either decide to adopt or reject an innovation;
- **Implementation**- individuals adopt an innovation and put it into use; and
- **Confirmation**- individuals may reverse their decision to adopt an innovation if they are exposed to a conflicting message (Rogers 2003).

Rogers in 2003 describes diffusion as ’the process in which an innovation is communicated through certain channels over time among the members of a social system‘(p.5). Based on this definition, diffusion consists of four elements. These are as follows:

- Innovation - an idea, practice, or object perceived as new by an individual or other unit of adoption;
- Communication channels - sending message from one individual to another using two types of channels (interpersonal and mass media). In the developing countries the interpersonal channel has been found to be more efficient than the mass media channel;
- Time - an important element in the rate of adoption and personal innovativeness of the diffusion innovation process; and
- Social System - a set of interrelated units engaged in joint problem solving to accomplish a common goal (Rogers 2003).

The literature on the Information System Context has highlighted other well-known models. These models include the Theory of Reasoned Action (TRA) developed by Fishbein and Ajzen in the 1970s (Fishbein & Ajzen 1975), the Technology Acceptance Model (TAM) developed by Davis and Bagozzi in the 1980s (Bagozzi & Fornell, 1982; Davis, 1989), and the Actor Network Theory (ANT) developed by Callon, Latour, and Law in the 1980s (Latour, 2005). Table 2.3 below shows a comparison of more well-known adoption and diffusion models:

No.	Name	Author(s)	Main Independent Constructs/Factors		Beliefs	Use	Originating Area	Remarks
1	Diffusion of Innovations (DOI)	Rogers 1962, 1983, 1995, and 2003	Perceived characteristics of innovations 1. Relative advantage 2. Compatibility 3. Complexity 4. Triability 5. Observability	Characteristics of the Decision-Making Unit 1. Socioeconomic Characteristics 2. Personality variables 3. Communication Behaviour		1- Describe the innovation-decision process. 2- Adoption of new technology up until now. 3-Implementation Success or Technology Adoption	Anthropology/ Sociology/ Education/ Communication/ Marketing and Management / Geography/ Economics	
2	Theory of Reasoned Action (TRA)	Ajzen and Fishbein 1980.	1-Attitude toward behaviour (ATB): previous attitude of a person toward performing that behaviour. 2- Subjective norm (SN): is the social pressure exerted on the person or the decision maker to perform the behaviour.		1- Beliefs and evaluation of behavioural outcomes. 2- Normative Beliefs & Motivation to comply	1- Use in many fields and is widely used in academia and business today (Magee 2002). 2- IS researchers often use this theory to study the determinants of IT innovation usage behaviour (Han 2003). 3- Behavioural intention, Behaviour	Social psychology	
3	Theory of Planned Behaviour (TPB)	Ajzen 1985	1-Attitude toward the specific behaviour (ATSB). 2- Subjective norms (SN). 3- Perceived behavioural control (PCB) (Ajzen 1991)		1-Behavioural beliefs 2-Normative beliefs 3-Control beliefs	1-Use in many fields and is widely used in academia and business today (Magee 2002). 2- IS researchers often use this theory to study the determinants of IT innovation usage behaviour (Han 2003). 3- Behavioural intention.	Social psychology	The Theory of Planned Behaviour (TPB) is proposed as an extension of the Theory of Reasoned Action (TRA)

4	Social Cognitive Theory (SCT)	Bandura 1986	1- Personal factors in the form of cognition, affect, and biological events, 2- behaviour, and 3- environmental influences that create interactions.		1-Bandura, emphasize that cognition plays a critical role in people's capability to construct reality، self-regulate, encode information, and perform behaviours. 2- Learning, Change in behavior.	Psychology	
5	Technology Acceptance Model (TAM).	Davis 1989	1- Attitude Toward Behaviour (ATB)	1- Perceived usefulness (PU). 2- Perceived ease of use (PEOU).	1-Use to explain or predict individual behaviours across a broad range of end user computing technologies and user groups (Davis et al., 1989). 2- Behavioral intention to use, System usage	Information Systems, Technology Adoption	1-The Technology Acceptance Model (TAM) was developed from (TRA) by Davis. 2- TAM does not include the influence of social and control factors on behaviour but those factors have been found to have a significant influence on IT usage behaviour (Mathieson 1991; Moore & Benbasat 1991; Taylor & Todd 1995; Thompson et al. (1991). 3-According to Bagozzi et al (1992), TAM has strong behavioural elements it assumes that when someone forms an intention to act, they will be free to act without limitation. In the real world there will be many constraints, such as limited ability, time constraints, environmental or organisational limits, or unconscious habits which will limit the freedom to act.

6	Decomposed Theory of Planned Behaviour (DTPB)	Taylor and Todd (1995)	1-Attitude toward behaviour (ATB) 2-Subjective norms (SN) 3- Perceived behavioural control (PBC)	1- Perceived usefulness (PU). 2- Perceived ease of use (PEOU) 3- Compatibility 4- Peers of the user 5- Superiors of the user influence 6-(PBC) was decomposed to: 1- Self efficacy 2- Technology and Resource facilitating conditions.	Uses for Understanding Information Technology usage: a test of competing Models. (Taylor & Todd 1995).	Social psychology	This model more completely explores the dimensions of attitude belief, subjective norm (i.e., social influence) and perceived behavioural control by decomposing them into specific belief dimensions (Taylor & Todd 1995).
7	Task-Technology Fit (TTF) Model	Goodhue (1988, 1995)	1- Task Characteristics 2- Individual Characteristics 3- Individual Systems and Services	1- Higher degrees of "fit" lead to higher performance and expectations of consequences of use Goodhue (1988, 1995)	1-Uses to measure IS success (Goodhue, 1995). 2- Individual performance, System utilization	Information Systems	According to Dishaw and Strong (1998), TTF is also related to models of user attitudes and behaviors toward IT and its use, e.g., technology acceptance model (TAM) (Davis et al., 1989) and the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980).
8	Technology Acceptance Model 2 (TAM2)	Venkatesh and Davis 2000	1- Perceived usefulness (PU). 2- Perceived ease of use (PEOU).	Social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) significantly influenced user acceptance (Venkatesh & Davis 2000).	First use it in Management Sciences in 2000. Venkatesh and Davis (2000)	Information Systems, Technology Adoption	

Table 2.3 Comparison of Adoption and Diffusion Models

Source: Adapted from AlHadidi (2010)

It is obvious that these models have been utilised in various studies in terms of mobile phones, technologies, IT innovations, and services. However, the literature in the context of m-Government services has not revealed any studies of a single model that combine the Diffusion of Innovations Model (DOI) and the Technology Acceptance Model (TAM) as well as Perceived Trustworthiness, Perceived Security, Perceived Enjoyment, and Personal Innovativeness. The existence of this gap in the literature about the adoption and intention to use m-Government services encouraged this research to empirically test the combination of these models (DOI and TAM) as well as external variables including Perceived Security, Perceived Trustworthiness, Perceived Enjoyment and Personal Innovativeness in order to determine the factors that influence the intention to use m-Government services. Therefore, in order to fill the gap, this research develops a validated model with relevant hypotheses. The proposed model of this research is meant to be useful for many countries considering delivery of m-Government services in order to explain the factors that affect the intention to use m-Government services. It is believed that the proposed model will contribute to the existing knowledge because it incorporates many unexplored dimensions that influence the intention to use m-Government services.

Rogers (2003) believes that any innovation is required to go through an innovation decision process, in which an individual or other decision-making unit passes through five stages as shown in Figure 2.1. Again, these five stages are: 1) first knowledge of an innovation; 2) forming an attitude towards the innovation; 3) making a decision to either adopt or reject the innovation; 4) implementing the innovation; and 5) confirming the adoption of the innovation. Rogers also defines personal innovativeness as 'the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system'. He also classifies the members of a social system in terms of their personal innovativeness into five categories: innovators; early adopters; early majority; late majority; and laggards. The relative speed by which an innovation is adopted by these members is called 'rate of adoption'.

In short, Rogers' theory describes the adoption and diffusion of innovations from four broad perspectives. These four broad perspectives are:

- The diffusion process seeks to understand the spread of innovations in terms of the speed at which an innovation spreads within the population;
- The adopter categorization seeks to understand the socio demographic characteristics of population segments;
- The innovation decision process seeks to understand how people adopt/reject and re-invent innovations; and
- The perceived attributes of innovations seek to understand the characteristics of innovation itself in terms of relative advantage, compatibility, complexity, trialability, and observability.

On the other hand, some previous researchers have criticized DOI theory; for instance, they have argued that there is a lack of clear consistent results (Downs & Mohr, 1976; Rogers, 2003; Tornatzky & Fleisher, 1990; Tornatzky & Klein, 1982; Van De Ven & Rogers, 1988; Van de Ven & Angle., 1989). Further, although a large amount of research on the DOI theory has been conducted across several disciplines, the challenge occurs in the complex, context-sensitive nature of the diffusion phenomenon itself. Specifically, in order to fully understand innovation, a careful attention to the personal, organizational, technological, and environmental contexts is essential (Tornatzky & Fleischer, 1990). Moreover, Dunphy and Herbig, (1995) state that there have been two main issues of criticisms of DOI theory as follows:

- There is a lack of process orientation. Research for instance do not track the individual's decision process over time, however, it tend to look only at the moment of adoption; and
- There is pro-innovation bias, which believes that all innovation is attractive.

As mentioned earlier in the research model (Figure 2.1) that the perceived attribute of an innovation derived from Rogers Diffusion of Innovation theory will be utilized in this study. Further, as shown above in the table 2.4, that several studies have included

Rogers' five attributes of innovation in the diffusion of innovations context. These perceived attributes are Relative Advantage, Compatibility, Complexity, Trialability and Observability. They will be used in this study because they have essential influence on the adoption of an innovation. This is because these five attributes explain (from 49 to 87) of the variance in the Rate of Adoption of innovations at the organizational level (Rogers 2003). Table 2.4 below shows several studies utilizing Rogers's DOI Measurement attributes.

			Results Showed Positive (+) or Negative (-) Significant Effect of Perceived Attributes on Dependent Variable?				
Study	Subject	Research Method	Relative Advantage (RA) (Perceived Usefulness)	Complexity* (CX) (Inverse of Ease of Use)	Trialability (TR)	Compatability (Not studied herein)	Observability (Not studied herein)
Ardis and Green (1998)	Domain Engineering and Software Development	Case Study	+	-	+	+	+
Atkinson (2007)	Developing a Questionnaire to Measure Perceived Attributes of eHealth Innovations	Pilot and Survey	+	-	+	+	+
Braak and Tearle (2007)	Scale Development and Relationship with Actual Computer Use	Survey	+	Not Studied	Not Studied	Not Studied	Not Significant
Choudhury and Karahanna (2008)	Relative Advantage of Electronic Channels - A Muntidimensional View	Scenario	+	Not Studied	Not Studied	Not Studied	Not Studied
Faiers, et al. (2007)	Whether consumers Assess Product Attributes in a Stepwise Manner	Case Study & Survey	+	+/-	+	+	+/-
Greer and Murtaza (2003)	Impact of Perceived Innovation Characteristics on Web Personalization	Survey	+	Not Significant	+	+	-
Kendall, et al. (2001)	E-Commerce Adoption	Survey	+	Not Significant	+	+	Not Significant
Lee (2004)	Adoption of Medical Technology using Rogers' Model	Interview	+	-	+	+	-
Murphy (2005)	Issues in the Adoption of Broadband Enabled Learning	Case and Survey	+	+/-	+/-	+/-	+
Oh, et al. (2003)	Adoption of Broadband Internet in Korea	Survey	+	-	-	+	+/-
Sakraida and Draus (2003)	Transistion to a Web-supported Curriculum	Case Study	+	+/-	+	Not Studied	Not Studied
Shelley (1998)	Adoption and Use of Email by Educators	Survey	+	+/-	+	+	+
Teng, et al. (2002)	IT Innovations: General Diffusion Patterns and Innovation Characteristics	Survey	+	+/-	Not Studied	+	Not Studied
Tornatzky and Klein (1982)	Innovation Characteristics and Adoption - Implementation	Meta	+	-	-	+	+/-

Table 2.4 Studies utilizing Rogers's DOI Measurement Attributes

Source: Adapted from Conrad (2009)

2.5. Technology Acceptance Model (TAM)

In addition to using Rogers' Diffusion of Innovations model, this study also uses the TAM for the dependent variable, the 'Intention to Use', as the TAM model is considered one of the most influential and most widely employed in the models in Information System (IS) Literature in terms of predicting Intention to Use technologies (Conrad, 2009). Conrad also argues that TAM replaces the TRA's attitude measures with two technology acceptance measures (Perceived Ease of Use and Usefulness). Thus, in the literature the TAM is considered the most influential extension of Ajzen and Fishbein's (1980) Theory of Reasoned Action (TRA).

Version 1 of the Technology Acceptance Model (TAM) developed by Davis (1989 is an information systems theory that models how users approach, understand, and utilize an innovation. In addition, as mentioned earlier that TAM includes two important variables. These variables are as follows: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU); the former is 'The degree to which a person believes that using a particular system would enhance his or her job performance'; whereas the latter is 'The degree to which a person believes that using a particular system would be free from effort' (Davis, 1989, p.320). Further, there is an overlap between some of the variables in the TAM and Rogers' perceived attributes, which provides a chance for incorporation. There are similarities with Rogers's Perceived Relative Advantage and Complexity with TAM's PU and PEOU respectively. Again, in this study, PEOU will be incorporated with Rogers' Model because this construct is well measured using the instrument scale developed by Davis, 1989; Moore and Benbasat, 1991.

Research related to the TAM has shown well-validated measures of 'Intention to Use' that can be used to evaluate the intention toward adopting a new technology or an innovation among individuals rather than using 'Rate of Adoption' measures. This is because the Rate of Adoption construct requires longitudinal measurement and a comparison sample (Conrad, 2009). In addition, Rate of Adoption is basically used to predict the timing of adoption across a large number of individuals, thus it is not suitable as an individual level measure of intention to use new technology (Conrad, 2009).

Therefore, for the purpose of this study, the construct 'Intention to Use' will be used as key dependent variable to measure individuals' intention to use mobile government services instead of 'Rate of Adoption'.

In the literature, the TAM is considered the most influential extension of Ajzen and Fishbein's (1980) Theory of Reasoned Action (TRA). Furthermore, the TAM has been constantly studied by researchers and has been expanded several times. For instance, Venkatesh and Davis have acknowledged that the TAM had some restrictions in providing the reasons why a person would perceive a given system useful (Venkatesh & Davis, 2000). Therefore, they proposed an additional variable which could be added as an antecedent to the perceived usefulness variable in the TAM. For that reason, they proposed a new model of the TAM called TAM 2 (Venkatesh & Davis, 2000) . In addition, Venkatesh and Bala have upgraded TAM 2 to TAM 3 (Venkatesh & Bala, 2008).

Several scholars have made assumptions about the TAM. For instance, Davis argues that the usage of a particular technology is voluntary (Davis, 1989). Further, given adequate time and awareness about a particular behavioral activity, an individual's stated preference to perform the activity (i.e. behavioral intention) will in fact closely resemble the way they do behave when the behavior is under a person's volitional control (Ajzen & Fishbein, 1980). Additionally, the TAM has strong behavioral elements assuming that when individuals form an intention to act, they will be free to act without limitation, whereas in the real world there will be several restrictions, such as limited ability, time constraints, environmental or organizational limits, or unconscious habits that will limit the freedom to act (Bagozzi, 1992).

The TAM2 was first introduced in Management Science in the research paper titled, 'A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies' (Venkatesh & Davis 2000). They developed TAM 2 for several reasons. For instance, it was to include additional key determinants of the TAM that explain perceived usefulness and usage intentions in terms of social influence and cognitive instrumental

processes and it was to understand how the effects of these determinants change with increasing user experience over time with the target system (Venkatesh & Davis, 2000).

Many scholars have recommended the integration of the TAM with other theories (e.g. DOI) in order to cope with swift changes in IS/IT, and improve specificity and explanatory power (Carter & Belanger, 2005; Legris, Ingham, & Colerette, 2003). Researchers argue that the constructs that are included in the TAM are considered to be essentially a subset of perceived innovation characteristics; accordingly, the integration of these two theories may well offer an even better model than either standing alone (Wu & Wang, 2005; Chen, Gillenson, & Sherrell, 2002). This is in line with previous scholars who have integrated these two theories and have achieved good results (Sigala, Airey, Jones, & Lockwood, 2000; Chen et al, 2002). Additionally, in order to examine the explanatory power of the TAM many scholars have conducted empirical studies and accomplished relatively consistent results on the acceptance behavior of IT end users (Igbaria, Zinatelli, Cragg, & Cavaye, 1997; Venkatesh & Davis, 2000; Horton, Buck, Waterson, & Clegg, 2001). Therefore, in predicting the individual acceptance of numerous systems, the TAM is believed to be valid (Chin & Todd, 1995; Segars & Grover, 1993).

Although several studies have confirmed the strength of the TAM model, several researchers have criticized the TAM's theory. For instance, they have argued that TAM has become a well known theory because it has been cited in most of the research that deals with user acceptance of technology (Lee, Kizar, & Larson, 2003). However, less attention has been given to the real problem of technology acceptance since TAM may have attracted more easy and quick research, (Lee, Kizar, & Larson, 2003). Further, Chuttur argues that criticisms of the TAM model fall into three categories; 1) the methodology used for testing the TAM model, 2) the variables and relationships that exist within the TAM model, and 3) the core theoretical foundation underlying the TAM model (Chuttur, 2009). In addition, others suggest that 'TAM has diverted researchers' attention away from other important research issues and has created an illusion of progress in knowledge accumulation' (Benbasat & Barki, 2007). Moreover, several

researchers have attempted to expand TAM with the intention of adjusting it to the frequently altering IT environments which has lead to confusion (Benbasat & Barki, 2007) Moreover, several researchers have attempted to expand the TAM with the intention of adjusting it to the frequently altering IT environments which has lead to confusion (Benbasat & Barki, 2007).

In short, this research uses DOI and TAM because they are important theories in guiding understanding of adoption, acceptance and rejection of new technology (Davis, 1989; Davis, Bagozzi, & Warshaw, 1992; Venkatesh et al., 2003; Ziamou, 2002). In addition, these theories are used for research on acceptance, adoption and innovation-decision process of both organisations and individuals (Gallivan, 2001). Also, they have strong supporting methodological apparatus that makes them popular and accepted widely by scholars (Venkatesh et al., 2003). Hitherto, several studies have successfully incorporated DOI into TAM in order to investigate users' technology acceptance behavior (Hardgrave, Davis, & Riemenschneider, 2003; Wu & Wang, 2005; Chang & Tung, 2008). However, few have attempted to examine all DOI perceived characteristics with the integration of TAM. For that reason, this has encouraged this research to empirically test and validate the combination (DOI) model and the (TAM) model as well as external variables including Perceived Security, Perceived Trustworthiness, Perceived Enjoyment and Personal Innovativeness. These variables were then synthesised into a conceptual model and then the model was tested for its predictive value.

2.6. **External Variables**

Along with DOI and TAM models this study also integrates constructs such as Perceived Trustworthiness, Perceived Security, Perceived Enjoyment and Personal Innovativeness. Until now the literature has not revealed any studies that incorporate these constructs in the DOI and TAM. For instance, Carter and Bélanger (2005) integrated constructs from TAM and DOI models as well as Web Trust model in order to form a comprehensive model of factors that impact citizen adoption of e-Government initiatives. The outcome of their study indicates that Perceived Ease of Use, Compatibility and Trustworthiness

are significant predictors of citizens' intention to use an e-Government service. Further, Sally and Indrit (2007) added Perceived Enjoyment, Perceived Security and Personal Innovativeness with TAM model in order to explain mobile service adoption behavior. They also state that 'The enjoyment that is perceived to be derived by using mobile services is, therefore, expected to affect attitude and intention of users to adopt them'(Sally & Indrit, 2007, p.66). In addition, other scholars argue that mobile services that offer enjoyment more broadly are more likely to be adopted by people than those that do not (Fang et al. 2005).

2.7. **Summary**

In order to provide a background to the present study, this chapter has described m-Government and the differences between m-Government and e-Government. The definition of m-Government adopted in this research is also presented followed by m-Government services and the enabling technologies. It has also described the critical issues relating to m-Government including drivers, inhibitors, and adoption issues. Further, it has discussed m-Government worldwide including in developing countries. The main advantage of m-Government is that it provides services anytime and anywhere to citizens through mobile devices including mobile phones, PDAs and other wireless technology. A critical review and empirical work of the DOI model and the TAM model is also provided in this Chapter.

Chapter 3.

A Model of Intention to Use Mobile Government Services

3.1. Introduction

Chapter 2 established the context of this research through reviewing the comprehensive literature on m-Government as well as a critical review of the DOI and TAM models. This included the factors that affect the intention to use m-Government services. This chapter introduces the research model used as a basis for understanding the factors influencing the intention to use m-Government services as well as the proposed hypotheses. The independent factors used in this study are based on Roger's Diffusion of Innovations (DOI) theory. These factors include relative advantage, compatibility, complexity, trialability and observability towards the intention to use 'dependent variable'. The intention to use construct was derived from the Technology Acceptance Model (TAM) theory, with the addition of the variables of age, gender, and education. The important factors of personal innovativeness, perceived trustworthiness, perceived security and perceived enjoyment derived from the literature are also included in the proposed research model in this study (see Figure 3.1 in Section 3.2).

In order to fulfil the aims of this study, linkages between variables in the model are drawn and justified in order to lead to the proposition of relevant hypotheses that are used to test each variable in the research model. Examination of these variables and incorporating them into the proposed model of this study is expected to provide valuable insights into the adoption of m-Government services by individuals. This chapter starts with Section 3.2, the proposed research model, including a description of the perceived attributes of innovations in the DOI model. Again, these perceived attributes are relative advantage, compatibility, complexity, trialability and observability followed by the

'intention to use' construct since this construct will also be incorporated in the proposed model. After that, the other variables that will be used in the research model which include perceived security, perceived trustworthiness, personal innovativeness, perceived enjoyment, demographics are also discussed.

3.2. **Research Model**

This study applies Rogers' Diffusion of Innovations theory as a base model because it is well established and has been extensively used in research on information technology diffusion (Prescott & Conger, 1995; Braak & Tearle, 2007; Choudhury & Karahanna, 2008; and Conrad, 2009). In addition, this theory fits well with peoples' understanding of the adoption of technology (Conrad, 2009), particularly in the context of developing countries (Prescott & Conger 1995). Further, the Diffusion of Innovations theory is one of the earliest technology adoption theories used in Information System (IS) research (Rogers 1995). Additionally, when it comes to both the organisational and individual levels, Rogers is considered the only innovation scholar to pose diffusion theories (Conrad, 2009).

While TAM and DOI models have substantial explanatory power, TAM is considered low in descriptive richness that enables researchers to draw conclusion (Plouffe, Hulland & Vandenbosch, 2001). Furthermore, Srite (2006), Kimery and Amirkhalkhali (2007) explained a comparison of variance for both DOI and TAM. They indicate that DOI model is more reliable across countries. This is because the findings of thesis two studies indicate that the perceived characteristics of innovations (PCI) in DOI model yields consistent variance explained across cultures (Srite, 2006; Kimery & Amirkhalkhali 2007).

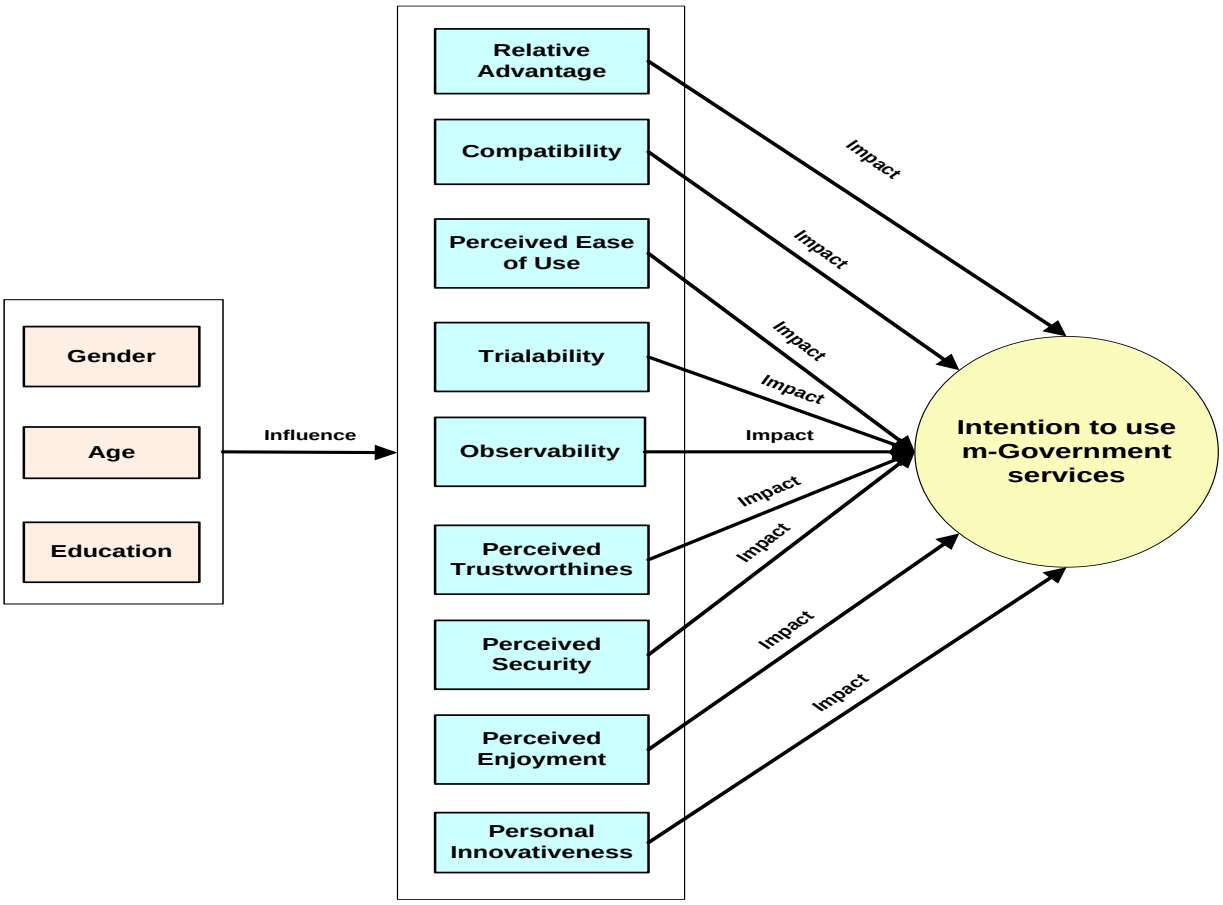

Figure 3.1 A conceptual model used in this study

The main constructs of the research model as shown in Figure 3.1 are:

- The dependent variable referred to as Intention to Use;
- Independent variables that may impact on Intention to Use (Relative Advantage , Compatibility, Perceived Ease of Use, Trialability, Observability, Perceived Trustworthiness, Perceived Security, Perceived Enjoyment and Personal Innovativeness); and
- Independent variables that may have differing influences on the independent variables depending on the characteristics of each person (Gender, Age and Educational attainment).

People represented in the sample including male/female; young/old; students/employees; educated and less-educated. The justification for these constructs in the research model is discussed in detail in the following sections as well as the development of related relevant hypotheses.

These perceived attributes of innovations will be utilized in this study as independent variables. In addition to these variables, as mentioned previously, the literature has highlighted important variables that should also be integrated into the model in this study. These variables are perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment. These variables were chosen because they appear to be the most commonly used variables in the literature in the context of information systems research and specifically in the research on the adoption and diffusion of innovations.

More details about the variables used in this study are discussed in the following subsections.

3.2.1. Relative Advantage

Relative advantage is defined by Rogers (2003) as 'the degree to which an innovation is perceived by users as better than the idea it supersedes' (p.15) and can be measured in terms of economic and social factors. In addition, Rogers argued that in order for citizens to use an innovation, they should perceive the innovation as beneficial (Rogers 2003). He added that scholars have found this variable to be one of the strongest predictors of an innovation's rate of adoption. This is an agreement with Trinkle (2001), who argues that citizens would adopt mobile services more quickly if the government were more responsive and informed in providing such advantageous services to them. Therefore, in order for citizens to adopt such an innovation, they need to see the beneficial value of this innovation.

In the context of different innovations and different consumers, Relative Advantage can be seen differently (Mattila, Karjaluoto & Pento, 2003). For instance, Lichtenstein and

Williamson,(2006) argue that the consumer considers that the perceived relative advantages of Internet banking, for example, outweigh the perceived risks and costs when compared with other forms of banking. Sarel and Marmorstein (2003) stated that when the relative advantage of any innovation is low, marketers must make efforts to increase the perceived value of the benefits.

The potential users, for instance, need to consider various variables such as the degree of risk, economic profitability, the savings in time and effort, etc. For example, the Mobile Parking Service allows citizens to reserve and pay their parking fees via their mobile phones on the spot instead of going to the counter or coin machine. This service also saves them time, and enables them to pay more quickly and easily, giving them with advantage of time and convenience. Conrad (2009) also argued that the characteristics of the potential users could affect which specific subdivision of Relative Advantage is the most significant. He also added that despite the type of technological innovation, Relative Advantage has a positive effect and is considered to be the most gereralizable amongst Rogers' five attributes. Therefore, based on these benefits, the following hypothesis is proposed:

***H1**: Higher levels of perceived relative advantage will be positively related to higher levels of intention to use m-Government services.*

3.2.2. Compatibility

Compatibility refers to the degree to which an innovation is perceived by users as consistent with their existing values, past experiences, and the needs of potential adopters (Rogers 2003, p.15). Moreover, high level of compatibility of innovation increases the diffusion's intention to use. This is because an innovation that seems to be incompatible with the values and norms of a social system will not be adopted as swiftly as an innovation that is compatible (Rogers 2003). This aspect is considered one of the most relevant constructs in the context of adoption research (Tornatzky & Klein 1982). This is an agreement with Carter and Bélanger (2005) who found that compatibility is a significant indicator in predicting citizens' intention to use e-Government services. In

addition, previous studies by Sarel and Marmorstein show that compatibility appears to have a significant impact on willingness to adopt an innovation (Sarel & Marmorstein 2004). Therefore, following these arguments, if the new idea gives meaning or is more familiar to the individuals they will be more willing to adopt the innovation since it appears to be compatible with their lifestyle. Therefore, the following hypothesis is proposed:

***H2**: Higher levels of perceived compatibility will be positively related to higher levels of intention to use m-Government services.*

3.2.3. Complexity/Perceived Ease of Use

Rogers' (2003, p.16) construct of Complexity refers to the degree to which the users perceive an innovation is relatively difficult to understand and use. This means that new ideas that are easy and simple to use and understand are adopted more swiftly than innovations that require the development of new skills and understanding (Rogers 2003). This is similar to the Perceived Ease of Use (PEOU) construct in the TAM. It is also in agreement with previous studies of Tan and Teo (2000), who state that the more complex, and the greater the skill and effort needed for adopting the innovation, the less likely it is to be adopted. Agarwal and Prasad (1997) have also argued that individuals perceive the complexity of an innovation differently. For instance, the perception of complexity involved in using Mobile Parking Service via a mobile channel varies for different individuals, depending on their experience of using Mobile Parking Service. In this study, PEOU will be incorporated with Rogers' Model because this construct has been well measured using the instrument scale developed by Moore and Benbasat, (1991). Hence, this leads to the following hypothesis:

***H3**: Higher levels of perceived ease of use will be positively related to higher levels of intention to use m-Government services.*

3.2.4. Trialability

Trialability is the degree to which an innovation may be experimented with prior to adoption (Rogers 2003, p.16). If individuals have the chance to try the innovation prior to adopting it, they will feel more comfortable about using it and more likely to adopt it quickly. In addition, if an innovation is trialable, it will provide the individual with more confidence and less uncertainty towards their intention to use (Rogers 2003). This is an agreement with Gerrard and Cunningham (2003) who argue that experimenting with the innovation can persuade individuals that their mistakes can be resolved, therefore providing a more predictable situation and providing greater confidence in the use of the innovation. Therefore, having a chance to try the innovation will increase its intention to use. Hence, the following hypothesis is proposed:

H4*: Higher levels of perceived trialability will be positively related to higher levels of intention to use m-Government services.*

3.2.5. Observability

Observability is the 'degree to which the results of an innovation are visible to others' and how easily the benefits can be communicated to others (Rogers 2003, p.16). According to Moore and Benbasat (1991), observability incorporates two specifically different dimensions, Result demonstrability and Visibility. The former refers to the outcomes of using the innovation, while the latter is the observability of the innovation itself. The results of using some innovations are easy to observe and visible to individuals, thus, they will be more likely to adopt them more quickly and easily. For example, the results of using Mobile Parking Service are observable and visible to individuals, so this system would be diffused faster than an innovation that is not so visible. This is why Rogers states that there is a positive relation between observability and adoption. Hence, the following hypothesis is proposed:

H5*: Higher levels of perceived observability will be positively related to higher levels of intention to use m-Government services*.

3.2.6. Intention to Use

The Perceived Characteristics of Innovation (PCI) variables, external variables and demographic variables lead to the final stage of determining individuals' intentions to use m-Government services. This includes both users and non-users - the former being people who are using m-government services, and the latter being people who have not yet used m-government services. Non-users need to make the decision to either adopt the service or reject it. Users may either continue or discontinue with the service. The Intention to Use construct was derived from the Technology Acceptance Model (TAM). Fishbein and Ajzen (1975), argue that behavioral intention can be seen as a guide of how hard people are willing to try to perform a particular behavior. Consequently Davis (1989) has extended the Intention to Use definition to include the intention to use technology. Armitage and Christian (2003) argue that behavioral intentions are defined as an individual's decision to follow a course of action. Nysveen, Pedersen, and Thorbjørnsen, (2005) have also extended the definition of Intention to Use in the context of the adoption of mobile services.

In common with the present study, several authors including Tan and Teo (2000), Black et al. (2001), Polatoglu and Ekin (2001), and Al-Sabbagh and Molla (2004) have used Rogers' independent variables as influencing the dependent variable of Intention to Use, rather than Rate of Adoption in the DOI. This is because 'the rate of adoption is usually measured by the length of time required for a certain percentage of the members of a system to adopt an innovation'(Rogers 2003, p.23). Further, the Rate of Adoption variable is not appropriate as individual-level of Willingness to Use new technology at the beginning of its introduction (Conrad, 2009). However, this research gathers data from Oman and in particular Muscat within short time period. Further, m- Government services in Oman are only in an early stage of development. Therefore, because of the length of time issue, this study will measure 'Intention to Use' as a dependent variable rather than 'Rate of Adoption'.

In addition, the literature has revealed important variables that will be incorporated in the proposed model of this study. With the addition of the variables of age, gender,

educational attainment and personal innovativeness (Rogers 2003; Agarwal & Prasad 1997), the important variables of perceived trustworthiness (Bélanger & Carter 2008; Li, Hess & Valacich, 2008), perceived security (Fang et al. 2007) and perceived enjoyment (Hong et al. 2008) derived from literature were also included in the proposed research model of this study. These variables of perceived security, personal innovativeness, perceived enjoyment and perceived trustworthiness are discussed in the following sections.

3.3. Perceived Trustworthiness

Along with DOI variables that impact on citizens' intention to use m-Government services; Perceived Trustworthiness is also an important variable, Bélanger, Janine, and Wanda (2002) define trustworthiness as 'the perception of confidence in the electronic marketer's reliability and integrity' (p.252). This is because citizens must have confidence in order to increase their Intention to Use m-Government services. This is in accordance with a report by the Hart-Teeter National Survey of the General Accounting Office GAO (2001) finding that Americans believe that e-Government may enhance the way government operates, but they fear about sharing private information with the government through the internet, fearing that the data will be altered and their privacy diminished (GAO, 2001). It can be explained that these fears delay the Intention to Use e-Government and m-Government services. According to Palvia, (2009) trust has a significant effect on participation intention through usage attitude. Further, Wei et al. (2009) found that there is there is a strong positive relationship between trust and the m-Commerce adoption.

Lack of trust in online transactions has been acknowledged by Bélanger and Carter (2008); Horst, Kuttschreuter and Gutteling (2007) as one of the main barriers in the adoption of e-Government services. This is because uncertainties and risks usually occur when conducting such transactions online (Bélanger & Carter, 2008). Therefore, in order to insure the creditability of online services, the governments should always establish trust (Warkentin et al., 2002). This is an agreement with several authors who argue that

one of the critical factors in the adoption of e-Government services is trust (Warkentin al., 2002; Horst, Kuttschreuter and Gutteling (2007); Bélanger & Carter, 2008; &West, 2008). For instance, when users are performing administrative transactions or accessing information via governmental portals, they expect the online information to be reliable, updated and accurate. For this reason, it is expected that trust would play an important role in increasing the adoption of online services (Bélanger & Carter, 2008). This is in line with West (2008) who argues that 'Visible statements outlining how a site insures visitors' privacy and Perceived Security are valuable assets for encouraging people to use e-Government services and information' (p.9). Therefore, the perception of trustworthiness could also impact citizens' intention to use m-Government services in general and Mobile Parking Service in particular. Hence, the following hypothesis is proposed:

***H7**: Higher levels of Trust in m-Government services will be positively related to higher levels of intention to use.*

3.4. **Perceived Security**

The emergence of m-Government services has raised various issues, among which is security. This is one of the technical barriers to m-Government diffusion, according to Al-Khamayseh et al (2006a); the Perceived Security of m-government services is considered the hallmark of a successful initiative. Smith and Jamieson (2006) acknowledge the main issues related with Information System Perceived Security in e-Government as being: Training, Management Support, Budget, Cost, Resources and Awareness. Although not all of these issues are applicable to all governments/organizations, in respect of information security Perceived Security they could appear to be important to a large number of organizations as key drivers or key inhibitors.

Many people still hesitate to use m-Government services due to their lack of trust in technology, which in turn negatively influences their intentions. This is in agreement

with Chang and Kannan (2002) who argue that Perceived Security and privacy are the most important issues affecting the adoption of m-Government services. Al-Sabbagh and Molla (2004) found that besides Trust (as mentioned earlier) Perceived Security is a major inhibitor of internet banking adoption in Oman. Previous researchers also found that Perceived Security is a significant inhibitor in the adoption of mobile services (Fang, Brzezinski & Xu, 2005). These findings indicate that Perceived Security could play a vital role in Mobile Parking Service dissemination.

In many countries, citizens are concerned about Perceived Security in m-Government services. For instance, Antovski and Gusev (2005) pointed out that when people SMS inquiries to government entities, they fear that their mobile phone numbers may be traced or sold to third parties. Furthermore, wireless networks are vulnerable when compared to wired networks, because they use public airwaves to send signals that allow outsiders to intercept and steal significant data as well as tamper with files. Therefore, in order for the government to encourage mobile users to use their m-Government services, they must assure them that their privacy is protected and their data will not be sold to third parties. On this basis, Perceived Security of m-Government services has been deemed as a vital issue to assess and investigate. Hence, the following hypothesis is proposed:

***H8**: Higher levels of Perceived Security in m-Government services will be positively related to higher levels of Intention to Use.*

3.5. **Perceived Enjoyment**

This study includes another variable that could play an important role on intention to use m-Government services. This variable is Perceived Enjoyment, which is 'the extent to which the activity of using a certain technology is perceived as being enjoyable in its own right, apart from any performance consequences that may be anticipated'(Davis, Bagozzi & Warshaw, 1992, p.435). Previous studies (Davis, Bagozzi & Warshaw, 1992; & Kulviwat et al., 2007) argue that perceived enjoyment or fun is a critical factor driving technology adoption. Another study of mobile advertising via SMS also indicates that

consumers are more likely to accept mobile advertising when the campaign is fun or interesting (Randolph et al. 2005). These findings indicate that creating a fun and enjoyable situation may assist in creating favorable consumer perceptions contributing to the usage of innovative technologies, especially for personalized services like mobile data services. Those individuals who have experienced enjoyment from using mobile data services are more likely to develop a positive attitude toward continued usage of such services.

Previous studies by Davis, Bagozzi & Warshaw, (1992) found that Perceived Enjoyment significantly influences intentions to use technology. Similarly previous studies including that of Anckar and D'lncau (2002), suggest that Perceived Enjoyment is one of the most significant factors in individual desire and users usually access their mobile services from anywhere and anytime in order to pass the time enjoyably.

Perceived Enjoyment may be seen as positively influencing users' attitudes towards individuals' intentions to use mobile services. Hence, enjoyable mobile services are likely to be adopted more swiftly than those which are not (Fang et al. 2007). These findings indicate that if the innovation is perceived as enjoyable, it is more likely to form a positive perception and be adopted easily. Thus, on this basis it is expected that Perceived Enjoyment may also increase users' intention to use m-Government services. Hence, the following hypothesis is proposed:

H9*: Higher levels of perceived enjoyment in m-Government services will be positively related to higher levels of intention to use.*

3.6. **Personal Innovativeness**

Rogers (2003) defines personal innovativeness as 'the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system'(p.22). Personal innovativeness or technology readiness could also be identified as the risk-taking propensity existing in certain individuals (Massey, Khatri & Ramesh, 2005). According to Agarwal and Prasad (1997), individuals with higher

personal innovativeness are more likely to form a positive attitude towards using the innovation than those with less personal innovativeness. Thus, the personality variable will determine traits in terms of innovativeness of the individual towards the innovation. Rogers also in 2003 has indicated general socio-economic predictors of personal innovativeness. For instance, age is not considered a factor for personal innovativeness, whereas, education and literacy are considered essential predictors for personal innovativeness.

The Diffusion of Innovations theory takes account of the fact that individuals have differing predilections towards acting innovatively. Rogers (2003) acknowledged that some people are able to manage high levels of uncertainty and respond more positively. Agarwal and Prasad (1997), argued the same, and explained this tendency as personal innovativeness, noting that it indicated the risk-taking propensity existing in some individuals and not in others. Furthermore, the extent of a person's innovativeness that influences his or her intention to adopt is determined by whether there is no prior perception of ease of use or perceived usefulness because of little knowledge about the innovation. The construct of personal innovativeness is vital to a research study of individual behavior toward innovations (Rogers 2003). Furthermore, this variable will assist in recognizing individuals who are expected to adopt innovations in information technology before others (Agarwal & Prasad, 1997). Hence, the following hypothesis is proposed:

***H6**: Higher levels of personal innovativeness will be positively related to higher levels of intention to use m-Government services*

3.7. **Demographics**

The importance of the variables in the propose model is expected to differ for people characteristics such as gender, age, and education. They provide guidelines to mobile service marketers and developers in understanding different demographics, thus,

providing insights affecting segmentation strategies (Nysveen, Pedersen & Thorbjørnsen, 2005).

Researchers including Bouwman et al. (2008) suggest that demographic variables are vital to investigation in the mobile services context. Therefore, as demographic variables are critical to the understanding of the intention to use m-Government services, they might be vital in determining how individuals make decisions to use m-Government services. Further, Venkatesh, Morris & Ackerman (2000) and Rogers (2003) investigated gender and age differences in the context of the adoption of new technology, and found that there are no significant gender and age differences in the determinants of technology use. Agarwal and Prasad (1997) have argued that levels of education influence willingness to adopt technology and Rogers (2003) found that more educated people are more likely to start using an innovation than less educated. Further, Al-busaidi and Olfman (2005) argue that culture is vital in the implementation and adoption of ICT-based systems such as mobile services. If these systems fail, this could be due to some cultural factors.

Additionally, Alshihi (2006) argue that a government official revealed that female users are more likely to use e-Government in Oman because it is more convenient for them. He justifies this because of the conservative value system in Oman where women prefer not to go out in public alone. Although females in Oman are equally treated as males (e.g. females in Oman can drive, have the right to vote, holding high positions in the country as Ministers, Undersecretaries, Member of Parliament, Ambassadors, etc), some cultural challenges might still affect the adoption of the m-Government service.

Further, several studies (Venkatesh & Morris, 2000; Chen & Wellman, 2004; MacGregor & Vrazalic, 2006; Laukkanen & Pasanen, 2008) conducted in ‘Western cultures’ indicate that males are more likely to adopt e-services than females. However, in Saudi Arabia this might not be the case with females more likely to adopt e-services than males (Siddiqui, 2008). This is because the culture of the Saudi Arabia can be described as conservative. Rogers (2003) also argues that the adopter of a new technology is usually having an appropriate level of education than the non-adopter. This is an agreement with

many researchers as Madden and Savage (2000), Dobbins et al. (2002), Mason and Hacker (2003), Choudrie and Dwivedi (2005) and Marchionni & Ritchie (2007) who concluded that adopters are usually have a good level of education. Thus, the following hypotheses are proposed:

***H10**: Gender will influence the intention to use m-Government services*

***H11**: Age will not influence the intention to use m-Government services*

***H12**: Education will positively influence the intention to use m-Government services*

On the other hand, some variables that seemed to be important, such as cost, digital divide and popularity were not seen as feasible within the focus of the study and therefore they have not been included in the research model. This is because most m-Government services are provided to citizens for free (Push services) or at minimal cost (Pull services) Further, mobile phones and SMS technology are very popular with users. Recent statistics show that the number of mobile users exceeds the total population in Oman and this phenomenon is reflected worldwide (TRA–Oman, 2011). Therefore digital divide and popularity have little effect on m-Government as oppose to e-Government.

In conclusion it is apparent from the literature that all DOI variables such as relative advantage, compatibility, complexity, trialability and observability as well as others derived from literature including perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment constitute major issues to be confronted by the governments and mobile service providers when introducing new mobile government services. However, the application of Rogers' Diffusion of Innovations (DOI) and the Technology Acceptance Model (TAM) will assist the governments to enhance the political context in terms of leadership support of m-Government services and to understand the factors that affect the intention to use m-Government services.

3.8. **Summary**

The use of the well-recognized theory of Diffusion of Innovations (DOI) incorporated with the Technology Acceptance Model (TAM) and with the addition of the variables of Perceived Trustworthiness, Perceived Security, Personal Innovativeness and Perceived Enjoyment derived from the literature as a basis for a new model was discussed. The incorporation of Rogers' theory with other variables has resulted in an integrative research model of intention to use m-Government services and the proposition of a number of hypotheses. The justifications for the constructs of the research model were discussed in detail as well as the development of related hypotheses. The following chapter, Chapter 4: Research Method and Realisation, provides the research method used to examine the proposed research model empirically and confirm the hypotheses presented in Chapter 3. Chapter 4 also presents in detail the empirical phase of the research that uses a mixed approach of quantitative surveys and qualitative semi - structured interviews.

Chapter 4.

Research Method and Realisation

4.1. Introduction

This chapter presents the research method used to validate a model of intention to use m-Government services as presented in Chapter 3. The method is to confirm or otherwise the hypotheses of the model and hence the extent of its predictive value. This chapter consists of the following sections. The first Section 4.1 presents the Introduction followed by the second Section 4.2 which introduces the research aims and the expected research outcomes. The basic research approach and why it is appropriate to this research is described in Section 4.3. The research design is described in Section 4.4, and the case study used in this research is presented in Section 4.5. Section 4.6 describes the data collection technique used in this study. It describes in detail the approach used, including the measurement of variables, questionnaire design and content, pilot study, sample population and size, interview design, interviewee selection, and this is followed by a discussion of its validity and reliability in Section 4.7. After that, Section 4.8 describes the data analysis of the quantitative date and the qualitative data. Finally, the chapter concludes with Section 4.9 Ethical Considerations and Section 4.10 the Summary of this chapter.

4.2. Research Aims and Expected Outcomes

The primary aim of this research was to develop and validate a model of intention to use m-Government services. This was achieved by testing the validity of an adapted model. This adapted model was based on the well-known theory of Diffusion of Innovations (DOI) and the Technology Acceptance Model (TAM) as well as other important variables revealed by the literature including perceived trustworthiness, perceived

security, perceived enjoyment and personal innovativeness. It was investigated within the Omani context and specifically the Muscat urban environment. Specifically, this research aimed to examine:

- The impact of perceived characteristics of m-Government services on intention to use m-Government services as perceived by users and non-users. These perceived characteristics include relative advantage, compatibility, complexity, trialability, and observability, perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment;
- The influence of demographic variables including gender, age and educational attainment of users and non-users on the perceived characteristics of m-Government services;
- The relationships between young and old people in terms of all measured variables including relative advantage, compatibility, complexity, trialability, and observability, perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment;
- The relationships between males and females in terms of all measured variables including relative advantage, compatibility, complexity, trialability, and observability, perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment; and
- The relationships between highly-educated and less-educated people in terms of all measured variables including relative advantage, compatibility, complexity, trialability, and observability, perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment.

As mentioned above, this research aimed to address the factors influencing the intention to use m-Government services. Therefore, it has produced the following research outcomes:

- A validated model of the intention to use m-Government services. This is the major expected outcome of this research as it is anticipated to assist the

governments, decision makers, mobile service providers and stakeholders in introducing and implementing m-Government services with some considerations of the important predictive values;

- The strongest and weakest predictive value that will impact on intention to use m-Government services;
- An understanding of a comparison between young and old people and their relationships with all the measured variables including relative advantage, compatibility, complexity, trialability, and observability, perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment;
- An understanding of comparison between males and females and their relationships with all the measured variables including relative advantage, compatibility, complexity, trialability, observability, perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment; and
- An understanding of comparison between highly-educated and less-educated people and their relationships with all the measured variables including relative advantage, compatibility, complexity, trialability, and observability, perceived trustworthiness, perceived security, personal innovativeness and perceived enjoyment.

4.3. **Research Paradigm**

A research paradigm is defined as 'a set of linked assumptions about the world which is shared by a community of scientists investigating that world' (Deshpande, 1983, p. 101). As observed by Yin (2009), the research approach or paradigm is when the empirical data is connected in a logical sequence to a study's initial research questions to its conclusion (Yin 2009). Therefore, this research aimed to collect data on relevant variables from a diversity of people within a short time frame rather than over long period as occurs in a longitudinal study. Therefore, in accordance with this shorter period, this research adopted a cross-sectional design as most suitable for this research.

There are three philosophical paradigms that social researchers have long debated about the appropriate approach to choose in order to conduct research. These are positivism, interpretivism, and critical theory (Orlikowski & Baroudi 1992; Trauth, 2001). However, Chua (1996); Neuman (2000); Hussey and Hussey (2003); and Creswell (2009) identify four philosophical perspectives on research methodologies: Post-positivism/ Positivism, Interpretivism, Advocacy and participatory, and the Pragmatic paradigm.

The Postpositivism/Positivist paradigm is more concerned with quantitative research than qualitative research where the individual starts with a theory and collects data that will either support or reject the hypotheses. In quantitative studies, researchers build relationships among variables and form them into questions or hypotheses and test the validity and reliability of these questions (Creswell 2009). Moreover, quantitative research is about prediction, using numbers to confirm or otherwise hypotheses as well as generalizing a sample to a large group of subjects in order for researchers to draw a sample of individuals at random from a broader population (York, 1998).

However, the Interpretivism paradigm is more of qualitative research approach and the aim of it is to depend heavily on the participants' views of the case being studied. On the other hand, qualitative research is believed to be the core of all human inquests as previous scholars argue that it is 'any type that produces findings not arrived at by statistical procedures or other means of quantification' (Strauss & Corbin 1998, p.10).

The advocacy and participatory paradigms is an approach for qualitative research (Creswell 2009) whereas, the Pragmatic paradigm is an approach for mixed methods research when combining both qualitative and quantitative research (Cherryholmes, 1992; Morgan, 1997; and Creswell, 2009). The value of this pragmatic paradigm is to focus on the research problem and then use the appropriate approaches to gain knowledge about the research problem (Creswell 2009). Table 4.1 below shows a summary of the main differences between the two most commonly used paradigms; positivism and interpretivism:

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

Table 4.1 Main Differences between Positivism and Interpretivism
Source: Adapted from Neuman (1997:83)

Information System (IS) research can choose any one of these philosophical paradigms, depending on the causal research epistemology (Orlikowski & Boroudi, 1992; and Myers, 1997). Hence, the Positivist paradigm is best suited for this research as it is specifically designed for the quantitative research approach. In addition, this research meets the key assumptions of the Positivist paradigm identified by Phillips and Burbules (2000), such as:

- Knowledge is conjectural- absolute truth can never be found. For instance, Researchers cannot prove a hypothesis; instead they only indicate a failure or reject the hypothesis;

- Research is the process of making claims and then refining some of them for other claims. Most quantitative research starts with the test of a theory;
- Data, evidence, and rational considerations shape knowledge. In practical, the researcher collects information on instruments based on measures completed by the participants;
- Research seeks to develop relevant, true statements. In quantitative research, researchers advance the relationships among variables and pose this in terms of questions or hypotheses; and
- Being objective is an essential aspect of competent inquiry; researchers must examine methods and conclusions for bias. For instance, standard of validity and reliability are important in quantitative research.

There are three types of research approach; qualitative research that aims to explore and understand the meaning of individuals or groups of a social or human problem, quantitative research which tests objective theories by examining the relationship among variables which are then measured and analysed statistically; and mixed methods research which includes both qualitative and quantitative research so that its overall strength is greater than either qualitative and quantitative research alone. This is in agreement with Creswell and Plano Clark (2007) who define mixed methods as follows: ’Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry’ (p.5). The advantage also of using mixed methods approach is that the combination provides a wider and greater understanding of research problems (Creswell 2009). In accordance with Denzin and Lincoln (2005), the proposed study uses multiple methods for triangulation in order to secure in-depth understandings of the phenomena in question. Table 4.2 below shows the advantages of a mixed methods approach.

No	Approaches	Advantages of Mixed Methodology
1	Logic of triangulation	The findings from one type of study can be checked against the findings deriving from the other type. For example, the results of qualitative investigations might be checked against a quantitative study. The aim is generally to enhance the validity of findings.
2	Facilitates	Qualitative research facilities quantitative research. Qualitative research may: help to provide background information on context and subjects; act as a source of hypotheses; and aid scale construction. Quantitative research facilitates qualitative research. Usually, this means quantitative research helping with the choice of subjects for a qualitative investigation.
3	Picture	Quantitative and qualitative methods are combined in order to provide a general picture. Quantitative research may be employed to plug the gaps in a qualitative study which arise because, for example, the researcher cannot be in more than one place at any one time. Alternatively, it may be that not all issues are amenable solely to a quantitative investigation or solely to a qualitative one.
4	Structure and Process	Quantitative research is especially efficient at getting to the structural features of social life, while qualitative studies are usually stronger in terms of 'processual' aspects. This strength can be brought together in a single study.
5	Researchers and Subjects' perspective	Quantitative research is usually driven be the researcher's concerns, whereas qualitative research takes the subject perspective as the point of departure. These emphases may be brought together in a single study.
6	Problem of Generality	The addition of some quantitative evidence may help to mitigate the fact that it is often not possible to generalise (in a statistical sense) the findings deriving from qualitative research.
7	Relationship between variables	Qualitative research may facilitate the interpretation of relationships between variables. Quantitative research readily allows the researcher to establish relationships among variables, but is often weak when it comes to exploring the reasons for those relationships. Qualitative study can be used to help explain the factors that underline the broad relationships that are established.
8	Relationship between macro and micro levels	Employing both quantitative and qualitative research may provide a means of bridging the macro-micro gulf. Quantitative research can often tap large-scale, structural features of social life, while qualitative research tends to address small-scale, behavioural aspects. When research seeks to explore both levels, integrating quantitative and qualitative research may be necessary.

Table 4.2 Advantages of Mixed Method Approaches

Source: Bryman (1998)

As a methodology, the mixed method approach involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative

and quantitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone (Creswell 2009). Therefore, in collecting informative data in a short time frame, the data collection technique utilized in this study is the mixed method technique. In addition it has the advantage that one approach builds on the results from the other, which in turn provides strength to the findings and further confirmation of the hypotheses. Thus, two stages for data collection were used in this research; firstly large scale survey questionnaires for the quantitative stage and secondly semi-structured interviews for the qualitative stage. The former were used to test the model and confirm the hypotheses, and the latter were used to elaborate findings from the survey questionnaires and provide further confirmation for the research model and hypotheses. According to Neuman (2006), a survey is a closed, planned research method that is appropriate when the researcher needs to learn about people's thinking or opinions in regard to a precise matter.

There are three strategies underpinning the mixed methods approach that the researcher may adopt (Creswell 2009). These three strategies are concurrent mixed methods, transformative mixed methods, and sequential mixed methods. The first strategy is where the researcher combines both quantitative research and qualitative research in order to provide a comprehensive analysis of the research problem. The researcher collects both forms of data at the same time, and then analyzes both in order to obtain the overall results. The second strategy is transformative mixed methods; where 'the researcher uses a theoretical lens as an overarching perspective within a design that contains both quantitative and qualitative data' (Creswell 2009, p.15). These two approaches do not meet the purpose of this research as the researcher is not collecting the data at the same time.

The third strategy is the sequential mixed methods which is 'procedures are those in which researchers seeks to elaborate on or expand on the findings of one method with another method'(Creswell 2009, p.14). The procedure for the data collection in this research started with a quantitative method. This quantitative method involved large

scale survey questionnaires in order to generalize results to a population and validate the model of this research as well as confirm the hypotheses. Then a qualitative method was used and semi-structured interviews were conducted to collect detailed views from participants in order to elaborate and expand on the findings of quantitative method.

This research adopted a sequential explanatory strategy as it aimed to collect and analyze the quantitative data in the first phase of the research, then collect and analyze the qualitative data that built on the quantitative results. This strategy is useful when unexpected or surprising findings are found in the first phase of quantitative research, because the researcher can investigate these in more detail by conducting the second phase of the data collection, the qualitative phase (Morse, 2000). Moreover, this strategy is easy to implement because it is in clear separate stages which makes it easy to present in detail and to report clearly. The quantitative data is given priority and more weight in this strategy. The steps involved in the sequential explanatory strategy are presented below in Figure 4.1:

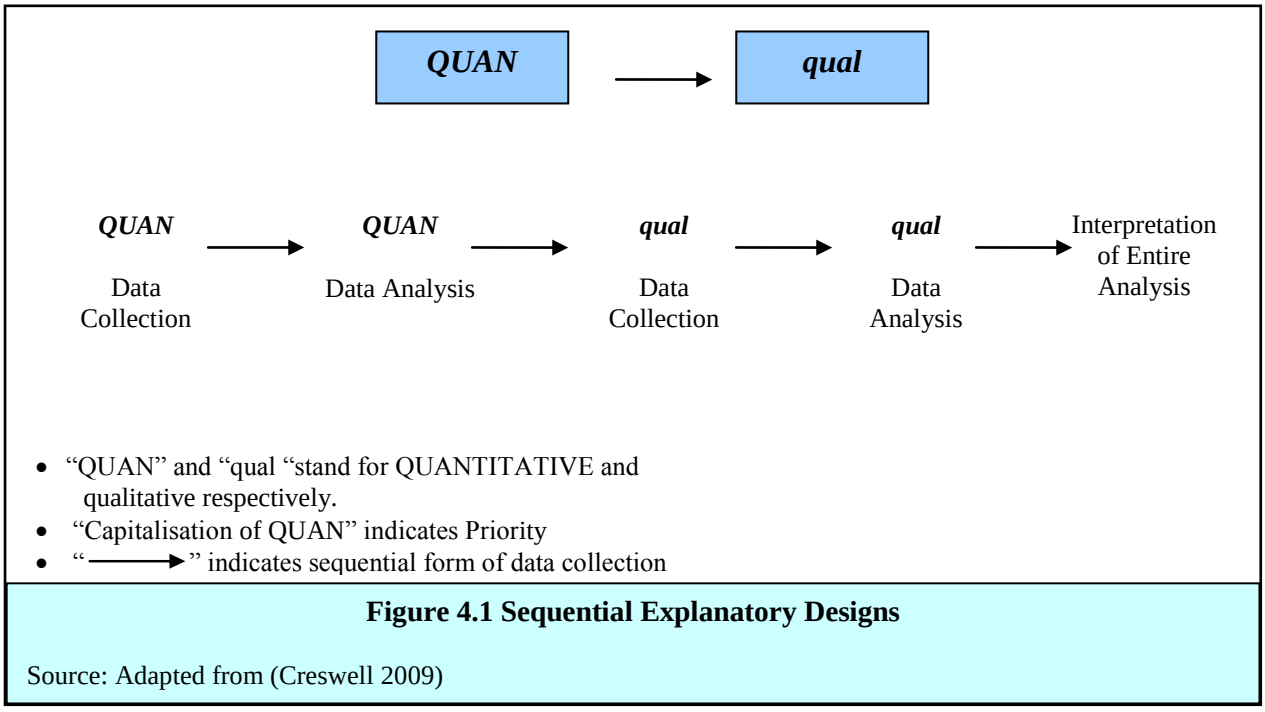

Figure 4.1 Sequential Explanatory Designs

Source: Adapted from (Creswell 2009)

Figure 4.1 above shows the mixed methods sequential explanatory design, which will be used in this research. This method consists of two different phases: quantitative followed by qualitative (Creswell et al., 2003). In this design, the researcher first collects and analyzes the quantitative (numeric) data. The qualitative (text) data are collected and analyzed second in the sequence in order to assist in explaining, or elaborate on, the quantitative results obtained in the first phase. The second, qualitative, phase builds on the first, quantitative, phase, and the two phases are connected in the intermediate stage of the study. The justification for this approach is that the quantitative data and their subsequent analysis present a broad understanding of the research problem. The qualitative data and their analysis refine and explain those statistical results by exploring participants' views in more depth (Rossman & Wilson, 1985; Tashakkori & Teddlie, 1998; Creswell 2009).

4.4. Research Design

As mentioned in the earlier section, this research will use the mixed methodology approach including quantitative (survey questionnaires) and qualitative (semi-structured interviews) methods. Figure 4.2 shows the research design used in this research:

Phase 1: This research design begins with a comprehensive literature review in order to accomplish several purposes. These are as follows; first, gain knowledge about the results of other studies that are closely related to this research topic. Second, identify the research gap. Third, indentify the main variables to fill the research gap. Fourth, identify the research theoretical grounds. Fifth, identify the measurement scale that best suits this research in order to measure the variables. Finally, formulate the research model and propose the relevant hypotheses.

Phase 2: Validate the research model and confirm or otherwise the hypotheses through the investigation of the most appropriate research methods. The research method used in this research is the mixed methods approach which incorporates quantitative and qualitative research and which uses the sequential explanatory design.

The data collection techniques used in this research starts with quantitative research followed by a qualitative research. The first stage of quantitative research strategy is conducted by administering survey questionnaires face–to-face. The advantage of this strategy is that the researcher can collect responses from all the completed questions within a short period. In addition, any doubts regarding any question can be clarified on the spot (Cavana, Delahaye, & Sekaran, 2001). Furthermore, there are several advantages to surveys, including easy to administer, enable the researcher to verify the values, relations and constructs of variables, provide responses that can be generalised from the sample, provide an objective method of comparing responses over different groups, help to confirm and quantify the results of qualitative research (Newsted, Huff & Munro, 1998), and to investigate a large number of opinions (Stroh, 2000). The survey questionnaire in this study was written in both languages, Arabic and English, to allow maximum responses.

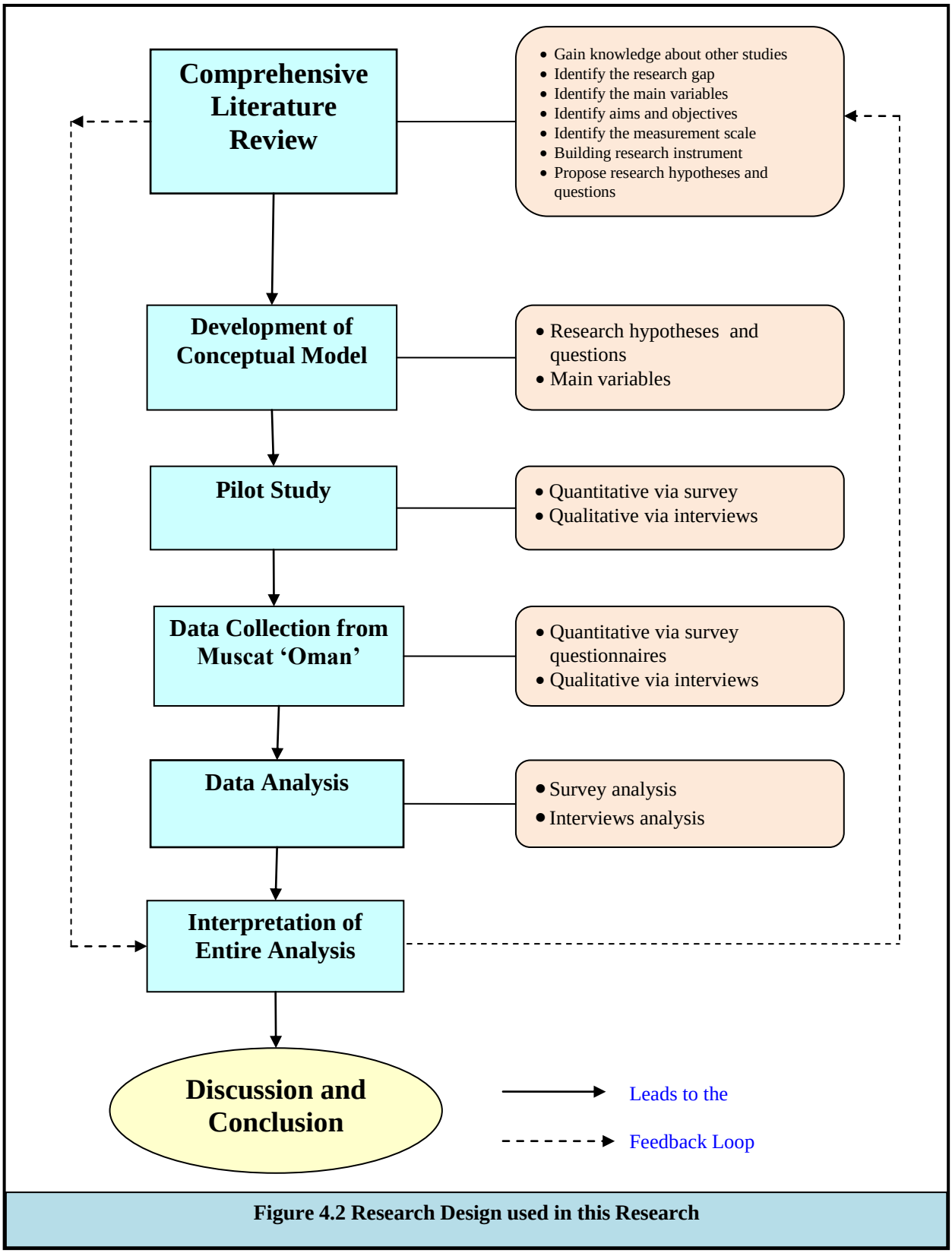

Figure 4.2 Research Design used in this Research

The second stage of data collection uses a qualitative approach of semi-structured face–to-face interviews conducted with six decision-makers involved in project planning for the m-Government services. This is in accordance with Cavana (2001) who argues that qualitative research aims to focus on the collection of rich information from a few people. In addition, Myers (2008) defines qualitative research as an approach of inquiry which moves from the underlying philosophical assumption to research design and data collection. In qualitative research the intention is to focus on answering questions such as "why," "in what way," and "what are the implications?" rather than "how many," "how often," and "how much?" as in the case of quantitative research (Hancock 1998). To summarise the differences between quantitative and qualitative approaches, Dey (1993) has identified the main differences as shown in Table 4.3:

Quantitative Approach	**Qualitative Approach**
Based on meanings derived from numbers	Based on meanings expressed through words
Collecting results in numerical and standardized data	Collecting results in non-standardized data requiring classification into categories
Analysis conducted through the use of diagrams and statistics	Analysis conducted through the use of conceptualization

Table 4.3 Main Differences between quantitative and qualitative approaches

Source: Dey (1993)

As mentioned in the previous section, this research uses the sequential explanatory mixed method approach. The purpose of this sequence explanatory strategy is to explain and interpret quantitative findings by collecting and analysing follow-up qualitative data. Therefore, as a first step, this research design starts with survey questionnaires and the analysis of the data collected. Second, semi-structured interviews are conducted in order to elaborate on findings collected from the first step and then analysed.

Phase 3: This step is the interpretation of the analyses of both quantitative and qualitative data. This will lead to the development of the final research model of

intention to use mobile government services. A feedback loop will be linked to the literature in order to amend the research model if necessary.

Phase 4: The discussion and conclusion including the limitation of the study and recommendations for further investigation.

4.5. Case Study: Oman Overview

This research gathers data from Muscat the capital of Oman in order to validate the proposed research model. Oman was chosen as a context of this research as the researcher is from Oman and can easily access the relevant data. In addition, the Omani government has recently announced its intention to implement m-Government services throughout the entire country – hence this research is timely for Oman. The most common m-Government service being utilized in Oman is the 'Mobile Parking Service' and hence it will be utilized in this study as an example of m-Government services which is only available in the capital Muscat.

In Oman, the mobile infrastructure is nearly complete - hence m-Government services can reach the vast majority of citizens in rural regions rapidly and at any time. As mentioned in Chapter 2, Sandy and McMillan (2005) argue that m-Government uses ICTs to improve the activities of public sector organizations and provide 'anytime' and 'anywhere' services to both citizens and public officials. This indicates that the ICT sector plays an important role in m-Government services provision. In Oman, the mobile infrastructure is nearly complete - hence m-Government services can reach the majority of citizens in rural regions rapidly and at any time.

The Sultanate of Oman moved from a traditional country into a modern state immediately after the accession of His Majesty Sultan Qaboos bin Said in July 1970. In early 1970, His Majesty the Sultan of the Sultanate of Oman gave imperative apprehension of information technology as well as the economic development. His majesty has directed the Omani government to concentrate their intention to determine new projects that aim to enhance the information technology, economic level in order to

provide an honorable livelihood for all Omani citizens (Oman Ministry of National Economy, 1996). As a result, the people of Oman have started to benefit from extensive free health care and education.

The Sultanate of Oman has started to open new channels to deliver better and cheaper services to the public anytime and anywhere. These new channels usually utilize wireless devices; such as, Personal Digital Assistant (PDAs), mobile phones, etc, and hence can be categorized as m-Government services. It is believed that countries that have rigorously adopted a model of intention to use m-Government services, have observed a successful implementation of m-Government services and delivered a better quality of m-Government services to their citizens (Al-Ruzaiqi, 2003).

4.5.1. Geography and Regions

According to the Ministry of National Economy in Oman (2011), the Sultanate of Oman is located in the southeastern region of the Arabian Peninsula. To the west it is bordered by the United Arab Emirates and the Kingdom of Saudi Arabia, and to the south by the Republic of Yemen. To the north there is the Strait of Hormuz and the Arabian Sea is to the East. The total area of the Sultanate of Oman is about (309,500) square kilometers. Valleys and desert take up 82 per cent of the total landmass, up to 15 per cent is mountain and only three per cent is coastal plain (Al-Rahbi, 2008). This indicates that the large proportion of mountains and deserts in Oman may slow the introduction of e-Government because of the difficulties in building the wired network infrastructure throughout the country and especially in the remote areas. Nevertheless, the mobile network infrastructure in Oman is expanding in order to cover the entire country especially in the remote areas (TRA, 2011). Oman is a small developing country where rural areas or remote areas do not have fixed phones in order to utilize government services via the internet. However, the majority of people who live in remote areas do have mobile phones, and therefore they can utilize government services via their mobile phones.

4.5.2. Population

According to the latest census in 2010, Oman is a country of 3.173 million people with 36.4 per cent expatriates, a population growth rate of 2 per cent and a residential density of 7.5 people per kilometre (Oman Ministry of National Economy, 2011). The majority of Omani citizens including males and females are within the ages of 15 and 44. On the other hand, the majority of expatriates are between the ages of 25 and 55. Visiting workers from South Asia, Egypt, Jordan and the Philippines usually account for this range of expatriate age (Alhinai, 2007). According to projections by the World Bank, by 2023 the population of Oman is expected to increase for the third time since 1970, to more than 5 million people (World Bank, 2004).

4.5.3. Oman Economic Background

The population in Oman as discussed in the previous section indicates important implications for economic development because of changing size and distribution of the population. These implications can be seen in service provision and delivery in areas such as health, education, information and communication technologies, and the labour market (Al-Rahbi, 2008). In 2009, the Omani economy suffered a slowdown in the Gross Domestic Product (GDP), but in 2010, the Sultanate of Oman' GDP recorded a remarkable recovery by increasing 23.4 per cent (Central Bank – Oman, 2010). This remarkable increase has positively affected the share of petroleum activities in the overall GDP from 40.6 per cent in 2009 to 46.5 per cent in 2010. During the same period the non-petroleum activities decreased from 61.6 per cent to 55.5 per cent (Central Bank – Oman, 2010).

According to the annual report in 2010 of the Central Bank of Oman (CBO) Oman's main revenue comes from oil and natural gas (Central Bank – Oman, 2010). The country's economic performance has improved drastically following a sharp increase in oil prices in 2000, with Gross Domestic Product (GDP) reaching US $12.73 billion in the first quarter of 2008, up to 42.9 percent over the same period of 2007 compared to US $ 270.97 million in 1970 (Oman Ministry of National Economy, 2011). During the first

three quarters of 2010, the economic performance increased and reached in the high growth rate in GDP at 28.3 per cent to US $42,559.67 million, compared to US $33,174.57 million during 2009 (Oman Ministry of National Economy, 2011). This increase in GDP indicates a good growth in oil and non-oil activities during this period. This could be explained by the increase in international oil prices during the period of the first three quarter of 2010. According to Ministry of National Economy, Oman has witnessed outstanding and major achievements within a short time of period. These achievements represent the foundations necessary to move into sustainable development. Therefore, in order to for Oman to continue moving into a stable development clearly defined objectives and long-term vision need to be established (Oman Ministry of National Economy, 1996).

In 1996, when the Five-Year Plan was established, the Omani government initiated the long-term strategic economic vision 'Oman 2020'. The objectives of the 'Oman 2020' vision were to move towards an increased dependence on private initiative, national labour and renewable resources that would lead to sustainable development rather than relying on an economy dependent on government spending, primary industries, and foreign labour (Oman Ministry of National Economy, 1996). In addition, the Omani government aimed to increase economic development to reach an average growth rate of 7.4 per cent during the period of 2000 to 2020 (Ministry of National Economy – Oman, 1996). In addition, the Omani government aimed to diversify its national income from the oil sector to the non-oil sector. This is because it is anticipated that the Omani economy will no longer rely on oil by the year 2020 (Al-Rahbi, 2008).

In the previous seventh five-year development plan (2006 – 2010), Oman has witnessed a pivotal improvement in the Information Technology (IT) sector. This was a vital era for the information technology field in general and e-Government and m-Government in a particular. This is because during the mentioned era, the vision of the seventh five-year development plan (2006-2010) was to upgrade the Information Technology (IT) sector through the implementation of the national strategy for Oman's digital society (Al-hinai, 2007). According to the Oman Digital Society Report, 2007 published by the

Information Technology Authority (ITA), this is achieved by focusing on establishing the basis of 'e-' and 'm-' government infrastructure as well as expanding the research and development field in order to incorporate most sectors of the national economy (ITA, 2007). The next Sub-Section discusses the ICT scene in Oman in more detail.

4.5.4. Oman: ICT Sector

In Oman, the Telecommunication Regulatory Authority (TRA) is responsible for the provision and promotion of telecommunication services throughout the country (TRA – Oman, 2011). The Council of Ministries made this decision as part of government policy for the promotion of ICT development in 1998. During the same year, the National Information Technology Committee (NITC) was set up to manage the development of the Sultanate's ICT sector to promote e-Government initiatives and the NITC set up the Information Technology Task Force (ITTF). According to the Economic and Social Council for Western Asia (ESCWA) in 2007, this (ITTF) is a technical action group consisting of representatives of experienced departments and bodies (ESCWA, 2007). In 2002, the National IT strategy was launched followed by a plan of action to be implemented by the IT Technical Secretariat (ITTS) (Al-Hinai, 2007). It can be said that the first major step for the Sultanate of Oman plans was to introduce e-Government and create a digital society. Al-Hinai (2007) states, it 'depends on how well the society is being transformed to move towards being a digital society; and on the successful implementation of the ICT infrastructure and the associated Tele-communication projects' (p.150).

The mobile infrastructure in Oman is still in its infancy but it is progressing at a rapid pace. Currently, there are two mobile services operators in Oman, Omantel and Nawras. The former was the first official internet service provider. It provides the country's fixed-line and Internet services (Al-Hinai 2007). The latter, was also granted a Class 1 license for fixed lines and broadband in 2005 (TRA, 2011). In addition to these competitors the mobile market in Oman expanded by launching five re-sellers of mobile services in 2009. These five re-sellers are Renna, Friendi, Injaz, Samatel and Mazoon. In 2010,

Samatel was granted a Class 1 license in order to compete with Omantel and Nawras (TRA, 2011).

Al-Badi & AlShihi (2007) point out that mobile penetration in Oman is higher than internet penetration. Further, Al-Badi & AlShihi argue that prepaid mobile services and Short Message Service (SMS) have become very popular in Oman since their introduction in 2001. According to Omantel (2007), which is one of the two national mobile carriers, 'The number of SMS exchanged between Oman Mobile subscribers recorded 4.6m per day ….. In other words, the monthly load is approximately 140m SMS, including customers roaming abroad'(Omantel, 2007). Additionally, the total number of SMS sent by both Omantel and Nawras operators reached 991.269 million during the period July to September 2008 (TRA 2009). This indicates that Omani citizens depend heavily on mobile phones and SMS in particular. This will encourage the Omani government to introduce more mobile government services in order to reach a vast number of people in Oman anywhere and anytime.

According to the Ministry of National Economy –Oman (2007), in November 2007 there were 2,369,741 mobile telephone subscribers, whereas the number of internet subscribers was only 68,710. However, according to the telecommunication regulatory authority (TRA) in Oman by January 2009 the penetration of mobile telephone and internet had increased to 3,265,356 mobile subscribers and 120,192 internet subscribers (TRA 2009). The high-level penetration of mobile subscriptions provides a great potential for Oman to successfully utilize and implement m-Government services to complement the current e-Government offerings.

On the other hand, the annual report of the Telecommunication Regulatory Authority (TRA) in 2009 revealed that the number of fixed telephone lines on 31st December 2009 stood at 299,826, a decrease of 1.6 per cent compared with the previous year of 2008. In addition, the penetration rates of fixed lines showed a declining trend dropping from 11 per cent in 2005 to 10.5 per cent in 2009 (TRA, 2009).

In addition, the annual report of Telecommunication Regulatory Authority (TRA) in 2009 showed that at the end of 2009 the number of internet users in Oman was 1,236,658 that included 453,183 fixed internet users and 783,475 mobile internet users (i.e. using internet service through their mobile devices via 3G). This indicates an increase in the number of internet users over the years that can be explained by the growth in private sectors and public sectors, as well as the various e-Government initiatives.

Type of Service		As of Mar 2011	As of Dec 2010	% Change
1. Main Fixed Telephone Lines:				
1.1	Post Paid	199,739	200,467	-0.36%
1.2	Pre-Paid	28,713	37,523	-23.48%
1.3	Public Telephone – Payphone	6,801	6,801	0.00%
1.4	ISDN Equivalent Channels	37,870	36,964	2.45%
	Total Fixed Telephone Lines in Operation (1.1-1.4)	273,123	281,755	-3.06%
	Fixed Line Penetration	10.14%	10.46%	-3.06%
2. Mobile Subscribers:				
2.1 Post Paid				
2.1.1	Operators	409,679	414,011	-1.05%
2.1.2	Resellers	-	-	-
	Total Postpaid Subscribers	409,679	414,011	-1.05%
2.2 Pre Paid				
2.2.1	Operators	3,591,929	3,732,963	-3.78%
2.2.2	Resellers	472,312	459,159	2.86%
	Total Prepaid Subscribers	4,064,241	4,192,122	-3.05%
	Total Mobile Subscribers: (2.1+2.2)	4,473,920	4,606,133	-2.87%
	Mobile Penetration	166.06%	170.97%	-2.87%

Table 4.4 Fixed and Mobile Sectors

Source: TRA (2011)

As of Table 4.4, the total telephone lines and total mobile subscribers have slowed down during the first quarter of 2011. During this period, the total telephone lines records 273,123 lines that is less than by 3.06 per cent when compared to the previous year of 2010, which shows 281,755 lines.

4.6. Data Collection

This section provides a detailed description of the first data collection approach used in this research including the quantitative method, the survey questionnaire design, the

population and sample, the survey instrument, validity and reliability, the variables in this research, and the pilot study. Quantitative research is defined as empirical research where the data are in the shape of numbers (Punch 2005). In addition, Hancock (1998) argued, a quantitative research is when collecting measurable information about a topic. In the social sciences, there are some well-known examples of quantitative methods as survey methods and laboratory experiments (Myers 2008).

4.6.1. Survey Design

The questionnaire was defined by Zikmund (2003) as a communication medium for data collection that includes a set of written questions for the participants to answer, hence, the design of the questionnaire is considered one of the vital stages in the survey process. Therefore, in order to obtain a good design three important aspects should be considered (Cavana, Delahaye, & Sekaran, 2001). Firstly, the questions should be written simply and clearly. Secondly, the order and the form of the written questions should be designed in a way that creates interest and keeps the participants involved. Finally, the formulation of each question should be carefully phrased so that the responses are easy to code and interpret.

Following the guidelines mentioned above, the survey questionnaire aimed to collect the relevant data for this study and test each hypothesis. Therefore, in order to guarantee a high rate of responses the survey questionnaire used in this study used clear and simple wording and was written in both English and Arabic. Furthermore, the questions began by measuring the Perceived Enjoyment variable, which is aimed at creating interest to encourage respondents to enjoy and complete the questionnaire. The survey questionnaire consisted of two parts: Part A included the demographics of respondents; Part B included questions asking respondents about their intention to use m-Government services.

The survey questionnaire is shown in Appendices A and B. The former consists of a plain language statement (that describes to participants the research objectives, the questionnaire format and content, approximate completion time, confidentiality

provisions for information collected, and contact information. Appendix B presents the final questionnaire instrument, and consists of the following two parts:

Part A: Firstly, the Mobile Parking Service is explained and the process of using this service is described in detail. The respondent then asked to provide demographic information including age, gender, citizenship and the level of educational attainment as well as whether he/she has previously been a user of Mobile Parking Service or not. Those who have used Mobile Parking Service are then asked where he/she gained this information (communication channel). For non-users respondents were asked which communication channel would convince him/her to adopt Mobile Parking Service. These questions were included to gain a clear picture of the sample of respondents in order to evaluate the scope to which the outcome of the survey can be generalized. The question format used in (Part A) is a nominal scale in a multiple choice format for the demographic information, with a blank space provided for answers that were not listed. Furthermore, brief additional instructions were provided to assist respondents to complete the questionnaire.

Part B: Firstly, m-Government is defined. Following this, the questions began by measuring the Perceived Enjoyment (PENJ) variable, which is aimed to express feelings towards using m-Government services in general and the Mobile Parking Service in particular, to determine whether the service is enjoyable and fun. Following this, questions related to the following variables were as follows:

- **Personal Innovativeness (PINOV)** to measure willingness to use the Mobile Parking Service;
- **Perceived Security (PSEC)** to measure the extent of belief that using an Mobile Parking Service is secure;
- **Perceived Trustworthiness (PTT)** to measure the extent of trust in using a mobile phone for Mobile Parking Service;

- **Relative Advantage (RA)** to measure the extent to which Mobile Parking Service is beneficial when compared to the traditional method of ticket machine or coins;
- **Compatibility (COM)** to measure the extent to which Mobile Parking Service could fit in with their lifestyle;
- **Perceived Ease of Use (PEOU)** to measure the extent to which Mobile Parking Service could be easy to use and not require a lot of mental effort and not be frustrating;
- **Trialability (TRI)** to measure the extent of belief to which would be better to try Mobile Parking Service for free before deciding to adopt it;
- **Observability (OBSV)** to measure the extent to which users could communicate with others about the results of using Mobile Parking Service; and
- **Intention to use (INT)** to express their intention towards using new m-Government services in the future.

The measurement scale for each construct PENJ, PINOV, PTT, PSEC, RA, COM, PEOU, TRI, OBSV, and INT used a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Table 4.5 below shows an example of the 5-point Likert scale used in this research questionnaire:

1. I believe using SMS parking is fun 1.أعتقد بأن استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة ممتعة	Strongly disagree	1	2	3	4	5	Strongly agree

Table 4.5 An example of the 5-point Likert scale

Demographic questions including Gender, Age and the level of Educational attainment were provided in a multiple choice format as shown in the example below. Where appropriate, a blank space to fill in was included in case the answer was not one of the listed choices. Although the pilot tests for the questionnaire showed the suitability and adequacy of the choices provided, brief additional instructions were provided throughout the questionnaire to assist respondents to complete it.

2. Please indicate your highest completed level of education 2. الرجاء تحديد المستوى التعليمي	Primary إعدادي	
	Secondary ثانوي	
	Undergraduate degree جامعي	
	Post-graduate degree دراسات عليا	
	Other (Please specify) أخرى (الرجاء التحديد) ----------	

Table 4.6 An example of nominal scale multiple-choice format

Using the adapted Rogers' Diffusion of Innovations' model as a basis, measurements in this study include the following independent variables: RA, COM, PEOU, TRI, OBSV, as well as other variables derived from the literature including PENJ, PINOV, PTT and PSEC. The dependent variable (INT) towards using m-Government services is derived from the TAM (see Chapter 3).

A critical literature review of a reliable and validated existing measurement scale was conducted in order to make the final decision about the most suitable measure for each of these variables. The appropriateness of existing measures was evaluated against the context, scope and objectives of the variables in this study. The wording of the original scale was modified to suit this study without affecting the scale itself.

Construct	Measures used	Source
Relative Advantag (RA)	I believe the use of SMS parking Service enables me to pay parking fees more quickly than other methods (e.g. using Coins, Ticket machine) I believe the use of SMS parking Service enables to pay the parking fees in an easier way compared to other methods (e.g. using Coins, Ticket machine). I believe the use of SMS parking Service is more efficient than using other alternative ways (e.g. using Coins, Ticket machine). I believe the use of SMS parking Service saves me time compared to the other ways (using Coins, Ticket machine) I believe the use of SMS parking Service increases my productivity	(Moore and Benbasat 1991)
Compatibility (COM)	I believe the use of SMS parking Service is compatible with my lifestyle. I believe the use of SMS parking fits well with the way I like to pay for other services I believe the use of SMS parking Service is completely compatible with how I like to do things I believe the use of SMS parking would fit well with the way I like to pay for parking fees	(Moore and Benbasat 1991)
Perceived Ease of Use (PEOU)	I believe the use of SMS parking service is clear and understandable I believe the use of SMS parking service is easy I believe learning to use SMS parking service is easy for me I believe the use of SMS parking service does not require a lot of mental effort I believe the use of SMS parking service is not frustrating	(Davis 1989; Moore and Benbasat 1991)
Trialability (TRI)	I believe before deciding whether to use the SMS parking service, it will be better to try it out by the user for free I believe it is better to use SMS parking service on a trial basis for long enough time to see what it could do I believe I would not have to spend a lot of effort to try SMS parking service I believe it would be better for the service provider to experiment the SMS parking service as necessary to check its effectiveness	(Moore and Benbasat 1991)
Observability (OBSV)	I believe I would have no difficulty telling others about the results of using SMS parking service I believe I could communicate to others the consequences of using SMS parking service I believe I would have no difficulty explaining why using SMS parking service may or may not be beneficial I believe the instructions of how to use SMS parking service is available and visible in many places	(Moore and Benbasat 1991)
Perceived Enjoyment (PENJ)	I believe using SMS parking service is fun I believe using SMS parking service is useful	(Davis et al. 1992; and (Hong et al. 2008)

	I believe using SMS parking service is a wise decision	
Personal Innovativeness (PINOV)	I like to explore new Mobile-Government services Among my peers, I am usually the first to try out new Mobile-government services In general, I am interested in trying out new Mobile-government services	(Rogers 2003; Agarwal & Prasad 1997)
Perceived Trustworthiness (PTT)	I believe I trust the ability of a Mobile to protect my privacy when using SMS parking service I believe that I'm adequately protected by law in Oman from problems that could be caused when using SMS parking service I believe I trust the SMS parking and it could be the best option to pay for parking fees	(Bélanger & Carter 2008; Li, Hess & Valacich, 2008)
Perceived Security (PSEC)	I believe using SMS parking service is financially secure I believe I'm not worried about the security when using SMS parking service I believe the mobile has enough safeguards to make me feel comfortable using it to interact with the SMS parking service	(Fang et al. 2007)
Intention to Use (INT)	I would use the SMS parking Service frequently I would use the SMS parking Service whenever possible I intend to use the SMS parking Service in the future I would like to use new Mobile-government services in the future	(Davis et al. 1989; Venkatesh et al. 2003)

Table 4.7 Measures for constructs used in this study

4.6.2. Survey Sample

The sample design and size are essential in order to provide a representative sample (Cavana, Delahaye, & Sekaran, 2001; Zikmund 2003). Therefore, it is imperative for the researcher to guarantee that the chosen sample design and size are correct in order to ensure that this chosen sample represents the population (Creswell 2009). Using a very large number of participants in a survey can be costly and time consuming as most social science studies have stated. Hence, in choosing an efficient and reasonable sample, this study has adapted the seven staged sampling procedure developed by Zikmund (2003) which was refined to suit this study. The seven stage sampling procedure is shown in Table 4.8.

Stage	Process	Selection of this research
1	Define target population	Omani citizens who are drivers and who are 18 or above and who live in Muscat Region
2	Select a population frame	42,288 drivers in Muscat Region
3	Determine sampling design	Probability/ Stratified Random Sampling
4	Plan for select sampling units	Plan for sample size selection, accuracy, time resources and right analysis
5	Determine sample size	Survey of 300 questionnaires
6	Select sampling units	Mobile Parking Service users/non-users
7	Conduct fieldwork	Distributed in Muscat municipality in Oman (The developer of Mobile Parking Service)

Table 4.8 Seven stages in selection of research sample

Source: Adapted from Zikmund (2003)

Stage 1: Since the source from which the researcher is to collect the data is the population, the researcher has to select the target population correctly and carefully. The Mobile Parking Service, which was developed by Muscat Municipality in Oman, is currently operating in the capital region of Muscat. Thus, this study focuses on Omani citizens/users and non-users who are 18 years old and above. This sample was chosen

because the official age for applying for a driving licence in Oman is 18. Hence, these people most probably have a driving license, and are most likely to have used Mobile Parking Service (users). However, those who do not hold a driving licence and presumably have not used Mobile Parking Service (non-users) are also of interest to this study as it useful to understand their perception towards their intention to use this service.

Stage 2: The second stage is to select the population frame, which includes a list of elements in the population from which a sample of study will be identified (Cavana, Delahaye, & Sekaran, 2001). Therefore, to collect the required data, the chosen sample was obtained from the Omani Ministry of National Economy. This reported that the total population of those who are 18 years old and above in the Muscat region was approximately 124,954 and of these, 42,288 was drivers (Ministry of National Economy – Oman, 2010).

Stage 3: This stage is to determine the sampling design. The sampling design as defined by Zikmund (2003) and Creswell (2009) is an approach which is used to choose the units of analysis. The unit of analysis refers to the individual case or group of cases that the researcher needs to convey something about when the study is over and is, for that reason, the focus of all data collection efforts (Teddlie & Tashakkori, 2009).

There are two groups of sampling procedures in the human sciences; the probability sampling technique and the purposive sampling technique. The former is mainly used in quantitative studies and is defined as when a quite great amount of units are randomly selected from a population where probability inclusion for every member of the population is determinable (Teddlie & Tashakkori, 2009). However, the latter is used in qualitative studies and is defined as when units are selected based on purposes connected with answering a research study's questions (Teddlie & Tashakkori, 2009).

Since this research uses the mixed methods approach which includes quantitative and qualitative methods, it will use both techniques, probability and purposive. There are three types of sampling underpinning the probability sampling technique. Firstly, random

sampling is defined where every sampling unit in an obviously defined population has an equal probability of being included in the sample (Teddlie & Tashakkori, 2009). Secondly, stratified sampling where the researcher divides the population into subgroups so that each unit belongs to a single group (e.g. male or female) and then selects units from those groups. Finally cluster sampling where the sampling units are considered to be groups within the population (e.g. neighborhood, hospitals, and schools) (Teddlie & Tashakkori, 2009).This research aimed to compare subgroups in the population in order to draw a representative sample. In this regard, the best technique for this research is stratified random sampling as it enables the researcher to obtain various subgroups (e.g. male, females, age, and education level attainment) of a representative population. The sample is broken into subgroups through the stratified technique described above. These subgroups include the following; 1) Male/Female, 2) Old/Young, and 3) Highly-Educated/Less-Educated.

Stage 4: To plan for the selection of sampling units. In order to approach Mobile Parking Service users/non-users, a formal letter was initiated from my employer Diwan of Royal Court (Royal Palace) to Muscat Municipality (the developer of Mobile Parking Service), to approach Mobile Parking Service users/non-users and distribute the survey questionnaire.

Stage 5: The sample size as defined by Teddlie and Tashakkori, (2009) is to select units of analysis (e.g. people, groups) in a way that will represent the population and enable the researcher to answer the research questions.

There are various ways to determine the sample size. In this research, three methods were considered suitable for this research. Firstly, Roscoe (1975) suggests that the most suitable size for social research is to select a sample size larger than 30 and less than 500. Secondly, Cavana, Delahaye, and Sekaran, (2001) state that the appropriate sample size should be 10 times or more than the number of both independent and dependent variables in the study. Finally, Harris and Schaubroeck (1990) suggest a minimum sample size of 200 to guarantee robust structural equation modeling. Accordingly, this research has considered the three methods mentioned above and hence the sample size of this research

was determined to be 300 survey questionnaires. The first reason for selecting this sample was because the sample size of this research (300) was more than 30 and less than 500, secondly this research included 10 variables (9 independent and 1 dependent) and the sample size of this research (300) was 30 times as large as the total number of variables in this study. Finally, the sample size of this research (300) was larger than 200 and the analysis technique used in this research was structural equation modeling (SEM) (see Section 4.8).

Stage 6: This stage determines the sampling units. The method for targeting the sampling units was detailed in Stage 4. At the researcher's request, the survey questionnaires were distributed specifically to:

- Two private banks (25 questionnaires to each bank);
- Two government ministries (25 questionnaires to each ministry);
- One school for males (25 questionnaires);
- One school for females (25 questionnaires);
- Sultan Qaboos University (100 questionnaires; 50 for students and 50 for employees); and finally
- Fifty questionnaires were distributed to people who about to park their car in the parking where Mobile Parking Service is used.

The above list included respondents with a large variety of characteristics such as age, gender, educational attainment and included employees in both private and government sectors to give the results generalisability.

Stage 7: This final stage involves the data collection and fieldwork.

4.6.3. Survey Pilot Study

Ticehurst and Veal (2000) argue that conducting a pilot study is crucial in order to achieve several aims, for instance, testing questionnaire wording, testing question sequencing, testing questionnaires layout, gaining familiarity with respondents, testing

fieldwork arrangements (if required), training and testing fieldworkers (if required), estimating response rate, and estimating interview or questionnaire completion time. A pilot test is essential to any researcher because it allows the researcher to check the reliability of the data to be collected as well as the validity of the questions. This is because the design of a questionnaire is crucial in obtaining the required information (Saunders, Lewis, & Thornhill, 2009). In order to ensure that the final formulation is as clear as possible, it is imperative to undertake various type of pilot test, since as Bell (2005) stressed, although the time is short it is recommended to provide the questionnaire a trial run as much as possible. Teijlingen et al. (2001) identify several different reasons for conducting pilot studies. They are as follows:

- Developing and testing adequacy of research instruments;
- Assessing the feasibility of a (full-scale) study/survey;
- Designing a research protocol;
- Assessing whether the research protocol is realistic and workable;
- Establishing whether the sampling frame and technique are effective;
- Assessing the likely success of proposed recruitment approaches;
- Identifying logistical problems which might occur using proposed methods;
- Estimating variability in outcomes to help determining sample size;
- Collecting preliminary data;
- Determining what resources (finance, staff) are needed for a planned study;
- Assessing the proposed data analysis techniques to uncover potential problems;
- Developing a research question and research plan;
- Training a researcher in as many elements of the research process as possible;
- Convincing funding bodies that the research team is competent and knowledgeable;
- Convincing funding bodies that the main study is feasible and worth funding; and
- Convincing other stakeholders that the main study is worth supporting.

The procedure for the pilot study was as follows (Peat, Mellis, & Williams, 2002):

- Administer the questionnaire to pilot subjects in precisely the same manner as it will be administered in the main study;
- Ask the subjects for feedback to identify ambiguities and difficult questions;
- Record the time taken to complete the questionnaire and decide whether it is reasonable;
- Discard all unnecessary, difficult or ambiguous questions;
- Assess whether each question gives an adequate range of responses;
- Establish that replies can be interpreted in terms of the information that is required;
- Check that all questions are answered;
- Re-word or re-scale any questions that are not answered as expected; and
- Shorten, revise and, if possible, pilot again.

The pilot study size may range from 25 to 100 subjects (Schindler & Cooper 1998). Consequently, prior to distribution of the questionnaires, a pilot study was conducted in two segments of the Omani population who possessed a driving licence: employees from the public sector, and university students. These two segments were chosen deliberately because the researcher had easy access to participants through official contacts in the Diwan of Royal Court (Royal Palace) and Sultan Qaboos University. The aim was to test the survey instrument and check the content validity, run a preliminary analysis, and examine the initial results against the study's main objectives. The structure of the questionnaire was designed to target both users and non-users. It was divided into background information about the participants and had sections devoted to each of the above-mentioned variables. These were treated as composite variables using sets of statements and Likert scales to determine users' perceptions agreements with each variable. As the Mobile Parking Service is available only in the capital region of Muscat, participants were chosen from this area. Fifty surveys were distributed randomly (30 to employees and 20 to students), and thirty seven were collected (74 per cent response rate).

4.6.4. Interview Design

This section provides a detailed description of the qualitative data collection. The findings derived from the quantitative approach enabled further investigation and follow-up study in order to provide further confirmation for the model and hypotheses. Therefore, the second stage of data collection used in this study, was qualitative semi-structured interviews. The interviews in this study aimed to elaborate on the findings from the quantitative data. As stated by Cavana (2001), the interview provides a unique chance to reveal in-depth information from an individual.

The design of interviews starts with a general description of the study as well as the aims and objectives. Afterwards, each participant was asked about general information about demographics include gender, age, organisation and position details, and education level. Next, general questions were asked that related to the demographic variables and their affect on intention to use mobile government services. These include gender age, and education followed by more specific questions. These include perceived security, relative advantage, perceived ease of use, and trailability and their impact on intention to use m-Government services (Appendix F presents a list semi- structured interview questions). During the interviews, the researcher has avoided to make any reference to the results received from the quantitative analysis in order to avoid any bias that could affect the interviewee's opinion.

4.6.5. Interviewee Selection

Kotulick and Clark (2004) have suggested that when excellent rapport and trust are established with the interviewee, there is a better focus on the topic, enabling the researcher to elicit information that is more relevant. Semi-structured interviews were conducted with six government officials to determine why some hypotheses were not confirmed. The non-confirmed hypotheses that needed to be further investigated were Relative Advantage, Complexity/Perceived Ease of Use, Trialability, and Perceived Security. Participants were selected according to their rank and involvement in making decisions pertaining to m-government adoption in their organizations. All were

considered a good representation of the decision makers who are involved in m-Government projects in Oman. These participants were from diverse government entities including Muscat Municipality, Ministry of Manpower, Information Technology Authority, Royal Court Affairs and Ministry of Higher Education. These government entities have implemented a variety of well known m-Government services for the entire population. In addition, these participants were considered to be well-educated and fully involved in m-Government projects at the higher executive levels. Therefore, the insight gained from the interviews provides a greater understanding of the concepts that this research examines.

Interviews were conducted with six decision-makers who are involved with m-Government services in Oman in accordance with the ethics requirements of Victoria University. Before the interviews were recorded on tape or in notes (depending on respondents' preferences), a plain language statement explaining the purpose of this research was giving (see Appendix E). In addition participants were assured that their responses would remain confidential (see Appendix F). These six decision-makers were:

- Head of the m-Government services sector at the Information Technology Authority (ITA)-responsible for e and m-Government projects in Oman;
- The General Director of Information Technology at Muscat Municipality - responsible for Mobile Parking Service;
- The Project Leader of Mobile Parking Service at Muscat Municipality;
- Director of Information Technology at Ministry of Manpower- responsible for mobile services' projects;
- Director of Information Technology at Ministry of Education- responsible for mobile services' projects; and
- Director of Information Technology at Royal Court Affairs Ministry- responsible for mobile services' projects.

Table 4.9 below shows the profiles of these participants.

Participants	Age	Education Level	Designation	Organisation
Participant 1	37	Master	Deputy Director General of Information Technology	Muscat Municipality
Participant 2	29	Master	Head of Project Section	Muscat Municipality
Participant 3	35	Bachelor	IT Director	Ministry of Manpower
Participant 4	35	Master	Deputy Manager of Information Technology department	Ministry of Higher Education
Participant 5	50	Master	Chief of Infrastructure of E-services	Information Technology Authority
Participant 6	38	Higher Diploma	Deputy Director of service Office	Royal Court Office

Table 4.9 Profile of Participants

A conceptual saturation point was reached after the sixth interview because the same ideas from different interviewees started to be repeated. For this reason, six interviews were thought sufficient for this phase of data collection. As mentioned above, these participants are the decision makers who are involved in the m-Government services projects. The participants' demographics are shown in the Table 4.9. The age range was from 29 to 50. In terms of their educational level, the highest qualification for most of them was a master's degree and the lowest one was a higher diploma.

4.6.6. Interview Pilot Study

Prior to conducting the actual interviews with the decision makers, a pilot study was conducted using four candidates. These candidates were chosen deliberately by the researcher in order to test the validity of the questions in-depth. The final test of the refined interview questions is presented in Appendix F.

Table 4.10 provides some details of the candidates and shows that the interviews were conducted with various candidates' experience. This is in order to elicit different views and sharpen the interview questions by refining the wording and sequence of questions as well as checking the clarity of the questions to be asked.

Interviewee	Researcher	User
Candidate 1	**Yes**	**Yes**
Candidate 2	**Yes**	**No**
Candidate 3	**No**	**Yes**
Candidate 4	**No**	**No**

Table 4.10 The candidates for the Pilot Test

4.7. Validity and Reliability

Validity and reliability are vital issues in a research process. It is accepted when a measure of concept is well-defined and was proposed in turn ensuring the measurement device should be both valid and reliable (Bryman & Cramer 2005). Sekaran (2002) proposes three types of validity tests in order to determine the integrity of measures. These are content validity, criterion-related validity, and construct validity.

4.7.1. Content Validity

According to Hair et al. (2006), validity is defined as when a scale or set of measures precisely represents the concept of interest. Previous researchers such as Davis (1989), Cavana, Delahaye and Sekaran (2001) argue that content validity is addressed by 1) reviewing relevant literature in order to identify suitable items; 2) seeking expert advice in order to sharpen the items; 3) conducting pilot tests in order to check the clarity of items and wording; and 4) relevant modification. Therefore, this study has followed these

steps, starting with the following. Firstly, the researcher reviewed the relevant literature in order to obtain a suitable and validated existed instrument that will be used in this research. Secondly, four PhD researchers were consulted to provide their judgment on the questionnaires and specifically the items in it. Thirdly, a pilot study was conducted by distributing fifty surveys 30 to employees and 20 to students, in order to check the clarity of items and the wording without modifying the original scale. Finally, some relevant modifications were made to the instrument according to the feedback in order to ensure the content validity of the instrument such as a reduction in the number of questions from 48 to 34 to remove questions that seemed to be vague, the addition of some definitions at the beginning about m-Government and Mobile Parking Service and the restatement of some questions that seemed to be repetitive to ensure greater readability and clarity.

4.7.2. Construct Validity

Construct validity is directly related to the questions that the instrument is measuring. There are two forms of construct validity that seem to be accepted widely, convergent, and discriminate validity (Churchill & Iacobucci 2009). The former is where indicators of a specific construct covers or share a high proportion of variance in common (Hair et al.2006). The latter is when the measures among different constructs have a low correlation (Zikmund 2003). This research ascertained the validity of the questions during the development of the instrument. In addition, the variables to be measured in this research were obtained from the well-known theories of Rogers' Diffusion of Innovations (DOI) as well as the Technology Accepted Model (TAM) and others from existing scales derived from the literature. These variables have been measured by previous researchers and have been confirmed as having construct validity. Thus, questions that have been confirmed as valid by previous researchers have been adapted to suit this research and the wording amended as necessary without affecting the original scale.

4.7.3. Reliability

The research might produce inaccurate results and negate the acceptance or rejection of hypotheses if reliability and validity are not checked (Creswell 2009). Consequently, reliability and validity are two vital characteristics of questionnaire items in a good measurement instrument (Cavana, Delahaye, & Sekaran, 2001; Zikmund 2003; Cresswell 2009). Reliability is imperative but not an essential provision for validity (Cavana, Delahaye, & Sekaran, 2001). For instance, a test may not be valid but may be reliable. On the other hand, a test must be valid in order to be a reliable. According to Zikmund (2003), reliability is a measure where similar outcomes are achieved over time and across conditions. Pallant (2005) agrees that reliability tests the consistency and stability of a measurement instrument.

Litwin (1995) suggests that there are four different methods to measure reliability 1) test-retest; 2) intra-observer; 3) inter-observer and; 4) internal consistency. This research utilizes internal consistency, as it is more suitable than the others. In order to measure internal consistency or reliability, Cronbach's alpha will be used, and the commonly accepted rule of thumb is that the result should be 0.8 and above (Litwin 1995; Malhotra & Birks 2000; & Bryman 2007). Chapter 5 provides more details about the results from Cronbach's alpha.

4.7.4. External Validity

This study has adapted the seven staged sampling procedure developed by Zikmund (2003) as mentioned before. Table 4.8 describes the chosen sample of population in relation to Zikmund's seven stages. The sample clearly reflects the general population in Oman. Therefore, outcomes reached in this study can be generalised to the rest of the population. Having said that, caution has to be taken as the sample and the mobile service (Mobile Parking) is specific to the capital area, Muscat. However, as the Omani context has no unique factors in terms of m-Government services, the model proposed in this research will be useful for many countries considering delivery of m-Government

services in order to explain the factors that influence/impact the intention to use m-Government services and it will contribute to the existing knowledge.

4.8. Data Analysis

In the second semester of 2009, about 300 questionnaires were distributed and 253 responses were collected. Among these 253 responses, 7 responses were discarded due to large proportions of the questionnaires not being answered. Therefore, 246 responses were deemed to be usable which is about (82 per cent response rate).

4.8.1. Survey analysis

The research model introduced in the previous Chapter three consists of 9 independent variables and 1 dependent variable. These variables need to be analysed using an appropriate analysis tool. Therefore, for this study different tools were used for the data analysis. First, the Statistical Package for the Social Sciences (SPSS) version 16 was used to organize the data that had been collected. Second, all the data were divided into segments, i.e. males, females, young and old people, users of the Mobile Parking Service, non-users of the Mobile Parking Service, highly educated, and less educated people. These segments were then transformed into Excel spreadsheet. However, for testing the model and hypotheses, the advanced technique of Structural Equation Modeling (SEM) was used (see Chapter 5). For analysing results of variables in particular latent constructs that have multiple dimensions in order to allow assessment of measurement properties and theoretical (structural) relationship, SEM is considered a powerful second-generation multivariate technique to meet this purpose (Hoyle 1995; Kline 2005; & Maruyama 1997). This study adopts Partial Least Squares (PLS) path modeling which is a division of SEM, and widely employed in information systems and marketing research. In addition, this PLS path modeling was chosen it is considered more appropriate for predictive and exploratory research (Azwadi, 2010). Further, PLS supports both formative and reflective variables (Thompson, Barclay, & Higgins, 1995; Chin, 1998) and can support exploratory and confirmatory research, whereas, other

methods as LISERL and Amos can only support reflective constructs (Gefen, Straub, & Boudreau, 2000).

The software used for PLS path modeling is called SmartPLS 2.0 tool developed by (Ringle, Wende & Will 2005). According to Bagozzi and Fornell (1982), the second-generation data analysis technique of SEM provides more benefits than the traditional first generation statistical tools such as ANOVA and MANOVA. In addition, Gefen, Straub, and Boudreau, (2000) argue that using the SEM technique allows the researcher to run a systematic and comprehensive analysis in order to test the interconnected variables and their items with only one single run, whereas the first generation tools can only analyze one layer of linkages between variables at a time. Further, there are four advantages of using the SEM technique as proposed by Bryman (2006). They are as follows:

- SEM takes mainly a confirmatory approach rather than an exploratory approach to the data analysis;
- SEM provides clear estimates of errors variance parameters;
- Data analysis using SEM procedures determines both unobserved (e.g. latent) as well as observed variables; and
- SEM methodology has several crucial features such as modeling multivariate relations, and estimating point and/or interval indirect effects.

Because of these advantages the SEM, technique was considered the most appropriate for this research in order to test the research model against the data. Using SEM method, the data analysis for the survey questionnaires go through several steps. These are as follows (for more details see Chapter 5):

- Distribution of Latent Variables: The aim is to present a broad picture of the respondent's evaluation of each perception or variable in the research model and understand more about the characteristics of the sample;
- Construct Specification Accuracy: This is to distinguish between the relationship of measures and latent constructs in order to avoid misspecification;

- Measurement model: is used to validate the indicators that are used to measure the latent variables using a confirmatory factor analysis. In order to specify a valid measurement model, it is imperative to establish satisfactory convergent and discriminant validities for the research model. The former is done through establishing Reliabilities of items in relation to their constructs, composite reliabilities (CR) of constructs, and the average variance extracted (AVE) are used in order to assess the convergent validity, whereas the latter is established for two reasons. Firstly, when all the items that are used to measure a construct load highly on that construct compared to their loadings on other constructs in the research model;
- Structural Model: is established when the R square value in a structural equation model measures the amount of variance in the dependent variable that an independent variable explains. As a rule of thumb, this R square value for endogenous variables should be higher or equal to 0.10; and
- Confirmation of Hypotheses: Each link in the structural model represents a hypothesis to be tested and for this research, there are ten hypotheses to be examined. Testing the hypothesis via Partial Least Squares (PLS) using Structural Equation Modeling **(**SEM**)** occurs through the calculation of the strength and the significance/insignificance of every structural path which in turn indicate that the hypothesis is confirm or otherwise.

4.8.2. Interview analysis

On the other hand, the software program used for analysis in this research for qualitative interviews was the NVivo computer program. The software program used for analysis in this research for qualitative interviews was the NVivo computer program. This program has several benefits; for example, it can easily manage, access and analyse qualitative data without losing its richness. Further, it is practical for locating patterns or common threads, and can be used to develop greater or more subtle concepts (Bazeley & Richards, 2000). According to Cavana, Delahaye, and Sekaran (2001), the NVivo program is one of the most popular programs available, and is well suited for analysis of

both unstructured and semi- structured interviews in qualitative research. Furthermore, this program is practical for small numbers of interviews where discussions are recorded. As mentioned in Section 4.6, the decision makers involved with m-Government projects were interviewed using a semi-structured format. The decision makers were asked whether they wanted to have the interview recorded on tape or whether they preferred the researcher to take notes. In addition, they were asked whether they preferred to use Arabic or English during the interviews. All of them agreed to recorded interviews in English.

Figure 4.3 shows the data analysis approach used in the qualitative method adapted from Creswell (2009) followed in this research building from bottom to top.

Step 1. Organizing and preparing the data for analysis. This involves transcribing the semi-structured interviews;

Step 2. Reading all data in order to obtain a general sense of data as well as an understanding of the general ideas of the participants' views;

Step 3. Coding of the data. This step involves organizing and categorizing all data into segments;

Step 4. Generating themes for all the data to prepare for the analysis;

Step 5. Interrelating all themes in order to provide a discussion of themes in the qualitative narrative; and

Step 6. Interpreting the meaning of themes, and learning from the data analysis process.

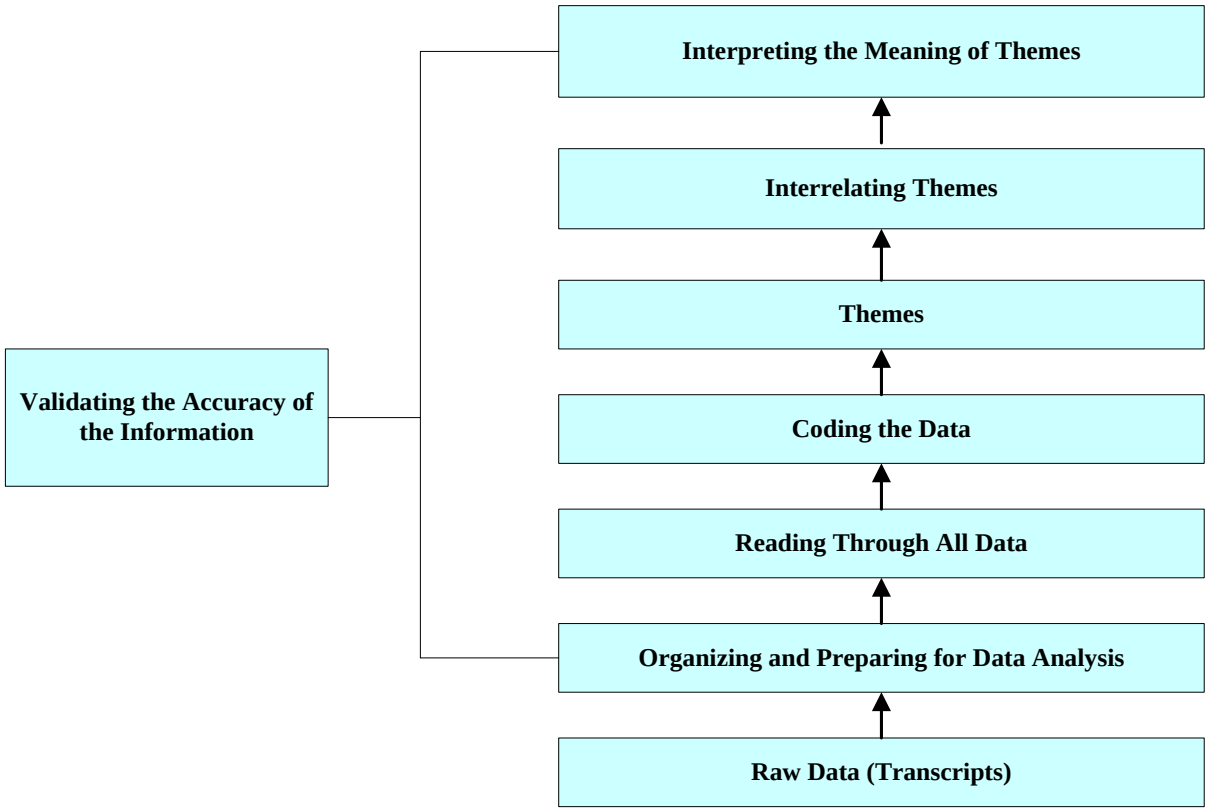

Figure 4.3 The data analysis approach used in the qualitative method

Source: adapted from Creswell (2009)

The coding process was done using the guidelines recommended by Tesch (1990). These guidelines are as follows:

- The researcher carefully read all the transcriptions in order to get a sense of the whole data;
- The researcher went through the first interview. This was the most interesting interview because this participant was fully involved with the Mobile Parking Service (the example of m-Government services used in this research). Then, several questions were noted; for instance, ‘What is this about?’ and ‘What does this mean?’;

- After completing the above task for the remaining participants, a list of themes was made and these themes were then grouped into similar topics.
- Those topics were abbreviated as codes and were written next to the appropriate segments of the text;
- Those topics were then turned into categories by grouping the topics that related to each other;
- The final decision on the appropriate abbreviation for each category was made; and
- The data was then ready for the preliminary analysis.

4.9. **Ethical Considerations**

Academic and professional researchers should always consider ethics as an important part of their research (Creswell 2009). This research complied with Victoria University's Code of Research Ethics. All participants were informed that their participation was voluntary to avoid potential risks. They were then briefed verbally about the aims of the project and the measures to ensure confidentiality. This information was also provided in the invitation letter or cover sheet. If they were willing to participate, they were provided with a consent form (See Appendix E) (Interviewees only). They were asked to set a time of their choice for the interview. In accordance with the ethics requirements of Victoria University, prior to being either be recorded on tape or in notes (depending on respondents' preferences), participants were assured that their responses would remain confidential. The University Human Research Ethics Committee's contact number and mail address was provided in the cover sheet or the invitation letter (See Appendix E). Participants were asked to keep the letter or the cover sheet so that they could contact the committee if they had any queries or complaints about the study or the way they were approached.

Interviewees were contacted through the Diwan of Royal Court to arrange the place, date, time of the interviews and confirm their willingness to take part in this important stage of data collection. Prior to this date the researcher contacted the offices of the

decision makers (their secretaries or office directors) to inform and provide them with an official invitation letter explaining the aims of the study, and a list of questions to be asked during the interview.

In order to ensure confidentiality, participants' names and identity will be kept confidential and will not be revealed in any publications as a result of this study. Data analysis reports will be written in a general format that will not enable the participants to be identified. The questionnaires were designed in a way that will ensure anonymity of the participant and participants were advised not to write any information that might reveal their identity. Participants were also advised of the confidentiality procedure in the cover letter or sheet provided to them before their involvement.

Mobile Parking Service users and non-users were approached through an intermediary and it was stressed to them that participation was voluntary. In addition, the consent form (See Appendix E) made it clear that subjects were free to decline or participate. The intermediary in this case was from Muscat Municipality (the developer of Mobile Parking Service) who distributed the questionnaires to users and non-users on behalf of the researcher. After that, follow-up contacts were made to these users via Muscat Municipality to ensure the delivery of the survey and ensure their understanding of the questions and cooperation. The researcher then gathered all completed survey questionnaires from the Muscat Municipality.

4.10. **Summary**

This chapter described the research method used to examine and validate the research model and confirm the hypotheses. It provided a detailed description of the empirical phase of the research that used a mixed methodology approach of quantitative surveys and qualitative interviews to investigate the impact of perceived characteristics of innovation towards intention to use m-Government services. These included relative advantage, compatibility, complexity/ perceived ease of use, trialability and observability, as well as factors of perceived trustworthiness, perceived security, personal

innovativeness and perceived enjoyment derived from the literature. Furthermore, this chapter presented the influence of age, gender and level of educational attainment on the perceived characteristics towards intention to use m-Government services. These factors were investigated from a user/non-user perspective in the developing country of Oman. This chapter also provided a general overview of m-Government services in the Oman ICT sector as well as its e-government/m-government vision, strategy and initiatives. In addition, it has described where m-government (as defined in Chapter 2) fits in this evolving sector of ICT. The ethical requirements for this research were also discussed in this chapter. The next chapter, Chapter 5, analyses the data required for the validation of the research model.

Chapter 5.

Validation of the Research Model

5.1. Introduction

As Chapter 4 described the research method used to validate a model of intention to use m-Government services, this chapter provides the validation of the research model. This chapter is organized as follows. The next Section 5.2 presents the analysis and results relevant to the demographic characteristics including gender, age, and education. The distribution of latent variables is discussed in Section 5.3. In Section 5.4 the constructs specification accuracy and decision rules to identify formative versus reflective constructs are presented. The measurement model is described in Section 5.5 and this includes convergent validity, reliabilities of items in each scale, composite reliabilities of constructs, average variance extracted, and discriminant validity. The structural model including confirmed or otherwise hypotheses is presented in Section 5.6 followed by the summary of this chapter in Section 5.7.

5.2. Analysis of Demographic Characteristics

This section presents the demographic characteristics used in this research. These demographic variables are gender, age, and education.

5.2.1. Gender

As shown in Figure 5.1, the 246 respondents included 87 females (35 per cent) and 159 males (65 per cent). The figure also shows that the percentage of males is higher than females. This could be explained by the fact that the survey was distributed in many

places without intending to target a specific group and therefore there was no control over the number of males versus females.

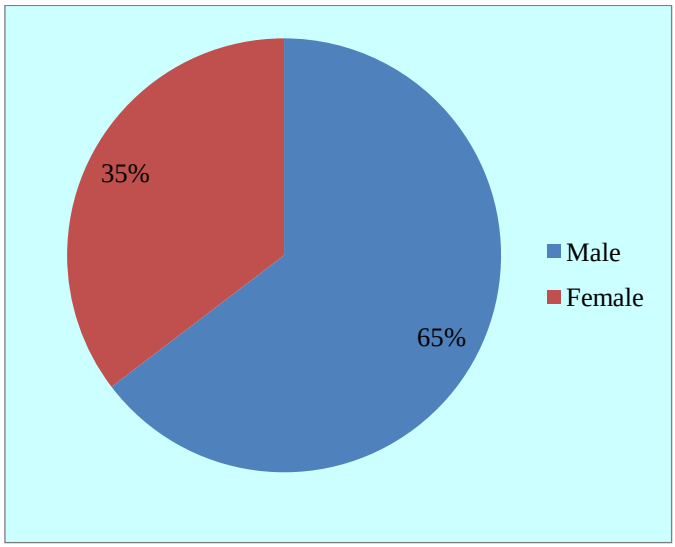

Figure 5.1 Sample distribution by gender

The relationship between gender groups (males and females) and all the variables in the research model, including PENJ, PINOV, PTT, PSEC, RA, COM, PEOU, TRI, OBSV, and Intention to use Mobile Parking Services (INT) are shown in Table 5.1.

This analysis shows that there is a positive relationship between Intention to Use and Compatibility, Perceived Ease of Use, Perceived Trustworthiness and Personal Innovativeness in the male group. Among these variables, Compatibility was found to be the most influential factor for men in terms of their intention to use the Mobile Parking Service as the T-value of 4.10 is greater than 1.96 and the P value is less than 0.001, which indicates a significant positive path. This is in line with Tornatzky and Klein (1982) who argue that compatibility is one of the most significant variables in the context of adoption research.

Gender	Females		Males	
Path	**Significant at (T > 1.96) (P < 0.05)**	**Path Weight Beta Values (β)**	**Significant at (T > 1.96) (P < 0.05)**	**Path Weight Beta Values (β)**
RA > INT	T(0.42<1.96) P(0.67>0.05)	0.06	T(0.32<1.96) P(0.75>0.05)	-0.03
CT > INT	T(0.84<1.96) P(0.40>0.05)	0.09	T(4.10>1.96) P(0.000<0.001)	0.32***
PEOU > INT	T(0.46<1.96) P(0.65>0.05)	-0.05	T(0.21<1.96) P(0.83>0.05)	0.02
TRI > INT	T(0.91<1.96) P(0.37>0.05)	0.07	T(0.97<1.96) P(0.33>0.05)	0.08
OBSV > INT	T(0.91<1.96) P(0.36>0.05)	0.12	T(2.91>1.96) P(0.00<0.05)	0.19**
PTT > INT	T(1.26<1.96) P(0.21>0.05)	0.19	T(2.88>1.96) P(0.00<0.05)	0.25**
PSEC > INT	T(0.27<1.96) P(0.79>0.05)	-0.03	T(0.81<1.96) P(0.42>0.05)	-0.07
PENJ > INT	T(1.64<1.96) P(0.10>0.05)	0.19	T(1.66<1.96) P(0.09>0.05)	0.14
PINOV > INT	T(2.78>1.96) P(0.00<0.05)	0.31**	T(2.23>1.96) P(0.03<0.05)	0.15**

Table 5.1the relationship between all variables within gender groups

*significant at p < 0.1
**significant at p < 0.05
***significant at p < 0.01

Consequently, the Compatibility for males has a stronger impact on their intention to use the Mobile Parking Service compared to females. The different perceptions of compatibility between the two groups could be explained by the culture in Oman. For example, in Oman, Omani males usually support females financially, thus it is expected that when they invest their money in such services it is compatible with their life style and fits well with their daily routine. On the other hand, because most females are supported by the males in the family, they might be less concerned about monetary investment in such services.

Conversely, Personal Innovativeness is the most influential factor for females in terms of their intention to use the Mobile Parking Service (T-value= 2.78 > 1.96, P=0.03 < 0.05). This result indicates a positive strength of relationship between personal innovativeness and the intention to use Mobile Parking Service for the female group. It can be observed from the analysis that individuals have differing predilections towards acting innovatively. The results in Table 5.1 which indicate that females are more positive than males in their perception of the Mobile Parking Service in terms of Perceived Ease of Use and Relative Advantage.

Concisely, Personal Innovativeness for females has a stronger impact on their Intention to Use compared to males. Generally, this could be explained by the fact that previously females in Oman were not treated equally to males and there was a distinction when it came to finding suitable work. However, nowadays, females in Oman are generally treated equally to males particularly in the work environment. For instance, when it comes to appreciation, or giving a reward, this is based on achievement alone and not on gender. In addition, giving females an opportunity to work in the same environment with males encourages them to challenge males in many fields; hence because they are competing with males, they are more likely to explore innovations.

5.2.2. Age

Figure 5.2 shows four age groups. These groups are as follows:

- 18- 28 years comprise 61 per cent of the sample;
- 29- 39 years comprise 31 per cent of the sample;
- 40- 50 years comprise 7 per cent of the sample; and
- 51-61 years comprise 1 per cent of the sample.

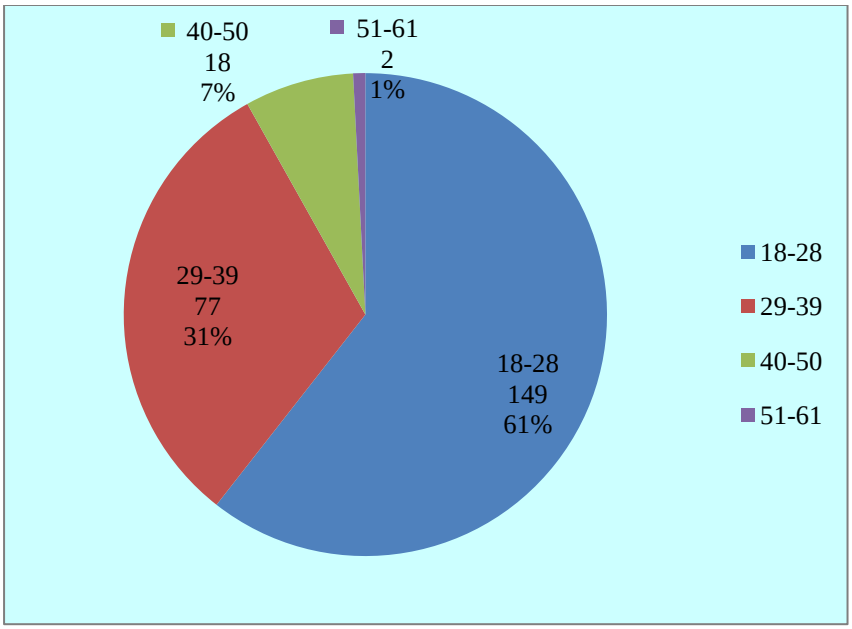

Figure 5.2 Sample distributions by age (years)

For easier analysis and readability, the sample can be categorised into two age groups; younger (18-39) and older (40-61). This categorization can assist the researcher to see how the relationships between different variables behave within each of these age groups. According to the T-statistics (7.04 greater than 1.96) and the (P-value 0.000 less than 0.001) Personal Innovativeness is the most influential factor for the older group (40-61) in terms of their Intention to Use the Mobile Parking Service.

These results show that personal innovativeness for the older group has a stronger impact on their intention to use the Mobile Parking Service compared to the younger group. This could be explained because this older group was born before 1970. The country's current Sultan Qaboos began his reign in the 1970 and since then Oman has moved into the modern era. It can be said that Oman saw a rapid growth in technology in the second half of the twentieth century with the thirst for knowledge of this age group (40 - 61), a great deal of awareness was focused on information and communications technologies and there was a high penetration of the Internet, mobile phones and m-Government services. Therefore this age group appreciates the value of such innovations more than the younger groups who see such innovations as routine and do not see the value of them.

Age	Group 1 (18-39)		Group2 (40-61)	
Path	**Significant at (T > 1.96) (P < 0.05)**	**Path Weight Beta Values (β)**	**Significant at (T > 1.96) (P < 0.05)**	**Path Weight Beta Values (β)**
RA > INT	T(0.26<1.96) P(0.80>0.05)	0.02	T(0.47<1.96) P(0.65>0.05)	-0.04
CT > INT	T(3.28>1.96) P(0.00<0.05)	0.23	T(4.34>1.96) P(0.00<0.001)	0.30***
PEOU > INT	T(0.038<1.96) P(0.97>0.05)	-0.00	T(1.47<1.96) P(0.16>0.05)	0.11
TRI > INT	T(0.99<1.96) P(0.32>0.05)	0.06	T(1.36<1.96) P(0.1>0.05)	0.11
OBSV > INT	T(2.74>1.96) P(0.006<0.05)	0.17	T(2.30>1.96) P(0.03<0.05)	0.20**
PTT > INT	T(3.07>1.96) P(0.00<0.05)	0.23	T(3.43>1.96) P(0.00<0.05)	0.36**
PSEC > INT	T(0.76<1.96) P(0.45>0.05)	-0.05	T(2.71>1.96) P(0.01<0.05)	-0.33**
PENJ > INT	T(2.24>1.96) P(0.03<0.05)	0.16	T(1.92<1.96) P(0.07>0.05)	0.11
PINOV > INT	T(3.01>1.96) P(0.00<0.05)	0.19	T(7.04>1.96) P(0.00<0.001)	0.25***

Table 5.2 the relationship between all variables within age groups

*significant at p < 0.1
**significant at p < 0.05
***significant at p < 0.01

For the younger group (18-39), the most influential variable in terms of their intention use the Mobile Parking Service is Compatibility as the T value of 3.28 is greater than 1.96. The least influential one is Perceived Ease of Use with a T value of 0.04 which is relatively low. Generally, this could be explained by the fact that the use of Mobile Parking Service requires a mobile phone and mobile phones are usually more popular with younger people than older people (Prensky, 2001). For this reason, younger people believe that Mobile Parking Service fits well with their lifestyles, their daily routine and the way they like to pay for other services.

5.2.3. Education

Figure 5.3 below shows the four main educational level groups. These groups are Primary (3 per cent), Secondary (34 per cent), Undergraduate (50 per cent), Postgraduate (11 per cent) and other (2 per cent). As the figure shows, the majority of the respondents are undergraduates and therefore, the sample in this study can be considered as generally well-educated.

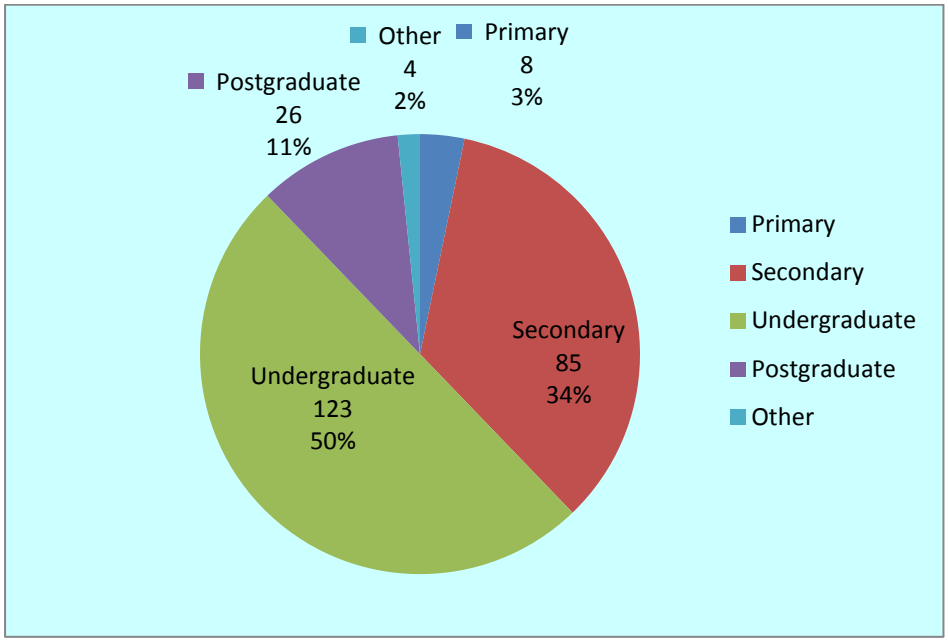

Figure 5.3 Sample distribution by educational level

These groups can be categorised further into two groups (see Table 5.3):

- Group 1: primary and secondary; and
- Group 2: undergraduate and postgraduate.

Education	Group 1 (Primary and Secondary)		Group 2 (Undergraduate and Postgraduate)	
Path	**Significant at (T > 1.96) (P < 0.05)**	**Path Weight Beta Values (β)**	**Significant at (T > 1.96) (P < 0.05)**	**Path Weight Beta Values (β)**
RA > INT	T(2.15>1.96) P(0.03<0.05)	0.30**	T(1.43<1.96) P(0.16>0.05)	-0.11
CT > INT	T(2.00>1.96) P(0.048<0.05)	0.18**	T(3.32>1.96) P(0.001<0.05)	0.29**
PEOU > INT	T(0.21<1.96) P(0.833>0.05)	0.024	T(0.28<1.96) P(0.78>0.05)	-0.03
TRI > INT	T(0.23<1.96) P(0.82>0.05)	0.022	T(1.18<1.96) P(0.24>0.05)	0.08
OBSV > INT	T(0.87<1.96) P(0.38>0.05)	0.11	T(2.92>1.96) P(0.004<0.05)	0.20**
PTT > INT	T(1.70<1.96) P(0.09>0.05)	0.21	T(2.59>1.96) P(0.01<0.05)	0.26**
PSEC > INT	T(1.10<1.96) P(0.27>0.05)	-0.11	T(0.53<1.96) P(0.60>0.05)	-0.05
PENJ > INT	T(0.31<1.96) P(0.75>0.05)	0.04	T(2.55>1.96) P(0.01<0.05)	0.20**
PINOV > INT	T(1.95<1.96) P(0.05)	0.20	T(3.71>1.96) P(0.000<0.001)	0.22***

Table 5.3 The relationship between all variables and educational level

*significant at p < 0.1
**significant at p < 0.05
***significant at p < 0.01

It can be seen from the Table 5.3 that the most influential variable on the Intention to Use m-Government services for Group 1 (Primary and Secondary) is Relative Advantage as the T-statistic value is 2.15 (greater than 1.96), whereas Compatibility has a stronger impact for Group 2 (Undergraduate and Postgraduate) in terms of their intention to use Mobile Parking Service (T-statistic 3.32 greater than 1.96). This could be explained by the fact that the less educated people in Group 1 usually utilize traditional ways to pay for other services. For this reason, utilizing Mobile Parking Service is new to them and they could appreciate the benefits (Relative Advantage) more than educated people who

have already been exposed to many m-Government services and who might not realize the advantages of using Mobile Parking Service. This is because it is a routine thing for them and is already compatible with their lifestyle.

5.3. Distribution of Latent Variables

This section provides the distribution of various variables in the research model. The aim is to present a broad picture of the respondent's evaluation of each perception or variable in the research model and understand more about the characteristics of the sample. Table 5.4 shows the statistical distribution (minimum, maximum, mean and standard deviation) of the scores of various variables.

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Relative Advantage (RA)	246	1.00	5.00	4.00	0.90
Compatibility (COM)	246	1.00	5.00	3.77	0.87
Perceived Ease of Use (PEOU)	246	1.00	5.00	3.97	0.91
Trialability (TRI)	246	1.00	5.00	4.03	0.93
Observability (OBSV)	246	1.00	5.00	3.71	0.81
Perceived Trustworthiness (PTT)	246	1.00	5.00	3.65	0.95
Perceived Security (PSEC)	246	1.00	5.00	3.54	0.94
Perceived Enjoyment (PENJ)	246	1.00	5.00	3.84	0.95
Personal Innovativeness (PINOV)	246	1.00	5.00	3.78	0.85
Intention to Use (INT)	246	1.00	5.00	3.91	0.86

Table 5.4 The un-standardised PLS scores of all variables in the research model

Note: Based on a Likert scale from 1 (strongly disagree) to 5 (strongly agree).

The minimum and maximum scores are based on a 5-Point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The mean scores represent the average of scores of the whole sample (246 respondents) on every scale in the questionnaire including: RA,

COM, PEOU, TRI, OBSV, PTT, PSEC, PENJ, PINOV, and Intention to use Mobile Parking Service (INT).

The respondents in this sample generally have above-average scores (Mean score greater than 3) for their Intention to Use Mobile Parking Service. This indicates a positive attitude towards their Intention to Use Mobile Parking Service. In addition, most respondents indicated that Relative Advantage (RA) (Mean = 4.00) and Trialability (TRI) (Mean = 4.03) are highly important when it comes to their Intention to Use Mobile Parking Service. Based on the items used to measure Relative Advantage in the questionnaire, the high mean value for this variable indicates that individuals find that using Mobile Parking Service enables them to pay their parking fees more quickly, more easily and more efficiently. It also saves them time and increases their productivity more than other methods such as using coins or ticket machines.

Additionally, the respondents generally think that the use of Mobile Parking Service is Compatible (COM) with their life style and Easy to Use (PEOU) (Mean scores greater than 3). In addition, the results of using the Mobile Parking Service are observable and visible to individuals (OBSV), so it would be diffused faster than any innovation that is not so visible. This emphasizes that the use of Mobile Parking Service is clear, understandable and does not require excessive mental effort or cause frustration (PEOU). Further, the respondents believe that the use of Mobile Parking Service is secure (PSEC) and trustworthy (PTT). The high mean scores for Personal Innovativeness (PINOV) and Perceived Enjoyment (PENJ) indicate that the respondents are highly innovative and enjoy using Mobile Parking Service. Finally, the respondents seem to have a highly positive attitude toward their Intention to Use (INT) Mobile Parking Service in the future.

5.4. Construct Specification Accuracy

It is vital to distinguish between the relationship of measures and latent constructs in order to avoid misspecification. Previous scholars indicate that misspecification issues

within structural equation models lead to 'serious consequences on the theoretical conclusions drawn from the model'(Jarvis et al. 2003, p.212). This issue is also emphasized by Mackenzie, Podsakoff and Jarvis (2005) who argue that construct misspecification affects the results of the structural model analysis and can lead to Type I (confirming a hypothesis when it is in fact insignificant) and Type II errors (rejecting a hypothesis when it is in fact significant). In the structural model, it is crucial to distinguish between the measurement of indicators on both formative and reflective constructs because this enables you to design or model the correct conceptual relations between constructs and their indicators.

There are two general types of relationships between latent constructs and their measures or indicators: formative and reflective. Formative relationships are drawn in a structural model using arrows coming from the measures towards the main construct, whereas reflective constructs are represented using arrows going from the main construct towards the measures, as shown in Figure 5.4 below.

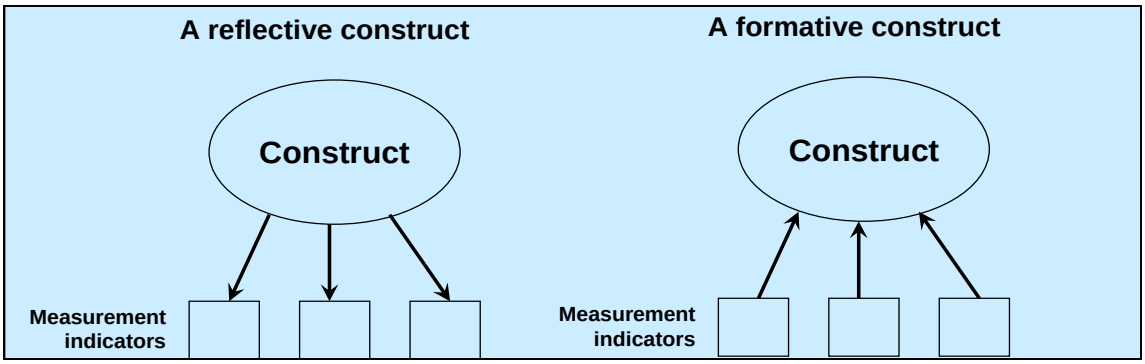

Figure 5.4 A simplified representation of how reflective and formative constructs are drawn in structural equation modeling

Source: (AlHinai Y, 2009)

The way constructs are represented in a structural model has implications for the conceptual domain that a construct covers. For instance, if a single indicator in a formative construct were deleted, this would affect the definition and meaning of the construct because it will be missing part of its conceptual domain. However, in the

reflective construct, if an indicator or measure is removed, this would not affect the conceptual domain because the measures or indicators are constructed in a manner that reflects the same core meaning of the construct (MacCallum & Browne, 1993)

In order to identify whether a construct should be specified as reflective or formative, a set of four decision rules or criteria were proposed by Jarvis et al. (2003) and adopted by, Mackenzie, Podsakoff and Jarvis (2005), Petter, Straub and Rai (2007); and AlHinai (2009). The summary of these decision rules are shown in Table 5.5; whereas, justifications of the specification of each of these constructs as either formative or reflective based on the decisions rules is mentioned (see Appendix G for more details on Construct Specification Accuracy).

Decision Rules	**Formative Model**	**Reflective Model**
1. Direction of causality from construct to measure implied by the conceptual definition • Are the indicators (items) (a) defining characteristics or (b) manifestations of the construct? • Would changes in the indicators/items cause changes in the construct or not? • Would changes in the construct cause changes in the indicators?	Direction of causality is from items to construct • Indicators are defining characteristics of the construct • Changes in the indicators should cause changes in the construct • Changes in the construct do not cause changes in the indicators	Direction of causality is from construct to items • Indicators are manifestations of the construct • Changes in the indicator should not cause changes in the construct • Changes in the construct do cause changes in the indicators
2. Interchangeability of the indicators/items • Should the indicators have the same or similar content? Do the indicators share a common theme? • Would dropping one of the indicators alter the conceptual domain of the construct?	Indicators need not be interchangeable • Indicators need not have the same or similar content/indicators need not share a common theme • Dropping an indicator may alter the conceptual domain of the construct	Indicators should be interchangeable • Indicators should have the same or similar content/indicators should share a common theme • Dropping an indicator should not alter the conceptual domain of the construct
3. Co-variation among the indicators • Should a change in one of the indicators be associated with changes in the other indicators?	Not necessary for indicators to co-vary with each other • Not necessarily	Indicators are expected to co-vary with each other • Yes
4. Nomo-logical net of the construct indicators • Are the indicators/items expected to have the same antecedents and consequences?	Nomo-logical net for the indicators may differ • Indicators are not required to have the same antecedents and consequences	Nomo-logical net for the indicators should not differ • Indicators are required to have the same antecedents and consequences

Table 5.5 Decision rules to identify formative- vs. reflective-indicator constructs.

Source: Jarvis et al. (2003)

5.5. **Measurement Model**

Two components are part of any Structural Equation Model (SEM); the measurement model and the structural model (Hoyle 1995; and Kline 2005). The first, the measurement model, is used to validate the indicators that are used to measure the latent variables using a confirmatory factor analysis. The second is used to describe the casual relationships between different variables in the research model (Hoyle 1995). This Section focuses on the measurement model, whereas Section 5.6 describes the structural model. As shown in Figure 5.5, each construct is measured by not less than three measurement indicators because the use of three or four measurement indicators per construct is recommended. Further, using more than five indicators will not present acceptable SEM results (Chin, 1998). In order to specify a valid measurement model, it is imperative to establish satisfactory convergent and discriminant validities for the research model. The measurement model used in the PLS analysis is shown in Figure 5.5.

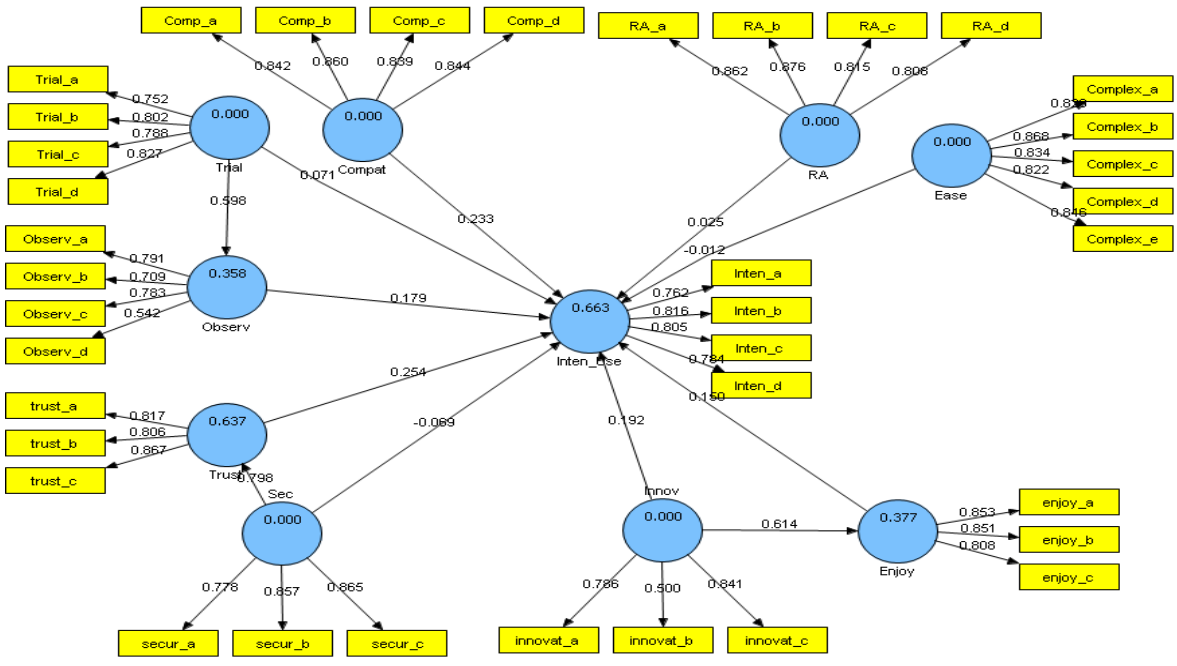

Figure 5.5 Measurement Model

5.5.1. Convergent Validity

Reliabilities of items in relation to their constructs, Composite Reliabilities (CR) of constructs, and the Average Variance Extracted (AVE) are used in order to assess the convergent validity (Fornell & Larcker, 1981). As a rule of thumb the minimum acceptable Cronbach's alpha of 0.70 (Nunnally and Bernstein1994) was used as a benchmark for acceptable construct reliability. Table 5.6 below shows Convergent Validity of Constructs:

Constructs	No. Items	Composite Reliability (CR)	Average Variance Extracted (AVE)	Communality
Relative Advantage	4	0.905885	0.706679	0.706679
Compatibility	4	0.909773	0.715992	0.715992
Perceived Ease of Use	5	0.922234	0.703513	0.703513
Trialability	4	0.870993	0.628230	0.628230
Observability	4	0.802331	0.508611	0.508611
Perceived Enjoyment	3	0.875914	0.701884	0.701884
Personal Innovativeness	3	0.760315	0.524789	0.524789
Perceived Trustworthiness	3	0.869516	0.689781	0.689781
Perceived Security	3	0.872613	0.695908	0.695908
Intention to Use	4	0.870657	0.627421	0.627421

Table 5.6 Convergent Validity of Constructs

The item loadings from the outer measurement model were examined in order to assess the item reliabilities. The correlation coefficients between the indicator and the latent variable represent the item loadings. The composite reliability of all constructs exceeds the 0.70 threshold, which is the suggested benchmark for acceptable construct reliability

(Hair et al. 2006). The Average Variance Extracted (AVE) of all constructs and the communality results in the model exceed 0.50 which is the recommended threshold (Fornell & Larcker, 1981). Table 5.6 shows that the research model in this study meets the minimum requirements for convergent validity.

5.5.2. Discriminant Validity

Discriminant validity is established for two reasons. Firstly, when all the items that are used to measure a construct load highly on that construct compared to their loadings on other constructs in the research model (see Table 5.7). Secondly, if the square root of Average Variance Extracted (AVE) for each construct is higher than its correlations with other constructs (Chin 1998) (see Table 5.8).

	Compact	Ease	Enjoy	Innov	Inten_Use	Observ	RA	Secur	Trial	Trust
Comp_a	**0.841666**	0.544495	0.526729	0.495533	0.602453	0.495220	0.607554	0.479508	0.395768	0.503228
Comp_b	**0.859915**	0.540447	0.548492	0.539237	0.607079	0.469577	0.617935	0.515579	0.478049	0.518886
Comp_c	**0.839015**	0.557032	0.394882	0.455264	0.544649	0.428201	0.560826	0.475100	0.372096	0.513308
Comp_d	**0.843900**	0.563658	0.551332	0.451982	0.581673	0.500573	0.584641	0.523908	0.346774	0.531608
Ease_a	0.577253	**0.822881**	0.471163	0.466553	0.532870	0.608518	0.517423	0.468100	0.431337	0.555476
Ease_b	0.572853	**0.868473**	0.529190	0.469741	0.522571	0.553195	0.549787	0.446819	0.454813	0.479271
Ease_c	0.543291	**0.834143**	0.505147	0.447074	0.478496	0.521814	0.527333	0.441018	0.453822	0.472657
Ease_d	0.515876	**0.821804**	0.484362	0.471474	0.529707	0.553525	0.541672	0.438031	0.528234	0.504896
Ease_e	0.521713	**0.845594**	0.504866	0.433022	0.543003	0.559981	0.569627	0.497556	0.515678	0.476376
Enjoy_a	0.567114	0.504545	**0.852814**	0.525349	0.584401	0.430772	0.553380	0.402102	0.412550	0.442861
Enjoy_b	0.494020	0.503846	**0.851378**	0.533775	0.505781	0.404532	0.486964	0.435862	0.409687	0.439918
Enjoy_c	0.440714	0.486323	**0.808402**	0.483790	0.512415	0.477080	0.482267	0.385748	0.360697	0.404790
Innovat_a	0.354138	0.434630	0.523754	**0.785827**	0.518600	0.370783	0.477338	0.357572	0.452590	0.358878
Innovat_b	0.327522	0.168270	0.204470	**0.500012**	0.288842	0.224626	0.155005	0.317228	0.123182	0.259473
Innovat_c	0.560612	0.501607	0.523931	**0.840733**	0.540051	0.468534	0.417474	0.433589	0.445406	0.430951
Inten_a	0.580059	0.476738	0.481378	0.431104	**0.762005**	0.478583	0.440277	0.429362	0.260842	0.529422
Inten_b	0.594939	0.515348	0.480190	0.487833	**0.816304**	0.559651	0.502106	0.472415	0.492183	0.553592
Inten_c	0.496263	0.470187	0.494006	0.457010	**0.804846**	0.440907	0.476189	0.444196	0.412698	0.481489
Inten_d	0.518212	0.507269	0.565033	0.642208	**0.784157**	0.510629	0.552621	0.422020	0.509499	0.459982
Observ_a	0.523260	0.629242	0.500816	0.488866	0.578614	**0.790501**	0.569561	0.387107	0.525485	0.429576
Observ_b	0.379559	0.378825	0.345930	0.380454	0.404275	**0.708571**	0.348974	0.355409	0.434614	0.351213
Observ_c	0.372949	0.452604	0.349885	0.340389	0.466382	**0.783214**	0.342608	0.333209	0.455471	0.358054

Observ_d	0.277606	0.427419	0.232672	0.154789	0.286949	**0.542269**	0.170524	0.292613	0.215273	0.326820
RA_a	0.557350	0.532815	0.539888	0.459746	0.516907	0.427907	**0.861818**	0.498502	0.493381	0.545862
RA_b	0.561082	0.571521	0.562166	0.441419	0.507440	0.435101	**0.875838**	0.422704	0.511059	0.488345
RA_c	0.612820	0.511694	0.473526	0.465617	0.540810	0.418712	**0.815366**	0.499502	0.422544	0.547278
RA_d	0.621524	0.553955	0.466767	0.377685	0.531202	0.522364	**0.807509**	0.410661	0.448093	0.470871
Secur_a	0.458175	0.426017	0.432350	0.402691	0.424630	0.366980	0.448738	**0.777736**	0.283566	0.591845
Secur_b	0.457656	0.468384	0.400243	0.404850	0.445612	0.395506	0.449371	**0.857102**	0.230106	0.675104
Secur_c	0.553105	0.473545	0.392443	0.454639	0.520213	0.433015	0.468834	**0.865002**	0.339117	0.721439
Trial_a	0.195236	0.276922	0.228200	0.324920	0.287098	0.396598	0.262834	0.177998	**0.752012**	0.167434
Trial_b	0.263202	0.326416	0.284965	0.379062	0.332614	0.439988	0.335937	0.173848	**0.801867**	0.194890
Trial_c	0.502873	0.590720	0.451405	0.413258	0.497453	0.520655	0.565766	0.333695	**0.788026**	0.362565
Trial_d	0.453258	0.528287	0.464527	0.481036	0.516671	0.511292	0.522887	0.348221	**0.826694**	0.389344
Trust_a	0.498071	0.473102	0.422151	0.412014	0.436099	0.409216	0.473126	0.742123	0.306205	**0.816768**
Trust_b	0.443399	0.461103	0.356742	0.350311	0.510666	0.431775	0.455491	0.560445	0.251214	**0.806496**
Trust_c	0.569872	0.540816	0.487945	0.450961	0.633958	0.439189	0.584521	0.678264	0.358715	**0.867062**

Table 5.7 The loadings of each item with each latent variable

Reading the figures for each measurement item in each row (starting from left most column), it can be seen that each item has the highest loading on its own construct compared to the item's loading on other constructs. Consequently, this satisfies the requirement for discriminant validity. Although, Innovative_b and Observ_d loadings are quite low compared to other items in the constructs, the loadings in the other items are still higher on their own constructs compared to other constructs. As shown in Table 5.8, most of the items load highly on their construct exceeding the 0.60 threshold, as recommended by Nunnally (1967).

Generally, the results ensure the discriminant validity as the loadings of measurement items on their related construct is greater than their loadings on other constructs (Chin 1998; Gefen, Straub & Boudreau, 2000) (see Table 5.7). In addition, the square root of AVEs for each construct is greater than its correlations with other constructs (see Table 5.8).

Constructs	AVE	Compact	Ease	Enjoy	Innov	Inten_Use	Observ	RA	Secur	Trial	Trust
Compact	0.72	**0.85***									
Ease	0.71	0.65	**0.84**								
Enjoy	0.70	0.60	0.64	**0.84**							
Innov	0.52	0.57	0.54	0.61	**0.72**						
Inten_Use	0.63	0.70	0.62	0.63	0.64	**0.74**					
Observ	0.51	0.56	0.66	0.52	0.50	0.63	**0.71**				
RA	0.71	0.70	0.64	0.60	0.51	0.62	0.53	**0.84**			
Secur	0.76	0.59	0.55	0.49	0.50	0.56	0.48	0.55	**0.87**		
Trial	0.62	0.47	0.57	0.47	0.51	0.54	0.60	0.56	0.34	**0.79**	
Trust	0.69	0.61	0.60	0.51	0.50	0.64	0.51	0.61	0.80	0.64	**0.83**

Table 5.8 Correlations among constructs and the square root of AVEs

*Square Root of AVEs are root of AVEs

Having established the convergent validity and discriminant validity of the measurement model, this will enable us to proceed further, assess the structural model and test the research hypotheses (see Appendix C for more details on Data Analysis of Questionnaires).

5.6. **Structural Model**

The R square value in a structural equation model measures the amount of variance in the dependent variable that an independent variable explains. As a rule of thumb, this R square value for endogenous variables should be higher or equal to 0.10 (Falk & Miller 1992). In order to explain the variance in the Intention to use (INT) m-Government services this research aimed to examine a set of variables. Again, these variables are

Relative Advantage, Compatibility, Perceived Ease of Use, Trialability, Observability, Perceived Trustworthiness, Perceived Security, Perceived Enjoyment, and Personal Innovativeness. This can be achieved through PLS analysis by examining the (R square) of the dependent variable Intention to Use (INT).

As shown in Table 5.9, the Personal Innovativeness variable explains (37per cent) of total variance in the perceived enjoyment. Also, Trailability explains (36 per cent) of the total variance in Observability and finally Perceived Security explains (64 per cent) of the total variance in Perceived Trustworthiness. These figures add more power to the model that this research examines since, besides to the main dependent variables; other important variables can also be explained by some other variables in the model.

Dependent Variables	**R Square**
Intention to Use	0.662717
Perceived Enjoyment	0.377394
Observability	0.357976
Perceived Trustworthiness	0.636523

Table 5.9 Variance R2 square for dependent variables

Together, the independent variables including Relative Advantage, Compatibility, Perceived Ease of Use, Trialability, Observability, Perceived Trustworthiness, Perceived Security, Perceived Enjoyment, and Personal Innovativeness explain (66 per cent) of total variance in Intention to Use (INT). This is a respectable percentage since more than (50 per cent) of citizens' intention to use Mobile Parking Service can be explained by understanding these specific variables.

5.6.1. Confirmation of Hypotheses

Each link in the structural model represents a hypothesis to be tested and for this research there are nine hypotheses to be examined. Testing the hypothesis via Partial Least Squares (PLS) using Structural Equation Modeling **(**SEM**)** occurs through the calculation of the strength and the significance/insignificance of every structural path. PLS measures a beta value (β) which is the path weight in order to obtain the strength of each path. In addition, through the bootstrapping analysis using T-statistics, the statistical significance/insignificance of every hypothesis or path can be tested (see Figure 5.6).

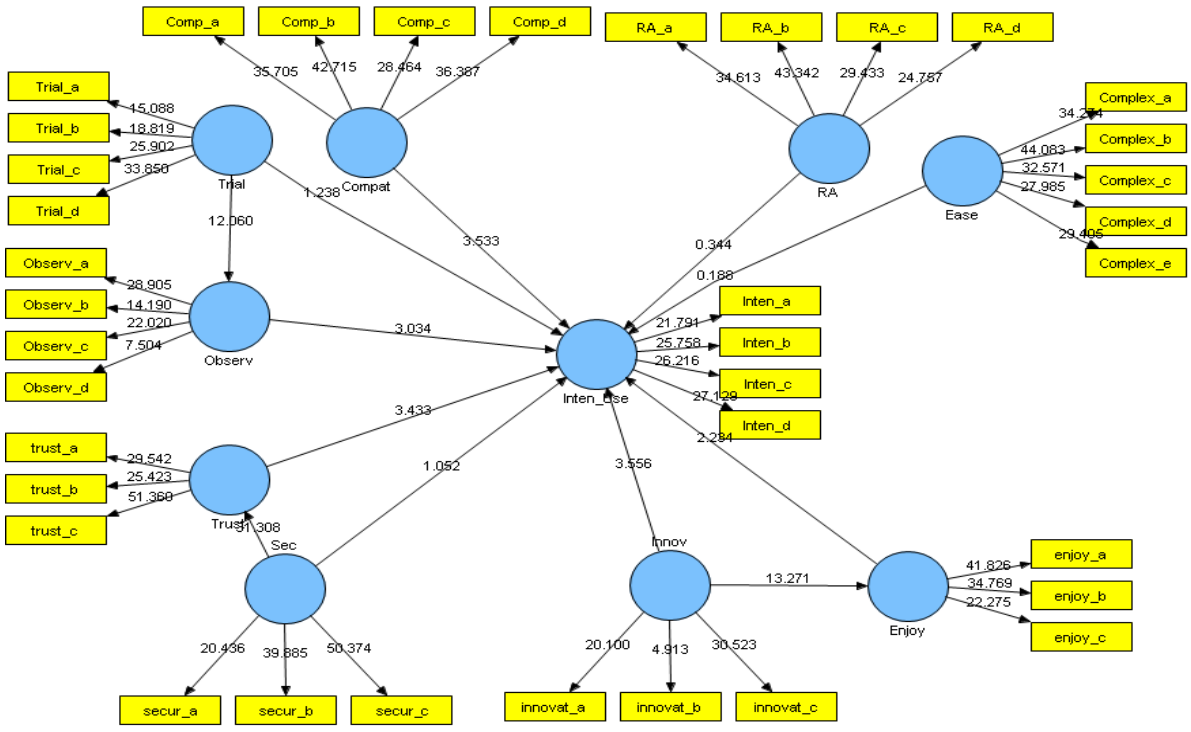

Figure 5.6 The bootstrapping results

As mentioned earlier, the distribution of latent variables shows a general positive attitude towards the use of Mobile Parking Service. However, when it comes to the PLS analysis of all variables and their relationships, it shows insignificant paths in some constructs. Table 5.10 below show the hypotheses confirmation results:

Path		Hypotheses	Significant at (T > 1.96) (P < 0.05)	Path Weight Beta	Overall Results	Supported?
Relative Advantage> Intention to use	H1	Higher levels of perceived relative advantage will be positively related to higher levels of intention to use mobile-Government services.	T (0.34 < 1.96) P (0.731 > 0.05)	β (0.03)	Not significant	No
Compatibility > Intention to use	H2	Higher levels of perceived compatibility will be positively related to higher levels of intention to use mobile-Government services.	T (3.53 > 1.96) P (0.000 < 0.01)	β (0.23)	0.23***	Yes
Perceived ease of use > Intention to use	H3	Higher levels of perceived ease of use will be positively related to higher levels of intention to use mobile-Government services.	T (0.19 < 1.96) P (0.85 > 0.05)	β (-0.01)	Not significant	No
Trialability > Intention to use	H4	Higher levels of perceived trialability will be positively related to higher levels of intention to use mobile-Government services.	T (1.24 < 1.96) P (0.22 > 0.05)	β (0.07)	Not significant	No
Observability > Intention to use	H5	Higher levels of perceived observability will be positively related to higher levels of intention to use mobile-Government services.	T (3.03 > 1.96) P (0.00 < 0.05)	β (0.18)	0.18**	Yes
Perceived Trustworthiness > Intention to	H6	Higher levels of perceived trustworthiness in the mobile Government services will be positively related to higher levels of intention to use.	T (3.43 > 1.96) P (0.000 < 0.01)	β (0.25)	0.25***	Yes
Perceived Security > Intention to use	H7	Higher levels of Perceived Security in the mobile government services will be positively related to higher levels of intention to use.	T (1.05 < 1.96) P (0.29 > 0.05)	β (-0.07)	Not significant	No
Perceived Enjoyment > Intention to use	H8	Higher levels of perceived enjoyment in the mobile government services will be positively related to higher levels of intention to use.	T (2.29 > 1.96) P (0.02 < 0.05)	β (0.15)	0.15**	Yes
Personal Innovativeness > Intention to use	H9	Higher levels of personal innovativeness in the mobile government services will be positively related to higher levels of intention to use.	T (3.56 > 1.96) P (0.000 < 0.01)	β (0.19)	0.19***	Yes

Table 5.10 Hypotheses confirmation results

*significant at $p < 0.1$
**significant at $p < 0.05$
***significant at $p < 0.01$

The results of PLS analysis show some structural paths are insignificant. These insignificant structural paths or non-confirmed hypotheses include Relative Advantage, Perceived Ease of Use, Trialability, and Perceived Security, whereas, the remaining structural paths indicated significant paths or confirmed hypotheses. These confirmed hypotheses are Compatibility, Observability, Perceived Trustworthiness, Perceived Enjoyment, and Personal Innovativeness. For instance, Compatibility has a significant impact on Intention to use Mobile Parking Service (H2, $T = 3.53 > 1.96$, $\beta = 0.23$, $P < 0.05$). This means that the respondents find it important to use the Mobile Parking Service instead of traditional ways to pay for parking and it also fits well with their lifestyle, daily routine, and the way they pay for other services. In addition, Observability has a significant impact on the intention to use Mobile Parking Service (H5, $T= 3.03 > 1.96$, $\beta = 0.18$, $P < 0.05$). This indicates that for respondents, the availability of clear instructions on how to use the Mobile Parking Service and the fact that they have no difficulty telling others about the service have an decisive impact on their Intention to Use.

Moreover, the impact of Perceived Enjoyment towards the intention to use Mobile Parking Service shows a positive and significant path (H8, $T= 2.29 > 1.96$, $\beta = 0.15$, $P < 0.05$). Furthermore, the PLS analysis results show a greater impact ($p < 0.01$) of Personal Innovativeness (H9, $T= 3.56 > 1.96$, $\beta = 0.19$, $P < 0.01$) and Perceived Trustworthiness (H6, $T= 3.43 > 1.96$, $\beta = 0.25$, $P < 0.01$) on intention to use Mobile Parking Service. Further analyses were done (see next Chapter 6, Section 6.4) of semi-structured interviews in order to obtain additional explanations of non-confirmed hypotheses. These include Relative Advantage, Perceived Ease of Use, Trialability, and Perceived Security. The findings obtained from the quantitative study were complemented by a qualitative study using semi-structured interviews with decision makers who are involved in m-Government projects. This was done in order to obtain further confirmation for the model and hypotheses and to acquire some in-depth explanations of some of the relationships/paths in the research model.

5.7. Summary

This chapter has provided an analysis of the data collected from the survey questionnaires (quantitative) and the interviews (qualitative) and has provided the results of both analyses. The demographic characteristics including gender, age, and educational attainment level and their influences on the variables in the research model have been discussed. Following the construct specification all constructs were found to be reflective. The measurement model and some statistical tests including convergent validity, reliabilities of items in each scale, composite reliabilities of constructs, average variance extracted, and discriminant validity have also been discussed. They were found to meet the requirement of convergent validity and discriminant validity followed by the structural model to confirm or disconfirm the proposed hypotheses.

For the quantitative analysis, the overall results of PLS analysis showed that some structural paths are insignificant. These insignificant structural paths or non-confirmed hypotheses were Relative Advantage>Intention to use, Perceived Ease of Use >Intention to use, Trialability>Intention to use, and Perceived Security>Intention to use, whereas, the remaining structural paths have indicated significant paths or confirmed hypotheses. These confirmed hypotheses were Compatibility>Intention to use, Observability>Intention to use, Perceived Trustworthiness>Intention to use, Perceived Enjoyment>Intention to use, and Personal Innovativeness>Intention to use. Further qualitative analysis was done in order to obtain additional explanations of non-confirmed hypotheses and different views were found from the decision makers depending on the application. Chapter 6 presents in more detail the findings derived from both the quantitative and qualitative analyses and discusses the results and the lessons learned.

Chapter 6.

Discussion of Findings

6.1. Introduction

The previous Chapter 5 discussed the validation of the research model. This chapter discusses the findings of both the quantitative and qualitative studies. The chapter is organized as follows. Section 6.2 presents and discusses the key findings relevant to the variables in the original Diffusion of Innovations Model (DOI) including: relative advantage, compatibility, perceived ease of use, trialability, observability, perceived trustworthiness, perceived security, perceived enjoyment, and personal innovativeness. In Section 6.3 the influence of demographic variables (gender, age, and education) is discussed and in Section 6.4, the key findings of the interviews are presented. A refined model of Intention to Use m-Government services based on the results of this research is presented in Section 6.5.

6.2. Key findings of survey

This section describes the impact of the variables in the original Diffusion of Innovations (DOI) model on the Intention to Use m-Government services. For each variable, the discussion starts with a brief explanation about the meaning of the variable, followed by the findings derived from the quantitative analysis. In addition, the importance of the findings and the implications they have on the successful implementation of m-Government services is discussed, followed by some suggestions for the decision makers who are involved in m-Government projects on how to utilize the influence of a variable for their advantage.

6.2.1. The impact of Relative Advantage on Intention to Use

In the Diffusion of Innovations theory, Rogers (2003, p.229) defined Relative Advantage as 'the degree to which an innovation is perceived as being better than the idea it supersedes'(p. 229). In the context of m-Government services, Relative Advantage is a characteristic of the Mobile Parking Service through which the user gains several advantages. These advantages include easiness, saving time, enabling individuals to pay parking fees more quickly and increasing their productivity as well as achieving tasks more efficiently compared to other alternatives of paying for parking (e.g. Coins, Ticket machine). The following hypothesis regarding citizens' perceptions of relative advantage was tested:

H1: *Higher levels of perceived relative advantage will be positively related to higher levels of intention to use mobile-Government services.*

The Partial Least Squares (PLS) analysis of the questionnaire data (Chapter 5) revealed that Relative Advantage did not have a direct impact on Intention to Use the Mobile Parking Service since the relationship was insignificant as (H1, T-value= 0.34, $P > 0.05$). In the context of e/m-Government services, this outcome is consistent with the previous studies of Schaupp and Carter (2005) who argue that relative advantage was found to have an insignificant impact on Intention to Use e-voting in the United States of America. On the other hand, Trinkle (2001) argues that individuals would adopt mobile services more quickly if the government were more responsive and informed in providing such advantageous services to them. Therefore, in order for individuals to adopt an innovation, they should see the beneficial value of this over the existing services. This outcome means that the respondents do not see the advantages of using the Mobile Parking Service even though it enables them to pay their parking fees more quickly, more easily and more efficiently and with increases productivity when compared with the other methods (e.g. using Coins, Ticket machine).

From these results, although the PLS results of quantitative analysis show an insignificant impact of Relative Advantage on Intention to Use Mobile Parking Service,

the qualitative results of the decision makers shows a significant impact on Intention to Use m-Government services. This is because a deeper analysis of the quantitative results revealed that the majority of respondents to the questionnaire were from the age group 18 to 28. This age group constitutes 61 per cent of the whole sample of 246 questionnaires. The Partial Least Squares (PLS) analysis of the questionnaire data (see Chapter 5) showed that most of the respondents from this particular age group indicated a low Relative Advantage for the Mobile Parking Service over the traditional methods (e.g. Coins, Ticket machine). This high percentage has a strong influence on the overall results. For this reason, the Relative Advantage of Mobile Parking Service shows insignificant impact on Intention to Use.

On the other hand, the total number of respondents in the whole sample had above-average scores towards their Intention to Use Mobile Parking Service as indicated in the (Mean) value which is greater than 4. This indicates a positive attitude towards their Intention to Use Mobile Parking Service. Therefore, although the quantitative analysis shows insignificant impact of Relative Advantage on Intention to Use, the respondents do have the potential to perceive m-Government services as beneficial in contrast with traditional methods.

Therefore, the decision makers who are involved in the m-Government services' projects should consider the Relative Advantage factor when introducing new m-Government services. They should introduce and market the benefits of any innovation to the individuals clearly and positively. This could be done via any effective media channel that can reach a large number of individuals (e.g. TV, Radio, Newspapers, Websites, Brochures, SMS, etc).

In summary, based on the results above, it can be observed that the respondents do not consider the importance of benefits of using Mobile Parking Services over the traditional methods (e.g. Coins, Ticket machine) unlike the decision makers who are responsible of m-Government services projects. However, the sample included users and non-users. Thus, it is not necessary for the users to continue using the services and it is not necessary for non-users to have the intention to use the service. Therefore, despite being

the (Mean) value greater than 4, the impact of Relative Advantage on Intention to use is insignificant. This could also be due to the fact that the advantages of using the Mobile Parking Service have not been marketed effectively. Concisely, these findings do not support the hypothesis of this research which is that a higher level of relative advantage will be positively related to higher levels of Intention to Use m-Government services.

6.2.2. The impact of Compatibility on Intention to Use

Rogers (2003, p.240) defined Compatibility as 'the degree to which an innovation is perceived as consistent with the existing values. In the context of m-Government services and the Mobile Parking Service, Compatibility means that it is compatible with citizens' lifestyles, fits in well with the way they like to pay for other services, and is compatible with their daily routine. The following hypothesis regarding citizens' perceptions of Compatibility was tested:

H2*: Higher levels of perceived compatibility will be positively related to higher levels of intention to use mobile-Government services*

Based on the results received from the PLS quantitative analysis, the Compatibility construct has a high impact on Intention to Use the Mobile Parking Service which supports the hypothesis of this research. This is because (H2, T-value= 3.53, $p < 0.01$) shows that compatibility is a strong indicator to highly impact on intention to use Mobile Parking Service. Therefore, a higher level of perceived Compatibility will be positively related to a higher level of Intention to Use the Mobile Parking Service. It can be observed that the respondents find it important that the Mobile Parking Service fits in well with their lifestyle, daily routine, and the way they pay for other services (e.g. Coins, Ticket machine).

In short, Rogers (2003) argues that any innovation that seems to be incompatible with the values and norms of a social system will not be adopted as swiftly as an innovation that is compatible. Consequently, compatibility is considered an important variable in the m-Government context and it will increase the diffusion of such an innovation. In addition,

Tornatzky and Klein (1982) have stated that this variable is one of the most significant in the context of research on adoption. This is in agreement with Carter and Bélanger (2005) who argue that Compatibility is a major indicator in predicting citizens' intention to use e-Government services.

Moreover, previous studies by Sarel and Marmorstein (2004) found that Compatibility appears to have a significant impact on willingness/intention to adopt an innovation. This is also in line with Al-Hadidi (2010), who argues that a positive experiences of using m-Government services that seems compatible with their lifestyle (Compatibility) would encourage people to use other electronic services in the future (Intention to Use).

Based on the results above, it can be seen that this is a good indication, because the majority of the respondents are familiar with technology. Additionally, if any new idea provides more information to individuals then their Intention to Use such an innovation will be increased. The respondents generally think that the use of Mobile Parking Service is compatible with their life style (Mean scores greater than 3), therefore they will be more willing to use such innovation.

In short, since the majority of the respondents are familiar with technology, the decision makers who are involved in m-Government projects should consider this issue and should aim to introduce more m-Government services that are compatible with people's lifestyles. This should be done in order to move forwards into the new digital era. These findings are also consistent with evidence from the literature review. Further, the respondents believe that Compatibility is an important variable as most of the respondents have indicated into the higher scale (Mean value= 3.77). It is clear that these findings of Compatibility support the hypothesis of this research, which is that a higher level of Compatibility will be positively related to higher levels of Intention to Use m-Government services.

6.2.3. The impact of Perceived Ease of Use on Intention to Use

Davis in 1989 defined Perceived Ease of Use as 'the degree to which a person believes that using a particular system would be free from effort'(Davis, 1989, p.320). In the context of m-Government services, Perceived Ease of Use means that it is clear and understandable, easy to use, easy to learn, not frustrating, and does not require a lot of mental effort. The following hypothesis regarding citizens' perceptions of Perceived Ease of Use was tested:

H3: *Higher levels of perceived ease of use will be positively related to higher levels of intention to use mobile-Government services*

The quantitative analysis results revealed that the relationship of Perceived Ease of Use and Intention to Use the Mobile Parking Service is insignificant as (H3, T-value=0.19, $p > 0.05$). This unusual outcome may support previous research by Gilbert, Balestrini & Littleboy, (2004) who found that an analysis of Perceived Ease of Use shows an insignificant path in the adoption of e-Government services. In addition, this is in line with previous researchers such as Davis (1989), Chua (1996), and Karahanna, and Straub (1999) who argue that the impact of Perceived Ease of Use was not a strong predictor on intended system use. Davis (1989) also added, the results recommend that ease of use may be an antecedent of usefulness rather a direct determinant of usage.

Therefore, the decision makers who are involved in the m-Government projects should consider this factor when introducing new m-Government services. They should ensure that the m-Government service is easy and clear and that the instructions are simple in order to encourage people to adopt the service. In addition, for the service provider, the system designer should develop such services that are simple and should target all segments of people (e.g. males/females, educated/non-educated, old/young, and disabled people). Nevertheless, the respondents believe that Perceived Ease of Use is important as shown by the results (Mean value= 3.71). It is obvious that these findings do not support the hypothesis of this research which is that a higher level of Perceived Ease of Use will be positively related to higher levels of Intention to Use m-Government services.

6.2.4. The impact of Trialability on Intention to Use

Rogers (2003, p.258) defines Trialability, as 'the degree to which an innovation may be experimented with on a limited basis'. In the context of m-Government services, Trialability can be described as the opportunity for individuals to try out the Mobile Parking Service for free before deciding to use it. The advantage of a trial is to dismiss uncertainty about a new idea (innovation) as well as improve confidence in its use. In addition, the service provider can experiment with the Mobile Parking Service as necessary to check its effectiveness. This means that the innovation can be modified to tailor it more precisely to the needs of the individuals. The following hypothesis regarding citizens' perceptions of Trialability was tested:

H4*: Higher levels of perceived trialability will be positively related to higher levels of intention to use mobile-Government services*

The quantitative analysis shows that the Trialability variable does not have an impact on the Intention to Use the Mobile Parking Service since the relationship was insignificant (H4, T-value=1.24, $p > 0.05$). However, the respondents in the total sample had an above-average score towards their Intention to Use Mobile Parking Services as indicated in the (Mean) value which is greater than 3. This could be explained by the fact that the respondents believe that trying the new idea for free is important (Mean value= 4.03). However, it is not necessary for their intention to use it (relationship is insignificant T-value=1.24, $P > 0.05$). Therefore, although the quantitative analysis does not show an impact of Trialability on Intention to Use since the relationship was insignificant, the respondents do want to be able to try out an innovation before using. In summary, that these findings do not support the hypothesis of this research which is that a higher level of Trialability will be positively related to higher levels of Intention to Use m-Government services.

6.2.5. The impact of Observability on Intention to Use

Roger (2003) defined Observability as 'the degree to which the results of an innovation are visible to others'(p.16). In the context of m-Government services, Observability means that individuals have no difficulty in telling others about the results of using the Mobile Parking Service and no difficulty in explaining why using the Mobile Parking Service may or may not be beneficial. Furthermore, the instructions for using the Mobile Parking Service are available and visible in many places. The following hypothesis regarding citizens' perceptions of Observability was tested:

H5*: Higher levels of perceived observability will be positively related to higher levels of intention to use mobile-Government services*

The quantitative analysis results show that the Observability variable has a high impact on Intention to Use Mobile Parking Service as (H5, $T = 3.03 > 1.96$, $p < 0.05$). The PLS analysis shows that the relationship between Observability and Intention to Use was significant. Respondents believed they had no difficulty telling others about the results of using the Mobile Parking Service and no difficulty explaining why using Mobile Parking Service may or may not be beneficial. They could communicate the consequences of using the Mobile Parking Service to others because the instructions on how to use Mobile Parking Service are available and visible in many places as indicated in the (Mean value= 3.71).

The outcomes of using the Mobile Parking Service are easy to observe and visible to individuals. Thus, they will be more likely to adopt it easily and quickly. These findings are consistent with findings from the literature review. For instance, this is in line with Rogers' (2003) statement that the relationship between Observability and Intention to Use is positive. This also supports the findings of Al-Hadidi (2010, p.233) who argues 'Observability proved to be an important concept, with the majority of respondents agreeing that their observations of friends and family using these m-services had encouraged their own usage'. Therefore, the quantitative analysis results support the

hypothesis of this research, which is that a higher level of perceived Observability, will be positively related to higher levels of Intention to Use m-Government services.

6.2.6. The impact of Perceived Trustworthiness on Intention to Use

Belanger, Janine & Wanda (2002, p.252) define Perceived Trustworthiness as 'the perception of confidence in the electronic marketer's reliability and integrity'. In the context of m-Government services, Perceived Trustworthiness is when the individuals are confident that their privacy will be protected when using Mobile Parking Service. In addition, they are confident that the law protects them from problems that could be caused when using the Mobile Parking Service. Further, they feel comfortable when using the Mobile Parking Service and they consider it the best option for paying parking fees. The following hypothesis regarding citizens' perceptions of Perceived Trustworthiness was tested:

H6*: Higher levels of trust in the mobile-Government services will be positively related to higher levels of intention to use*

The quantitative analysis results revealed that the Perceived Trustworthiness variable has an impact on the Intention to Use the Mobile Parking Service (H6, $T = 3.43$, $p < 0.01$). The impact of Perceived Trustworthiness on Mobile Parking Service towards Intention to Use as perceived by the majority of respondents showed a significant path. In addition, respondents indicated positive responses to using Mobile Parking Service as the (Mean value equal to 3.65).

The majority of respondents believed that they could trust the ability of a mobile phone to protect their privacy when using the Mobile Parking Service. In addition, they believed they could trust the Mobile Parking Service and that it was the best option for paying for parking fees. Therefore, it is expected that trust would play an important role in increasing the adoption of online services (Horst, Kuttschreuter & Gutteling, 2007). This is an agreement with West (2008, p.7) who argues 'Visible statements outlining

how a site insures visitors' privacy and Perceived Security are valuable assets for encouraging people to use e-Government services and information'. Consequently, trust is a vital factor in gaining trust in m-Government services and will encourage people to use other m-services. Thus, these findings are also consistent with evidence from the literature review. Therefore, this indicates a positive impact and it supports the hypothesis of this research, which is that higher levels of trust in the m-Government services will be positively related to higher levels of Intention to Use.

6.2.7. The impact of Perceived Security on Intention to Use

Al-Khamayseh et al (2006b), argue that Perceived Security of m-Government services is considered the hallmark of a successful initiative. In the context of m-Government services and the Mobile Parking Service, Perceived Security means that individuals believe that the use of Mobile Parking Service is financially secure and that the mobile phone has enough safeguards to make them feel confident about its use. The following hypothesis regarding citizens' perceptions of Perceived Security was tested:

H7*: Higher levels of Perceived Security in the mobile-Government services will be positively related to higher levels of intention to use.*

The PLS results from the quantitative analysis of Perceived Security and its impact on Intention to Use, show a relatively low insignificant relationship as (H7, T=1.05, $p > 0.05$). This is an indication that the majority of respondents do not perceive Perceived Security as a vital factor which would impact on their Intention to Use m-Government services. The respondents believed that Perceived Security by itself was an important (Mean is greater than three) but not in the context of their Intention to Use m-Government services. In summary, these findings indicate insignificant impact and it does not support the hypothesis of this research, which is that higher levels of Perceived Security in the mobile-Government services will be positively related to higher levels of intention to use.

6.2.8. The impact of Perceived Enjoyment on Intention to Use

As mentioned in Chapter 3, this study includes another variable that could play an important role into the Intention to Use m-Government services. This variable is Perceived Enjoyment, which is the extent to which the activity of using a certain technology is perceived by individuals as being enjoyable in its own right (Davis, Bagozzi & Warshaw, 1992). In the context of m-Government services, Perceived Enjoyment is the characteristic of Mobile Parking Service which means that the use of it is fun, interesting, and enjoyable. The following hypothesis regarding citizens' perceptions of Perceived Enjoyment was tested:

H8*:* *Higher levels of perceived enjoyment in the mobile-Government services will be positively related to higher levels of intention to use*

According to the PLS results of the quantitative analysis, the relationship between Perceived Enjoyment and Intention to Use the Mobile Parking Service was significant (H8, $T = 2.29$, $p < 0.05$). It is observed that respondents consider that the use of Mobile Parking Service is fun and enjoyable (Mean is greater than three) and therefore this is likely to increase their Intention to Use it. This is in line with previous studies by Davis, Bagozzi & Warshaw, (1992); Bruner and Kumar (2005) who argue that Perceived Enjoyment is a critical factor in driving technology adoption.

These outcomes indicate that creating a fun and enjoyable environment could help in providing favorable consumer perceptions contributing to the usage of innovative technologies, especially for personalized services like mobile data services. Consequently, those people who have experienced enjoyment from using mobile data services are more likely to develop a positive attitude toward continued usage of these services. Consequently, this indicates a high impact and therefore supports the hypothesis of this research that higher levels of Perceived Enjoyment when using m-Government services will be positively related to higher levels of Intention to Use.

6.2.9. The impact of Personal Innovativeness on Intention to Use

Rogers (2003) defines Personal Innovativeness as ’the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system‘(p.22). In the context of m-Government services, Personal Innovativeness is the characteristic of individuals who want to be the first to try out and explore new mobile m-Government services. The following hypothesis regarding citizens’ Perception of personal innovativeness was tested:

H9*:* *Higher levels of personal innovativeness of individuals will be positively related to higher levels of intention to use mobile-Government services.*

The PLS results derived from the quantitative analysis show a significant relationship between Personal Innovativeness of individuals and the Intention to Use the Mobile Parking Service (H9, $T = 3.56$, $p < 0.01$). This is indicates that Personal Innovativeness has a strong impact on the Intention to Use Mobile Parking Service. It is clear from the outcomes that the majority of respondents like to explore and try out new mobile m-Government services.

These findings are consistent with previous studies in the literature. Rogers (2003); Agarwal and Prasad (1997) argue that some individuals are able to manage high levels of uncertainty and that some individuals have a propensity for risk-taking propensity while others do not. Consequently, this strongly confirms the hypothesis of this research which is that higher levels of Personal Innovativeness of individuals in the m-Government services will be positively related to higher levels of Intention to Use.

6.3. Key findings of Demographic Variables

This section discusses the influence of demographic variables on the perceived characteristics of innovation. Again, these perceived characteristics of innovations include Relative Advantage, Compatibility, Perceived Ease of Use, Trialability,

Observability, Perceived Trustworthiness, Perceived Security, Perceived Enjoyment and Personal Innovativeness. In this study there were 246 respondents with 87 females (35 per cent) and 159 males (65 per cent). The higher percentage of males is because the survey was distributed in many places without intending to target a specific group and therefore there was no control over the number of males and females (see Chapter 5).

In the sample there were four age groups. These groups were as follows: 1) 18- 28 years comprising 61 per cent of the sample; 2) 29- 39 years comprising 31 per cent of the sample; 3) 40- 50 years comprising 7 per cent of the sample; and 4) 51-61 years comprising 1 per cent of the sample. For easier analysis and readability, the sample was categorised into two age groups, younger (18-39) and older (40-61). This categorization can assist in seeing how the relationships between different variables behave within each of these age groups.

There were four main levels of education groups. These groups were Primary (3 per cent), Secondary (34 per cent), Undergraduate (50 per cent) (the highest percentage of the sample); Postgraduate (11 per cent) and other (2 per cent). Again, for easier analysis and readability, these groups were categorised further into two groups; Group 1 (Primary and Secondary) and Group 2 (Undergraduate and Postgraduate). The results and a discussion of the different variables and their influence on the Intention to Use Mobile Parking Service in terms of demographics for example, gender, age, and education are discussed below:

6.3.1. The Influence of Demographic Variables on Relative Advantage

The PLS Analysis results revealed that the relationship between Relative Advantage and Gender was insignificant. The relationship between Relative Advantage in the female group was ($T = 0.42$, $P > 0.05$) which is relatively low. The relationship between Relative Advantage in the male group was also very low: ($T = 0.32$, $P > 0.05$). In the two age groups of younger and older the relationship between Relative Advantage and Age was insignificant with the value of ($T = 0.26$, $P > 0.05$ and $T = 0.47$, $P > 0.05$)

respectively. With the Education variable, a closer analysis revealed that Relative Advantage had an influence in the Primary and Secondary group, where the relationship was positively significant with values of ($T = 2.15$, $P < 0.05$). However, for the other group, undergraduate and postgraduate, there was an insignificant path ($T = 1.43$, $P < 0.05$) which indicates that Relative Advantage in terms of individuals' characteristics has no influence on the Intention to Use Mobile Parking Service.

In summary, the analysis shows that there is no influence of demographic variables on Relative Advantage except in the Primary and Secondary education group. This could be explained by the fact that this group is still in its early stage of education and therefore considered to be less educated. Therefore when they are exposed to an innovation such as the Mobile Parking Service, they appreciate the benefits of using this service more than people who are more educated. People who are more educated are exposed to many innovations in their life and so these innovations become routine and these people do not appreciate the value of such innovations as much.

6.3.2. The Influence of Demographic Variables on Compatibility

The Compatibility variable shows a highly significant influence on the male group ($T = 4.10$, $p < 0.001$). It also indicates a more positive relationship between Compatibility and males in relation to their Intention to Use Mobile Parking Service than females ($T = 0.84$, $p > 0.05$). For instance, males believe that the use of Mobile Parking Service is compatible with their lifestyle and fits well with the way they like to pay for other services whereas females do not see the Mobile Parking Service as compatible with their life style. This could be explained by the culture in Oman where the two groups perceive the compatibility of m-Government services differently. Thus, when the government intends to introduce new m-Government services they should target the two groups differently and pay particular attention to the female attitude to compatibility.

The Age variable, which includes the younger age group (18-39) and the older age group (40-61), has a high influence on the Intention to Use the Mobile Parking Service.

The former shows a high influence on the Intention to Use Mobile Parking Service ($T = 3.28$, $P < 0.05$), and the latter shows an even higher influence ($T = 4.34$, $P < 0.001$). This is could be explained by the fact that the use of Mobile Parking Service is simple and does not require a mental effort and hence the use of this Mobile Parking Service is compatible with all age groups. Similarly to the Age variable, the impact of the Education variable on compatibility is significant. Both groups, Primary and Secondary and Undergraduate and Postgraduate) have a high influence on Compatibility ($T = 2.00$, $P < 0.05$) and ($T = 3.32$, $P < 0.05$) respectively. However, the latter shows a higher influence than the former.

6.3.3. The Influence of Demographic Variables on Perceived Ease of Use

The PLS analysis results revealed that there was an insignificant influence of the demographic variables, gender, age and education on Perceived Ease of Use. It can be seen from the analysis that individuals perceive ease of use of Mobile Parking Services equally regardless of gender, age or education level. This is also could be explained by the fact that the use of Mobile Parking Service is simple and does not require a mental effort.

6.3.4. The Influence of Demographic Variables on Trialability

Similarly to Perceived Ease of Use, the PLS analysis results indicate that the influence of demographic variables on Trialability was insignificant. All groups included in the demographic variables including younger or older, more or less educated, males or females have a similar perception of the influence of Trialability on the Intention to Use Mobile Parking Service. In short, that free trials of Mobile Parking Services would not be perceived differently by different sections of the community.

6.3.5. The Influence of Demographic Variables on Observability

Based on the PLS analysis shows that demographic variables have an influence on Observability. The overall findings indicate that there is an insignificant relationship between Observability and females ($T = 0.91$, $P > 0.05$) but there is significant influence with males ($T = 2.91$, $P < 0.05$). There is also a significant influence with both age groups in the Age variable, younger and older. The former shows a high influence on the Intention to Use the Mobile Parking Service ($T = 2.74$, $P < 0.05$), whereas the latter also shows a high influence but is slightly less than the former ($T = 2.30$, $P < 0.05$). With the Education variable, the analysis revealed that there is only a high influence with one group, the Undergraduate and Postgraduate ($T = 2.92$, $P < 0.05$), whereas the Primary and Secondary shows an insignificant influence ($T = 0.87$, $P > 0.05$).

Thus the respondents perceive differently the Observability of Mobile Parking Services. Therefore, the decision makers who are involved in the m-Government projects should consider the Observability dimension when introducing new m-Government services.

6.3.6. The Influence of Demographic Variables on Perceived Trustworthiness

The analysis of the PLS results shows similar findings for Perceived Trustworthiness as for Observability. The results indicate a significant relationship between Perceived Trustworthiness and males when using the Mobile Parking Service ($T = 2.88$, $P < 0.05$). In contrast, the results show an insignificant path for females when using Mobile Parking Service ($T = 1.26$, $P > 0.05$). In addition, the findings show both age groups, 18-39 and 40-61 have a significant influence on Perceived Trustworthiness ($T = 3.07$, $P < 0.05$) and ($T = 3.43$, $P < 0.05$) respectively. With regard to Education, only one group, undergraduate and postgraduate, shows a significant influence of Perceived Trustworthiness when interacting with Mobile Parking Service ($T = 2.59$, $P <0.05$).

In summary, the Perceived Trustworthiness for individuals using mobiles and m-Government services differs according to their gender, age, and education level.

Consequently, the government should also consider this issue when intending to introduce new m-Government services.

6.3.7. The Influence of Demographic Variables on Perceived Security

The quantitative analysis revealed that the Perceived Security variable has an insignificant influence on both the, female and male, groups in terms of their Intention to Use the Mobile Parking Service. However, regarding Age, the PLS analysis results shows older people (40 – 61) have a high influence of Perceived Security when interacting with Mobile Parking Service ($T = 2.71$, $P < 0.05$), whereas younger people (18 – 39) have an insignificant influence ($T = 0.76$, $P > 0.05$). In respect to the Education variable the detailed PLS analysis shows an insignificant influence on the Perceived Security variable when using Mobile Parking Service. In brief, the Perceived Security variable is only of concern to older people (40 – 61) when they interact with Mobile Parking Service.

6.3.8. The Influence of Demographic Variables on Perceived Enjoyment

Overall, the quantitative analysis results revealed that the Perceived Enjoyment variable shows an insignificant influence on both females and males. Interestingly, younger people (18 – 39) show a high influence of perceived enjoyment when interacting with Mobile Parking Service ($T = 2.24$, $P < 0.05$). Regarding education, a closer PLS analysis shows more educated people (Undergraduate and Postgraduate) enjoy using the Mobile Parking Service more than the other group (Primary and Secondary) ($T = 2.55$, $P < 0.05$and $T = 0.31$, $P > 0.05$) respectively.

Briefly, it can be observed from the results that younger, educated people are more likely to enjoy the Mobile Parking Service than less educated and older people. This could be explained by the fact that younger people are more outgoing and usually enjoy using mobile devices for many purposes, for instance, chat, games, maps and listening to music

and hence they consider Mobile Parking Service to be one of these enjoyable mobile services. In contrast, older people use mobile devices for more specific functions such as making and receiving calls and SMS and thus they consider Mobile Parking Service as an advanced application and prefer to stick with more routine applications.

6.3.9. The Influence of Demographic Variables on Personal Innovativeness

The quantitative analysis findings revealed that the variable Personal Innovativeness has a high influence on females ($T = 2.78$, $P < 0.05$) and males ($T = 2.23$, $P < 0.05$). A closer analysis shows a higher influence on females than males. With regard to Age, again the analysis indicates that there is a higher influence on the younger age group (18 – 39) than older (40 – 61) people. The analysis results revealed the former as ($T = 7.04$, $P < 0.01$ and the latter as $T = 3.01$, $P < 0. 05$). Once again, a deeper analysis shows an interesting finding, which is that older people have a greater perception of Personal Innovativeness than younger people. The PLS results for Education also show a high influence on the two groups (less educated) in terms of their Intention to use Mobile Parking Service with a higher influence for more educated people. In summary, Personal Innovativeness was considered being the most influential variable for older people (40-61) in terms of their intention to use Mobile Parking Service.

6.4. Key Findings of Interviews

A follow-up study involving six interviews with decision makers was conducted in order to compare and confirm the results of the quantitative data as some of the hypotheses were found to be not confirmed in the quantitative study. These non-confirmed hypotheses were Relative Advantage > Intention to Use, Perceived Ease of Use > Intention to Use, Trialability > Intention to Use, and Perceived Security > Intention to Use.

6.4.1. The impact of Relative Advantage on Intention to Use

Relative Advantage means that the user gains several benefits such as ease of use, a saving in time and efficiency in achieving tasks compared to other alternatives of paying for parking (e.g. Coins, Ticket machine).

Further investigation was sought through the qualitative analysis of the interviews. This can be explained by the fact that the interviews were done with decision makers from diverse entities of government (e.g. Muscat Municipality, Ministry of Manpower, Royal Court Affairs, and Ministry of Higher Education). These decision makers are involved with different m-Government services such as SMS Exam Grade; which is a push and pull SMS to request the final grade developed by Ministry of Higher Education, and, Jawab SMS service developed by Ministry of Manpower which is also a push and pull SMS service to notify subscribers of completion of transactions, their cost and any other important information needed (see Table 2.2, List of m-Government services available in Oman in Chapter Two). This analysis of the interviews with decision makers revealed that most of the respondents stressed the important impact of Relative Advantage on Intention to Use mobile government services.

Therefore, the decision makers were asked about the Relative Advantage of using m-Government services in a wider context than those citizens who completed the questionnaires using only one example of m-Government services, the Mobile Parking Service. In addition, there were some issues with this particular application which could explain the belief of the citizens about the lack of any Relative Advantage of Mobile Parking Service over traditional payment methods. For instance, people complained about the response time delay and some of them also complained that the instructions on how to use the service were not available everywhere.

The quantitative analysis of Relative Advantage and its impact on Intention to Use shows an insignificant path as the T-statistic is 0.34, which is below the 1.96 threshold. This means that a higher level of relative advantage will not necessarily be positively related to a higher level of Intention to Use. However, in the qualitative analysis, Relative

Advantage showed a significant impact on the Intention to Use m-Government services. The qualitative data showed that almost all participants believed that the relationship between Relative Advantage and Intention to Use and the impact of Relative Advantage on Intention to Use are vital, as indicated by the following excerpts:

'Of course using mobile government services through SMS is very beneficial, for example it saves you time, convenient [Relative advantage], and also you can keep a record of your SMS unlike using the coins'. (Participant 1)

Participants 2 and 3 stated that they have received several complaints about some m-services, for instance delays in response time, but they had overcome these issues. These participants also argued that m-Government services have several advantages that increase the individuals' intention to use. For example, m-Government services can be used anytime and anywhere because anyone can afford a mobile phone and have it available at any time. Further, if SMS is used to buy an e-ticket through a mobile phone, the ticket will be valid everywhere in Muscat unlike coins which are only valid in the parking spot. In addition, m-Government services can save time, speeds up the application process, reduces traffic, and is more efficient than the traditional alternatives [Relative advantage].

'It is very effective and interactive tool, you can reach your target directly, send awareness, and the penetration of the mobile it is very high in Oman comparing to the penetration of the internet and you can find it everywhere in the world and saves time, cost, and efficient' [Relative advantage]. (Participant 4)

'Yes it will increase their intention to use because I believe the advantage of using mobile government services; saves time, saves money[Relative advantage], encourage people to use new services since they are familiar with the existing one'.(Participant 6)

Concisely, that although the PLS results of quantitative analysis show that Relative Advantage has an insignificant impact of on the Intention to Use Mobile Parking Service, the qualitative results from the decision makers show a positive significant impact on the

Intention to Use m-Government services. This could be explained by the fact that since the decision makers were from a diverse range of government entities they were involved in diverse m-Government services, so they were asked about the Relative Advantage of using mobile government services in general. By contrast, those citizens who completed the questionnaires were only asked about the Relative Advantage of using the Mobile Parking Service.

A closer analysis of qualitative results revealed that although there were several advantages of Mobile Parking Service there were some issues with this particular application. For instance, people complained about the delay in response time. In addition, some of them also complained that the instructions on how to use the service were not available everywhere. Therefore, in relation to the quantitative analysis results, this could be the reason why the relationship between Relative Advantage and Intention to Use shows an insignificant impact.

6.4.2. The impact of Perceived Ease of Use on Intention to Use

Perceived Ease of Use means that the Mobile Parking Service is clear, understandable, easy to use, not frustrating, and does not require a lot of mental effort. In contrast, the qualitative results show a high impact of Perceived Ease of Use on Intention to Use m-Government services. These are in line with Rogers (2003) who argues that new ideas that are easy and simple to use and understand are adopted more swiftly than those that require the development of new skills and understandings. Tan and Teo (2000) also agree stating that the more complex, and the greater the skill and effort needed for adopting the innovation, the less likely it is to be adopted.

These outcomes indicate that an innovation can be perceived by respondents as either easy or difficult to use. This depends on their demographic characteristics, for instance, their educational level, experience, age and gender. This is in line with Agarwal and Prasad (1997) who have argued that Complexity/Perceived ease of use of the innovation can be perceived differently by individuals.

In short, that although the PLS results of quantitative analysis show an insignificant impact of Perceived Ease of Use on Intention to Use Mobile Parking Service, the qualitative analysis results from the decision makers show a high significant impact on Intention to Use m-Government services. The decision makers stressed that since the aim in introducing m-Government services is to make them easier than the traditional services, m-Government services are usually simpler to use and the instructions are clearer and more understandable. However, the interviews with the decision makers showed that some complaints were received from users about the Mobile Parking Service particularly about the instructions and about its ease of use. Therefore, this could be the reason why the relationship of Perceived Ease of Use and Intention to Use shows an insignificant impact in the analysis of the quantitative results. Another reason might be that the Mobile Parking Service is simple to use and hence, the respondents did not give so much attention to Perceived Ease of Use.

The quantitative analysis of Perceived Ease of Use and its impact on Intention to Use, shows an insignificant effect (T-statistics 0.188 < 1.96). This is an indication that higher levels of Perceived Ease of Use are not necessarily positively related to higher levels of Intention to Use. However, in the qualitative study when the participants were asked about the relationship of Perceived Ease of Use and Intention to Use and whether it will have an effect on the spread of m-Government services, the results show that Perceived Ease of Use has a positive impact on Intention to Use.

For example, Participant 1, emphasized the simplicity of using this SMS tool when compared to the traditional alternatives (e.g. coins) by saying: *'It is much easier than the traditional alternatives and the instruction is clear [Perceived Ease of Use] and if we start closing the coin service then yes we will intend to expand the SMS parking but we are not planning to close the coin service because it is another gate and some people they do not have phone to use SMS'*

In addition, another participant compared the SMS services with the traditional tools and the advantages of using SMS in place of traditional alternatives. The participant said*: 'Yes it is easy to be used and the process is easy and understandable [Perceived ease of*

use] because once you do a mistake, the system will return to you and direct you how to use the SMS parking in the right direction through a simple instruction unlike the coins' (Participant 2)

Participants 3, 4 and 6 indicated that they had received several complaints at the beginning when these services were being launched.

For instance, some people complained that some m-Government services were not easy to use and that the instructions on how to use them were not clear. However, these complaints have been resolved and now the instructions on how to use SMS services are very simple and clear. In addition, these instructions are available everywhere (e.g. websites, through SMS, in the parking spot, and through vouchers). Because the process for using SMS services and the instructions are now clear and understandable [Perceived Ease of Use], this will positively increase the individuals' Intention to Use and will increase the spread of m-Government services. Consequently, this indicates a positive relationship between Perceived Ease of Use on the Intention to Use m-Government services.

In summary, that although the PLS results of the quantitative analysis show an insignificant impact of Perceived Ease of Use on the Intention to Use Mobile Parking Service, the qualitative results show a positive significant impact on the Intention to Use m-Government services. A closer analysis of the qualitative results shows that since the aim of introducing these m-services was to make them easier than the traditional services, m-Government services are usually simple to use and the instructions are clear and understandable [Perceived Ease of Use] when compared to the traditional alternatives. However, the qualitative analysis showed that there had been some issues with the Mobile Parking Service. For instance, it was not so simple to use and the instructions were not clear. Therefore, with regard to the quantitative analysis results, this could be the reason why the relationship of Perceived Ease of Use and Intention to Use shows an insignificant impact.

6.4.3. The impact of Trialability on Intention to Use

Trialability means that individuals believe that it would be better to try the Mobile Parking Service out for free first to see what it could do before deciding whether to use it. It would also be better for the service provider to experiment the Mobile Parking Service as necessary to check its effectiveness.

The results for the impact of Trialability on Intention to Use from the quantitative study showed an insignificant path as (T-statistic = 1.24 < 1.96). This is an indication that free trials are not necessary to increase citizens' Intention to Use m-Government services. However, the qualitative analysis results revealed a variety of views among decision makers. Four of the six participants indicated that Trialability and Intention to Use are positively related and they believe that free trials will increase the spread of mobile government services because there are so many benefits. For example, participants 1 and 2 emphasized that free trials will increase the spread of m-Government services simply because there is no charge. In addition, participant 3 mentioned that free trials are a very effective marketing tool for new mobile services, as shown in the following statement:

'We have a very good acceptance level because when we started the service we kept it for free for 6 month and this is type of marketing will increase their intention to use and the spread of these services besides free trials will help them because you will get four benefits including, training them how to use the service, free of cost, and marketing for the services and making them comfortable using the service.' (Participant 3)

The impact of Trialability on the use of m-Government services was further emphasized by Participant 4 who indicated that free trials lead to greater awareness among potential users and therefore lead to wider spread of the services, as shown by the following:

'Yes it will increase the spread, and we have done it in the beginning for 2 months so they get to know it and how to use it and knows the value of it' (Participant 4)

However, the other two participants (Participants 5 and 6) had an interesting opposing views on the importance of Trialability on citizens' Intention to Use m-Government services, as indicated by the following excerpts:

'It doesn't matter because the service provider charges you for SMS and this is very minimal and normal charges, they are not charging for the service itself.' (Participant 5), and

'We didn't use free trials and we are not planning to do so because when you do something for free people will keep just using the service and sending SMS and probably will reach 500 SMS per day from just one person, so restriction has to be there because otherwise they will misuse the services, for instance give someone a free fuel so he or she will not stay at home he or she will be just driving around and cause traffics on road so restriction has to be there on all services whether mobile or others' (Participant 6).

Briefly, the construct Trialability is perceived differently by citizens and the decision makers.

On the other hand, the results from the qualitative data analysis differ. Some of decision makers agree that it is important to be able to trial a new idea first while others disagree. This could be due to the fact that decision makers do not share a common understanding about Trialability since they have experienced it differently and some have not done it before. Some of them said that if individuals have the chance to try the innovation prior to adopting it, they will feel more comfortable about using it and will be more likely to adopt it quickly. Rogers (2003) stated that if an innovation is Trialable, it will provide the individual with more confidence and less uncertainty towards their intention to use such innovation.

In summary, the quantitative and qualitative results show the perception of Trialability involved in using Mobile Parking Service varies for different individuals. This depends on their experience of using Mobile Parking Service as well as their demographic characteristics including gender, education and age. Therefore, these findings about

Trialability do not support the hypothesis of this research which is that a higher level of Trialability will be positively related to higher levels of Intention to Use the Mobile Parking Service.

6.4.4. The impact of Perceived Security on Intention to Use

Perceived Security means that individuals believe that the use of Mobile Parking Service is financially secure. They are not worried about Perceived Security when using this service because they know there are enough safeguards in place.

The analysis of the quantitative study showed an insignificant path (T-statistic is 1.05 < than 1.96) for the impact of Perceived Security on Intention to Use. This means that people do not see Perceived Security as a factor that would increase their Intention to Use the SMS parking service. However, in the qualitative study, the interviews with the decision makers revealed different views, as the following statements show:

'Perceived Security wise we do not have an issue but we have technical issue sometimes, for example when you send an SMS, you won't get confirmation from clients and this will affect the spread and quality of the service'. (Participant 1); and

'We do not have a real threat of Perceived Security that somebody will steal your money or data, that Perceived Security comes when you go online payment using your credit card and you want to pay 100 R/O, honestly I get scared but here using SMS parking I do not get scared because the amount is very minimal'(Participant 1)

"Perceived Security is not a factor because people are used to use SMS for example they vote using SMS on TV programs, and for post-paid it will be clear in their Bill, and for pre-paid they can easily check the remaining balance that has been deducted". (Participant 2)

"Perceived Security is not a factor, because people they believe using their mobile is more secure than using the internet." (Participant 3)

Perceived Security is a vital factor in order to gain customer trust because if there is no Perceived Security or privacy, the service provider will lose credibility and customers will not use the services. (Participants 4 and 5)

In brief, that similar to Trialability, the construct of Perceived Security is perceived differently by citizens and the decision makers depending on the application itself. For instance, the charge for the Mobile Parking Service is minimal so Perceived Security is not an important factor and hence will not significantly impact the Intention to Use, whereas with m-payment (sending your credit card details), Perceived Security is a vital factor and will impact the Intention to Use such services.

On the other hand, the qualitative analysis shows different results for the impact of Perceived Security on Intention to Use m-Government services. The majority of decision makers indicated that Perceived Security is a vital factor and it will affect the spread of m-Government services. This is an agreement with Al-Khamayseh et al (2006b), who state that the Perceived Security of m-Government services is considered to be the hallmark of a successful initiative. It can be observed from the results of both quantitative and qualitative analyses that there are different views about Security. Some perceive Perceived Security as a driver while others perceive Perceived Security as inhibitor and not all of these issues are applicable to all governments/organizations.

As a result, from both analyses that the perception of Perceived Security in relation to using Mobile Parking Service via a mobile channel varies for different individuals, depending on their experience in using Mobile Parking Service in a particular and m-Government services in general as well as on their demographic characteristics including gender, education and age.

6.5. **Model Refinement**

The findings discussed above have highlighted the most influential independent variables that impact the dependent variable (Intention to Use). Therefore, a refinement of the proposed Intention to Use model for m-Government services is necessary.

Table 6.1 shows the ranking order of the most influential independent variables/ predictive values on the dependent variable Intention to Use.

Independent variables	Dependent variable	T-value > 1.96	Rank order	Hypothesis Supported?
Personal Innovativeness	Intention to use	3.56	1	Yes
Compatibility	Intention to use	3.53	2	Yes
Perceived Trustworthiness	Intention to use	3.43	3	Yes
Observability	Intention to use	3.03	4	Yes
Perceived Enjoyment	Intention to use	2.23	5	Yes
Trialability	Intention to use	1.24	6	No
Perceived Security	Intention to use	1.05	7	No
Relative Advantage	Intention to use	0.34	8	No
Perceived Ease of Use	Intention to use	0.19	9	No

Table 6.1 Ranking order of the most predictive values on the Intention to use

It can be seen from the Table 6.1 that Personal Innovativeness is considered to be the most influential variable on the Intention to Use, whereas, Perceived Ease of Use is the least significant variable. Figure 6.1 below shows the proposed research model of Intention to use m-Government services:

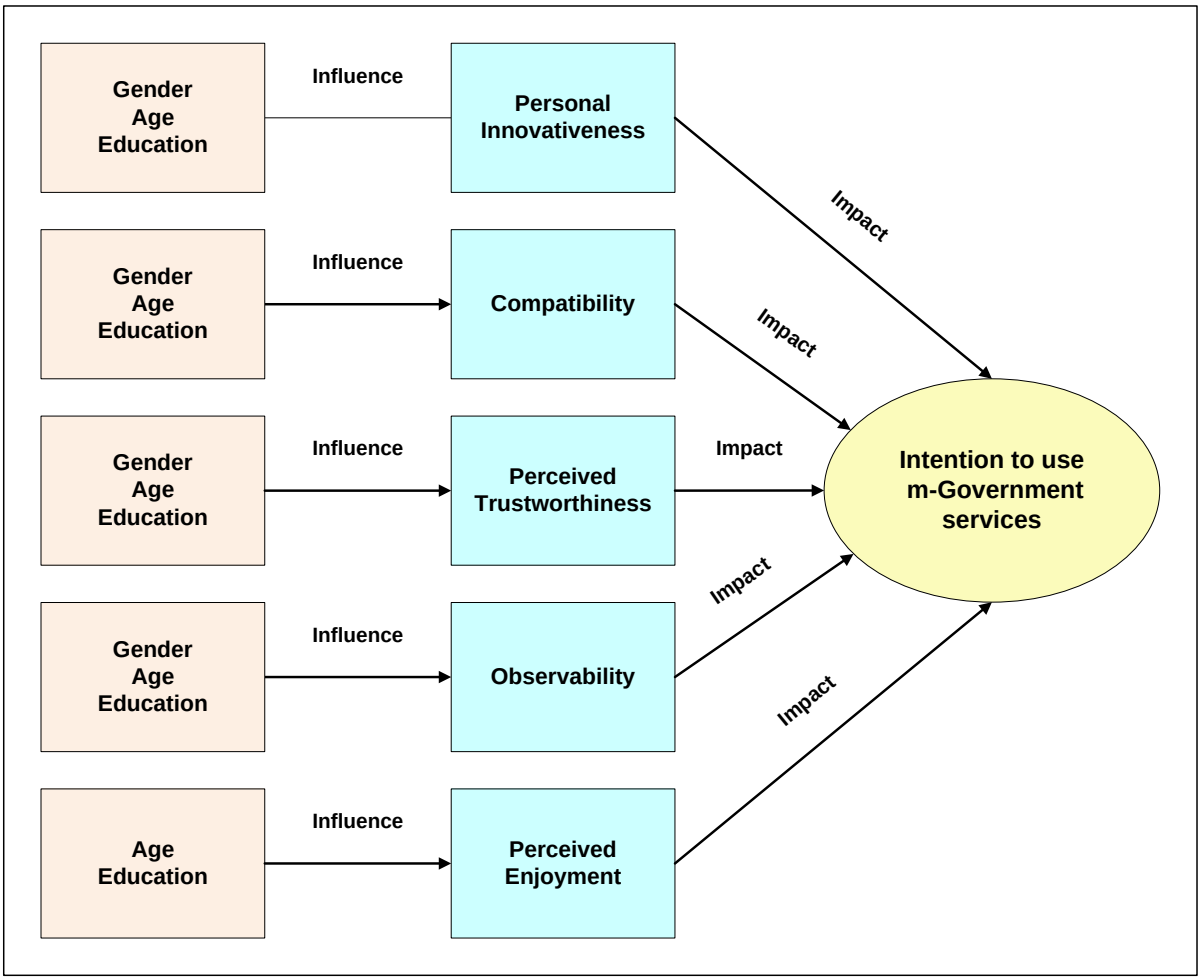

Figure 6.1 The proposed model of Intention to Use m-Government services

It can be seen from Figure 6.1 above that Personal Innovativeness is considered to be the most influential predictor on the Intention to Use m-Government services followed by Compatibility, Perceived Trustworthiness, Observability, and Perceived Enjoyment respectively. In addition, Figure 6.1 shows that there is no relationship between Gender and Perceived Enjoyment as the results showed insignificant influence with Perceived Enjoyment. Therefore, the Gender variable was excluded in the proposed research model against the Perceived Enjoyment variable. When compared with the original model illustrated in Chapter 3 (A model of intention to use mobile government services), it is clear that some variables have not been included in the proposed research model of intention to use mobile government services since the results shows insignificant impact

on Intention to Use. Consequently, the proposed research model of intention to use mobile government services has been proved to be a successful model in explaining the factors that affect intention to use mobile government services.

6.6. Summary

This chapter has discussed the key findings relevant to the variables in the original Diffusion of Innovations Model (DOI) including: relative advantage, compatibility, perceived ease of use, trialability, observability, perceived trustworthiness, perceived security, perceived enjoyment, and personal innovativeness, and the influence of demographic variables (gender, age, and education). Further, this chapter has presented the key findings of interviews followed by a refined research model of Intention to Use m-Government services based on the results of this research.

Overall, amongst the nine variables tested against the Intention to Use m-Government services, only five variables were found to be significant and therefore these five variables have been incorporated in the proposed Intention to Use model. These variables are Personal Innovativeness, Compatibility, Perceived Trustworthiness, Observability and Perceived Enjoyment. Trialability, Perceived Security, Relative Advantage and Perceived Ease of Use were found to be insignificant predictors and hence these variables have not been included in the proposed research model. Further, Personal Innovativeness is considered to be the most influential predictor on the Intention to Use m-Government services followed by Compatibility, Perceived Trustworthiness, Observability, and Perceived Enjoyment respectively. The proposed Intention to Use model of m-Government services which will assist the decision makers who are involved in the m-Government projects, mobile service providers and any other stakeholders to introduce new mobile government services smoothly was validated and proved to be a successful model in explaining an Intention to Use m-Government services.

Chapter 7.

Conclusion and Future Research

7.1. Introduction

Chapter 6 discussed the findings of both the quantitative and qualitative studies. In addition, it presented a new model of intention to use m-Government services. This chapter provides some concluding remarks and the implications for research and practice from the findings of the quantitative and qualitative studies. This chapter starts with Section 7.2, the theoretical and practical implications, followed by the limitations and future research directions in Section 7.3.

7.2. Implications

As the Omani context has no unique factors in terms of m-Government services, the model proposed in this research is intended to be useful for many countries considering delivery of m-Government services in order to explain the factors that influence/impact the intention to use m-Government services and it will contribute to the existing knowledge. This is because it incorporates many unexplored dimensions that influence/impact the intention to use m-Government services. The decision makers who are involved in m-Government projects need research that can assist the provision of relevant guidelines for implementation of comprehensive m-Government services. The ‘ model of intention to use m-Government services’ will be of practical usefulness to these decision makers, because it will enable them to better understand the challenges they face in the implementation of m-Government services and the implementation of these services will be more effective. This research developed a validated model consists of the Diffusion of Innovations (DOI) model and the Technology Acceptance Model (TAM) as well as external variables including Perceived Security, Perceived Trustworthiness,

Perceived Enjoyment and Personal Innovativeness. These variables were then synthesised into a conceptual model and then the model is tested for its predictive value to determine for instance, what factors influence/impact the intention to use m-Government services. The proposed model of intention to use m-Government services has been validated and has proved successful in explaining the intention to use m-Government services.

Therefore, this research has many theoretical and practical implications which are discussed in the following sections. A discussion of theoretical and practical implications is presented in sub-sections 7.2.1 and 7.2.2 respectively. Finally, an account of the limitations of the current research and suggestions for future research directions are discussed in Section 7.3.

7.2.1. Theoretical implications

From a theoretical perspective, this research has many contributions. First, this research fills an important gap in the literature because it helps in understanding m-Government from citizens' perspectives in terms of their needs, such as adoption factors and challenges as well as a less visible issue influencing the success of m-Government applications is that the 'citizens' needs' to access public sector services via mobile technology are being overlooked.

Second, this research adds value by incorporating the DOI, the TAM, and other variables including Perceived Trustworthiness, Perceived Security, Personal Innovativeness and Perceived Enjoyment into a single model for the first time in the context of m-Government services.

Third, this research contributes to theory by examining the applicability of the Diffusion of Innovations (DOI) model and the Technology Acceptance Model (TAM). In addition, it examines important variables derived from the literature including Perceived Trustworthiness, Perceived Security, Perceived Enjoyment and Personal Innovativeness. Therefore, this research has provided more insights to researchers in the field to

determine if the DOI is applicable in explaining the factors that impact on intention to use m-Government services.

Fourth, this research contributes to knowledge by providing a new understanding of the variables which influence/impact the dissemination of m-Government services. This is because this research has tested DOI model, and in particular the Perceived Characteristics of Innovation (PCI) (e.g. Relative Advantage, Perceived Ease of Use for TAM, Compatibility, Trialability, and Observability) as well as other important variables including Perceived Enjoyment, Perceived Security, Personal Innovativeness, and Perceived Trustworthiness. Therefore, this has determined the most important factors/ predictive values which are Personal Innovativeness, Compatibility, Perceived Trustworthiness, Observability and Perceived Enjoyment. In addition the least important factors that will influence/impact on the Intention to Use m-Government services were highlighted (Trialability, Perceived Security, Relative Advantage and Perceived Ease of Use). Accordingly, the model was enhanced to reflect these key findings. Moreover, the most important variables have been ranked to depict the degree of significance of the variables that influence intention to use m-Government services as shown previously in Table 6.1. This should provide m-Government adopters with a priority plan that aids successful development in a logical order.

Fifth, this research assists by analyzing the demographic characteristics of the individual (e.g. Gender, Age, and Education) and their influence on the DOI Model, the TAM, and other variables including Perceived Trustworthiness, Perceived Security, Personal Innovativeness and Perceived Enjoyment. This is because there is a lack of research about demographic variables as Thompson, (2001), Akman et al, (2005), and Schrammel, Kottel and Tscheligi (2009) have indicated. The research revealed that some demographic variables have no relationship with key adoption factors. For instance, no relationship was found between Gender and Perceived Enjoyment. It also showed that sometimes the demographic variables may react differently to some adoption factors. For example, Personal Innovativeness was found to have a greater influence on female as opposed to male respondents. Similarly, different age groups showed varying

relationships to Personal Innovativeness. Consequently, this can assist the decision makers who are involved in m-Government projects to better understand the factors affecting their intention use m-Government services.

Sixth, this study helps to define mobile users' characteristics, which will be of interest to mobile companies and countries for better and more focused mobile services. This was discussed in detail in Section 6.3.9, where for example, gender showed a positive relationship with all m-Government adoption factors investigated in this study except for perceived enjoyment. In addition, mobile services were found to be more popular with the younger group (18-39), although the older group (40-61) showed an interestingly positive attitude in general to mobile services.

Finally and interestingly, although DOI and TAM factors have been tested before in several domains and have proven to be significant to technology adoption, this study found that some of the factors are applicable (significant) to intention to use m-Government services. This was discussed in detail in Section 6.4, where disagreements between qualitative and quantitative findings were highlighted. Although proper justifications were provided, further investigation and testing is required.

7.2.2. Practical implications

In practical terms, this research will enable decision makers who are responsible for m-Government projects as well as mobile service providers to better understand the factors that can influence the dissemination of the m-Government services they introduce. Most of the interviewees agreed that better understanding of the m- Government environment is crucial to the successful implementation of future initiatives. For example, an official from Muscat Municipality stated there is a lack of proper knowledge about m-Government services among some of the government decision makers. This knowledge which is provided in this study is believed to assist them to gain an in-depth understanding of the applicability of the variables in the DOI model and thereby implement m- Government services successfully. In addition, the study can assist other stakeholders in the field of m-Government services to better understand and implement

m-Government services in order to realize the benefits of these services and fulfil the needs of citizens.

This research also offers the decision makers who are responsible for m-Government projects and mobile service providers with a richer understanding of the citizen's demographic characteristics in terms of age, gender, and education level. Therefore, when implementing m-Government services, they can consider these demographic characteristics and their individual influence in the model in order to achieve a successful implementation of m-Government services. Most of the interviewees indicated that demographic variables have little effect on m-Government adoption. Although this might seem an appropriate with younger users based on the findings of this study, the study further elaborates on the effects of each demographic variable on the adoption variables used in the model. This should enhance decision makers understanding of users demographic characteristics as far as m-Government adoption is concerned.

In addition, this research provides valuable insights into how to enhance a citizen's perceptions of m-Government services introduced by government entities or the mobile service provider. It also demonstrates the most influential factors/predictive values and the least influential factors in the Intention to Use m-Government services. For instance, Personal Innovativeness is found to be the most influential predictor on the Intention to Use m-Government services followed by Compatibility, Perceived Trustworthiness, Observability, and Perceived Enjoyment respectively, whereas, Perceived Ease of Use is the least significant variable. On the other hand, qualitative analysis of the interviewees' responses highlighted additional m-Government adoption factors which are seen as insignificant.

Finally, the proposed model provides a framework/roadmap for m-Government services where future initiatives could be evaluated.

7.3. Limitations and future research directions

This research has the following limitations. Firstly, this research uses only one m-Government service, the Mobile Parking Service since it is the most popular m-Government service in Oman. However, the proposed model in this research could easily be tested with other m-Government services. This is because the second data collection using semi-structured interviews was conducted with decision makers who are involved in various m-Government projects.

Secondly, the data was gathered from Omani citizens in Muscat and excluded expatriates. However, the same Intention to Use model developed in this research could be used for expatriates from any other regions in Oman or from abroad as it is designed to be useful for many countries considering delivery of m-Government services.

Thirdly, this research was cross-sectional and not longitudinal. Therefore, it is uncertain whether the intention to use m-Government service was influenced by the individuals' expectations. This is because the individual's perceptions change over time when they gain more experience (Venkatesh et al, 2003). Therefore, in order to evaluate the validity of the proposed model and the findings, a longitudinal research should be conducted using the same Intention to Use model developed in this research.

Fourthly, this research focused on government to citizens (G2C) and excluded government to businesses (G2B) and government-to-government (G2G). However, since most of government's initiatives in the mobile sector are currently directed mainly towards individuals rather than businesses or governments, the focus of this research on G2C is timely and more beneficial to the governments.

Finally, conflicts between quantitative and qualitative findings were found as described in Section 6.4. Although the study provided justifications about the conflicts, additional studies and investigations are required to elaborate on these disagreements.

In summary, the outcomes of this research suggest several directions for future research. Firstly, future research could test the validity of the proposed Intention to Use model in

the private sector where mobile commerce is of concern using m-Commerce services. Secondly, since this research has focused on the DOI and TAM, future research could test the applicability of other models in the same context of Oman. Thirdly, since this research has concentrated on the Mobile Parking Service, future research could concentrate on other m-Government services using the same proposed Intention to Use model. Finally, since the data was gathered from one urban city in Oman in a particular from the capital Muscat, future research need studies in many urban and rural areas on diverse groups of countries before model is robust.

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Appendixes

Appendix A: Plain Language Statement – Questionnaire

Questionnaire Cover Letter

Please direct all enquiries to:
Hamed Al-busaidi Tel: +61 (0) 415587417 +968 99447448 Email: hamedahmed.al-busaidi@research.vu.edu.au
Assoc Prof. Geoff Sandy Tel: +61 3 9919 5309 Email. Geoff.Sandy@vu.edu.au

Dear (Sir/Madam)

E-government is the application of Information and Communication Technology (ICT) utilized by the government agencies aims to enhance the information or services delivery to citizens. It provides services to citizens through wired network such as internet, and fixed telephones. The internet nowadays has become the cheapest and most effective channel that being utilized by the government in order to deliver information and communication services to citizens. However in order to check a certain type of government service (e.g. exam notification) requires resources such as computer, telephone, and internet connection, which may not be available to citizens. Nevertheless, due to the existence of advance technology such as wireless mobile communication infrastructure, pushing the governments to utilize this technology in order to better deliver its service to citizens anywhere and anytime with satisfaction. Governments that utilize this technology will gain many benefits such as cost reduction, greater work efficiency, and effectiveness, and faster access to public services anytime and anywhere. Hence, Mobile Government is defined as "a strategy and its implementation involving the utilization of all kinds of wireless and mobile technology, services, applications and devices for improving benefits to the parties involved in e-government including citizens, businesses and all government units".

This survey is part of Doctor of Philosophy, being undertaken by the researcher Hamed Al-busaidi and supervised by Assoc Prof. Geoff Sandy at Victoria University. It aims to investigate the factors affecting the intention to of mobile government services. This project will use Diffusion of innovation (DOI) as a main model to test the applicability of this model in the context of the adoption of M-government services. This study will assist the decision makers who are involved in m-Government projects to better understand and implement Mobile government services in the right direction and according to the citizens needs.

In order to achieve the desired goals, you have been purposefully selected to kindly assist us in providing valuable information in order to understand specific factors that affect the adoption and diffusion of Mobile-government services. Based on that, we would like to invite you to be part of this study, which will assist the researcher to identify factors affecting the intention to use of Mobile-government services. Based on understandings gained from this research, the decision makers who are involved in m-Government projects will better understand the challenges it will face in the implementation of M-government services - and implementation of these services will be more effective and according to your needs.

I assure you that all responses will be confidential. Return of the survey form will constitute your voluntary consent to participate in the study.

Thank you in anticipation of your involvement

Yours sincerely,

Hamed Al-busaidi

Appendix B: Questionnaire Instrument

A PhD study of

دراسة الدكتوراه بخصوص

A Model of Intention to use Mobile Government Services

نموذج استخدام وانتشار خدمات الحكومة الإلكترونية عن طريق الهاتف المتنقل

Please direct all enquiries to: **الر جاء توجيه جميع الاستفسارات إلى:**
Hamed Al-busaidi Tel: +61 (0) 415587417 +968 99447448 Email: hamedahmed.al-busaidi@research.vu.edu.au
Assoc Prof. Geoff Sandy Tel: +61 3 9919 5309 Email. Geoff.Sandy@vu.edu.au

Please return the completed questionnaire in the reply paid envelope.

الرجاء إرسال الاستبيان المنجز في المغلّف المعد لذلك، والمدفع الثمن مسبقاً

This Questionnaire should only take 10 minutes to complete

لا يتطلب إنجاز الاستبيان أكثر من عشر دقائق

PART A: Background Information

القسم الاول: المعلومات العامة

Please mark your response from Question 1 to 5 by ticking only one answer for each question as shown: ✓

الرجاء اختيار خيار واحد من بين الخيارات قرينة كل سؤال من الأسئلة من 1 إلى5 وذلك بوضع علامة ✓

1. Please indicate your gender 1. الرجاء تحديد الجنس	Male ذكر	
	Female أنثى	

3. Please indicate your age range 3. الرجاء تحديد العمر	18-28	
	29-39	
	40-50	
	51-61	
	62+	

2. Please indicate your highest completed level of education 2. الرجاء تحديد المستوى التعليمي	Primary إعدادي	
	Secondary ثانوي	
	Undergraduate degree جامعي	
	Post-graduate degree دراسات عليا	
	Other (Please specify) أخرى (الرجاء التحديد) _____	

4. Are you an Omani Citizen? 4. هل أنت عماني؟	Yes نعم	
	No لا (Please specify your Citizenship الرجاء تحديد الجنسية)_____	

Mobile Parking Service: is a new value-added service that enables vehicle drivers to reserve parking spaces and pay their parking fees via their mobile phones. A fee for this service starts at 60 Bz for 30 minutes. The service operates as follows: 1) SMS to 90091 your vehicle registration number, vehicle code, and time (e.g. 65 RS 60). 2) A confirmation message will be received.

خدمة حجز المواقف عن طريق الرسائل القصيرة: هي خدمة مبتكرة جديدة تمكن سائقي المركبات من استخدام المواقف العامة ودفع رسوم حجز الموقف عن طريق الهاتف المتنقل. رسوم استخدام الخدمة تبدأ من 60 بيسة لمدة 30 دقيقة. وتستخدم الخدمة كالتالي: 1. إرسال رسالة قصيرة إلى الرقم 90091 تحتوي على رقم ورمز لوحة السيارة بإلاضافة إلى المدة المطلوبة (مثلاً 65 رس 60) 2. استقبال رسالة تأكيد

Please mark more than one answer if required for question 6 and question 7 as shown : ☑

الرجاء اختيار أكثر من خيار واحد إن تطلب في السؤال السادس و السابع بوضع علامة ☑

5. Are you currently a user of SMS parking service? 5. هل أنت حالياً من مستخدمي خدمة حجز المواقف عن طريق الرسائل القصيرة؟	Yes نعم	
	No لا	

7. If you are a user of SMS parking service, how did you learn about it?	7. إذا كنت من مستخدمي خدمة حجزالمواقف عن طريق الرسائل القصيرة فأي من الوسائل التالية كانت أكثر إقناعاً لك لتبدأ في استخدم هذه الخدمة.	TV	
		Newspaper	
		Radio	
		Family	
		Friends	
		Other (Please specify)_____	

6. If you are not a user of SMS parking service, which one of the following information sources is the most effective to convince you to adopt the service?	7. إذا لم تكن من مستخدمي خدمة حجز المواقف عن طريق الرسائل القصيرة فأي من الوسائل التالية قد تكون أكثر إقناعاً لك لتبدأ في استخدام هذه الخدمة.	TV	
		Newspaper	
		Radio	
		Family	
		Friends	
		Other (Please specify)_____	

PART B: **القسم الثاني:**

Mobile Government is defined as the "provision of government applications via wireless technologies, anywhere, anytime, employing a diversity of mobile devices".

تعرف الحكومة الألكترونية المتنقلة بتوفير الخدمات الحكومية عن طريق التكنولوجيا اللاسلكية، في أي مكان، في أي وقت، باستخدام مجموعه متنوعة من الأجهزة النقالة.

Please indicate your response from question1 to 38 by circling only one number of the scale

الرجاء تحديد مدى التوافق مع النقاط المطروحة من 1 إلى 38 وذلك بوضع دائرة حول الرقم المناسب أمام كل عبارة.

Please rate your Willingness and Enjoyment of trying Mobile Parking and new Mobile-government services

الرجاء تحديد معدل قابلية ومتعة تجربة خدمة حجز المواقف و الخدمات الجديدة للحكومات الإلكترونية عن طريق الرسائل القصيرة

	أعارض بشدة Strongly disagree						أوافق بشدة Strongly agree
1. I believe using SMS parking service is fun 1.أعتقد بأن استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة ممتعة		1	2	3	4	5	
2. I believe using SMS parking service is useful 2. أعتقد بأن أستخدام خدمة حجز المواقف عن طريق الرسائل القصيرة مفيدة		1	2	3	4	5	
3. I believe using SMS parking service is a wise decision 3. أعتقد بأن استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة قرار صائب		1	2	3	4	5	
4. I like to explore new Mobile-Government services 4. أرغب على أكتشاف خدمات جديدة للحكومة الإلكترونية باستخدام الهاتف المتنقل		1	2	3	4	5	
5. Among my peers, I am usually the first to try out new Mobile-government services 5. من بين أصحابي (أقراني) في الغالب أكون أول من يجرب استخدام الخدمات الجديدة للحكومة الإلكترونية باستخدام الهاتف المتنقل		1	2	3	4	5	
6. In general, I am interested in trying out new Mobile-government services 6. بشكل عام أنا مهتم بتجربة الخدمات الجديدة للحكومة الإلكترونية باستخدام الهاتف المتنقل		1	2	3	4	5	

Please rate your level of trust and security to use SMS parking service

الرجاء تحديد معدل مدى ثقتك بخدمة حجز المواقف من الناحية الأمنية عن طريق الرسائل القصير

7. I believe using SMS parking service is financially secure 7. أعتقد بأن استخدام عملية الدفع المالي في خدمة حجز المواقف عن طريق الرسائل القصيرة آمنه		1	2	3	4	5	

8. I believe I trust the ability of a Mobile to protect my privacy when using SMS parking service 8.أعتقد بأنني على ثقة من قدرة عند استخدام خدمة حجز المواقف الهاتف المتنقل لحماية خصوصيتي	أعارض بشدة Strongly disagree	1	2	3	4	5	أوافق بشدة Strongly agree
9. I believe I'm not worried about the security when using SMS parking service 9. أعتقد بأني لست قلقا بشأن النواحي الأمنية المتعلقة بالهاتف المتنقل عند استخدام خدمة حجز المواقف		1	2	3	4	5	
10. I believe the mobile has enough safeguards to make me feel comfortable using it to interact with the SMS parking service 10. أعتقد بأن الهاتف المتنقل يمتلك تقنيات وقاية وحماية كافية تجعلني في طمأنينة عند استخدام خدمة حجز المواقف		1	2	3	4	5	
11. I believe that I'm adequately protected by law in Oman from problems that could be caused when using SMS parking service 11.أعتقد بأن الناحية القانونية في عمان قد تحميني على نحو كاف من المشاكل التي قد تنتج من استخدام خدمة حجز المواقف.		1	2	3	4	5	
12. I believe I trust the SMS parking and it could be the best option to pay for parking fees 12. أعتقد بأني أثق في خدمة حجز المواقف عن طريق الرسائل القصيرة وقد تكون الأفضل والأنسب لي من حيث دفع رسوم الخدمة.		1	2	3	4	5	
Please rate the level of how you think that using SMS parking service is beneficial to you ***الرجاء تحديد معدل مدى الاستفادة من استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة***							
13. I believe the use of SMS parking Service enables me to pay parking fees more quickly than other methods (e.g. using Coins, Ticket machine) 13.أعتقد بأن خدمة حجز المواقف عن طريق الرسائل القصيرة توفر فرصة دفع الرسوم بسرعة أكبرمقارنه بالطرق الأخرى (مثل: استخدام العملات المعدنية، أجهزة التذاكر)	أعارض بشدة Strongly disagree	1	2	3	4	5	أوافق بشدة Strongly agree
14. I believe the use of SMS parking Service enables to pay the parking fees in an easier way compared to other methods (e.g. using Coins, Ticket machine). 14. أعتقد بأن خدمة حجز المواقف عن طريق الرسائل القصيرة توفر فرصة دفع الرسوم بطريقة أسهل مقارنه بالطرق الأخرى (مثل: استخدام العملات المعدنية، أجهزة التذاكر)		1	2	3	4	5	
15. I believe the use of SMS parking Service is more efficient than using other alternative ways (e.g. using Coins, Ticket machine). 15. أعتقد بأن استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة أكثر كفاءة من استخدام أي بدائل أخرى (مثل: استخدام العملات المعدنية، أجهزة التذاكر)		1	2	3	4	5	
16. I believe the use of SMS parking Service saves me time compared to the other ways (using Coins, Ticket machine) 16. أعتقد بأن استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة يوفر الوقت مقارنه بالطرق الأخرى (مثل: استخدام العملات المعدنية، أجهزة التذاكر)		1	2	3	4	5	
17. I believe the use of SMS parking Service increases my productivity 17. أعتقد أن استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة يزيد من أنتاجية المستخدم		1	2	3	4	5	

Please rate the level of how do you think that using SMS parking service fits well with the way you like to do things in your daily life ***الرجاء تحديد معدل مدى تناسب خدمة حجز المواقف عن طريق الرسائل القصيرة مع الطريقة التي تود بها إنجاز أعمالك اليومية.***							
18. I believe the use of SMS parking Service is compatible with my lifestyle. 18. أعتقد بأن طريقة استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة تتوافق مع أسلوب حياتي	أعارض بشدة Strongly disagreed	1	2	3	4	5	أوافق بشدة Strongly agree
19. I believe the use of SMS parking fits well with the way I like to pay for other services 19. أعتقد بأن الطريقة المستخدمة في خدمة حجز المواقف عن طريق الرسائل لدفع الرسوم تتوافق مع ما أتطلع إليه عند الدفع للخدمات الأخرى القصيرة		1	2	3	4	5	
20. I believe the use of SMS parking Service is completely compatible with how I like to do things 20. أعتقد بأن طريقة استخدام خدمة حجز المواقف عن طريق تتوافق تماما مع طريقتي المفضلة لعمل الأشياء الرسائل القصيرة		1	2	3	4	5	
21. I believe the use of SMS parking would fit well with the way I like to pay for parking fees 21. أعتقد بأن استخدام الرسائل القصيرة لدفع الرسوم يتوافق مع الطريقة التي أرغب بها عند استخدام خدمة حجز المواقف		1	2	3	4	5	
Please rate the level of how easy do you think the use of SMS parking service ***الرجاء تحديد معدل مدى سهولة استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة***							
22. I believe the use of SMS parking service is clear and understandable 22. أعتقد بأن طريقة استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة واضحة ومفهومه	أعارض بشدة Strongly disagreed	1	2	3	4	5	أوافق بشدة Strongly agree
23. I believe the use of SMS parking service is easy 23. أعتقد أن استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة سهله		1	2	3	4	5	
24. I believe learning to use SMS parking service is easy for me 24.أعتقد بأن تعلم أستخدام خدمة حجز المواقف عن طريق الرسائل القصيرة سهل بالنسبة لي		1	2	3	4	5	
25. I believe the use of SMS parking service does not require a lot of mental effort 25.أعتقد بأن استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة لا تتطلب مجهود ذهني		1	2	3	4	5	
26. I believe the use of SMS parking service is not frustrating 26. أعتقد بأن استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة ليست معقدة		1	2	3	4	5	
Please rate the importance of trying out SMS parking service prior to adopting it ***الرجاء تحديد معدل أهمية تجربة خدمة حجز المواقف عن طريق الرسائل القصيرة قبل التطبيق***							
27. I believe before deciding whether to use the SMS parking service, it will be better to try it out by the user for free 27. أعتقد بأن لتحديد أمكانية استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة من الأفضل تجربتها مجاناً أولاً من فبل المستخدمين قبل وضعها قيد التنفيذ	أعارض بشدة Strongly disagree	1	2	3	4	5	أوافق بشدة Strongly agree
28. I believe it is better to use SMS parking service on a trial basis for long enough time to see what it could do 28. أعتقد بأنه من الأفضل وضع خدمة حجز المواقف عن طريق الرسائل القصيرة في فترة تجربة للمستخدمين لمدة مناسبة للاطلاع على فعاليتها		1	2	3	4	5	

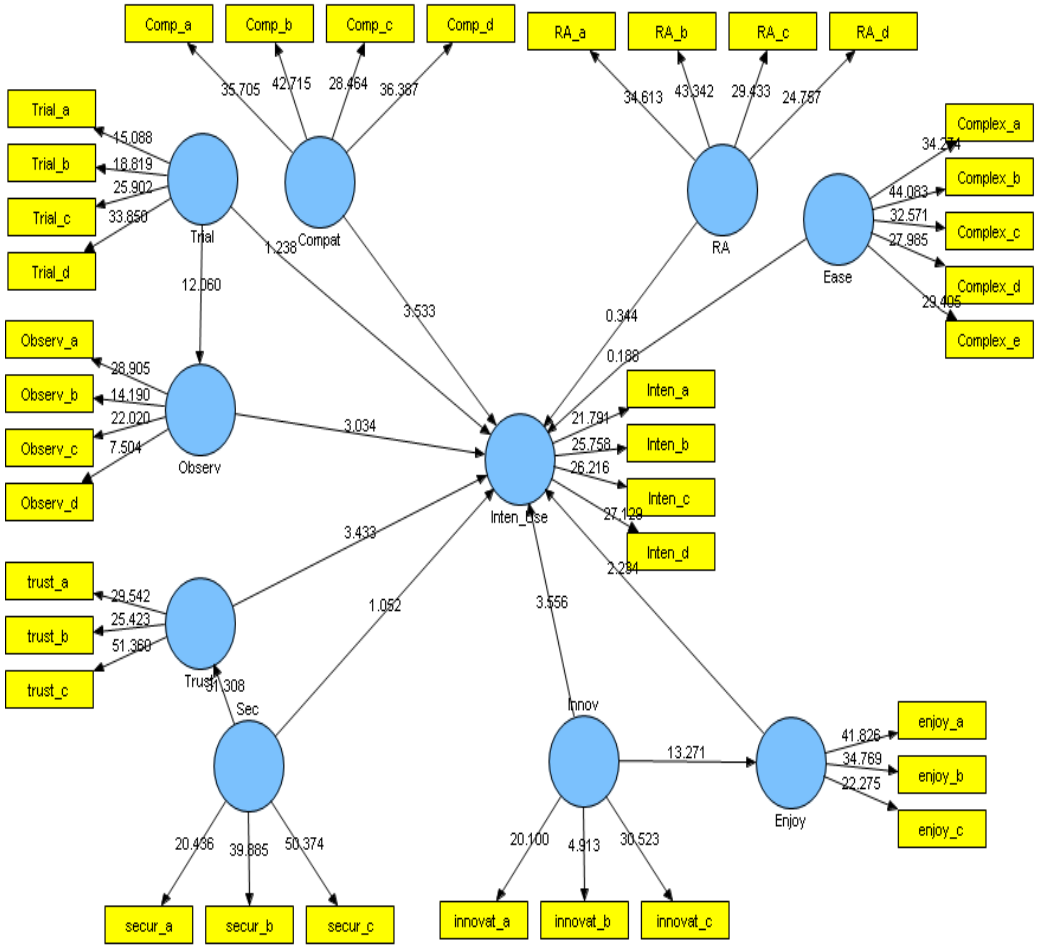
29. I believe I would not have to spend a lot of effort to try SMS parking service 29. أعتقد بأن تجربة خدمة حجز المواقف عن طريق الرسائل القصيرة لن تستهلك الكثير من الجهد مني		1	2	3	4	5	
30. I believe it would be better for the service provider to experiment the SMS parking service as necessary to check its effectiveness 30. أعتقد بأنه من الأفضل من الجهة الموفرة الخدمة بإجراء تجربة على خدمة حجز المواقف عن طريق الرسائل القصيرة كل ما أستدعى الأمر للتأكد من فعاليتها		1	2	3	4	5	
Please rate the level of result demonstrability of SMS parking service to the public ***الرجاء تحديد معدل مدىشيوع استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة للعامة***							
31. I believe I would have no difficulty telling others about the results of using SMS parking service 31. أعتقد بأنه لا توجد صعوبة في نشر فوائد خدمة حجز المواقف عن طريق الرسائل القصيرة للأخرين	أعارض بشدة Strongly disagree	1	2	3	4	5	أوافق بشدة Strongly agree
32. I believe I could communicate to others the consequences of using SMS parking service 32. أعتقد بأنه يمكنني إطلاع الآخرين على عواقب استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة		1	2	3	4	5	
33. I believe I would have no difficulty explaining why using SMS parking service may or may not be beneficial 33. أعتقد بأنه لا توجد صعوبة في شرح فوائد أو مضار استخدام خدمة حجز المواقف عن طريق الرسائل القصيرة		1	2	3	4	5	
34. I believe the instructions of how to use SMS parking service is available and visible in many places 34. أعتقد بأن التعليمات على كيفية أستخدام خدمة حجز المواقف متوفره وواضحه في أماكن عدة		1	2	3	4	5	

Thank you very much for your time and assistance in completing this questionnaire

شاكر لكم جزيل الشكر لوقتكم ومساعدتكم لتكملة هذا الاستبيان

Appendix C: Date Analysis for Questionnaire

Bootstrapping Results



Index Values for Latent Variables

	LV Index Values
Compat	3.773856
Ease	3.975703
Enjoy	3.848645
Innov	3.782006
Inten_Use	3.915405
Observ	3.718286
RA	4.006401
Sec	3.543468
Trial	4.032362
Trust	3.658586

Cross Loadings

	Compat	Ease	Enjoy	Innov
Comp_a	0.841666	0.544495	0.526729	0.495533
Comp_b	0.859915	0.540447	0.548492	0.539237
Comp_c	0.839015	0.557032	0.394882	0.455264
Comp_d	0.843900	0.563658	0.551332	0.451982
Complex_a	0.577253	0.822881	0.471163	0.466553
Complex_b	0.572853	0.868473	0.529190	0.469741
Complex_c	0.543291	0.834143	0.505147	0.447074
Complex_d	0.515876	0.821804	0.484362	0.471474
Complex_e	0.521713	0.845594	0.504866	0.433022
Inten_a	0.580059	0.476738	0.481378	0.431104
Inten_b	0.594939	0.515348	0.480190	0.487833
Inten_c	0.496263	0.470187	0.494006	0.457010
Inten_d	0.518212	0.507269	0.565033	0.642208
Observ_a	0.523260	0.629242	0.500816	0.488866
Observ_b	0.379559	0.378825	0.345930	0.380454
Observ_c	0.372949	0.452604	0.349885	0.340389
Observ_d	0.277606	0.427419	0.232672	0.154789
RA_a	0.557350	0.532815	0.539888	0.459746
RA_b	0.561082	0.571521	0.562166	0.441419
RA_c	0.612820	0.511694	0.473526	0.465617
RA_d	0.621524	0.553955	0.466767	0.377685
Trial_a	0.195236	0.276922	0.228200	0.324920
Trial_b	0.263202	0.326416	0.284965	0.379062
Trial_c	0.502873	0.590720	0.451405	0.413258
Trial_d	0.453258	0.528287	0.464527	0.481036
enjoy_a	0.567114	0.504545	0.852814	0.525349

enjoy_b	0.494020	0.503846	0.851378	0.533775
enjoy_c	0.440714	0.486323	0.808402	0.483790
innovat_a	0.354138	0.434630	0.523754	0.785827
innovat_b	0.327522	0.168270	0.204470	0.500012
innovat_c	0.560612	0.501607	0.523931	0.840733
secur_a	0.458175	0.426017	0.432350	0.402691
secur_b	0.457656	0.468384	0.400243	0.404850
secur_c	0.553105	0.473545	0.392443	0.454639
trust_a	0.498071	0.473102	0.422151	0.412014
trust_b	0.443399	0.461103	0.356742	0.350311
trust_c	0.569872	0.540816	0.487945	0.450961

	Inten_Use	**Observ**	**RA**	**Sec**
Comp_a	0.602453	0.495220	0.607554	0.479508
Comp_b	0.607079	0.469577	0.617935	0.515579
Comp_c	0.544649	0.428201	0.560826	0.475100
Comp_d	0.581673	0.500573	0.584641	0.523908
Complex_a	0.532870	0.608518	0.517423	0.468100
Complex_b	0.522571	0.553195	0.549787	0.446819
Complex_c	0.478496	0.521814	0.527333	0.441018
Complex_d	0.529707	0.553525	0.541672	0.438031
Complex_e	0.543003	0.559981	0.569627	0.497556
Inten_a	0.762005	0.478583	0.440277	0.429362
Inten_b	0.816304	0.559651	0.502106	0.472415
Inten_c	0.804846	0.440907	0.476189	0.444196
Inten_d	0.784157	0.510629	0.552621	0.422020
Observ_a	0.578614	0.790501	0.569561	0.387107
Observ_b	0.404275	0.708571	0.348974	0.355409
Observ_c	0.466382	0.783214	0.342608	0.333209
Observ_d	0.286949	0.542269	0.170524	0.292613
RA_a	0.516907	0.427907	0.861818	0.498502

RA_b	0.507440	0.435101	0.875838	0.422704
RA_c	0.540810	0.418712	0.815366	0.499502
RA_d	0.531202	0.522364	0.807509	0.410661
Trial_a	0.287098	0.396598	0.262834	0.177998
Trial_b	0.332614	0.439988	0.335937	0.173848
Trial_c	0.497453	0.520655	0.565766	0.333695
Trial_d	0.516671	0.511292	0.522887	0.348221
enjoy_a	0.584401	0.430772	0.553380	0.402102
enjoy_b	0.505781	0.404532	0.486964	0.435862
enjoy_c	0.512415	0.477080	0.482267	0.385748
innovat_a	0.518600	0.370783	0.477338	0.357572
innovat_b	0.288842	0.224626	0.155005	0.317228
innovat_c	0.540051	0.468534	0.417474	0.433589
secur_a	0.424630	0.366980	0.448738	0.777736
secur_b	0.445612	0.395506	0.449371	0.857102
secur_c	0.520213	0.433015	0.468834	0.865002
trust_a	0.436099	0.409216	0.473126	0.742123
trust_b	0.510666	0.431775	0.455491	0.560445
trust_c	0.633958	0.439189	0.584521	0.678264

Average Variance Extracted

	AVE
Compat	0.715992
Ease	0.703513
Enjoy	0.701884
Innov	0.524789
Inten_Use	0.627421
Observ	0.508611
RA	0.706679
Sec	0.695908
Trial	0.628230
Trust	0.689781

Total Effects (Mean, STDEV, T-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)
Compat -> Inten_Use	0.233013	0.234002	0.065954	0.065954
Ease -> Inten_Use	-0.012399	-0.007554	0.065856	0.065856
Enjoy -> Inten_Use	0.149720	0.148905	0.067008	0.067008
Innov -> Enjoy	0.614324	0.617694	0.046291	0.046291
Innov -> Inten_Use	0.284177	0.278375	0.058748	0.058748
Observ -> Inten_Use	0.179357	0.179883	0.059110	0.059110
RA -> Inten_Use	0.024667	0.022919	0.071667	0.071667
Sec -> Inten_Use	0.133829	0.132160	0.051460	0.051460
Sec -> Trust	0.797824	0.798563	0.025483	0.025483
Trial -> Inten_Use	0.178466	0.185545	0.053810	0.053810
Trial -> Observ	0.598311	0.600884	0.049610	0.049610
Trust -> Inten_Use	0.254239	0.251580	0.074057	0.074057

Appendix D: Plain Language Statement - Interviews

Please direct all enquiries to:
Hamed Al-busaidi Tel: +61 (0) 415587417 +968 99447448 Email: hamedahmed.al-busaidi@research.vu.edu.au
Assoc Prof. Geoff Sandy Tel: +61 3 9919 5309 Email. Geoff.Sandy@vu.edu.au

Dear (Sir/Madam)

E-government is the application of Information and Communication Technology (ICT) utilized by the government agencies aims to enhance the information or services delivery to citizens. It provides services to citizens through wired network such as internet, and fixed telephones. The internet nowadays has become the cheapest and most effective channel that being utilized by the government in order to deliver information and communication services to citizens. However in order to check a certain type of government service (e.g. exam notification) requires resources such as computer, telephone, and internet connection, which may not be available to citizens. Nevertheless, due to the existence of advance technology such as wireless mobile communication infrastructure, pushing the governments to utilize this technology in order to better deliver its service to citizens anywhere and anytime with satisfaction. Governments that utilize this

technology will gain many benefits such as cost reduction, greater work efficiency, and effectiveness, and faster access to public services anytime and anywhere. Hence, Mobile Government is defined as 'a strategy and its implementation involving the utilization of all kinds of wireless and mobile technology, services, applications and devices for improving benefits to the parties involved in e-government including citizens, businesses and all government units'.

This survey is part of Doctor of Philosophy study, being undertaken by the researcher Hamed Al-busaidi and supervised by Assoc Prof. Geoff Sandy at Victoria University. It aims to investigate the factors affecting the intention to use of mobile government services. This research will use Diffusion of innovation (DOI) as a main model to test the applicability of this model in the context of the adoption of m-government services. This study will assist the decision makers who are involved in m-Government projects to better understand and implement Mobile government services in the right direction and according to the citizens needs.

In order to achieve the desired goals, the researcher is conducting interviews for 30 minutes with decision makers involved with m-Government projects in Oman such as yourself, who are in a position to provide valuable information on m-Government projects current and future plans, in addition if there are barriers hindering the projects progress. Based on that, we would like to invite you to be part of this study, which will assist the researcher to identify factors affecting the intention to use of Mobile-government service. Based on understandings gained from this project, the decision makers who are involved in m-Government projects will better understand the challenges it will face in the implementation of m-Government services - and implementation of these services will be more effective.

I assure you that all responses will be confidential. Could I ask you please to complete the attached Consent Form prior to our interview.

Thank you in anticipation of your involvement

Yours sincerely,

Hamed Al-busaidi

Appendix E: Consent Form for Participants Involved in Research

INFORMATION TO PARTICIPANTS:

We would like to invite you to be a part of Doctor of Philosophy study into **' A Model of Intention to Use Mobile Government Services'** which is sponsored by Diwan of Royal Court

This objective of this study is to investigate the factors affecting the intention to use of mobile Government services. This project will use Diffusion of innovation (DOI) as a main model. This study will assist the decision makers who are involved in m-Government projects to better understand and implement mobile Government services in the right direction and according to the citizens needs. This research has commenced with a general literature search process focused on key concepts from the following areas: information systems, diffusion of innovation theories, and E/M-government. The literature search helped to set and refine the study's aims. The literature will undergo a more focused literature on M-government experience wide world in general. In addition a more focus literature on Diffusion of innovation technology in general and diffusion of innovation theory for Rogers in particular. Semi-Structured interviews and survey questionnaire will be the primary data collection tools that will be used in this study. The interview will be taped or notes taken according to the participant's preference in order to record information accurately. The information gathered will be kept confidential along with the identity of the participant. The anonymity and confidentiality of participants and information collected from participants will be ensured through important steps.

CERTIFICATION BY SUBJECT

I,

of

certify that I am at least 18 years old* and that I am voluntarily giving my consent to participate in the study:

A Model of Intention to Use Mobile Government Services being conducted at Victoria University by:

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by:

Hamed Al-busaidi

and that I freely consent to participation involving the below mentioned procedures:

- I am participating on voluntary bases.
- The interview will be: Audio taped Notes taken. (please circle your preference)
- The interview will take place in my office
- The information gathered from me will be kept confidential along with my identity.
- The anonymity and confidentiality of participants and information collected from participants will be ensured through important steps.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed:

Date:

Please direct all enquiries to:
Hamed Al-busaidi Tel: +61 (0) 415587417 +968 99447448 Email: hamedahmed.al-busaidi@research.vu.edu.au
Assoc Prof. Geoff Sandy Tel: +61 3 9919 5309 Email. Geoff.Sandy@vu.edu.au

If you have any queries or complaints about the way you have been treated, you may contact the Secretary, Victoria University Human Research Ethics committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 phone (03) 9919 4781

Appendix F: Interview Questions (Guideline)

Semi-Structured Interview Questions

Note: The main questions are listed below. However, this is a semi-structured interview and it is anticipated that more questions will be added based on the interviewee responses.

Demographics

General information to include:

- Gender
- Age
- Organization and position details
- Education level

General Question

- Does peer pressure or recommendation have an (or any) impact on the spread of mobile government services use in a society?

- Do you think Gender would make a difference on the spread of mobile services use in a society? how?

- Do you think Education level would make a difference on the spread of mobile services use in a society? how?

- Do you think Age would make a difference on the spread of mobile services use in a society? how?

- What are the barriers to the spread of Mobile government services if there are any?

- Do you intend to introduce new Mobile government services in the future? If yes what are they?

- **Security**

    - Do you think citizens find the use of Mobile government services is financially secure? Does it have impact on the spread of Mobile government services?

    - Do you think citizens feel comfortable using the mobile when interacting with Mobile government services?

- **Perceived Easy to Use**

    - Do you think citizens find it easy to use Mobile government services?

    - Do you think citizens find the process of using Mobile government service is clear and understandable?

- **Relative Advantage**

    - Do you think citizens find the use of Mobile government services more useful than traditional alternatives?

    - Do you think citizens find the use of Mobile government services more efficient than traditional alternatives?

    - Do you think citizens find the use of Mobile government services will save them time than traditional alternatives?

- **Trialability**

- Do you think citizens find trying Mobile government services for free will have impact on the spread of mobile government services?

Appendix G: Construct Specification Accuracy

ɔnstruct	Indicators	Construct Type	Reason
Relative Advantage (RA)	• I believe the use of Mobile Parking Service enables me to pay parking fees more quickly than other methods (e.g. using Coins, Ticket machine). • I believe the use of Mobile Parking Service enables me to pay the parking fees in an easier way compared to other methods (e.g. using Coins, Ticket machine). • I believe the use of Mobile Parking Service is more efficient than using other alternative ways (e.g. using Coins, Ticket machine). • I believe the use of Mobile Parking Service saves me time compared to other ways (using Coins, Ticket machine). • I believe the use of Mobile Parking Service increases my productivity	Reflective	• Direction of causality is from construct to items. • Indicators are manifestations of the construct • Changes in the indicator do not cause changes in the construct • Changes in the construct do cause changes in the indicators • Indicators are interchangeable and have similar content/indicators and share a common theme • Dropping an indicator does not alter the conceptual domain of the construct • Indicators are expected to co-vary with each other • Nomo-logical net for the indicators do not differ • Indicators have the same antecedents and consequences

Compatibility (CT)	• I believe the use of Mobile Parking Service is compatible with my lifestyle. • I believe the use of SMS parking fits well with the way I like to pay for other services. • I believe the use of Mobile Parking Service is completely compatible with how I like to do things. • I believe the use of SMS parking would fit well with the way I like to pay for parking fees.	Reflective	• Direction of causality is from construct to items. • Indicators are manifestations of the construct • Changes in the indicator do not cause changes in the construct • Changes in the construct do cause changes in the indicators • Indicators are interchangeable and have similar content/indicators and share a common theme • Dropping an indicator do not alter the conceptual domain of the construct • Indicators are expected to co-vary with each other • Nomo-logical net for the indicators do not differ • Indicators have the same antecedents and consequences
Perceived Ease of Use (PEOU)	• I believe the use of Mobile Parking Service is clear and understandable. • I believe the use of Mobile Parking Service is easy. • I believe learning to use Mobile Parking Service is easy for me. • I believe the use of Mobile Parking Service does not require a lot of mental effort. • I believe the use of Mobile Parking Service is not frustrating.	Reflective	• Direction of causality is from construct to items. • Indicators are manifestations of the construct • Changes in the indicator do not cause changes in the construct • Changes in the construct do cause changes in the indicators • Indicators are interchangeable and have similar content/indicators and share a common theme • Dropping an indicator does not alter the conceptual domain of the construct • Indicators are expected to co-vary with each other

			• Nomo-logical net for the indicators do not differ • Indicators have the same antecedents and consequences
Trialability (TRL)	• I believe before deciding whether to use the SMS parking service, it will be better to try it out by the user for free. • I believe it is better to use Mobile Parking Service on a trial basis for long enough time to see what it could do. • I believe I would not have to spend a lot of effort to try SMS parking service. • I believe it would be better for the service provider to experiment the Mobile Parking Service as necessary to check its effectiveness.	Reflective	• Direction of causality is from construct to items. • Indicators are manifestations of the construct • Changes in the indicator do not cause changes in the construct • Changes in the construct do cause changes in the indicators • Indicators are interchangeable and have similar content/indicators and share a common theme • Dropping an indicator does not alter the conceptual domain of the construct • Indicators are expected to co-vary with each other • Nomo-logical net for the indicators do not differ • Indicators have the same antecedents and consequences
Observability (OBSV)	• I believe I would have no difficulty telling others about the results of using SMS parking service. • I believe I could communicate to others the consequences of using SMS parking service. • I believe I would have no difficulty explaining why using Mobile Parking Service may or may not be beneficial. • I believe the instructions of how to use Mobile Parking Service is available and visible in many places.	Reflective	• Direction of causality is from construct to items. • Indicators are manifestations of the construct • Changes in the indicator do not cause changes in the construct • Changes in the construct do cause changes in the indicators • Indicators are interchangeable and

			have similar content/indicators and share a common theme • Dropping an indicator does not alter the conceptual domain of the construct • Indicators are expected to co-vary with each other • Nomo-logical net for the indicators do not differ • Indicators have the same antecedents and consequences
Perceived Trustworthiness (PTT)	• I believe I trust the ability of a Mobile to protect my privacy when using SMS parking service. • I believe that I'm adequately protected by law in Oman from problems that could be caused when using SMS parking service. • I believe I trust the SMS parking and it could be the best option to pay for parking fees.	Reflective	• Direction of causality is from construct to items. • Indicators are manifestations of the construct • Changes in the indicator do not cause changes in the construct • Changes in the construct do cause changes in the indicators • Indicators are interchangeable and have similar content/indicators and share a common theme • Dropping an indicator does not alter the conceptual domain of the construct • Indicators are expected to co-vary with each other • Nomo-logical net for the indicators do not differ • Indicators have the same antecedents and consequences
Perceived Security (PSEC)	• I believe using Mobile Parking Service is financially secure. • I believe I'm not worried about the Perceived Security when using SMS parking service. • I believe the mobile has enough safeguards to make me feel comfortable using	Reflective	• Direction of causality is from construct to items. • Indicators are manifestations of the construct

	it to interact with the SMS parking service.		• Changes in the indicator do not cause changes in the construct • Changes in the construct do cause changes in the indicators • Indicators are interchangeable and have similar content/indicators and share a common theme • Dropping an indicator does not alter the conceptual domain of the construct • Indicators are expected to co-vary with each other • Nomo-logical net for the indicators do not differ • Indicators have the same antecedents and consequences
Perceived Enjoyment (PENJ)	• I believe using Mobile Parking Service is fun. • I believe using Mobile Parking Service is useful. • I believe using Mobile Parking Service is a wise decision.	Reflective	• Direction of causality is from construct to items. • Indicators are manifestations of the construct • Changes in the indicator do not cause changes in the construct • Changes in the construct do cause changes in the indicators • Indicators are interchangeable and have similar content/indicators and share a common theme • Dropping an indicator does not alter the conceptual domain of the construct • Indicators are expected to co-vary with each other • Nomo-logical net for the indicators do not differ • Indicators have the same antecedents and consequences

Personal Innovativeness (PINV)	• I like to explore new m-Government services. • Among my peers, I am usually the first to try out new Mobile-government services. • In general, I am interested in trying out new Mobile-government services.	Reflective	• Direction of causality is from construct to items. • Indicators are manifestations of the construct • Changes in the indicator do not cause changes in the construct • Changes in the construct do cause changes in the indicators • Indicators are interchangeable and have similar content/indicators and share a common theme • Dropping an indicator does not alter the conceptual domain of the construct • Indicators are expected to co-vary with each other • Nomo-logical net for the indicators do not differ • Indicators have the same antecedents and consequences
Intention to use (INT)	• I would use the Mobile Parking Service frequently. • I would use the Mobile Parking Service whenever possible. • I intend to use the Mobile Parking Service in the future. • I would like to use new Mobile-government services in the future.	Reflective	• Direction of causality is from construct to items. • Indicators are manifestations of the construct • Changes in the indicator do not cause changes in the construct • Changes in the construct do cause changes in the indicators • Indicators are interchangeable and have similar content/indicators and share a common theme