An Exploratory Study on Adoption and Diffusion of m-Government Services in the Sultanate of Oman

Ahmed AL-HADIDI

School of Engineering
Cardiff University, Cardiff, UK

Submitted in Partial Fulfilment of the Requirements of the Degree of Doctor of Philosophy, September 2010

Dedication

I owe an enormous gratitude to my loving mother Rahma Al-Hadidi who passed away on 1/1/2002. She provided me with love and patience. God bless her and let her soul rest in peace "Amen".

Contents

Figures

Tables

Acknowledgements

I would like to express my sincere gratitude and say special thanks to God (Allah the most merciful) for his prime help and for granting me the strength and power to undertake this study.

I would like to express my deepest thanks to my Father and my Aunt for their daily prayers and enormous efforts to make me who I am. Without my family's (brothers and sisters) help, support, and encouragement, this thesis would not have been completed. I would like to say many thanks to my wife for her great wishes to complete my research successfully; I appreciate all that you have done for me. To my daughters Saba, Rahma, Hoor and Saja, this thesis is the work that I have always told you I had to travel to the UK and do. You have been a reminder of the things that really matter in my life while I was far from you. Therefore, I devote this thesis to you.

I would like to express my deepest appreciation to my supervisor Prof. Yacine Rezgui for his help and support during my study for the last three years as well as for his valuable advice and guidance. Without his support, this thesis would not have evolved as it has. I am also grateful to my employer (Royal Army of Oman) for sponsoring my postgraduate education (Masters and PhD).

I wish I could give individual acknowledgment to all those who have contributed in this thesis. However, this is impossible, but I am truly grateful to all those who have participated significantly with their insightful views and opinion. Their contributions, time, and the effort they spent in completing the questionnaires and in the interviews were of a great help for me to carry out the fieldwork, which made this study possible.

Finally, I wish to express my gratitude for the continued support received from Dr. Ian Wilson and all other staff of Cardiff University in general, and the School of Engineering in particular, who work behind the scenes to ensure research students get all academic resources and help they need, I say thank you and God bless you all.

Declaration

This work has not previously been accepted in substance for any degree and is not concurrently submitted in candidature for any degree.

Signed ..... (Candidate) Date 10/9/2010

STATEMENT 1

This thesis is being submitted in partial fulfilment of the requirements for the degree of PhD

Signed ..... (Candidate) Date ...10/9/2010

STATEMENT 2

This thesis is the result of my own independent work/investigation, except where otherwise stated. Other sources are acknowledged by explicit references.

Signed ..... (Candidate) Date ...10/9/2010

STATEMENT 3

I hereby give consent for my thesis, to be available for photocopying and for inter-library loan, and for the title and summary to be made available to outside organisations.

Signed ..... (Candidate) Date 10/9/2010

Abstract

Attempts to implement e-Government have increased around the world due to recent technological advances; in developing countries e-Government appears to be a vehicle for accelerating efforts to achieve developed status. The Sultanate of Oman has heavily invested in e-Government development and diffusion over the last five years, but adoption has been thwarted by low computer ownership and limited internet access. For the Sultanate to continue its development, other means need to be found to achieve successful e-Government. Mobile telephone service currently covers about 95% of the country, with over half of the Omani population owning a mobile device, and the number of subscribers continuing to increase. The thesis therefore explores the potential for mobile-government (m-Government) to function as a driving force for e-Government adoption in Oman.

Following an in-depth review of the perceived critical success factors for m-Government, and the extensive literature regarding technology adoption and diffusion, the Researcher proposes an integrated "m-Government Adoption Model for Oman". Using a dual case study approach, the model was tested to ensure that it was appropriate for the Omani cultural context, and detailed analysis of the empirical research results led to necessary refinements.

The thesis provides practical contributions via the m-Government Adoption Model and associated recommendations. The Researcher believes these will allow Oman's decision-makers to understand the reasons for the lack of e-Government success to date, and by implementing the m-Government critical success factors in the short- to medium-term, move towards successful e-Government in the longer term. It also makes a methodological contribution to the literature via an adoption and diffusion framework amalgamating elements from existing theories developed in the West, to investigate the prevailing situation in a developing country in respect of m-Government initiatives. This, by implication, may also be valuable in similar cultural contexts, especially those in the Gulf countries.

Chapter 1
Introduction

Statement of the Problem and Rationale for the Study; Hypothesis and Research Questions; Research Aims and Objectives; Methodology; Research Contribution; Scope of the Research; Structure of the Thesis

1.1 Statement of the Problem and Rationale for the Study

With the technological advancement witnessed in the last half century, attempts to implement e-Government have become commonplace in both developed and developing countries alike, with aims that encompass improving efficiency at one end of the scale to enhancing democracy at the other. According to the UNDP (2003), the goals of e-Government range from offering a more efficient delivery of services, to reform and development. For developing countries, therefore, e-Government would seem to be a vehicle for accelerating efforts to achieve developed status. The World Bank Group (2004) states that the objectives of e-Government are to provide: better services delivery to citizens, improved services for business, transparency, and empowerment through information and efficient government.

However, these objectives are unattainable in the absence of certain resources and mind-sets, and to be truly effective and out-reaching, e-Government relies on a number of pre-conditions. The availability of computer hardware and software, and a favourable citizen predisposition towards the use of electronic communication, are important in this respect. Hence, in all e-Government efforts, the possession of personal computers by individuals, and/or their availability through libraries and other public institutions, is presumed, as also is a willingness to engage in the process on the part of the general public. Unfortunately, such assumptions about the affluence of individuals, the level of technological development of a country, and the predisposition of its citizens towards electronic communication, may not be legitimate. Indeed, as noted by (Al-Shihi and McGrath, 2004), even the advanced

nations whose levels of wealth enable internet access to be readily available to the vast majority of populations, are struggling to increase their citizens' adoption of e-Government initiatives. British people, for example, are still reluctant to use established facilities for e-Government experience (Swartz, 2003), and in Japan people remain unhappy with the notion of making online payments (Aoki, 2000). The evidence is similar in e-Government projects worldwide where it is apparent that users' IT awareness and motivation are major obstacles. With respect to developing and transitional countries in particular, a survey conducted five years ago revealed that 35% of e-Government projects were total failures, 50% were partial failures, and only 15% were successful (Commonwealth Telecommunications Organisation 2002; Heeks, 2003).

Among the developing countries, those in the Arab world appear to have attracted little attention in respect of their adoption of e-Government, and serious investigation of the success or otherwise is absent (Al-Shihi and McGrath, 2004). Anderson (2000) has identified the Middle East as one of the world's regions where there is lower and slower internet growth, and Ghareeb (2000:12) cited poor technical infrastructure as a major cause of this situation, noting at the same time that *"the number of those who can afford to buy [a] computer, know English, and access the internet is still quite minuscule"*. Al-adwani (2003:15) found support for Ghareeb, arguing that *"the cost of the internet in many Arab countries is way beyond the purchasing power of [the] average citizen"*.

That said, the prediction by Ernst & Young (2002), is that substantial opportunities and growth potential exist for e-commerce applications in the Gulf region, and with this in mind the Omani government has made a large investment in the development and diffusion of e-Government over the last five years. Despite this tremendous financial commitment, however, the purpose of the exercise remains largely unclear, and recently calls have been made by the Scientific Research Council in Oman for a better understanding of current e-Government experience in the country's organisations. Adding to the concern is the fact that computer and internet penetration is still considered to be low among the general Omani population,

highlighting a digital divide between the country's different regions in terms of information communication technology (ICT) services and adoption rates. Compounding this problem is the fact that ICT knowledge and skill in the Sultanate is low, signalling a need to educate citizens as a pre-condition for the success of e-Government initiatives Al-Shihi (2006:201).

Not surprisingly, these circumstances have hindered the adoption of internet services, including those related to e-Government, which the government has been keen to promote. The reality in Oman is that the performance of the government sector in the provision of services to citizens is poor, and is perceived to be so both in its quality and quantity by citizens, large numbers of whom do not have computer access. This is problematic for the Sultanate given that its geographical position makes it a gateway to both the east and west, and that it has long been recognised as a trading country with a strong political affiliation to the more developed countries of the world, since these trading partners, operating fully-fledged e-Government systems, have expectations of similar degrees of openness and types of administration. There is, therefore, some international pressure, however slight, to keep abreast with e-Government developments outside the Sultanate.

There is, therefore, a dilemma in Oman, since attempts to introduce e-Government are currently thwarted by low computer ownership and internet access among the general population. Indeed, although internet services were launched to the Omani public in January 1997, and attracted 4,163 subscribers by the end of that year, the anticipated penetration rate has not materialised (ESCWA, 2005).

Another means to arrive at the goal of e-Government needs to be found if the Sultanate is to continue with its development, and this may be achieved by the use of mobile phones, which have a much wider dissemination throughout the country when compared to internet usage. Indeed, the mobile infrastructure in Oman currently covers about 95% of the country (Oman Mobile, 2007a), and a recent estimate indicated that over half the Omani population has a mobile device (Ministry of National Economy, Oman, 2006a). Moreover, there has been a clear trend showing increased numbers of mobile subscribers since 1996 when these services were first

offered to the Omani population (Ministry of National Economy, Oman, 2003; 2005), with prepaid mobile service and SMS, introduced in 2001, having both become popular with subscribers. Furthermore, with the entry into the market in 2004 of a second mobile telecommunications company – Nawras – to rival Omantel (Ministry of Information, Oman, 2008) the likelihood is that mobile usage will expand substantially among the population, thereby providing the vast majority of the nation with the means to participate in mobile-government (m-Government).

It would seem, therefore, that the potential of m-Government to function as a driving force for e-Government adoption in Oman is an appropriate issue for exploration. An appreciation of the issues in this connection, and the identification of any likely barriers to the development of the Sultanate in consequence of an inability to launch a successful e-Government strategy, is a matter of national importance, and given that theoretical models exist that can assist in such an analysis, it is both necessary and timely for this study to be undertaken.

1.2 Hypothesis and Research Questions

On the basis of the problem outlined above, this study is exploratory in nature and seeks to test the following overarching hypothesis:

"m-Government is a prerequisite for the success of e-Government in Oman"

In exploring this issue, three major research questions arise as follows:

1. What are the major obstacles to the uptake of e-Government and mobile services in Oman?
2. What are the critical success factors behind the implementation of m-Government initiatives in the Sultanate of Oman?
3. Can a model of m-Government be developed that is appropriate for the Omani cultural context, and that can be effectively adopted and diffused?

1.3 Research Aims and Objectives

The research questions identified are translated into a wider aim and several objectives that help to operationalise the research. Primarily, the study aims to identify the factors that have led to the delayed deployment of e-Government in Oman, and to investigate the development and diffusion of m-Government in the Sultanate, as a means to implementing e-Government in the future. A number of objectives associated with these aims are established as follows:

1. Identify the reasons for the delay in implementing e-Government in Oman.
2. Identify the critical success factors for the full adoption of m-Government services in Oman.
3. Propose a model of m-Government that is appropriate for the Omani cultural context and that can be effectively adopted and diffused.
4. Examine the influence of the demographic variables of users on their adoption or rejection of m-Government services.
5. Investigate the potential of m-Government services to function as a driving force for e-Government adoption in Oman.

1.4 Methodology

In order to achieve the aims and objectives of the study, both secondary and primary data will be collected. Secondary data will come from a review of all connected literature. This will include theoretical contributions in the areas of adoption and diffusion models, and government by electronic and mobile means. From these, the researcher will identify a model for the development of m-Government within the Omani context. Additionally, descriptive literature commenting on the state of the art in Oman will be used. Primary data will be gathered from fieldwork undertaken with high-ranking and key personnel in a range of Omani organisations, including government ministries, telecommunication companies, and private companies, and will be gained by means of personal interviews. Additionally, a questionnaire survey will be conducted with a diverse

population of citizens, both youth and adult, in order to obtain the general public viewpoint. This interview and questionnaire exercise will provide data relating to the potential adoption of m-Government, and in analysing that data, both qualitative and quantitative techniques will be used.

The potential for the adoption of mobile services is explored through a conceptual framework derived from the researcher's exploration and understanding of the literature. Figure 1.1 presents this, and outlines four main influential domains: critical success factors (CSFs) and barriers facing m-Government, adoption and diffusion models for m-Government, research method (case study), and research contribution.

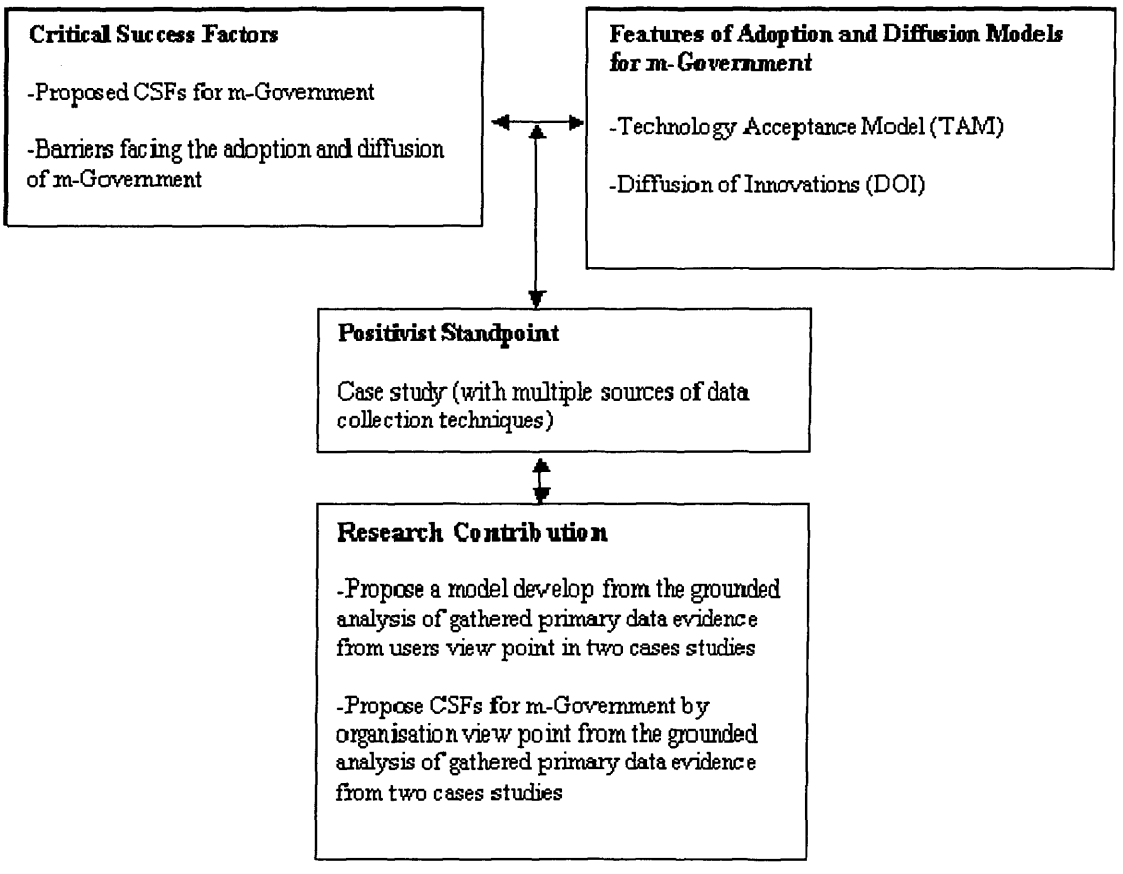


Figure 1.1: Conceptual Framework

1.5 Research Contribution

The study has a number of contributions to make. Firstly, by considering a range of adoption and diffusion models and finding one that suits the Omani context, the work will make a theoretical contribution, since so far no one model has been suggested that is appropriate for the Middle Eastern environment, and particularly the Gulf countries. There will, therefore, be a methodological contribution to the literature associated with adoption and diffusion of innovations.

However, given the nature of the topic – m-Government and e-Government – the research outcome will also contribute towards literature in this area, and in particular to that section of the literature that relates to developing countries. This is a worthy outcome since one of the aims of development is the furtherance of democratic processes. Enhanced knowledge and understanding about the role of m-Government and e-Government, and its capacity to engage large numbers of the population, will contribute towards this goal.

In practical terms, the study has a contribution to make in that it will allow Oman's decision-makers in the area of e-Government, to gain a comprehensive understanding of the reasons for its lack of success to date, and to move towards implementing the critical success factors so that e-Government can be achieved in the longer term. As a short and medium-term measure, m-Government, using the model to be proposed by this study, will serve as a building block for the nation's development.

1.6 Scope of the Research

The research is concerned with m-Government, and to a lesser extent, e-Government. It is not concerned with the teaching of IT skills or with issues relating to the teaching or promotion of citizenship, other than from the viewpoint of making government accessible to the population. Furthermore, in its efforts to investigate the impediments associated with the development and diffusion of m-Government, the concentration is on non-technical and country-specific factors, and hence it does not concern itself with the development of either software or hardware. It is restricted in

scope to an exploration and identification of the critical success factors for m-Government, and to the formulation of an m-Government model that is applicable to the Omani context.

1.7 Structure of the Thesis

The thesis comprises eight chapters.

Chapter 1 – *Introduction*: has provided a general introduction to the problem being researched. It has given a brief rationale for pursuing the interest, and indicated the main hypothesis, the associated research questions, the aims and objectives, and the methods by which these will be achieved, outlining the research sample envisaged. Additionally, it has briefly outlined the expected contributions of the study and clarified what the study does and does not intend to do.

Chapter 2 – *ICT Development in the Sultanate of Oman*: introduces the Omani context as the background to appreciating the current plans to develop and improve the ICT sector, and specifically e-Government and m-Government.

Chapter 3 – *e-Government and m-Government*: provides a review of the literature pertaining to these constructs, and includes a conceptual analysis of both. Their goals, importance, and the relationship between the two are explored.

Chapter 4 – *Critical Success Factors and Adoption and Diffusion of m-Government*: considers the literature relating to the CSFs that have been identified in respect of m-Government. It also identifies the barriers to the adoption and diffusion of m-Government, reviews adoption and diffusion models, and presents a proposed m-Government Adoption Model for Oman.

Chapter 5 – *Research Methodology*: reviews the theoretical principles of research and presents the research methodology employed to meet the aims and objectives of the study.

Chapter 6 – *Fieldwork Results and Analysis*: presents the in-depth results from the two phases of the research methodology outlined in the previous chapter.

Chapter 7 – *Discussion of the Research Findings*: presents a discussion of the outcomes from the research fieldwork. It considers e-Government and m-Government readiness in Oman, reviews the barriers to m-Government, studies the CSFs, further discusses the proposed m-Government Adoption Model for Oman, and presents a revised version of the m-Government Adoption Model for Oman.

Chapter 8 – *Conclusion*: provides answers to the research questions based on the findings from the study as a whole and then proceeds to test the hypothesis. The Researcher also presents recommendations that he believes should be made as a result of the findings from this study, his perception of the main contributions to knowledge, an account of the limitations of the research, and some thoughts on potential future research that have emerged through the process of completing the current study.

There are five appendices for reference, which contain copies of the survey instruments developed and used within the fieldwork research, and detailed quantitative data analyses.

Chapter 2

ICT Development in the Sultanate of Oman

Overview of the Sultanate of Oman; The ICT Sector in Oman; e-Government Services in Oman; m-Government Services in Oman

2.1 Introduction

The aim of this chapter is to document and analyse the ICT environment in the Sultanate of Oman. This is achieved by exploring government information and publications to provide general background information about the Sultanate with an emphasis on the status of its ICT sector. To better illustrate Oman's stage of development, details regarding the country's politics, geography, population, and economy is provided. The development of the ICT sector in Oman, including its strategies and plans, infrastructure and current applications, is described. Finally, a detailed description of Oman's current e-Government and m-Government services initiatives is provided.

2.2 Overview of the Sultanate of Oman

The Sultanate of Oman is an independent state in the Middle East, in the extreme south-eastern corner of the Arabian Peninsula. It occupies an area of 309,500 sq km and a coastline of 1,700 km; it is the third largest country in the Arabian Peninsula. Oman is considered one of the fifteen states that constitute the famed 'Cradle of Humanity' (ESCWA, 2007). The Sultanate shares borders with the United Arab Emirates to the north-west, the Kingdom of Saudi Arabia to the west, the Republic of Yemen to the south, to the north-east with the Gulf of Oman, and to the south-east with the Arabian Sea. (Ministry of National Economy, Oman, 2006b).

Oman, and the United Arab Emirates, the Kingdom of Saudi Arabia, the States of Qatar and of Kuwait, and the Kingdom of Bahrain, comprise the Gulf Co-operation Council (GCC), which was formed in 1981 to develop co-ordination, integration and

inter-connection between Member States in all fields, strengthening ties between their peoples (GCC-SG, 2005). The GCC region is considered the richest worldwide in terms of oil with an estimated Gross Domestic Product (GDP) of £160.18 billion in 2001 (GCC Statistical Department, 2005).

The system of government in Oman is that of a monarchy, and the country's so-called Renaissance began with the accession of His Majesty, Sultan Qaboos bin Said Al Said to the throne on 23 July 1970 (Ministry of Information, Oman, 2006). Oman is a peaceful country, having a stable economy and warm welcoming culture. Indeed, it has been listed as the most peaceful Arab country in the Middle East and North African region, according to the Global Peace Index study, and 22nd out of 121 countries around the world. That particular study, published at the end of May 2007, was produced under the supervision of Britain's Economist Intelligence Unit (Ministry of Information, Oman, 2008).

Sultan Qaboos bin Said Al Said is a well-known peacemaker in the region, receiving the International Peace Award from the National Council on US-Arab Relations in 1998. Additionally, in January 2007 the Indian Council for Cultural Relations, which oversees the Jawaharlal Nehru Award for International Understanding, declared Sultan Qaboos the winner of the annual prize, awarded annually to leaders and eminent figures who have made outstanding contributions to the promotion of international understanding and friendship between people around the world (Ministry of Information, Oman, 2008).

2.2.1 Geography and Regions

The Sultanate is divided into nine main administrative Governorates and Regions: four Governorates and five Regions which, prior to 1970, did not exist. The governorates are: Muscat, Dhofar, Musandam and Buraimi, each of which has its individual administrative, geographical and economic significance; the five regions are: Batinah, the Dhahirah, the Dakhiliyah, the Sharqiyah and the Wusta. Between them they comprise a total of 61 *wilayats* (townships) (Ministry of Information, Oman, 2008). Figure 2.1 shows the different regions and governorates in Oman.

Source: http://www.omanet.om/arabic/regions/MAP.asp

Figure 2.1: Oman's Regions

Table 2.1 provides a brief summary of information relating to the geographical location, importance, and population, of each governorate and region:

Table 2.1: Oman's Governorates and Regions

Governorate / Region	Location	Importance	Population (2003)
Governorate of Muscat	Situated on the Gulf of Oman at the south part of Al Batinah coast.	Capital and home to Oman's seat of government and headquarters of the state administrative apparatus.	632,073
Governorate of Dhofar	Dhofar borders the Arabian Sea to the south-east and the Republic of Yemen.	Has, since ancient times, taken an important role in Omani history, which still prevails.	215,690
Governorate of Musandam	Lies in the extreme north of the Sultanate. It is separated from the rest of the Sultanate by a strip of UAE land	Overlooks the Strait of Hormuz, and hence is of tremendous strategic value since this Strait is the most important international shipping lane for oil exports and trade.	28,378
Governorate of Buraimi	Located in the north-western part of the Sultanate, Buraimi, like Musandam, enjoys a vital strategic and commercial location.	Due to an abundant supply of water from its *wadis* and *aflaj* (irrigation channels), it became an important station on a major trade route and a significant producer of wheat, dates and other fruit.	76,838
Batinah Region	Coastal strip between the sea and the mountains.	Batinah has the largest population of any of Oman's regions and is one of the most important geographically and economically.	653,505
Dhahirah Region	Slopes from the southern foot of Al Hajr Al Gharbi Mountains towards the Empty Quarter.	Rich in agricultural, tourist and historical resources and several oil and gas fields.	30,177
Dakhiliyah region	Borders on the Governorate of Muscat to the north and the Wusta Region to the south.	Rich history, cultural heritage and topographical location.	267,140
Sharqiyah Region	North-eastern part of the Sultanate, bordering the Arabian Sea to the east.	Oman Liquefied Natural Gas (OLNG) project at Qalhat began exporting in October 2000.	313,761
Wusta Region	Lies to the south of the Dakhiliyah and Dhahirah regions.	Large number of productive oil and gas fields and a temperate climate throughout the year.	23,000

Source: Ministry of Information, Oman (2008)

2.2.2 Population and Demographics

According to the latest census in 2006, Oman had a population of 2,508,837 people including 666,153 residents (Ministry of National Economy, 2007). Males

exceeded females at a ratio of 128:100; in the 2003 census gender differences in the Omani man power population were documented to show: 64.7% for males, and 18.7% for females and 16.6% for non Omani males and females (Census Administration, 2004). In addition the majority of Omanis (63.6%) are between 15-64 years old, as shown in Figure 2.2:

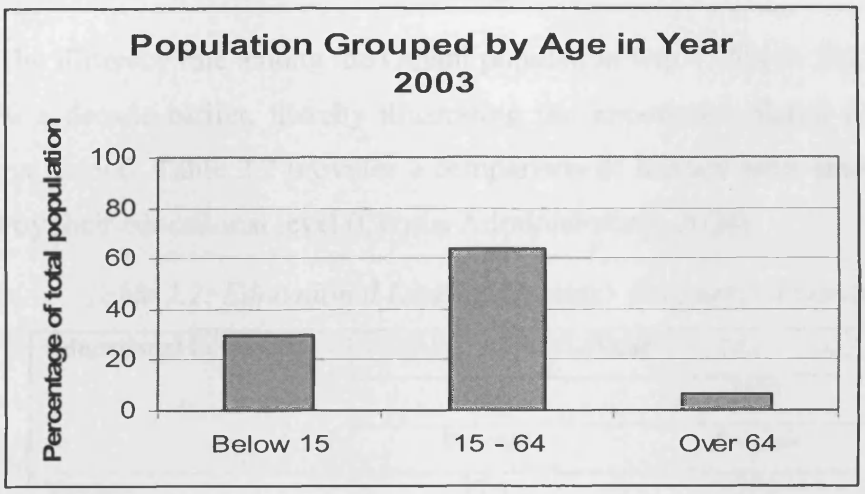


Figure 2.2: Oman's Population Grouped by Age

Figure 2.3 depicts the general distribution of population within the different governorates and regions in Oman. From this it can be seen that Al Batinah has the greatest population concentration of the Sultanate with 28%, Muscat is second with 27%, and Al Sharqiyah is third, having 13.4%.

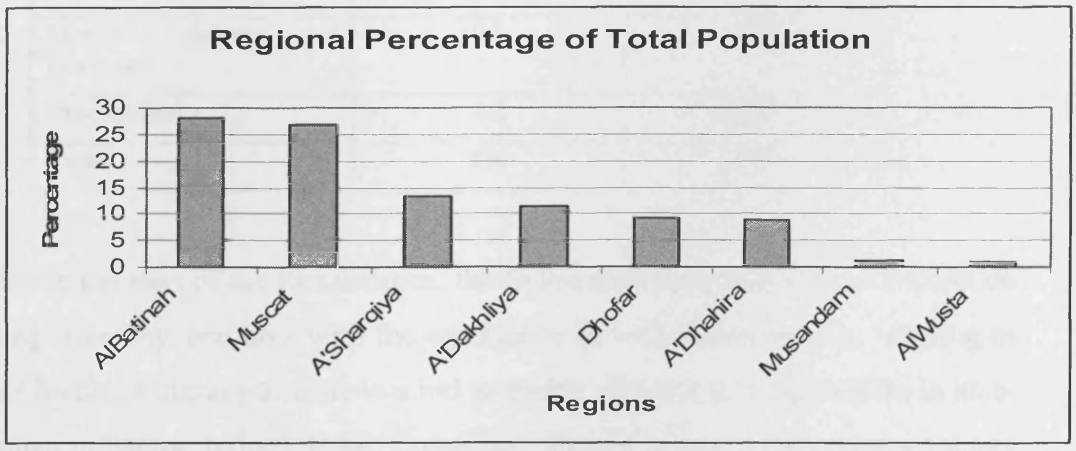


Figure 2.3: Population Distribution in Oman's Regions

Regarding non-Omanis, Muscat has the greatest concentration of expatriates with 44.8%, Al Batinah is second with 15.9%, and Dhofar third with 11.6%. The majority of Omani nationals (31.7%) are in the Al Batinah region whilst Muscat records the next highest concentration with 21.4%.

2.2.3 ICT in Education and Training

The illiteracy rate among the Omani population was 17.8% in 2003 compared to 31.8% a decade earlier, thereby illustrating the importance placed on education during that period. Table 2.2 provides a comparison of literacy rates among Omanis, grouped by their educational level (Census Administration, 2004).

Table 2.2: Educational Level of Omanis - Frequency Distribution

Educational Level	**Year**	
	2003	1993
	Per cent	Per cent
Illiterate	17.8	31.8
Read and Write	19.8	27.9
Elementary Education	20.9	21.5
Preparatory Education	17.5	10.4
Secondary Education	17.9	5.5
Diplomas and Technical degrees	2.5	1.5
Bachelor's degrees	3.1	1.1
Master's degree and Doctorate	0.3	0.1
Unidentified	0.2	0.2
Total	**100**	**100**

Since the start of the Renaissance, the Sultanate has expended great efforts on eradicating illiteracy, and now with the emergence of e-Government, it is working to extend its levels of literacy to ICT, in a bid to enable all citizens to participate in its e-Government initiative. Indeed, Basic Computer Literacy is now a compulsory subject in all schools as a separate subject from Grade 0 to Grade 10 in Basic Education (ESCWA, 2007), and in Grade 11, the ICDL (International Computer Driving

License) is a required course which provides each student with the opportunity to learn IT skills and applications. Furthermore, there are units in many subjects that require the use and application of IT, and for the purposes of additional practice, students in the Basic Education programme can use the Learning Resource Centres at their schools, and in Grades 5 to 9, they also have access to computer laboratories where both PCs and laptops are available.

Education clearly plays a critical role in helping Oman's two major aims – developing awareness and building capacity – to be achieved. The majority of the Sultanate's Higher Education Institutions (HEIs) offer programmes in IT or Computer Science, with Sultan Qaboos University and the government's newly-transformed Colleges of Applied Sciences (formerly Colleges of Education), as well as many private universities and colleges, offering majors or full degrees in IT. Moreover, there are two exclusively technology-oriented colleges, namely the Middle East College of Information Technology, and the new Oman-German University of Technology (ESCWA, 2007).

In support of this ICT education provision in its schools and universities, the government has plans to use the internet to increase e-Government and e-education, and in January 2007, Omantel launched the Easy Learning Service to provide hundreds of electronic training courses in accounting, sales, marketing, and customer services. In February 2007 Omantel began offering sixty free hours of internet access to new subscribers, describing the initiative as part of a larger plan to spread the digital culture (Omantel, 2007).

According to the ITA (2007:34), the National IT Training and Awareness Initiative is a nation-wide project from the Information Technology Authority (ITA) aimed at developing ICT skills and capability and increasing ICT awareness within the government and the community. In achieving its goals for furthering ICT literacy and awareness levels within society, the initiative also aims to contribute to the development of a local ICT industry and to provide increased employment opportunities for the youth of Oman.

The initiative has been divided into two key projects – Government IT Training and Community IT Training. The ITA conducted a preliminary market investigation to evaluate internationally recognised digital literacy programmes and vendors to determine which would be suitable for these projects, and is currently running a pilot to evaluate two of these. The pilot is also evaluating an implementation model for national government IT training. Based on the evaluation of the pilot, a national level implementation plan will be devised as a cost-effective model for government IT training and awareness across the nation. The Government IT Training project aims to train and certify between 120,000-200,000 civil service employees over the three-year period 2007-2010.

2.2.4 Economic Development in Oman

Oman's currency is the Rial (RO), equivalent to about £1.20. The country's main revenue comes from oil and natural gas. In order to diversify the economy, the government is giving impetus to the development of various alternative industries (Ministry of Information, Oman, 2008).

Oman's 1970 Renaissance was assisted by the 1976 implementation of five-year development plans, which aim to enhance the citizens' well-being. The early five- year plans focused on meeting the basic needs of the country as a whole, and addressed the major requirements of: education, health, transport, and telecommunication. These development plans continue today underpinning Oman's economy as it progresses smoothly through consecutive and complementary programmes. For example, the Sixth Five Year Development Plan (2001–2005) emphasised the growth of fixed and mobile telecommunications and internet services (OCIPED, 2005); and the Seventh Five Year Development Plan, which is current (2006-2010), lays emphasis on upgrading the Information Technology (IT) sector by implementing the national strategy for Oman's Digital Society, with a stress on establishing the basis of e-Government, and also on expanding research and development activities to include most sectors of the national economy (ITA, 2007).

In 1995, looking to the long-term, the government formulated a 25-year development plan, entitled *Vision 2020* which had as its main focus: the development of a robust economy with professional leadership and a skilled labour force, the promotion of external economic relationships, and the diversification of Omani industry. The Vision sought to introduce a diversification strategy, in recognition of the need to reduce Oman's reliance on the oil sector, by replacing oil with natural gas, and identifying and promoting other local industries. Many of the Vision's goals were considered to be facilitated by ICT.

Another aim of *Vision 2020* was the privatisation of government-held resources, a move that includes divesting government properties and presenting these to the private sector for development, and Omantel, the sole provider for ICT services in Oman, is one such enterprise. The privatisation of Omantel was accelerated in 2001 when Oman joined the World Trade Organisation, which stipulated free trade and liberalisation of the communications sector as a condition of membership. Consequently, free trade zones and industrial estates to promote local and foreign investment have also been established. Through this initiative, investors are offered various incentives, such as 100% foreign ownership for any projects established within the free trade zone boundaries, customs duty exemptions in respect of imported or exported products, and the removal of restrictions on company profits or money transfer and investments (OCIPED, 2005).

Table 2.3 presents details of the socio-economic indicators for 2005.

Table 2.3: Socio Economic Indicators – 2005

Indicator	Value
Population (in 1000s) (Mid year estimates)	2508837
GDP at market price (Million. US$)	30,834
Average annual rate of growth of GDP	24.6
GNI per capita (US$)	11,692
Merchandise imports (Million. US$)	8,970
Merchandise exports (Million. US$)	18,692
Oil & Gas Revenues as a % of total government Revenue	78.8

Source: Ministry of National Economy (2007)

2.3 The ICT Sector in Oman

In keeping with those in the other GCC countries, Oman's ICT is still in its infancy, but it is developing rapidly (Al-shihi, 2006), and a survey conducted in 2001 by NFO MERAC, a leading regional market research organisation, indicated that almost 17% of the population shopped online, spending an average of £534 annually, and representing a trade value of £240 million (Ernst & Young, 2002). In fact, this volume of internet purchasing is greater than that of some developed nations, such as Australia, where only 10% of the population engaged in online shopping in 2001, and the average annual purchase was £143, with a trade value of £190 million (Ernst & Young, 2002).

2.3.1 Overview of the ICT Sector in Oman

Oman's ICT policies and strategies have been evaluated by the United Nations Economic and Social Commission for Western Asia (ESCWA, 2003) as having, on average, clear plans and objectives. The Commission noted that Oman has assigned a specific national entity to achieve its goals and allocated financial resources to ICT projects; and further, that good political leadership was exhibited in the production of a clear ICT strategy, a clear ICT operational plan, and strategies for both ICT research facilities and technology incubators. In addition, it observed the opportunities for improvement in Oman's ICT infrastructure, including further development of research facilities, telecommunications, and the technology incubator initiative (ESCWA, 2003).

This international evaluation is a reflection of the fact that Sultan Qaboos regards ICT as playing an important role in the development of the national economy. Indeed, it was as a result of such opinion that the National IT Committee was established in 1998, to supervise the development of the Sultanate's IT sector, and promote its benefits. This Committee is chaired by the Minister of National Economy, and has inaugurated a technical working group comprising representatives of the relevant departments, as well as a technical secretariat at the Ministry of National Economy (Ministry of Information, Oman, 2008).

Further evidence of the Sultanate's commitment to the creation of a robust infrastructure for IT and Telecommunication-based industries, is seen in the establishment of the IT Complex-Knowledge Oasis Muscat (KOM), which is attracting investment for the development of knowledge-based industries, upgrading the technologies of Oman businesses, and supporting young inventors (Ministry of Information, Oman, 2008).

Moreover, in May 2006, the Information Technology Authority (ITA) was established by Royal Decree, as a financially and administratively independent legal entity responsible for implementation of the Oman Digital Society strategy. The ITA monitors infrastructure initiatives and all Digital Oman-related operations. Via the Digital Oman initiative, the ITA is aiming to develop an integrated infrastructure that will ensure the provision of e-Government services for both the public and the business community. At the same time, it is aiming to create an environment in which knowledge-based industries can flourish, thereby generating new employment opportunities for young Omanis, attracting foreign investment, and enabling the effective use of IT and telecommunications (Ministry of Information, Oman, 2008).

It is planned that all government departments and institutions will eventually be linked to a secure data network and be able to provide e-Government data and services through a system of multiple outlets. This will create an operational and regulatory framework for e-administration and the country's IT and telecommunications infrastructure, including the data and network security system. Thus far, several initiatives have been launched by the ITA to develop the community's IT and telecommunications skills, including a Digital Oman Society awareness campaign. The trial phases of an IT training programme for civil servants in Muscat, Nizwa, and Sohar were introduced at the beginning of 2007, and in April of the same year, the ITA concluded the national e-payment gateway agreement with MasterCard Worldwide and Bank Muscat, that enables efficient e-commerce facilities via secure online payments. This service will operate alongside the e-Government services portal – the Ubar Portal (Ministry of National Economy, 2008).

As with elsewhere around the world, Oman's Telecommunication sector has witnessed rapid growth in recent years, and services are provided by three companies: Oman Telecommunications Company (Omantel), Oman Mobile Communications Company (Oman Mobile) and the Omani-Qatari Telecommunication Company (Nawras) (Ministry of Information, Oman, 2008). Omantel is one of the leading telecommunications companies in the GCC region, and has a significant role in the development of the sector, having upgraded its technology and services. In Oman, its contribution to the goal of creating a digital society has been major (Ministry of Information, Oman, 2008). Together with the ITA, Omantel has agreed to establish a single government network whereby data can be exchanged electronically and electronic transactions performed speedily and efficiently. Moreover, Omantel is providing the infrastructure for the project's government sites and establishing a management and support centre for the network. Following an agreement signed with the Omani E-trading Company, Omantel also assists in the promotion of e-commerce by providing solutions for electronic purchases and trading over the internet, thus reducing the costs of purchasing from suppliers (Ministry of Information, Oman, 2008).

In March 2007, an agreement (£9,000,000) was signed between Omantel and the Chinese company Huwawi, to provide between 100,000 and 180,000 new high efficiency, high-speed, multi-purpose ADSL broadband lines across the country. Additionally, Omantel has established Wi-Fi internet wireless hot lines in a number of shopping complexes and cafes; and in 2006, it installed around 1,850 WLL fixed telephone wireless system lines to provide coverage for the more inaccessible rural and mountain areas, thereby allowing over 160 villages in various parts of the country access to fixed telephone lines (Ministry of Information, Oman, 2008). By the end of June 2007, there were 257,235 fixed line telephone subscribers, and 2,135,539 subscribers to billed and prepaid GSM mobile services provided by Oman Mobile and Nawras. In contrast, only 65,611 subscribers to Internet services were documented (Ministry of National Economy, 2007).

It is acknowledged internationally that Oman's ICT infrastructure has achieved a number of standards (ESCWA, 2005). Notably, it has reduced disparities in standards of telecommunications service between rural and urban areas, there is now a limited telecommunication infrastructure and equipment, and other telecommunication improvements are in progress. Hence, while it is true that Oman is still in the early developmental stages with respect to its ICT services and infrastructure, the government is demonstrating strong commitment to the sector, and is currently undertaking a comprehensive planning and development programme for it, to benefit the whole of society (Al-shihi, 2006).

2.3.2 ICT Vision and Strategy

In November 1999, His Majesty Sultan Qaboos bin Said clearly proclaimed his vision for ICT development in His Royal Speech on the 29th National Day of Oman, saying:

> *"It is essential that Omani society - government and citizen – should realize the extent of the need to be prepared to encounter the challenges of globalization. We shall go through the improvement of our national capabilities, basing the economy on the firm foundations of international competitiveness and productivity, enhancing the performance of our institutions, and recognizing the value of knowledge, technology and research, which are the keys to progress."*

From His Majesty's vision, and following a Council of Ministers' decision in 1998, the National Information Technology Committee (NITC) was established to oversee the development of the Sultanate's IT sector and to work towards the implementation of the e-Government initiative. The Minister of National Economy headed this committee, which was replaced in 2001 by the IT TASK Force (ITTF) comprising representatives of the competent departments and bodies and focusing on wider IT related issues (Ministry of Information, Oman, 2008).

The ITTF had the realisation of a Digital Oman as its main vision, and has worked to develop a National IT Strategy together with a Road Map for its implementation. Through the ITTF's efforts, the Digital Oman Strategy was developed and approved in 2002. Subsequently the IT Executive Committee (ITEC)

was formed and operated in 2003-2006 to oversee the implementation of the Digital Oman Strategy (Minister of National Economy, Oman, 2006b).

Under the supervision of ITEC, the IT Technical Secretariat (ITTS) was established as the operational entity undertaking the country's plans to introduce e-Government, and from ITEC's initiative, the ITA was formed, in accordance with the recommendations of the Digital Oman Strategy, to formulate the Road Map (ESCWA, 2007).

The ITTS was then directed to develop a National Strategy for Oman, and the Task Force worked collaboratively with IT consultants Gartner Group on the matter. In May 2003, a strategy was produced, establishing an ICT framework and the following list of priorities and programmes (National Committee for Information Technology – Oman, 2003):

- advancing the telecommunications infrastructure and producing e-payments
- implementing both a government information and e-form portals
- developing a 'one stop shop' project intended for company registration and related matters
- enhancing information security, laws and legislation pertaining to electronic transactions
- improving IT awareness and reducing the 'digital divide'
- incubating diversified and comprehensive IT organisations
- developing an independent structure to carry out the implementation of the strategy.

The ITA works with the vision "to transform the Sultanate of Oman into a sustainable Knowledge Society by leveraging Information and Communication Technologies to enhance government services, enrich businesses and empower individuals" (ITA, 2006:2). Within this context, e-Oman, the Digital Society plan of action, was incorporated within the Road Map to include a range of initiatives related to the provision of government services through electronic channels, building ICT

capacity within various segments of the corporate sector and the public. The Road Map serves as a guideline for the ITA in defining and following up its annual business plan (ESCWA, 2007).

According to ESCWA (2007), Oman has adopted an integrated approach in developing its ICT strategy, which sets out detailed recommendations and a plan of action to realise these objectives. Following this strategy, the ITA envisages the transformation of the Sultanate into a sustainable knowledge-based society by leveraging ICT to enhance government services, enrich businesses, and empower individuals. Some of the key initiatives of the ITA in its efforts to realise a digital Oman are as follows:

- Setting up a unified e-Government architecture including IT infrastructure, applications and shareable databases of services and public information;
- Creating an IT governance framework, standards and guidelines for the ICT sector infrastructure, and a security framework;
- Enabling customer-centric e-Government services for both individuals and businesses and streamlining them within the common IT infrastructure;
- Developing plans and policies for the training and development of human resources in IT while enhancing existing competencies;
- Deploying ICT education and training programmes suitable for various segments of society, based on systematic studies and comprehensive planning.

2.3.3 Building Confidence and Security in the Use of ICT

According to the Ministry of National Economy, Oman (2003), legislation was promulgated in March 2002 to enable the appropriate development of the ICT sector. The legislation included the establishment of the Telecommunications Regulatory Authority (TRA) to implement and monitor a regulatory framework for the sector and to facilitate its development. The TRA is currently responsible for issuing licences for internet and mobile service providers and will extend its operation to cover fixed infrastructure and, later, value-added services. In addition, a Real Time Gross

Settlement project initiated earlier by the Central Bank of Oman in collaboration with Hewlett Packard, is being developed to aid in the establishment of an e-payment infrastructure in the country (AME Info, 2005).

According to the Omantel (2007), Omantel filters any immoral, illegal and undignified material available through its Internet connectivity. This practice is in line with many international Internet Service Providers (ISPs), that block sites according to content, in particular pornographic sites, and others that encourage hacking. In the case where a potentially useful site has been misclassified, Omantel provides the means for communication through email, and errors are corrected within 72 hours. The Sultanate prohibits pornography in all its forms from entering Oman, and items subject to confiscation at the airport include compact discs, video and audio-cassettes. Furthermore, the ESCWA (2007) notes that the TRA works in accordance with the Telecom Act (Royal Decree No: 30/2002) which has provisions regarding the use of any electronic means for communication, including radio waves. The above Act also penalises violations by way of misuse of any telecommunication medium under the control of the TRA, with high penalties and imprisonment. Online transactions for true e-commerce are expected to begin after the national e-payment gateway is operational.

In 2002, Murphy found that existing legislative structures did not provide sufficient security for e-Oman's growing ICT sector (Murphy, 2002). The ITTF's strategy is to set a solid security framework with the adoption of appropriate and enforced legislation and regulations to support users' confidence in their online transactions and activities. According to the ITA (2007), the Security Policy Framework drafted by the ITA has been derived based on a structured collection of independent guidelines, processes and practices. The framework aims to ensure the protection of information assets from unauthorised access to, or modification of, information, whether in storage, processing, or transit. It is based on existing, accepted standards, guidelines, and collections of practices and reflects the behaviours of an initial community of high performing organisations. Both business and

government organisations can implement the framework with practices they choose or are required to use for their market sector and country.

According to ESCWA (2007), the forthcoming electronics transactions law addresses key issues such as: validity of e-transactions, intellectual property protection, taxation and data protection, legal recognition for electronic signatures, admissibility and evidential value of data messages, electronic payment validity and jurisdictional matters, issues of electronic messages, and protection for privacy and security. The law, drafted by a professional law firm, has been reviewed by the ITA and is being reviewed by the legal authorities. Oman has its laws in accordance with the IPR (Intellectual Property Rights) laws along with its accession into the World Trade Organisation's TRIPS (Trade Related Aspects of Intellectual Property Rights) agreement. Infringement of copyright is punishable by two years' imprisonment or 2000 RO (c. £2,666) fine. A computer program can be protected as a literary work and so the copyright includes the right to control the reproduction and translation of the original program code into another computer language. It also includes the compilation and decompilation of programs.

2.3.4 Infrastructure

Clearly, the success of the Digital Oman initiatives depend on how well society is progressing in its transformation to a digital one, and on the successful implementation of the ICT infrastructure and the associated telecommunication projects. In this respect, it is readily observed that the growth of the telecommunication sector has been rapid due to government efforts with respect to privatisation and liberalisation (ITA, 2007).

According to ESCWA (2003), ICT infrastructure in Oman is described as achieving the following standards: firstly, Oman has successfully reduced differences in standards of telecommunications service between rural and urban areas, secondly, telecommunication infrastructure and equipment is available on a limited scale, and thirdly, telecommunication improvements are underway.

In addition, ESCWA ranked Oman's telephone density as being average, the standard of its international telephony and internet structural links were classified as developing, and the country's internet penetration was also average. A year earlier, however, Ernst & Young (2002) considered Oman to have a 'low infrastructure readiness' and recommended that the government should do the following as a matter of priority: 1) develop e-commerce laws, robust security measures, and a B2B payment infrastructure; 2) establish an independent telecommunication regulator to encourage competition among the ISP market; and 3) increase awareness of e-commerce benefits within the private sector.

The Ministry of National Economy, Oman (2003) reported that by the end of April 2003, there were 235,105 fixed phone lines in Oman, 228,483 mobile telephone subscribers, 277,759 prepaid mobile subscribers and internet subscribers exceeded 50,000 , as shown in Figure 2.4:

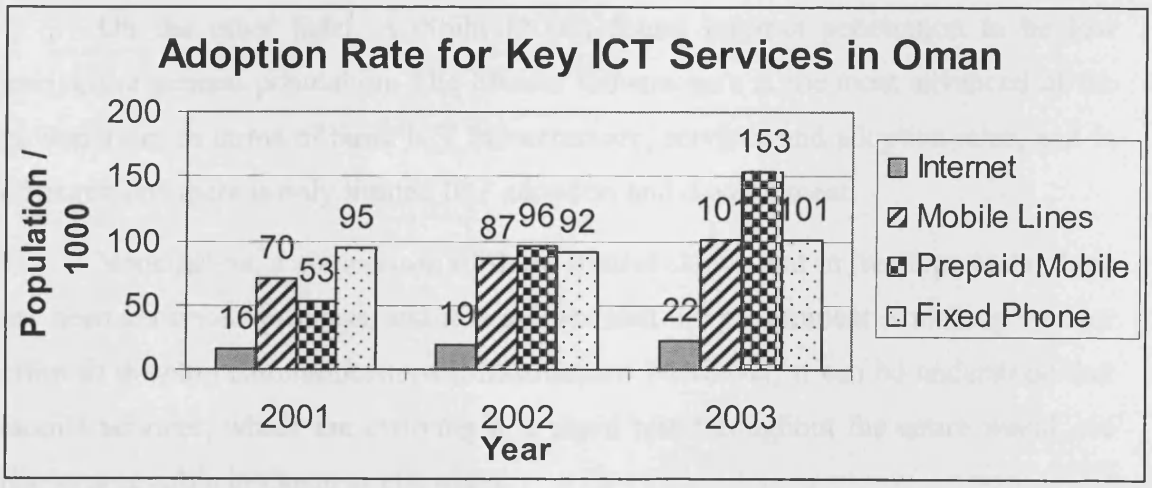


Figure 2.4: Adoption Rate for Key ICT Services in Oman

According to ESCWA (2007), the TRA reported that at the end of the first quarter of 2007 there were 271,411 fixed phone lines in Oman, 2,026,301 mobile telephone subscribers, 1,765,786 prepaid mobile subscribers, and internet subscribers exceeded 65,678; these totals differ considerably to those in the situation illustrated in Figure 2.4. More detail appears in Table 2.4, below, which indicates the current penetration levels of ICT services in Oman.

Table 2.4: Current Penetration Levels of ICT Services in Oman

Category	Total
1. Number of Fixed Line Subscribers	271,411
- Post paid subscribers	225,918
- Pre paid subscribers	38,649
- Card Pay phone	6,844
2. Number of Mobile Subscribers	2,026,301
- Post paid subscribers	260,515
- Pre paid subscribers	1,765,786
3. Number of internet Subscribers	65,678
- Dial- up subscribers	48,827
- DSL subscribers	15,498
- Leased Line Subscribers	272
- Internet (Others)	1,081

Source: Telecommunication Regulatory Authority (TRA) – End of First Quarter 2007

On the other hand, Al-Shihi (2006) found Internet penetration to be low among the general population. The Muscat Governorate is the most advanced of the governorates in terms of basic ICT infrastructure, services and adoption rates, and in other regions there is only limited ICT adoption and development.

Nonetheless, a comparison of these figures shows that in just four years, there has been enormous progress, and it is evident that the government is making a major effort to develop communications infrastructure. Moreover, it can be understood that mobile services, which are evolving at a rapid rate throughout the entire world, are just as accessible in Oman as elsewhere.

In its consideration of the Seventh Five Year Development Plan (2006-2010), ESCWA (2007) described the main directions as including the following:

- Upgrading the Information Technology sector through implementing the National Strategy for the Oman Digital Society with special emphasis on establishing a sound basis for e-Government;
- Giving special priority to the research and development activities in the public and private sectors.

ESCWA (2007) also reported that the wireless connectivity for broadband services is available for adoption in Oman, and that both mobile communication service providers offer a wireless connectivity to access the internet, using a WiFi-enabled laptop, PDA or mobile device. This brings the main advantage of being able to access one's office from wherever one might be, attend to emails, and conduct meetings and presentations remotely, thereby increasing productivity and offering flexibility.

OmanTel provides a broadband wireless service – Ibhar – that enables internet access in public places, such as cafes, hotels, shopping malls, airports, and restaurants, where Ibhar Prepaid Card holders are able to go online. Nawras also supports broadband connectivity through a broadband mobile network based on EDGE technology, which allows access to all services from making and receiving calls, sending and receiving SMS and picture messages, and downloading games and ring tones, to accessing the internet through wireless connectivity. The Nawras Internet can also be used outside Oman, in places where Nawras provides a Data Roaming service, although in those instances the Data Roaming tariffs apply (ESCWA, 2007).

At the moment, OmanTel's Ibhar WiFi hotspots are mainly in Muscat, but are expected to rapidly spread to other key locations across the country. At the ITU Regional Workshop on IP Based Regulations Awareness that was held during May 2007 in Oman in association with the TRA, the potential of WiMax (Worldwide Interoperability for Microwave Access) was discussed, from which it emerged that wireless data can be provided over long distances, through point-to-point links. This will enable the user to surf the internet on a laptop computer without connecting the laptop to a wall socket. WiMax services are currently being evaluated for their suitability to local requirements (ITA, 2007).

2.4 e-Government Services in Oman

In the ESCWA (2003) assessment of the use of ICT applications in government organisations, which was based on the following criteria: computerisation of public agencies, digitisation of information, e-Government planning usage, and e-

procurement, Oman was ranked at maturity level 2, indicating that strategies had been set but that at the time of the report, there was incomplete planning/implementation underpinning these strategies. The study found that e-Government organisations in Oman lacked interactivity, being primarily focused only on the delivery of information.

Over the past decade most governments around the world have been moving to a situation where they provide at least some services to their citizens via the internet, and this has been achieved with varying degrees of success. Included in those that have made efforts in this regard are some of the Arab governments, some of which are still at the beginning of the road, as is the case in the Sultanate of Oman, some have made modest progress as for example, Egypt, and yet others have achieved remarkable progress, as is the case in Dubai (Naima and Muhammad, 2005).

The e-Government survey report 'From e-Government to Connected Governance', prepared by the United Nation's Department of Economic and Social Affairs Division for Public Administration and Development Management, indicates that all governments around the world are moving forward in e-Government development and countries have advanced from e-Government applications to a more integrated connected governance stage. According to the United Nations 2008 e-Government Readiness Report, Oman has jumped 28 points in the ranking (with an e-Government readiness index of 0.4691) to 84th position in 2008 from 112th in 2005 (United Nations, 2008). This considerable leap signifies the acceleration of e-Governance-related activities spurred by the public and private sectors of the Sultanate, and as reported by The Times of Oman (2008), the move to automate business processes and re-engineer current processes in order to deliver services through modern means that can be reached easily by the public, is much in evidence. E-Oman has given a special thrust in the way public sector organisations reach out to the public with information, interaction and higher levels of awareness.

Government organisations exhibit considerable variation in their commitment to implementing e-Government. The following paragraphs describe Oman's e-Government initiatives in detail:

*The Royal Oman Police (ROP) (**www.rop.gov.om**)*

Users of this website can check for Driving Violations and Visa Status online using details of their ID and driving licenses. In January 2004, the Directorate General of Civil Status, part of the ROP, introduced a new civil status system (Civil Register) to collect personal information on births and deaths, marriages and divorces. The system is supported by a multifunction ID smart card with an embedded electronic chip that features biometric recognition. The card is intended to provide instant access to the holder's civil status details and greatly improves the government's administrative processes. The ID is planned to be used for financial and personal transactions with government, and specified transactions with the private sector. The smart card's use may be extended to other Ministries such as a medical card for the Ministry of Health, or an employment card for the Ministry of Manpower. The ROP also offers online download for its application forms regarding licences, passports and visas (Directorate General of Civil Status, 2005).

In addition to the above initiatives, the ROP utilises the Oman Arab Bank smart card system for payments of customs fees at Sultan Qaboos Port and Seeb International Airport (Alwatan, 2004). Users who are customers of the Oman Arab Bank can apply for a smart debit card at the bank and are charged as required from another of their accounts at the bank. The customs fees application and the smart card are then submitted to the ROP employee at either Sultan Qaboos Port or Seeb International Airport, details entered and the transaction authorised by the user. The ROP collects these fees remotely, using a modem to return the funds to its Oman Arab Bank account. ROP staff are trained in the use of this system (Al-Shihi, 2006).

*Muscat Municipality (**www.mctmnet.gov.om**)*

Muscat Municipality is a leading organisation in e-Government, with online information services for residents on such matters as building permits, rent contracts, and municipality licences; clients can also pay online using the Mobile-Rial (M-rial); an e-currency for municipal services. Internet cafés and service bureaux are encouraged through financial incentives to participate in this e-currency initiative. The municipality is pursuing arrangements with local banks regarding electronic

transfers of funds and plans to introduce e-payment through credit cards in the near future (Al-Shihi, 2006).

*Ministry of Manpower (**www.manpower.gov.om**)*

The Ministry has introduced a job bank employment system registering both job seekers and private sector vacancies, thereby using e-Government throughout Oman to facilitate job hunting. Job seekers and employers also have the Ministry's website to place details about themselves, or access the information they require. Additionally, the Ministry has adopted a system to track all private sector employees' performance and attendance. This system is connected to the Public Authority for Social Insurance to ensure that the safety and rights of employees are secure (Al-rashdi, 2004).

*The Ministry of Commerce and Industry (**www.mocioman.gov.om**)*

The Ministry has initiated a one-stop shop project for company registrations as part of the National IT strategy produced in May 2003. The process of registering a company usually requires input from different government parties, such as the Oman Chamber of Commerce and Industry, Muscat Municipality, the ROP, the Ministry of Commerce and Industry, and the Ministry of Manpower. Registration of a company is complex due to administrative imperatives and geographical separation, although representatives from the different registering bodies were initially collocated. To facilitate registration, the process required for each government organisation is being placed online, at a total cost of $US2.6 million. The project was awarded to GBM (IBM branch in the Gulf region) in May 2005. In addition, the Ministry also has an agreement with the Oman Arab Bank to accept payments through the bank's smart card system. The bank's customers can now make payment for the Ministry's services via their bank smart cards (Al-Shihi, 2006).

*Oman Chamber of Commerce and Industry (**www.chamberoman.com**)*

The Chamber provides a good and secure form of Government to Business (G2B) applications in which businesses can register, access, and share information with other private organisations. For a fee, businesses can register online and gain

such services as the Chamber's pdf format publications, an entry in the Chamber's trade directory with hyperlink to the business' own website, access to industry and economic reports, join industry forums within the Chamber, access notification of current tenders in selected industries, and undertake online training programmes (Al-Shihi, 2006).

*Muscat Securities Market (**www.msm.gov.om**)*

This is an informative website detailing the security market's structure, its regulatory environment and the securities and other products on offer. The security market offers trading information on each security or index, including real time offers and trades. It also has provision for traders to register and receive email and SMS alerts about selected companies' security prices, news and activities (Al-Shihi, 2006).

*Ministry of Education (**www.moe.gov.om**)*

Oman has contracted Cisco Systems to build a wireless local area network (WLAN), which, in the first phase, will connect 200 government schools. This network will provide students with internet access and e-learning programmes, particularly self-paced learning and access to lessons online. Implementation of this significant project was undertaken within five months, including three months for testing. The system is based on "Cisco Aironet 1200 Series Access Points and Linksys WMP546 Wireless PCI Network Cards, which offer 11 and 54Mbps connectivity and optimize secure encryption for improved security" ESCWA (2005:11). The Ministry also offers secondary school students the option to access their semester results online through the Ministry website or to register online and receive the results on SMS. The site has information on its schools in the Sultanate, contact information for Ministry representatives, and a downloadable news and information service (Al-Shihi, 2006).

*Ministry of Civil Service (**www.mocs.gov.om**)*

This Ministry has introduced a central human resource database for all public sector employees in government organisations. The system holds employees' data on their recruitment, promotion, retirement and vacation entitlements. Later, it will be

linked to the Ministry of Manpower job bank (described earlier) in order to broadcast public sector vacancies into the broader job market system (Al-Shihi, 2006).

*Public Establishment for Industrial Estates (**www.peie.com**)*

This is a part of the Ministry of Commerce and Industry. The website contains information about the organisation's industrial sites throughout the country, promoting them for local and foreign investment. It has an online register to facilitate information flows for suppliers and contractors. Estate tenants have a private section where they can log on to view their factory details, invoices, payments and utilities accounts.

Other governmental institutions have built informative websites that provide useful information and reports for users. They also contain useful directories for contacts, FAQs, and in some cases information pertaining to tenders and available job vacancies (Al-Shihi, 2006).

2.5 m-Government Services in Oman

From the literature review in Chapter Three, it will be shown that mobile subscribers are increasing rapidly throughout the world in general, and a recent estimate has indicated that over half of the Omani population now has mobile devices (Ministry of National Economy, Oman, 2005); the mobile infrastructure in Oman currently covers about 95% of the country (Oman Mobile, 2007a). Consequently, it can be argued that it is better for the Sultanate of Oman to make a major effort to develop a communication infrastructure for mobile services. Indeed, as noted by Kushchu and Kuscu, (2003:2) *"How about the implications for those countries that have not yet started or are at the early stages of e-government strategy and implementation processes? These countries may have more advantages depending on type of the issues faced by the governments. In developing countries mobile government applications may become a key method for reaching citizens and promoting exchange of communications especially when used in remote areas"*. As noted already, mobile services are continually improving, and it is this development which is encouraging governments worldwide to contemplate the transition to m-

Government services. Coupled with this general technological development, the World Bank (2006), documenting changes between 1995-2006, shows that the overall ICT sector has improved significantly in Oman and that its improvement rate was even better than the world average, which bodes well for the future of m-Government services in the Sultanate. Furthermore, and according to the latest analysis of the sector, the performance indicators used indicate a continuous improvement. It is, nonetheless, true that the Research Council of Oman (2007) has reported that ICT service penetration throughout the country remains poor and that great efforts are needed to achieve the desired objectives, but there is much evidence that such effort is being given to the matter. In this connection, Al-Shihi (2006) recommended that future work in the Sultanate of Oman could test the validity of findings on m-Government and m-commerce initiatives. Thus, several organisations in Oman have started to open mobile channels with their clients. This section outlines the major m-Government services in Oman:

Muscat Municipality

In co-operation with Oman Mobile, one of the mobile operators in the country, Muscat Municipality has developed and recently introduced a leading m-Government application. It is an m-Parking system which enables motorists to pay their parking fees in the Muscat area using their mobile phones (Muscat Municipality, 2007; Alwatan, 2005a). Drivers send details of their vehicle registration number and the parking time required, via SMS, to the short code number '90091'. The driver then receives a confirmation message for the reservation with details of the time allocated and the parking fees are calculated and added or deducted (prepaid users) to the motorist's phone bill. Five minutes before the time period expires, the municipality sends a reminder SMS message to the motorist asking him/her either to move the vehicle or pay for more time (Alwatan, 2005a; Times of Oman, 2005).

The Royal Oman Police (ROP)

The Royal Oman Police (ROP) initiated a mobile service allowing drivers to inquire and receive information about their traffic offences. Motorists are required to send a message with their ID and vehicle details to '3004' and then receive

information on the number of traffic offences and amount payable. The ROP plans to enable the system to notify drivers of their offences as soon as they happen, which will be useful to parents and business owners in particular (Al-Shihi, 2006).

The Ministry of Education

The Ministry of Education now sends the final general certificate results to students via SMS. Alternatively, students can inquire about their results by messaging their seat numbers to '92020' after which they receive their final marks (Oman Mobile, 2007b). In addition, the Higher Education Admission Center now informs students of their admission status in different institutions via SMS allowing them to accept or reject the offer by messaging back their choice (Al-Shihi, 2006).

Muscat Securities Market

Muscat Securities Market has developed a paid service that enables investors to receive regular updates on market and stock alerts via SMS (Oman Mobile, 2007c). The service also enables users to get an SMS every 30 minutes on market movers - top winners, losers and most active companies (Oman Mobile, 2007d).

The Civil Aviation and Meteorology

The Civil Aviation and Meteorology in co-operation with Oman Mobile, has introduced a weather forecast service for most towns in Oman that allows users to receive weather reports on their mobiles (Oman Mobile, 2007e). Other public organisations have also started to send bulk messages to citizens informing them about certain activities and events. For example, the Public Authority for Social Insurance has begun a public campaign to publicise its services and their perceived benefits to clients. One of the means used was to send advertising SMS to all residents in Oman. Another example is in the Oman Tender Board and Ministry of Manpower where they now send notification messages to clients about their transactions and/or other different issues such as new tenders and job vacancies (Al-Shihi, 2006).

Higher Education Admission Centre

From the initial plan of the HEAC establishment, it became apparent that the Centre would not be able to operate efficiently unless it used latest technologies. The

Centre depends on the Electronic Higher Education Admission System to allow students to apply online. Every year, more than 50,000 apply online through the HEAC admission system. This made the registration process much easier since student can log into the HEAC website at their nearest internet access, and start the registration process. Moreover, this year, SMS capabilities have been added for the registration process, thereby allowing students to perform most of the functionalities that are provided by the internet. According to the Research Council of Oman, (2007) report, a successful example of using ICT to develop an inclusive information society is the HEAC. All students at the secondary school level are trained and required to access the services through the internet or via SMS through mobile telephones.

Ministry of Civil Service

The system holds job-seeking data that are linked to the Ministry of Manpower job bank in order to broadcast public sector vacancies into the broader job market system. Interested people send a text message to '92022' and write in the message 'recruitment' and receive their final acceptance via text message.

2.6 Conclusion

This chapter has focused on providing an up-to-date picture of the ICT sector in Oman. In setting the scene, it has presented some general contextual information about the Sultanate, namely details of its governorates and regions from which it was seen that the country has great disparities between rural and urban areas, and hence, the provision of ICT facilities.

It has been shown how, despite being only in the early stages of development, Oman's ICT sector has been receiving substantial support from the government through a formal strategy including committees and organisations with varying responsibilities for developing and monitoring the services which are being created. Moreover, it was also seen that in comparison with other developing countries, Oman's efforts are greater, resulting in a swift move up the e-readiness index in just four years. This bodes well for Oman's vision of e- and m-Government. The various e-Government and m-Government initiatives have also been detailed.

Chapter 3
e-Government and m-Government

e-Government: Concept, Theory and Practice; m-Government: Concept, Drivers and Adoption

3.1 Introduction

This chapter provides a review of the literature regarding e- and m-Government. It includes definitions for each, and explores their observable benefits through current available examples, and the relationship between the two,

The Government is an institution that has provided services to its citizens since ancient times. In the past governments provided the primary tools for citizens, but after economic development they have extended their provisions to water, electricity, telephone, education, and health care. In order to provide these services, governments appoint citizens and establish groups of ministries to make policy on the best way to deliver, bearing in mind the need to be effective and efficient.

However, with the great population increase due to improvements in health services and lower death rates, the demands for public services have soared, and although governments have recruited more employees and created more departments, this has not solved the problem. Indeed, problems in the area have increased because of the law of diminishing returns, and the growing number of bureaucrats (Heeks, 2001). Even today, in most citizens' eyes, a government service is associated with delay, inefficiency and ineffectiveness.

The private sector, in contrast, is perceived differently, since changes have taken place, which mean that with the help of new information technology and the internet, e-commerce can deliver services to customers quickly, efficiently and accurately. The changes in the private sector and the development of democracy increase the demands of citizens on their governments (Ho, 2002), and in order to satisfy these demands and to improve their standards, governments begin to search for ways of serving citizens more effectively. In this respect, the private sector has set a

good example for governments that have now begun to serve citizens by electronic means, thereby bringing about the birth of e-Government.

3.2 e-Government: Concept, Theory and Practice

e-Government as a concept has only emerged in the last decade as a result of the introduction of e-Commerce to government operations. Governments have been using technology for forty years and are now moving from IT to ICT. The evolution from IT to ICT has increased the ability of e-Government to improve the efficiency of services provided to citizens, reduce costs, and simultaneously encourage citizen access to the democratic process.

However, as e-Government is still in its infancy, effective implementation cannot be taken for granted, and financial, organisational and cultural issues represent the potential for serious obstacles in this respect. Hence, if e-Government is to be successful, the approach to its construction and deployment must be based on well-considered principles, and where it exists, on appropriate theory.

3.2.1 Defining e-Government

There are several definitions of e-Government which express the different concepts involved: "*Electronic Government*" shows its relationship to electronics, "*On-line Government*" expresses the immediate processing contact, "*Digital Government*" focuses on the use of digital code, and "*Dot Government*" emphases the government's use of the internet. In a national study by Hart-teeter for the Council for Excellence in US government, it was noted that *"If the 1990s were the Dot.Com Decade, the first decade of the 21st century may well come to be seen as the Dot.Gov Decade"* (The Performance Institute, 2002:13). This comment may sound a little exaggerated but it did point out the significant phenomenon of the rapidly-spreading development of e-Government around the world.

Furthermore, there are some who view e-Government as a technical society, one output of which is electronic service – the submission and delivery of services and information to citizens electronically. Others consider it to operate in the area of

creative work, with the government's measures being intended to reinvent business and governmental actions through new ways of integrating information and providing access to it through websites, by allowing greater participation in the registration process, procurement and service performance (Atallah, 2001).

At present, the vast majority of definitions focus on the role of ICT in facilitating the delivery of public services to the government, companies and citizens (West, 2004).

Heeks (2001) perceives e-Government as a process of reform targets in the government sector, and as the basis for determining the responsibility of employees on the grounds that information is more than technology in determining liability. On the other hand, Turban et al. (2002:15) defines e-Government as *"the use of information communication technology in general, and e-commerce in particular, to provide citizens and organisations with more convenient access to government information and services"*. This definition underlines the close relationship between e-commerce and e-Government and identifies both ICT and e-commerce as very important components of e-Government.

Other definitions emphasise the importance of e-Government in increasing the participation of citizens in the democratic process. For example, Carbo and Williams (2004) define it as the use of information technologies (and in particular the internet), to deliver government information and services and involve citizens in the democratic process and real-time government decision-making in a much more convenient, customer oriented, cost-effective, and potentially different and better manner.

The OECD (2003:23) defines e-Government as *"the use of information and communication technologies, and particularly the internet, as a tool to achieve better government"*. Similarly, Choudrie et al (2004:108) defined e-Government as an *"Internet driven activity that improves citizen access to government information, services and expertise to ensure citizen participation, and satisfaction with e-government process"*. The World Bank Group (2004:8) defines and describes the benefits of e-Government as *"The use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that*

have the ability to transform relations with citizens, businesses, and other arms of government". This definition explains the various uses and benefits of e-Government and how they interact with citizens.

In summary, e-Government is concerned with the use of ICT to improve not only the internet administrative operations within the public sector, but also the external services and relationships between government and citizens/businesses. The internet and mobile computing are the tools of e-Government used to facilitate access for citizens quickly in almost real time, especially if they use mobile computing.

e-Government can be over-simplistically perceived as merely placing citizen services online, but in its broadest sense it refers to the technology-enabled transformation of government. *"E-government is governments' best hope to reduce costs whilst promoting economic development, increasing transparency in government, improving services delivery and public administration, and facilitating the advancement of an information society"* (World Bank, 2006:33).

From these definitions it can be concluded that e-Government is a system that literally engages and covers every entity in its area of authority (i.e. citizens, businesses and public organisations). In other words, depending on the services offered, its scope includes everyone in its jurisdiction. In some instances, its scope can surpass jurisdictional boundaries, where external services to people and businesses, such as tourism and foreign investment services, are provided. Clearly, these varied definitions have shown that there is still no agreed concept of e-Government because some studies in the area view e-Government as an ICT project to be implemented, while others take into account intangible factors such as culture, politics and other social issues that have proven to be important factors in the success of e-Government projects. In the Researcher's opinion, e-Government should be understood as the use of ICT to make the access, delivery, and transactions of government work, easier, simpler and more automatic, in order to improve the efficiency, effectiveness, transparency and accountability of a government so that it can truly benefit its citizens, business and employees.

3.2.2 Classification of e-Government Activities

e-Government provides those with its jurisdiction the means to deal with it on an electronic basis. These services on offer in this venture vary depending on users' needs and ICT capacity, and given the broad range of such needs and abilities, different applications of e-Government have naturally developed. According to the World Bank (2006) and UNDP (2003), e-Government activities can be classified into four categories as detailed below:

Government to Citizen (G2C)

This type of e-Government activity deals with the relationship between government and citizen. Government to Citizen (G2C) activities allow citizens to access government information and services. For that reason, public organisations publish information and contact details and offer regular services online. The ultimate aim of this application is to give users different options and communication channels for government transactions. This option includes basic citizen services such as: ID card and passport renewals, ordering of birth certificates, and database libraries. An example of this is the Government Online (GOL) project in Canada that provides a client-centred service delivery across different delivery channels such as via the internet, in person, and by telephone or mobile (OECD, 2003). Another example describes a single Point Tax Payment System that was developed in Mauritius to allow taxpayers to lodge their income taxes (Heeks, 2003).

Clearly, the point of e-Government is to serve the needs and life situations of citizens online, and hence, it is essential to construct systems that are designed for that purpose rather than simulating government departments online (NOIE, 2003). In this respect, the Australian Government Information Management Office (AGIMO, 2004: 46) believes that *"Maximum value can be attained from citizen-centric e-government systems that follow life events, rather than being limited by agency boundaries."* Mexico's web portal (www.gob.mx) shows a good example of such an approach, since it includes more than 1,500 informative and transactional services from over 100 government institutions (OECD, 2003).

Government to Business (G2B)

This type of e-Government activity deals with the relationship between government and the private sector. It enables businesses to conduct online transactions with government, thereby reducing bureaucracy and simplifying regulatory processes, as well as helping the government and businesses to become more competitive. Poon (2002) has argued that G2B applications should be given the same level of attention and importance as those of G2C, and that government must work closely with businesses to develop effective e-Government systems, and avoid system incompatibilities. Such close liaison enables the government to benefit from businesses' online experiences in areas such as e-marketing strategies. Moon (2003) shares this point and strongly recommends that state governments in the USA try to establish strong collaborative relationships with vendors. Obviously, the need for businesses to transact with government is important, since they, like individuals, must comply with regulatory requirements, such as: renewing registrations, lodging taxes, downloading tender documentation, and many others. Moreover, e-Government allows external business inquiries to be managed effectively, one example being the tourism portals that bring information to domestic and foreign businesses.

Government to Government (G2G)

This type of e-Government deals with the interaction between government departments in the effective delivery of services to themselves and citizens. G2G applications are intended to improve collaboration and co-ordination between government players, and hence improve inter-government operations (Huang et al, 2005). They facilitate the sharing of databases, resources and capabilities and therefore enhance the efficiency, effectiveness and processes. In Oman, for example, all government departments and institutions will eventually be linked to a secure data network and will supply e-Government data and services through a system of multiple outlets, including the data and network security system (Ministry of Information, Oman, 2008). Pizzella (2005) describes a G2G e-Government plan from the USA (GovBenefits.gov) that maintains a network and co-ordinates inputs from many central and state governments to help users find out their eligibility for a range of

benefit programmes. Currently the network includes over 400 federal benefits programmes and over 600 programmes from all fifty states.

Government to Employee (G2E)

This type of e-Government is involved with the internal interaction and relationship between government and its employees. The information and services offered by government institutions to employees and the channels by which employees interact with senior management are represented by G2E. New Zealand has made headway in this respect by developing and enhancing intranets that allow for effective interaction between government and its employees (E-government Unit, 2004). Among the provisions are electronic document management systems, data sharing with other agencies, and in some agencies, mobile computing solutions to help employees on the move.

The situation in the USA is considered to be less innovative; however, it has been noted by Mahler and Regan (2003) that federal government is slow in its intranet development and offers few employee services online, despite the user-friendly progress in public websites. Commenting on the increasing popularity of G2E, Abramson and Morin (2003) consider this to be a challenge to federal government in the USA. Another possible obstacle to the widespread adoption of G2E applications is in the relatively small number of employees in comparison to external citizens or business, as was found by Ho et al (2005) who noted that despite its success in G2C and G2B, the Hong Kong government has not been able to increase its adoption rate for G2E applications. In the Researcher's opinion, G2E should not be difficult to formulate and put into practice, and once established, it can save time for both employees and government agencies.

3.2.3 Goals and Objectives of e-Government

As the literature shows, the various government initiatives internationally identify different goals and objectives. These differences mainly result from the focus of the initiative in question, and are different depending upon whether they are being formulated by a global institution such as the World Bank, or the United Nations

Development Programme, or by a government department for the benefit of its citizens, its employees, or the private sector. What is clear, however, is that the objective of e-Government is to benefit citizens, businesses and employees (Deloitte Research, 2003). In his exploration of the concept of e-Government, Arbi (2001:15) found the aim to have two phases: *"In the first phase, e-government is an initiative designed to improve public services through the internet; advantage in more phases, e-government should allow for two-way communications between the administration and the people, and knowledge management, and support for electronic commerce, and even the so-called 'democracy click'"*.

The World Bank (2004) states that the objectives of e-Government are to provide: very good service delivery to citizens, improved service provision for businesses, transparency, empowerment through information and efficient government. According to the UNDP (2003) there are five goals of e-Government: improving the quality of life, improving the productivity and efficiency of government agencies, creating a better business environment, providing online services for the customer, and strengthening good governance and broadening public participation.

To take a particular example, the goals of e-Government in the Republic of Kenya are to make the government more results-oriented, efficient, and to enable citizens to access government services through the use of internet and other channels of communication, such as mobile phones and WiFi. The specific objectives of e-Government in Kenya are: firstly, to improve collaboration between government agencies through a reduction in the duplication of efforts and enhance efficiency and effectiveness of resource utilization; secondly, to improve Kenya's competitiveness by providing timely information and delivery of government services; thirdly, to reduce transaction costs for the government, citizens, and the private sector through the provision of products and services electronically; and fourthly, delivering e-Government services for citizens (E-Government in Republic of Kenya, 2004).

The IDABC E-government observatory (2005) identified the key objectives of e-Government in Portugal as:

- Increasing citizen satisfaction with public services
- Achieving increased efficiency
- Promoting citizen participation in the democratic processes through better dissemination of information
- Increasing the transparency of the bureaucratic structure, thereby increasing citizen trust in public services
- Achieving international recognition of the quality of Portuguese e-Government

Furthermore, Dong et al (2004:68) stated the following objectives for e-Government in China:

- Helping to achieve the policy of reform and open e-Government
- Delivering e-Government services
- Transferring government functions
- Improving working efficiency and the effectiveness of supervision
- Increasing the rationality, harmony and democracy of government work
- Improving the overall capability of implementing administrative power

Similarly, in a developing country like the Sultanate of Oman, the Ministry of National Economy, Oman (2003), has identified the following goals:

- To develop a national database and link it to the global infrastructure
- To utilise ICT to improve the flow of relevant data and services to public and private organisations
- To support the private sector's commitment and resources in the sector
- To formulate a national IT strategy
- To advance the telecommunications infrastructure and produce e-payments
- To implement both government information and e-form portals

- To develop a 'one stop shop' project intended for company registration and related matters
- To enhance information security, laws and legislation pertaining to electronic transactions
- To improve IT awareness and reduce the 'digital divide'
- To incubate diversified and comprehensive IT organisations
- To develop an independent structure to carry out the implementation of the strategy

From the different objectives highlighted in this section, it can be seen that the World Bank model emphasises, primarily, the efficiency of services, whilst the UNDB model is comprehensive and focuses more on the efficient delivery of services. On the other hand, the model of e-Government in the Republic of Kenya leans towards improving services to citizens and the private sector, and in Portugal the aim is to increase citizen satisfaction and transparency of bureaucratic processes, whilst in China the goal is to improve the efficiency and effectiveness of government functions. The Sultanate of Oman model aims to develop infrastructure and improve services to public and private organisations.

3.2.4 Benefits of e-Government

From the above, the major benefits of e-Government may be seen to be: improving the delivery of services to the public and the private sector, and improving public administration and reducing costs. Various authors argue that the use of ICT, which is the basis of e-Government, has the potential to offer a wide range of benefits to government. The OECD (2003) explored these benefits more broadly in terms of public administration and society at large and pointed out other potentials of e-Government, such as helping to achieve specific policy outcomes through information sharing, contributing to reform, and other broad policy objectives. In addition, it promotes the information society and ICT industry, building trust between

governments and citizens by enabling citizen engagement in the policy process, promoting open and accountable government, and helping to prevent corruption.

Schware (2000) identified the benefits associated with the use of ICT in government as: firstly, equal access to government for all, secondly, acceptable levels of service to the people, thirdly, speedy response to the felt needs of the government, and lastly, transparent government with growing accountability. According to the World Bank (2004), the benefits of e-Government are: firstly, reducing costs, secondly, promoting economic development, thirdly, enhancing transparency and accountability; fourthly, improving services delivery; fifthly, improving public administration; and sixthly, facilitating an e-Society.

On the other hand, Heeks (2001) views ICT as providing three basic change potentials, namely, automation, informatisation and transformation. He argues that these changes can potentially bring efficiency and effectiveness gains to government. The efficiency gains include government that is cheaper, more productive, and quicker. Effectiveness gains include government that works better and is innovative. Heeks (2001) further argues that e-Government has the potential to make government more transparent and accountable by providing such information as government budgets and expenditure on the web.

All these benefits can make it possible to improve relations between government and the public. However, before they can be realised, government at different levels must be fully integrated, build the necessary capacities to ensure sustainability, and overcome the challenges associated with e-Government. In summary, the advantages associated with e-Government can be divided into two groups: improved turn-around time by the government in meeting the public's needs, and improved access to government services and information by the public.

3.2.5 Services Provided by e-Government

There are many services provided by e-Government via the internet or through mobile phones, and these vary from country to country. For example, the study

conducted by the US Centre for Technology in Government by Cook (2000), identified that citizens required the following services to be provided online:

- Renewing a driver's license
- Voter registration
- Voting
- State park information and reservations
- Access to one-stop shopping (one portal for all government services)
- Ordering birth, death, and marriage certificates
- Filing state taxes
- Hunting and fishing licenses
- Accessing medical information from the National Institute of Health.

In a survey carried out by the State of California, USA (2001), the following were identified as the services most frequently available through e-Government in various states throughout the nation.

- Filing a personal income tax return
- Reserving a campsite in a state park
- Applying for a state fishing or hunting license
- Renewing a professional license
- Submitting employment information
- Registering a complaint against a business or professional licensee
- Renewing a driver's license
- Requesting a government loan.

Hendry (2003), outlined the e-services offered in the US national state and local websites, as including:

- Ordering and downloading publications
- Filing complaints
- Online databases (e.g. access to voting records of elected officials)
- User payments (e.g. payment of parking tickets)
- Paying and filing taxes
- Fully executable services (e.g. driver's license renewals and voter registration)
- State park information.

3.2.6 Advantages of e-Government

The rapid evolution of the internet means it is now accessible to millions of people internationally and has enabled people to access communication and information from all over the world. In the past it was used primarily for education and information sharing purposes (Schneider and Perry, 2000), but internet applications now facilitate day-to-day activities. e-Government is an important application and if designed and implemented correctly it can improve most services provided by government, reduce cost and time, deliver services more efficiently, and provide transparency in respect of management and economic development in the administration of government and access to services on a 24-hour day basis. Atallah (2001) and NOIE (2003) define the benefits of e-Government as follows:

- Improvement of service delivery and citizens' social welfare
- Reduction of users' and organisations' time, effort and costs
- Increase of users' ICT skills and knowledge
- Creation of new business and work opportunities.

After a thorough examination of the advantages of e-Government initiatives in its member countries (Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan,

Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, UK, USA), the OECD (2003) stated that it:

- Improves efficiency in processing large quantities of data
- Improves services through better understanding of users' requirements, thus aiming for seamless online services
- Helps achieve specific policy outcomes by enabling stakeholders to share information and ideas
- Assists a government's economic policy objectives by promoting productivity gains inherent in ICT and e-commerce
- Contributes to governments' reform by improving transparency, facilitating information sharing and highlighting internal inconsistencies
- Helps in building trust between governments and their citizens; an essential factor in good governance by using internet-based strategies to involve citizens in the policy process, illustrating government transparency and accountability.

From the above it appears that the advantages of e-Government are in creating a better environment for government, business and citizens, increasing good governance, improving the productivity and efficiency of government agencies, and improving the quality of life for citizens.

3.2.7 Economic Impact of e-Government

When governments establish the level of efficiency and effectiveness that can be achieved by providing services to their citizens electronically, the private sector in turn is also affected, since the process leads to the creation of a healthy atmosphere for private organisations, whether local or international, to conduct electronic commerce with a view to reducing costs and improving control. Furthermore, it allows them to deal promptly with the government to overcome complexities and avoid bureaucracy. The handover of integrated services from a single point creates

opportunities for increased co-operation between private and governmental organisations in various fields.

Arnold (1995, cited by Heeks, 1999:10), stated that such reforms were launched at least as early as the start of the twentieth century in the USA. In the late 1980s and early 1990s 'reinventing government' terminology emerged (Heeks, 1999:9). Today, governments are trying to reshape their citizens' old perceptions of long queues, cumbersome processes (Silcock, 2001:88) and corruption. For this reason, many countries, such as the UK, Malaysia (through Malaysia 2020) (Kamaruzzaman and Kelch 2002), and Oman (through Oman 2020) (Ministry of Information, Oman, 2008), have developed their economic visions, to support which, governments have formulated ambitious visions and plans to use ICT in implementing their e-Government initiatives. It is noticeable that many countries have held meetings and conferences about e-Government and the need to simplify administrative procedures.

In terms of the impact of the social, economy cost and expenditure achieved by e-Government in many countries following the transfer of public services to electronic services, some examples are given in the following sub-sections, which also identify the benefit to both developed and developing countries in moving towards the e-Government model.

3.2.7.1 Developed Countries

According to Atallah (2001) State governments in the US are saving up to 70% by moving services online, compared to the cost of providing the same services over the counter. For example, online license renewal in the state of Arizona costs $2 per transaction, versus $7 over the counter. Furthermore, in Washington State, government e-procurement systems are saving an average of 10-20% in terms of material and purchase costs, and in Alaska online vehicle registration costs have dropped from $7.75 to only $0.91 using an online system.

NOIE (2003) provides detail of some Australian e-Government initiatives. For example, Centrelink (www.centrelink.gov.au) is a government agency representing 20

public agencies, and providing services to over 6,000,000 people. It launched an online system at a cost of AU$600,000 in 2001 to facilitate communication with users. The system is convenient and time saving for its clients and the agency's transaction savings over a three-year period totalled AU$5 million. In addition, E-tax (ato.gov.au) was launched by the Australian Taxation Office (ATO) in 1997 to help taxpayers to prepare and lodge their income tax returns. The initiative has helped to reduce the ATO's processing time from eight weeks to two, and reduced overall costs by AU$1 million, per year for five years.

From above it is clear that implementation of e-Government and m-Government in developed countries creates opportunities to save money and facilitate transactions in both the public and private sectors.

3.2.7.2 Developing Countries and the Arab World

According to Atallah (2001) eight out of ten Brazilians are filing their income tax forms online this year. The government of Brazil saved $10 million when eleven million people paid their income taxes online. In addition, use of the internet in Chile to schedule tax payments, check accuracy, and refer back for full tax history has reduced both time and error. Therefore, the Chilean government is expected to save $200 million, from a total of $4 billion in bids tendered annually, after the introduction of a procurement website. In Singapore an e-citizen initiative is achieving an annual saving of $14.5 million to the government, and through the portal the government was able to offer 92% of its services online by the end of 2001 (Ke and Wei, 2004).

On the other hand, as a member of the Arab World, Oman shares many characteristics with other Arab countries and the Gulf States, such as culture, religion, language and history. According to Atallah (2001) the integration of databases of the Moroccan Ministries of Finance and Planning has halved the preparation time of the national budget. Also, the use of internet by the Dubai Ports and Customs Authority allows thousands of freight transport companies to reduce time and costs with 24-hour access to customs clearance services. Therefore, the overhaul of government services

offered to businesses and individuals in Dubai is estimated to have reduced administrative costs by at least 10%.

Taking an overall perspective in all countries from the above, the implementation of e-Government and m-Government, and the ability to deliver integrated services from a single point, creates opportunities whereby co-operation between governments, the private sector, and individual citizens can take place, thereby saving money and reducing administrative problems on a global scale. It also provides opportunities to increase transparency, reduce costs, and reduce corruption. Therefore, the international society needs to consider the social and economic impacts of e-Government projects to help their adoption and diffusion.

3.3 m-Government: Concept, Drivers and Adoption

Through a comprehensive review of the relevant literature, this section considers the development of ICT and the demand for better, well-organized, and more effective government. Governments have pursued e-Government initiatives to offer services and information online to citizens, government organisations, and businesses. Researchers and practitioners have recently begun to pay attention to wireless mobile-technology applications (m-Government) in the public and private sector as a manifestation of e-Government.

The following subsections address defining m-Government, the relationship between-e-Government and m-Government, and the goals and objectives of m-Government. The drivers of m-Government, services provided by m-Government, and the adopter types of m-Government are then explored.

3.3.1 Defining m-Government

Fountain (2001) argued that internet technology is not just about e-Government. Due to limited internet penetration, there is also concern that e-Government may exacerbate the digital divide and raise the issue of inequalities among citizens (West, 2000). In this respect, it is suggested by Kushchu and Kuscu (2003) that technological advances, and the readiness of individuals to adopt them,

point to an inevitable move to m-Government. Pocket PCs, tablets, handheld terminals, short message service (SMS), personal digital assistants (PDAs), and mobile or cellular telephones bring many possibilities in this direction for individuals and governments.

Lanwin (2002) on the contrary, believes the introduction of m-Government is subject to many difficulties, and argues that delays caused by inadequate infrastructure, regulatory systems, and the adoption of mobile technology, represent obstacles that will control the penetration of m-Government. On the other hand, Wexler and Taylor (2004) believe that the 'anywhere anytime' feature and costless connection in the WLAN environment will be sufficient to surmount most barriers. Having surveyed wireless users and managers, Wexler and Taylor (2004) note that "technology will soon get smarter" and make good any shortfalls currently experienced, and their opinion is in keeping with previous arguments.

Five levels of sophistication are seen in m-Government sites, and it is suggested (Nicoll et al., 1999) that there is a tiered implementation and functionality ranging from initial publication of the information level to the fully interactive level of information sharing. The accompanying level of technology sophistication is believed to escalate accordingly, as improvements in technologies occur and the service demand matures.

The rapid development of mobile technologies such as internet-enabled mobile phones; PDAs, Wi-Fi and wireless networks has spurred the development of m-commerce and m-business models, which are perhaps equally relevant to government (Sadeh, 2002). In this way, a new channel is provided through which it is possible to deliver government services to citizens in effective and possibly cheaper ways. Such use of wireless technologies to deliver government services is usually called mobile government or simply m-Government (Ghyasi and Kushchu, 2004).

Moon (2004:5) adds to our expanding knowledge base and understanding of e-Government by focusing on the potential of m-Government to improve and enhance government services, and defining the concept *"government's efforts to provide information and services to public employees, citizens, businesses, and non-profit*

organizations through wireless communication networks and mobile devices such as pagers, PDAs, cellular phones, and their supporting systems."

While e-Government consists of conventional government services made available for citizens through electronic means such as internet-connected computers and other devices, m-Government is defined by Kushchu and Kuscu (2003:3), as *"the strategy and its implementation involving the utilizations of all kinds of wireless and mobile technology, services, applications and devices for improving benefits for citizens, business and all government units."* In the same way, Bassara et al (2005) considers m-Government as a strategy, the implementation of which involves the use of all kinds of wireless and mobile technologies, applications and devices for improving services delivery to the parties involved in e-Government including citizens, businesses and all government units. Mobile computing in local government tends to mean delivering services in the field – in the streets, in people's homes or other convenient locations. It is usually understood as meaning taking services to the customer or to the relevant location, rather than the customer having to visit council offices to access services (Goldstuck, 2003).

Some scholars (Östberg, 2003; Lallana, 2004) firmly believe m-Government to be a sub-set of e-Government that uses mobile and wireless communication technology. In m-Government, ICTs are limited to mobile and/or wireless technologies like cellular/mobile phones as well as laptops and PDAs connected to wireless local area networks (LANs). This school of researchers argue that m-Government should not be considered a new type of government, but rather as a new tool to enable effective government. Clearly, mobile communications and internet technologies are enabling access to new e-Government services at anytime and from anywhere (Al-bayrak et al, 2003).

Kwon (2004) defined m-Government as: a) Future Government that provides for citizens, companies and government to deliver personalised government services through wireless networks, b) Multi-channel Government that overcomes current limitations of e-Government and supports mobility and accessibility and, c) Wired-Wireless Convergence Network that can access government service anytime and

anywhere. In 2007, Kushchu asked many professionals to give their opinion on the reality of m-Government, and their response was that it was merely e-Government using new technologies – *"M-government is a natural and inevitable extension of e-government"* (Kushchu, 2007: viii). And Snellen and Thaens (2008) defined m-Government as the application of mobile devices, such as mobile telephone, Personal Digital Assistants (PDAs) and hand held PCs in the exchanges between officials, citizens (organisations), and public administration.

In summary, it is clear that m-Government is understood to mean the use of all kinds of wireless networks and mobile technologies such as mobile telephone, PDAs , or laptop in public and private sectors operation to help make public information and government services available *"anytime, anywhere, anyhow"* to citizens and officials (Al-Hadidi et al, 2010). This strengthens the e-Government benefits that government work is made easier, simpler and more automatic, so that a government can benefit citizens, business and employees.

3.3.2 Relationship between e-Government and m-Government

Governments have long recognised the potential of ICT to bring about fundamental changes, not only in the way they function but also in their relations with other organisations, societal groups and individuals. Both in their relationship with the citizen, inter-organisational arrangements and intra-organisational activities, ICT and internet technology in particular, have seemed to promise enormous opportunities to reinvent government and increase efficiency and effectiveness in the public sector (Al-Kibsi et al, 2001; Layne and Lee, 2001). Also, the rapid diffusion of mobile ICT such as laptops, mobile phones, PDAs, along with emails, instant messaging and other networking services have rapidly fuelled the mobilisation of interaction (Sorenson, 2003).

Dearle (1998) argued that as interaction goes with users, mobility has been regarded as a new paradigm in computing. Hjelm (2000) declared that the internet revolution is the mobile revolution and indicated society would be marked by mobile, "*always-on*" citizens and government, as well as by transient online communication.

The author mentions that governments need to take full advantage of the mobile and wireless ICT technology as well as dealing with the fluidity of the interaction with the mobile society.

m-Government is believed to influence the development of complex strategies and tools in relation to e-Government, and to be inevitable given the increasing numbers of people with access to mobile phones and mobile internet facilities (Kushchu and Kuscu, 2003). Mobile phone access has become a way of life for people in both advanced and developing countries, and is seen as a convenient and effective communication channel.

That said, a number of questions arise, such as will m-Government replace e-Government activities? As already seen, several researchers believe not, arguing that it should be conceived as complementary to e-Government efforts (Lallana, 2004; Östberg, 2003; Kushchu and Kuscu, 2003), providing the additional value of supporting the mobility of its users, whilst retaining the benefits of conventional e-Government efforts that provide services through wired networks. Furthermore, most researchers believe that e-Government is the cornerstone for m-Government (Chang and Kannan, 2002; Goldstuck, 2003; Kim et al, 2004; Abanumy and Mayhew, 2005; Antovski and Gusev, 2005; Scholl, 2005). Moreover, wireless applications may facilitate the greater mobilisation of government officials allowing them the ability to handle real-time information concerning, for example, crimes, accidents, safety and other public issues (Kushchu and Kuscu, 2003).

These ideas are echoed by, Cilingir and Kushchu (2004) in their evaluation of m-Government developments in Turkey. They found m-Government to be definitely complimentary to e-Government, noting that the former requires the presence of the latter since without it no infrastructure exists. However, it was noted that such dependency does not render m-Government a mere extension of e-Government, and that while it does enhance the effectiveness of the existing e-Government efforts thereby creating incremental value, its real power is in its ability to offer unique benefits. Cilingir and Kushchu (2004) argue that m-Government must be incorporated into the design of e-Government.

Indeed, a recent study shows that more people are surfing the web via mobile phones and suggests that the PC may soon lose its dominance in internet access (Tan, 2006). Therefore, the benefits of e-Government can be improved by m-Government through which citizens gain easy access anywhere, and at any time, to governmental information via the available wireless internet.

In summary, it can be seen that improvements in wireless and mobile technology, and the greater acceptance of these technologies by the public, will push e-Government applications and services to the new model that is m-Government, which in many cases will support e-Government activities, but which will add its own unique dimension and benefits. Clearly, the attraction of m-Government services for citizens is mobility, along with the ability to link to networks at any time and from anywhere. m-Government constitutes an alternative, additional, channel to provide services that in many cases e-Government has failed to do. However, the transformation of e-Government to m-Government will not be easy. It will require a carefully designed strategy, planning and support. The truth is that the relationship between e-Government and m-Government is complimentary (Östberg, 2003; Kushchu and Kuscu, 2003; Lallana, 2004).

3.3.3 Goals and Objectives of m-Government

The goals of m-Government are: a) Advancing e-Government services by adding mobile value (mobile value: convenience, timeliness, personalisation, location-based etc.) and b) Implementing e-Government services over the wired and wireless internet in an integrated way (offering seamless e-Government services to the public anytime, anywhere and creating high-value inter-operable mobile services in the public sector). From a citizen's perspective, mobile government stands for new front-end access to public services, that have been made available specifically for mobile devices, or adapted from existing e-Government applications (Kwon, 2004).

According to Madhusudhana et al (2005:13), the goals and objectives of m-Government are:

- Mobile services can generally be seen as a communication channel between the authority and the citizen (as well as the private entity).
- The most evident application of this concept relates to the context of particular cases and processes, (e.g. requests for certificates), where at least part of the correspondence, (notifications on the status of a process), could be done through mobile means.
- Mobile services can particularly stimulate the participation of the citizen in local community matters and be applied as a channel for the submission of complaints, suggestions etc., that is accessible to the public. This kind of service also encompasses the communication between the authority and the citizen during the follow-up of the complaint/suggestion.
- Within the context of general public information services, mobile services can also be used as a vehicle for the promotion of local (cultural, fairs) events.
- The promotional effect would be particularly useful for local businesses with limited financial and organisational capabilities to otherwise announce their presence at a timely and geographically limited event such as a local fair.
- This kind of service could also encompass the delivery of particular information to registered users.

Clearly, the purpose of m-Government is to help develop effective e-Government services for citizens, especially where e-Government can not provide these services due to citizens living in remote (mountainous and rural) areas. As with e-Government, the objectives are to improve services to individuals, and both public and private organisations, therefore it is apparent that they are interdependent and mutually complementary. Mobile devices can be used to access the services at times and in places when fixed internet services are not available.

3.3.4 Drivers of m-Government

The evolution from e-Government to m-Government activities is undoubtedly being driven by major developments in the technological infrastructure and advances in mobile telecommunication services. These major changes can be considered as representing three trends: mobile device penetration; convergence of wired internet and wireless telecommunication networks; and the move towards 3G services and higher data transfer rates. The services include personalisation, location based services and context aware applications. The following sub-sections will address these factors which together provide a strong rationale for the pursuit of m-Government.

3.3.4.1 Mobile Device Penetration

Today, many countries are launching e-Government projects to effectively enhance the provision of governmental services. e-Government encompasses the usage of all information and communications technologies (so far, mainly by using the internet), to deliver governmental services to citizens and improve the quality of governmental activities. However, various e-Government ranking surveys, show that even those countries that have succeeded in deploying e-Government projects, also face a subsequent problem – the accessibility of such services by its citizens (Accenture, 2005; United Nations, 2004). The access limitations vary from country to country and are dependent upon each country's economic development. The differences may include; availability of information relating to online governmental services, satisfaction with the quality of the services provided, citizens' proficiency in the use of personal computers, and the availability of personal computers and internet connections. In particular, low availability of personal computers and fixed internet penetrations are seen as the basic constraints in deploying e-Government in developing countries (Godoy and Stiglitz, 2005).

On the other hand, penetration rates in respect of mobile phones are rapidly increasing worldwide. According to the United Nations (2004), mobile technology can trace its beginnings to the agreement made by a dozen companies in July 1985 to establish the Global System for Communications (GSM). The GSM Association

estimates that it takes 12 years to reach 1 billion connections, but only 30 months thereafter to reach 2 billion connections. In a survey by Reuters, global mobile phone usage was predicted to exceed 3.25 billion users by the end of 2007. According to the association, almost 7 billion text messages are sent each day.

In 2002, the number of mobile subscribers surpassed the number of fixed-line subscribers in 97 countries (ITU, 2002), and by the end of 2004, that number had almost doubled to 171, while the number of mobile subscriptions had increased to 1.8 billion. At the same time, of 215 International Telecommunications Union (ITU) members, 144 had higher mobile penetrations than internet penetrations; and, of those 144 countries, 107 of them were developing countries (ITU, 2005). Clearly this level of adoption in relation to mobile technology is an encouragement for governments seeking to develop their channels of communication with citizens and organisations (Kushchu and Borucki, 2004).

Particularly in developing countries, it can be see that m-Government is a much more attractive proposition given that mobile phone penetration is now greater than that of fixed lines. Moreover, as this applies to middle and low income countries (49 and 36 respectively), mobile phones with their capacity for SMS, make m-Government a sound option (Lallana, 2004).

In Turkey mobile phones have penetrated 23.3 million (34%) of the country's 69.6 million population compared to only 4.3 million (6%) internet users. The mobile phone penetration rate is high and is increasing yearly, whereas internet penetration rate remains low (Cillingir and Kushchu, 2004). Recent research (Portio Research, 2007), indicated that over half of the world's population would have a mobile phone by 2008, and that the global mobile penetration rate would surpass the 50% mark in the following year. In addition, a further 1.5 billion mobile phone users are expected over the next four years to bring the overall penetration rate to 75% by 2011. Some 65% of these additional users are likely to come from the Asia Pacific region, rather than from Africa as had previously been supposed. Moreover, the majority of the new subscribers will be from rural regions in countries such as India and Pakistan, while mature markets such as Europe are not expected to show any serious signs of growth

over the next few years. However, Portio Research (2007) predicts that the US is likely to buck that trend, and five years of sustained high-value volume growth is envisaged.

Furthermore, mobile devices are now playing a significant role in our daily and business lives. For example, in India, mobile phone users (65.31 million) have now outnumbered fixed-line customers (47.71 million) (TRAI, 2005). The gross subscriber base consisting of fixed as well as mobile connections became 110 million, which increased at the end of August 2005. According to the Ministry of National Economy in the Sultanate of Oman, mobile penetration rates are growing rapidly in Oman. At the end of June 2007, the fixed line telephone service stood at 257,235 subscribers, whereas subscribers of billed and prepaid GSM mobile services provided by Oman Mobile and Nawras rose to 2,135,539 subscribers. On the other hand, the number of subscribers of internet services stood at 65,611 (Ministry of National Economy, Oman 2007).

In summary, the proliferation of mobile phones around the world will facilitate the increase of mobile government, and this will be particularly so in mountainous and rural areas where no internet access is available. The citizens in these areas can access government sites via the internet (through their mobile phone), to use services provided by the government, and thereby improve their own quality of life as transactions become easier and indeed, possible. In summary, mobile deployment will contribute significantly to the e-Government diffusion and mobile connections will play a key role in this process.

3.3.4.2 Emergence of Mobile Internet

One of the major reasons for growth in the use of mobile phones has been the convenience of instant communication with another person. However, the importance of data communication is now increasing. In Japan NTT DoCoMo have created a successful business and technological model for connecting mobile phone users to the internet through "i-mode" (Wallace, 2002). I-mode was launched in 1999 and has

been hugely successful. In only three years, it had over 43 million subscribers using these new facilities of accessing the internet, exchanging e-mails, downloading ring tones, accessing location-based information, making simple purchases, and reading news and other business information through their mobile phones (Supaporn, 2002). An example of a similar service in Europe is that of "Vodafone live".

However, Blechar et al (2005) reported conflicting findings in their study entitled 'New Mobile services and the Internet - friend or foe?' In presenting the statement *'[The mobile portal] does not offer me anything I want that I cannot find for free on the Internet'* to respondents, they found 71% agreed or strongly agreed with it, and in response to the statement *'Prices on traffic charges will keep me away from using the [portal] services'*, 63% were in agreement or strong agreement. Moreover, in a study on trust in connection with the Internet and Mobile Services, Minna-Kristiina et al (2005) found that whilst users were less tolerant of technical problems on the internet, they placed more trust in internet services than in mobile services. Social aspects are important in both service modes. Clearly, the social aspects are of relevance to any m-Government initiative.

It is predicted (Kelly and McCarthy, 2006) cited in the Information Economy Report that growth in the mobile phone industry in developed countries will be as a result of increased innovation services, from SMS and affordable roaming to internet access, and the expectation is that by 2010 more than one third of all Europeans will have internet-enabled phones. Indeed, Kelly and MCarthy (2006) found that 29% of internet users in France, Germany, Italy, Spain and the United Kingdom regularly access the web from their mobile phones, in comparison to only 19% in the United States. Not surprisingly, the highest concentrations of mobiles are found in high-income nations (World Bank, 2006), with the billion people living in these 58 nations owning 935 million mobiles in 2006. Undoubtedly, mobile penetration is growing as also is mobile access to the internet.

The speed of access to mobile internet and the technology behind it has taken a number of generations to reach its current state. Initially, mobile phones used analogue data transfer and the voice quality was not always good. However,

improvements have been made – the second-generation models (2G) which use digital encoding (e.g. GSM, CDMA) mean improved voice quality and better security. However, there is only limited data transfer. Users can use these phones to send emails and faxes, access and download programs, and much more. The generation which followed 2G, is known as 2.5G and provided increased data speed rates, as well as packet-switched connection (GPRS). Third-generation protocols support much higher data rates (typically 5-10 MB per second) and are intended primarily for applications other than voice.

It must be noted, however, that whilst data transfer speeds are continually improving, problems are caused and limitations faced because of the small size of mobile phones and their low memory capacity (compared to an average computer), and because of the small screen and buttons.

3.3.4.3 Example of the Mobile Net Applications and Services

An excellent example of the mobile internet is the Japanese mobile operator, NTT DoCoMo, that offers a service (i-mode) that provides a significant number of mobile internet applications and services. Following its launch in 1999, it has gained over 43 million subscribers, who are able to access applications and services via the i-mode portal. Services can be categorised into one of four main groups: transaction, information, database and entertainment. I-mode uses packet-switched technology which enables its subscribers to have constant internet access, but they are only charged for the amount of data that they transfer.

The applications for mobile net in Japan are mostly of the entertainment type, where, for example, users may download screen savers, ring tones and play games (Kushchu and Kuscu, 2003). Other services may include browsing information and databases, such as news, stock prices, telephone directory and location-based dining guides (Supaporn, 2002). Business applications, such as mobile banking, ticket reservations and trading, need to be improved. Mobile development is also happening in many other countries. In north European countries, mobile net applications are

playing a significant role in users' daily lives (Kushchu and Kuscu, 2003). Nordea is a financial services group that use an extremely successful wireless application protocol (WAP) based online banking services. The service allows users to pay bills and check their balances and statements (Sadeh, 2002).

Short messaging service (SMS) is by far the most popular application of the mobile net (Sadeh, 2002). This is a service that is used by nearly all mobile phone users. The most popular services after SMS are those that relate to entertainment, e.g. games, dating services, downloading ringing tones and screen savers. What is lacking in services is any strong development in the business-related applications - there are only a few good examples in banking, travel and location-based services.

Mobile phones are becoming more and more personalized, due partly to the limited facilities and options available because of the size of mobile phones (Kushchu and Kuscu, 2003). It is not possible to provide users with large amounts of data because of the small size of the phone screen, as well as the limited memory capacity (Kushchu and Kuscu, 2003). This has meant that developers have been concentrating on trying to tailor services to meet a user's profile. They collect data from the user (for example, his/her location) and try to make information relevant to the user, based on the information supplied. City guides and dining services are typical examples. The more recent applications are aiming to discover the user's context and then, for example, providing targeted information (Sadeh, 2002).

3.3.5 Services Provided by m-Government

Despite its infancy, mobile government is a growing and important set of complex strategies and tools that will change completely the roles and functioning of traditional governance (Zálešák, 2003).

In advocating the existence and importance of mobile government, there are two basic facts to be considered: a) there are more people who do not have access to PCs than there are people who do not have a mobile phone or other wireless device, which will make government and services available more to mobile customers as a

group than to PC users, even though m-Government is considered a sub-set of e-Government; and b) computers are not generally portable, but information and public services can be: m-Government provides for instant availability of services and information, helping frequent travellers and people on the move to access government services. When travelling overseas, citizens will not have to rely on unsafe internet cafes, as mobile coverage exists in the vast majority of countries globally.

Mobile government also means that a citizen does not have to search for internet kiosks, or even get a connection to the house. *"People now carry a mobile government access terminal with them wherever they go"* (Abraham and Irak, 2005:307). m-Government can be applied to four main purposes in the public sector (Zálešák, 2003) as follows:

1. **M-Communication**: improving communication between government and citizens (G2C, C2G). Providing information to the public is not a trivial activity, it is the foundation of citizen empowerment. Without relevant information, citizens are unable to form intelligent opinions and thereby, are unable to act on the issues meaningfully. Information is also needed not only to promote transparency, but also accountability. Mobile devices provide an important access channel for governments to reach citizens (G2C).
2. **M-Services**: m-Transactions and m-Payments. Mobile devices not only provide a channel of communication between citizens and government, they also enable government-to-citizen transactions.
3. **M-Democracy**: m-Voting and the use of mobile devices for citizen input to political decision-making is an m-Government application with tremendous potential to enhance democratic participation.
4. **M-Administration**: improving Internal Public Sector Operations. m-Government also provides opportunities to improve the internal operation of public agencies.

Several countries have already launched m-Government services; Table 3.1 provides a summary of such services:

Table 3.1: m-Government services in other countries

Country	m-Government Services	References
Estonia (Tartu)	- *Mobile Parking*: paying for parking via mobile phone. - *Mobile Bus Ticket*: paying for bus tickets via mobile phone. - *T-number*: receiving information on sightseeing in Tartu. - *Mobile Payment*: paying for products, services, etc., via mobile phone - *M-teacher*: interface allowing teachers to send text messages to parents when important information needs to be forwarded. - *M-library*: register and receive an SMS when a book, movie or audiotape becomes available.	Rain and Maarja (2005)
Turkey	-*Mobile Electronic System Integration*: This service allows the mobile law enforcement units to be more efficient in their job. - *Traffic Information System*: Conduct queries regarding offending drivers' license and vehicle information. - *Local Government Applications*: SMS technology is used by citizens to pay their taxes.	Ghayasi and Kushchu (2004)
Philippines	- *Civil Service Commission SMS service*: Aim is to increase the efficiency and speed of service delivery. Citizens use this service as a weapon to pressure the government agencies to move towards this goal. - *Reporting Criminal Offences*: citizens can report criminal offences as well as police officers to relevant authorities, so that they can take action. - *Polling Coverage through SMS*: This service gives the citizens convenience, ease and mobility in getting updated polling information.	Ghayasi and Kushchu (2004); Lallana (2004); Villafania (2004)
Dubai (Government)	- *Push SMS services* are available for driving license renewals, traffic jam information, health card renewals and trade license renewals. - *Pull SMS service*, which includes flight information, the payment of traffic fines and information pertaining to trade license status. - *Mobile portal* allows users to access visa information and police services, such as traffic fine enquiries and payments, and to obtain prayer timings.	(Ewan, 2006)
Malta	-Notification via SMS by the *blood bank* to advise registered blood donors when urgent need for blood arises. - Notification via SMS to parents from their children's *school* to inform them if their children are absent from school on that day. - Notifications via SMS from *public libraries* to individuals who have placed a reservation for a book - *Bus schedule* availability via SMS - *Reporting incidents* or relevant information to the Police Force.	Government of Malta (2008)
Singapore	- *Central Provident Fund board* (CPF) members are allowed to view their CPF account information on their mobile phones. They can access and check: Account Balances, Contribution History and Property. - *MyeCitizen SMS alerts*: Notification on CPF Application Status, Library Books Due, Passport Renewal, Road Tax Renewal, TV (Household) and Vehicle Radio Licence. - *News and traffic information*: access to several services such as: What to see, Where to eat, What to do, what's happening, Getting Around, Fun Stuff, Travellers Essentials, Weather, Currency.	m-Government services in Singapore, (2008)

Clearly, from the examples provided in the Table 3.1, the services provided through m-Government appear to be many and varied, and while in the beginning it is expensive to provide these because considerable investment in telecommunications infrastructure, software and website design is required, once the services have been implemented and are working, customers become accustomed to using the technology and over time m-Government becomes cost-effective and actually saves money.

3.3.6 Adopter types of m-Government

From the above, m-Government is viewed as a subset of e-Government and it refers to any transactions via mobile technology, such as laptop, phones or personal digital assistants (PDAs). The most significant features of mobile technology are mobility and portability: the ability to access services almost anywhere, on the move, and through wireless networks and different devices. This subsection presents some of the early adopters of m-Government services, including m-Government security, m-Government and m-Democracy, and m-Government and the Education System.

3.3.6.1 m-Government Security

The emergence of e-Government and m-Government services has raised various issues, of which security is one of the most important. To take advantage of the benefits of e-Government, there are various special security requirements that are dictated by the sensitive data transmitted during e-Government transactions. The data may include private and personal data, such as identity and contact details, government data, credit card and bank account numbers, etc. According to Bredow and Wimmer (2002), security in e-Government is a big challenge and a fairly complex job, since in the near future, we will witness changes in the requirements of security, with changes in networking, computing and the possibility of being online at all times. eEurope (2005) recognised that security requirements will rapidly change, as networking and computing develop and computing becomes more ubiquitous. Broadband connection will offer people the possibility to be connected to the internet at all times. Therefore, managing security will become a difficult and complex task, as

the user has to deal with the availability, integrity, authenticity, and confidentiality of data and services.

In addressing various security concerns about mobile technology and wireless networks, particularly the wireless transmission of information, Tsai (2003) highlighted three major ways to help ensure a secure mobile-technology network: Firstly, prevent data stealing during transfers between the network and the mobile device. Secondly, prevent unauthorised parties from accessing information in the mobile device. Thirdly, ensure that viruses cannot be infected on unsecured mobile devices. Similarly, in a report for the National Institute of Standards and Technology (NIST), Karygiannis and Owens (2002) compiled a comprehensive security checklist for wireless network systems. Measures included: developing a security policy, ensuring that users of the technology are trained in computer security awareness, performing risk assessments and developing a physical security-access barrier (such as identification badges and sign-ins).

Consequently, to clearly identify the category of protection that a security system for a mobile service or wireless computer network security needs, the security goals are classified as follows (Schafer, 2003):

- Confidentiality: ensures that information is not disclosed to unauthorised users.
- Integrity: ensures that the information cannot be corrupted or altered in any way.
- Accountability/Non-repudiation: guarantees the identity of the sending and receiving party in an information transmission.
- Availability: ensures that the services implemented in a system are available and function properly.
- Access control: ensures that only authenticated/authorised entities are able to access services and data. More specifically, the access control security goal can be further categorised in the following sub-goals:
    - Authentication: confirms the claimed user identity.
    - Authorisation: controls the access rights granted to authenticated users.

Smith and Jamieson (2006) identified the key issues associated with Information System Security in e-Government as being: Training, Management Support, Budget, Cost, Resources and Awareness. Although not all of these issues are relevant to all governments/organisations, they would appear to be important to a large number as key drivers or key inhibitors in respect of IS Security and Business Continuity Planning processes.

It is noted by Swartz (2003), that the adoption of e-Government services by the British population has been slow, with only 15% using such services in 2001. Likewise, Aoki (2000) observes that although Japan has the second-largest number of internet hosts in the world following USA, it continues to be slow in developing e-commerce and e-payment. The developing countries are no more successful, for the many reasons already discussed earlier regarding access. Indeed, the e-Government for Development Information Exchange Project (Commonwealth Telecommunications Organisation, 2002) and Heeks (2003) have noted that, for e-Government projects in developing and transitional countries, 35% were total failures, 50% were partial failures and only 15% were successful.

The reasons for poor e-Government implementation rates include the difficulties encountered in system development and implementation, but in countries such as the UK and Japan, where there is investment in system development and populations are technologically astute, these factors cannot account for the lack of adoption, and clearly there are other forces at work relating to culture.

In fact, it is unlikely that full security can ever be achieved, at least not at a reasonable cost. There will always be weak points, attacks, incidents and failures that will generate damage and undermine trust in systems and services. This is no different from other technologies and aspects of daily life. Society as a whole, as well as individuals have to learn how to manage the risks involved in networks and information systems, in the same way that they have become accustomed to using bank cards which were not the norm twenty years ago. Hence, when citizens have complete confidence in e-Government and mobile services, they will accept them because they will save time, effort and money and are totally portable.

3.3.6.2 m-Government and m-democracy

The Merriam Webster online dictionary (2008) defines democracy as a government in which the supreme power is vested in the people and exercised by them directly or indirectly through a system of representation usually involving periodically held free elections. Therefore, putting 'm' in front of democracy means using information and communication technology tools to improve and facilitate the exercise of democracy.

Voting is crucial to democracy and is a sign of people's opinions in different democratic countries. Nowadays, with the fast development of mobile technology, electronic voting systems can be employed that replace the inefficient manual system and avoid human mistakes. For a range of reasons, citizens may be unable to attend voting centres in the flesh, but need to vote remotely, for example, from home or while travelling outside the country. Therefore, there is a great demand for remote voting actions that are easy, transparent and most importantly, secure.

Davison (2005) defines m-democracy as the provision of government content and services in formats specifically tailored for hand-held computers (PDAs) and/or mobile phones. Joel (2008) suggests that voting should not be a process that is confined just within national boundaries. "Could every man and woman on the planet have an equal voice and be part a global participatory process?" Joel (2008:4). Joel believes that mobile phones could be an essential part of a global democracy and that voting could be done via SMS.

Kushchu and Kuscu (2003) argue that m-democracy gives citizens two great opportunities: firstly; they can express their opinions directly to government officials and secondly, they can closely monitor representatives. Furthermore, they also state how important it is for the government officials, who are surrounded by advisers and assistants, to know the authentic opinions and changing expectations of citizens. M-democracy allows the government to receive feedback directly from the public. Wireless technology can also help by holding virtual referendums.

Linnar and Rain (2000) suggested four main m-democracy services which have contributed to m-Government:

- Possibility of requesting information from government databases while on the move.
- Use of mobile devices for access to government portals.
- Giving ideas, feedback and policy recommendations to authorities through a mobile device.
- Mobile voting and opinion polling, m-voting.

The primary benefits of m-democracy are improving the election services to the citizens, reducing costs, saving time, transparent voting from anywhere and anytime, encouraging development and investment. According to Davison (2005) the benefits of m-democracy are:

- All Users: Readily accessible government information, services and communication.
- Citizens: Convenience. From anywhere, one can access information and have the ability to send in queries, report problems (e.g. street potholes) and communicate in a timely manner.
- Councillors: Convenience. Councillors with busy schedules can be a primary audience for real-time content related to the decision-making process, government announcement headlines and meeting updates. Furthermore, they could be given the ability to inform or communicate with constituents directly from mobile device to mobile device or PC. As more and more people have wireless access to their e-mail inbox, this allows for integrated access.
- Local Administration: Effectively reach more citizens with location-specific content. This also allows stronger collaboration between departments to cross-promote government information suitable for mobile or small screen formats.

m-Government aims to make interaction with these participants more convenient, user-friendly, transparent, inexpensive and effective. According to Rain and Maarja (2005), there are different examples of governments using m-democracy, for example:

- Switzerland: in October 2005, the first mobile-based voting process took place in a small city called Bulach. The system had been thoroughly tested for safety by the local Hewlett-Packard Company and underwent a trial run during student elections at Zurich University. Every user was sent a unique user ID through the post. They also had to enter a personal code and their date of birth before they could send their vote, which was recorded to prevent report voting.
- Great Britain: local administrations have used a non-binding, m-polling system to ascertain public opinion. Currently in the UK, experiments are being conducted in m-voting with mixed results. Older citizens are not comfortable with sending text messages for voting while the younger generations feel that SMS is a "fun application".
- Estonia: Tallinn City Council used m-polling in 2005 for public opinion on the new city logo. The logo that turned out to be the public's favourite was taken into account by the experts.

Nonetheless, the associated difficulties are highlighted by Kushchu and Kuscu (2003) who pointed out that some people may be reluctant to send comments by mobile phone because their number is visible at the other end. In this respect, there are various technical solutions, and the protection of privacy should not be a continuing problem. The major anxieties as identified by the UK and Czech Republic in their piloting of voting via mobile phones are as follows:

- Lack of knowledge about mobile phones
- Lack of confidence in new technology (many people worried about their vote going astray)
- Cost of sending a vote through a mobile device
- Preferences regarding use of SMS messages
- Fraud, such as vote selling.

In summary, the possible applications in terms of m-democracy, include m-voting and the use of mobile devices to enable input in the decision-making process.

Enabling citizens to vote via mobile phone provides a huge opportunity for use in any location and at any time, whether the person is inside or outside the country. This increases the likelihood of people voting, as it is made more convenient for them. The m-voting system can also be used instead of the traditional voting system to reduce human error. Computer systems are highly efficient and accurate in the calculation of votes and mistakes are much less likely. In the Sultanate of Oman, the voting system (Shura) is based on the traditional voting system. The voter is able to vote for his/her chosen candidate by being physically present at the voting station and filling in a voting paper. This can potentially facilitate the process of vote buying by candidates, which is evidently an injustice. In view of this possibility the development of an m-voting system in Oman, such as that tried in Switzerland and other countries, would help to reduce the phenomenon of counterfeiting and allow voters to elect their preferred candidate when they are sitting at home or even if travelling outside the country.

3.3.6.3 m-Government and the Education System

The statistics from the literature indicate that the penetration of mobile phones continues to increase. Therefore in the education sector, developers have started to consider how they can develop mobile technology in schools and provide useful ways to assist children and teenagers, who commonly have a mobile phone with them at all times. Recently, in the field of education, researchers and developers have taken much interest in the testing and development of mobile learning tools for teaching and learning. According to Teemu, (2007), mobile learning (or m-learning) means learning that is enhanced with mobile tools and mobile communication. Many people see it as a follow-up of e-learning, where computers and the internet are used for teaching and learning.

Kushchu and Kuscu (2003) have argued that the internet and mobile phones hold a very important position in terms of an integrated education system, as they provide direct communication between parents, students and schools. Parents can receive daily updates on the academic performance of their children, and sometimes, immediate notifications if their children are late or missing a class. This direct

communication between parents and schools is highly valued by the families, especially if both parents are working. Timely communication among educators, parents, and students can prevent academic failure and serious disciplinary actions. As for students in higher education, mobile services may provide an opportunity to send and receive announcements on emergencies and public safety, class schedule updates, campus events, traffic and weather conditions, office hours, campus resources available and examination results. This can help students to efficiently use wireless devices and note books in a technologically-improved academic environment to better accumulate knowledge.

Lehner et al (2002) believe that mobile or electronic education should not attempt to replace traditional education with tutors and instructors, but instead should support both student and teacher by providing services that facilitate teaching, learning, and education-related administrative tasks. With today's technologies, it is possible to implement mobile educational systems. However, several obstacles need to be overcome. While the distribution of educational content to university faculties and students seems to be easier using wireless technologies, device capabilities currently limit the possible ways in which this content can be presented. In the future, new devices are to be expected so that m-learning services will resemble today's e-learning solutions.

According to Laura et al (2006), learning and teaching with mobile technologies is beginning to make a breakthrough from small-scale pilots to institution-wide implementations. In order for these implementations to be successful, educators and technology developers must consider the following key issues: Context, Mobility, Learning over time, Informality, and Ownership. O'Malley et al (2003) have argued that research-informed guidelines can help to address these issues along with more practical concerns such as cost, usability, technical and institutional support. A set of such guidelines is presented and outlined here:

- Investigate a cost model for infrastructure, technology and services.
- Study the requirements of all those involved in the use of the technology (learners, teachers, content creators) to ensure it is usable and acceptable.

- Assess whether the technology is suited to the learning task and examine the advantages and disadvantages of each technology before making a decision on which one to use.
- Assign the necessary roles for initiating and thereafter supporting mobile learning.
- Develop procedures and strategies for the management of equipment when it is provided by the institution.
- Provide training and (ongoing) technical support to the teachers, to enable them to use mobile technologies to enhance current, and create new, instructional activities.
- Consider the use of mobile technologies for student administration tasks.
- Consider the use of mobile technologies to support collaborative and group learning.
- Discover and adopt suitable applications that match the needs of your specific classroom and map directly to your curriculum needs.
- Ensure security and privacy for the end users.

It is argued (Laura et al, 2006) that mobile technologies are becoming more embedded in education, bringing improved opportunities, rich social interactions, context awareness and internet connectivity, and hence showing the potential for a tremendous impact on learning. With the greater involvement of such technologies, it is predicted that learning will gradually move outside the classroom and into the learners' environments, both real and virtual, thereby becoming more situated, personal, collaborative and lifelong. In this situation it will be important to learn how to use mobile technologies so that learning becomes part of daily life wherever the learner may be.

3.4 Conclusion

This chapter has provided a review of literature on e- and m-Government, and acknowledged that the former is generally considered to be an information and

communication technology system, that is used to make the access, delivery and transactions of government work, easier, simpler and more automatic. In exploring the concept of m-Government, it was seen that this encompasses the use of all kinds of wireless and mobile communication technologies, such as mobile phones, PDAs and laptops to help make public information and government services available "*anytime, anywhere, anyhow*" to citizens and officials. Additionally, it makes government work more efficient and automatic, so that a government can benefit its citizens, businesses and employees. It appears that m-Government constitutes an alternative, additional channel, to provide services where in many cases e-Government has failed.

The literature has clarified the goal of e-Government, which is to enhance the interaction between government, citizen, business and employee, in order to stimulate political, social and economic progress in the country. On the other hand, mobile governments' primary goals are seen as being to improve services to both public and private organisations. In addition, the purpose of m-Government is to help develop effective e-Government services for citizens, where e-Government is ineffective, for example in remote locations (mountainous or rural areas) where there is no infrastructure to underpin fixed telephone lines. Therefore, mobile services can be seen as a communication channel between government, organisations, and citizens.

It has also been shown that the advantages of e-Government are in: creating a better environment for government, business, and citizens, increasing good governance, improving the productivity and efficiency of government agencies, and improving the quality of life.

However, the relationship between e-Government and m-Government is collaborative and m-Government cannot be seen as replacing e-Government, so in many cases it will be complementary to e-Government efforts. The conventional e-Government efforts provide services through wired networks with interactive and relatively intelligent web applications. The value of m-Government comes from the capabilities of applications supporting mobility of the citizens, businesses and internal operations of the governments.

This literature review has found that mobile penetration rates are growing rapidly throughout the world. Therefore, in developing countries, where internet penetration still remains low due to infrastructure and people's readiness issues, but mobile phone and mobile internet penetration are high, m-Government becomes a better option. Furthermore, the review has found that the services provided through mobile government are less costly than providing such services in the traditional ways.

Chapter 4
Critical Success Factors, Adoption, and Diffusion of m-Government

Review of Critical Success Factors; Analysis of the Critical Success Factors; Proposed Critical Success Factors for m-Government; Barriers to Adoption and Diffusion of m-Government; Adoption and Diffusion Models; An m-Government Adoption Model for Oman

4.1 Introduction

Government organisations, companies, and institutions are becoming increasingly aware of the benefits to be gained from having strong organisational frameworks, within which behavioural and managerial skills (soft skills) are integrated with technical competencies (Spencer and Spencer, 1993), and as a result, the last decade has witnessed a growth in the attraction of e-Government.

This chapter reviews and compares the Critical Success Factors (CSFs) that appear in the literature, with the intention of identifying strengths and weaknesses. After considering these, and exploring the possibilities for addressing any deficiencies that may be found, the Researcher proposes a set of CSFs for m-Government, which is believed to be more suitable for the Sultanate of Oman government. The barriers to adoption and diffusion of m-Government are then reviewed, together with existing models for technology adoption and diffusion. From these reviews the Researcher proposes a new m-Government Adoption Model for Oman, which will be utilised in the two case studies for the thesis.

4.2 Review of Critical Success Factors

Whyte and Bytheway (1995) have argued that in the history of information systems in business it is probably true that there has been more failure and disappointment than success. Indeed researching prior to that statement, the Butler

Cox Foundation (1986), Galloway and Whyte (1989), and Lyytinen (1988), all produced findings that suggested one in two information systems development projects would not lead to successful systems. Furthermore, according to Rubinstein (2007), whilst investments in IT have increased significantly during the past two decades, both in public and private sector organisations, the rate of failure remains quite high.

In spite of such failures, however, efforts towards providing government services in the electronic environment and establishing e-Government projects are growing rapidly and today billions of dollars worldwide are spent in this way. For success in these ventures, governments need to take account of the CSFs associated with the implementation of e-Government and m-Government projects, and in this respect, researchers, consulting firms, and government organisations themselves have identified what they consider such factors to be. Not surprisingly, there is variation among the suggestions.

However, there is general agreement upon the concept of CSFs. The original definition was introduced by Rockart (1979:85) who said that CSFs were *"areas of activity which should receive constant and careful attention from management. The current status of performance in each area should be continually measured, and current status information should be made available"*. Boynton and Zmud (1984) agreed with this interpretation, defining CSFs as *"those things that must go well to ensure success for an organization"*. A more specific definition was offered by Dickinson et al (1984:32), who stated that: *"CSFs are those events, circumstances, conditions, or activities that require special attention of management because of their significance"*.

It is crucial to establish these factors at the beginning of a project in order to maximise its benefits. This is achieved by identifying those influences which are greatest on the project, but that is not always a straightforward operation, and there are differences in opinion as to how to do this. Some writers recommend a top-down approach (Christine and Rockart, 1981; Freund, 1987), while others suggest a more specific exercise, identifying between three to six factors that contribute to success

(Daniel, 1961), or categorising factors as *"internal or external events"* (Dickinson et al, 1984). Whichever strategy is chosen, these influences which are critical to the organisation's mission, must be recognised and acted upon effectively; otherwise organisational success is likely to be denied (Olson, 2004). Hence, it is of paramount importance to determine those aspects of an organisation that are significant to its operation so that they can be taken into consideration at the beginning of any project, since if they are neglected in the decisions, the project will not be successful.

Through a comprehensive review of the relevant literature, including empirical studies in a range of cultural environments, including the USA, Europe, the Middle East, and Australia, this section considers the CSFs associated with the successful adoption and diffusion of m-Government in differing cultural contexts. The focus is on organisational and company factors, and competences that act as enablers of successful e-Government, and hence m-Government implementation. To obtain a wide insight into the international experience to date, studies of five projects with differing aims are investigated, from which it is observed that in different cultural environments, and depending upon the nature of the organisation and initiative concerned, the CSFs vary in their visibility and importance. Moreover, it is noted that certain factors that emerge as dominant in particular phases of such initiatives, have much less influence as these projects mature. From the literature, and these five international case studies on CSFs, the Researcher has integrated a number of factors and introduced some new ones, to develop a new model comprising 10 CSFs that address both hard and soft issues within organisations. This new model is offered as one that is more suitable for the adoption and diffusion of m-Government in a range of cultural environments.

4.2.1 Study One: Public Sector Information System CSFs – USA

In a study conducted by Rosacker and Olson (2008) to investigate public sector information system CSFs, ten key success factors were highlighted, as identified by Slevin and Pinto (1986) and empirically tested by Pinto and Prescott (1988) in the situation of a state government IS project. These include a Project mission, Top management support, Client consultation, Schedule/plan, Personnel,

Technical tasks, Client acceptance, Monitoring and feedback, Communication and Trouble-shooting.

Importantly from this research, the specific findings concerning the dominant factors for each phase for state government projects differ from those reported by previous scholars when using a cross-section of private and public sector organisations as their sample. With respect to the conception phase, it was established that top management support, project schedules and plans, and project mission were the dominant CSFs (in rank order). For the planning phase, project schedules and plans, project mission, and technical tasks were highlighted as the three dominant CSFs (in rank order). In respect of the implementation phase, the dominant CSFs were technical tasks, project schedules and plans, and project mission (in rank order). Pinto and Prescott (1988) had identified each of these factors as dominant during this phase of the project life cycle. The similarity is important, since this stage represents the actual implementation of the project, rather than the planning, and is the point when a project manager has the greatest control over resources. On the other hand, in respect of the conception, planning and implementation phases, those CSFs with less importance are Client consultation, Personnel, Client acceptance, Monitoring and feedback, Communication and Trouble-shooting. Table 4.1 provides greater detail:

Table 4.1: Critical Success Factors for Public Sector Information System

CSF	Description	Support	Less support
Project mission	Clear statement of goals and objectives	Yes	-
Top management support	Necessary resources and authority present	Yes	-
Client consultation	Communication, consultation and active listening to all stakeholders	No	Yes
Schedule/plan	Detailed specification of actions required for project implementation	Yes	-
Personnel	Recruitment, selection and training of necessary team personnel	No	Yes
Technical tasks	Availability of required technology and expertise	Yes	-
Client acceptance	The act of selling final projects to their ultimate intended users	No	Yes

Monitoring and feedback	Timely provision of an appropriate network and necessary data to all key actors	No	Yes
Communication	Appropriate network and necessary data to all key stakeholders in project implementation	No	Yes
Trouble-shooting	Ability to handle unexpected crises and deviations from plan	No	Yes

To summarise, it can be seen that these results offer substantial insight into the factors that impact upon decision-making in state government IT projects, and while some similarities are apparent between these findings and earlier research work, in many respects it appears that the perceptions of state government IT project managers regarding CSFs are quite different from private sector managers' perceptions.

4.2.2 Study Two: CSFs for e-Government – GCC Countries

An exploratory study by Al-Rajehi (2007) to identify CSFs for e-Government in the Gulf Co-operation Council (GCC) countries, involved three case study organisations in the public sector – two in Dubai, and one in Kuwait. Al-Rajehi (2007) highlighted thirteen key successes, one of the aims being to determine the factors associated with their effectiveness. These include leadership and commitment, vision and strategy, financing, reform, transformation of culture, utilisation of human resources, user-centric approach, measurement of the success of e-Government, IT infrastructure, e-Government teams, inter-agency collaboration, consultants and satisfaction.

From the findings, a framework was developed, consisting of three main dimensions (internal, implementation, and external factors). The internal factors are leadership and commitment, vision and strategy, finance, reform, culture, and human resources. The implementation factors are: user-centric approach, inter-agency collaboration, measurement of e-Government, e-Government team, consultants, and IT infrastructure. And the external factors are: user satisfaction for the citizens, the private sector, and civil groups.

The Kuwait case was the Public Authority of Agriculture and Fisheries (PAAF), and the result of the exploratory study showed strong demand from the public and management for the implementation of online services, in the hope that these would save time and money for the users. In this case study, Al-Rajehi (2007) identified the important CSFs as leadership, culture, human resources, IT infrastructure, and change management in implementing internet services, whereas he found less support for inter-agency collaboration and consultants.

The two cases in Dubai were the Dubai Police (DP), and the Dubai Municipality (DM). Using interviews and questionnaires, Al-Rajehi (2007) found leadership to be the most important CSF in the successful implementation of e-Government services in the DP. The ruler Sheikh Muhammad Al-Maktoom is the leader of the Dubai e-Government initiative, and he has provided the required vision and dedication for its successful implementation, which has resulted in Dubai becoming a global economic and information hub.

The overall analysis indicates that in each of the three organisations, there is a dominant CSF in the successful implementation of e-Government projects. For example, in the DM, the dominant CSF is the presence of consultants, in the DP it is the nature of the leadership, and in the PAAF in Kuwait it is the e-Government team. The degree of success enjoyed is dependent upon the effect of the dominant CSF on the remaining CSFs. Hence, it is important for managers to identify the dominant CSF and ensure it is supported. As seen from this piece of research, the dominant CSF varies according to organisational considerations. Table 4.2 presents the CSFs found within the three cases and indicates the levels of support for them.

Table 4.2: CSFs for Kuwait (PAAF), and Dubai (DP and DM)

Factors	**PAAF (Kuwait)**		**DM (Dubai)**		**DP (Dubai)**	
	Support	**Less Support**	**Support**	**Less Support**	**Support**	**Less Support**
1-Leadership and commitment	Yes	-	Yes	-	Yes	-
2-Vision and strategy	Yes	-	-	Yes	-	Yes
3-Financing	Yes	-	-	Yes	-	Yes

4-Reform	Yes	-	Yes	-	Yes	-
5-Transformation of culture	Yes	-	Yes	-	Yes	-
6-Utilisation of human resources	Yes	-	Yes	-	Yes	-
7-User-centered approach	Yes	-	Yes	-	Yes	-
8-Measurement the success of e-Government	Yes	-	-	Yes	-	Yes
9-IT infrastructure	Yes	-	-	Yes	-	Yes
10-e-Government teams	Yes	-	Yes	-	Yes	-
11-Inter-agency collaboration	-	Yes	-	Yes	Yes	-
12-Consultants	-	Yes	-	Yes	-	Yes
13-Satisfaction	Yes	-	-	Yes	-	Yes

The emergence of dominant CSFs is very important, since it shows other known CSFs in some cases to be less influential in other contexts. Clearly, the nature of the organisation and the particular goals in mind, determine which of the acknowledged CSFs assume prominence in any given mission, and it could be that the same organisation could find different CSFs assuming greater importance according to the specific change envisaged at the time.

4.2.3 Study Three: A CSF Model for m-Government – Australia

Sandy and McMillan (2005) described a Success Factors Model, involving six factors, developed to assist those in planning and implementing m-Government services. They reported on the usefulness of the model as seen in Australian organisations, in particular the Victorian State Government and the agencies of the Royal District Nursing service (RDNS) and the South West Health Network (SWHN). The six factors included in the model are:

- Cost
- Business Re-engineering

- Education
- Acceptance
- Security
- Access.

The experiences of the case study organisations confirmed the predictive benefits of the model in respect of systems service delivery, or transitioning to a more sophisticated delivery level. Moreover, using interviews with senior managers and operatives, Sandy and McMillan (2005) demonstrated that all factors were present during the relative projects. Interviewees within the Government of Victoria, who examined the model at different levels, confirmed all factors to be relevant and to be correlated with the level of service delivery and technology sophistication.

Importantly from this research, each of the case study organisations commented on the importance of cost, and recommended that funding adjustments should be achieved by means of public/private initiatives. Also, both the RDNS and SWHN commented on the use of a centralised governing body in relation to Business Re-engineering. This body was seen to champion the project and to be able to marshal political and managerial backing in this respect.

Moreover, the RDNS and SWHN had developed standard operating systems for both staff and customers, and provided education to staff in the way of new skills and knowledge. Furthermore, both the RDNS and SWHN showed the importance of acceptance, demonstrating the participation of staff and customers in the project evolution. In addition, in the SWHN, access was particularly important, since wireless access was used as a rapid deployment tool in remote towns and villages, and by specialised staff in remote hospitals and pharmacies. Lastly, consistently, security was a major success factor.

In conclusion, Sandy and McMillan (2005) confirmed the idea that the level and range of m-Government service delivery expands in tandem with increasing levels of technological sophistication. They also emphasised that the relative importance of a success factor can change depending on the level and range of service

delivery, and they argued that their study suggests that a lack of technology or technological solutions are not the main obstacles to the success of m-Government initiatives.

The findings also suggest that the most important success factors in m-Government implementation are: procedural benchmarking, championing the project, the existence of tight service level agreements, securing long-term contracts, ease of transition to wireless m-Government, and minimising the risks associated with the use of new technologies.

Whilst being convinced of the value and validity of the model for those planning and implementing m-Government service delivery, Sandy and McMillan (2005) nonetheless acknowledged its limitations as far as being able to generalise their findings to other jurisdictions, and they urged for further testing of the model with additional case studies.

4.2.4 Study Four: CSFs in Interactive m-Government – Middle East

Investigating the factors which can influence the pressures that could affect the transition process, Al-Khamayseh et al (2007) found that such pressures differ between nations, and identified a nation's technological and information infrastructure, mobile device penetration and acceptance, public and social pressures, and security, as variables in this particular equation. The study draws on the expertise of people involved in m- and e-Government projects as well as suitably qualified academics. Researchers were seen as an important source of knowledge as their work requires familiarity with all the developments in the field (Zmijewska and Lawrence, 2005).

The study involved an extensive literature review that included m-Government and e-Government conference material, journal articles, and consultancy documentation as a means to identify leading researchers in the field, and as a result Al-Khamayseh et al (2007) identified eighteen Fully Interactive M-Government success factors, these being: "Privacy and security, Infrastructure, User need, Quality, e-Government, Acceptance, Cost, Standards, m-Government Framework, Mobile

penetration, Infrastructure management, Awareness, Access, Strategy, IT literacy, Portals and gateways, Private partnerships, Legal issues".

To validate these findings the authors asked the experts for feedback on CSFs required for fully-interactive m-Government, and the responses appear in Table 4.3, which shows the factors ranked according to the percentage of respondents who chose them. Those factors receiving more than 47% were initially classified as core success factors.

Table 4.3: Responses Regarding CSFs for Fully-interactive m-Government

Success Factor	Percentage
Privacy and security	65%
Infrastructure	55%
User need and preferences	52%
Quality and user friendly applications	48%
e-Government	48%
Acceptance	48%
Cost	48%
Standards and data exchange protocols	45%
Coherent m-Government Framework	42%
High Mobile penetration	42%
Infrastructure management	39%
m-Government awareness	35%
Access	32%
Strategy	29%
IT literacy	26%
m-Government portals and exclusive gateways	26%
Partnership with private sector	13%
Legal issues: liberalisation of telecommunication sector	10%

Privacy and Security, attracting a 65% response is the highest ranking core success factor identified by the experts. This appeared as number six on the list of success factors on the survey. This result confirms the findings from the literature review conducted by Al-Khamayseh et al (2007) that secure m-Government applications are considered the hallmark of successful m-Government. Infrastructure attracted a 55% response, indicating that m-Government demands a particular infrastructure that is available nowadays in most countries of the world. User needs and preferences also attracted a similar percentage response (52%). Four factors attracted a 48% response, these being Quality and user-friendly applications, E-Government, Acceptance, and Cost.

Regarding Acceptance, the Pacific Council on International Policy (2002) and Chang and Kannan (2002) agree that the first step in creating this among staff is to train and educate them, and to begin with superiors who subsequently influence others throughout the hierarchy in a downward manner. It is also suggested by Chang and Kannan (2002) that training technology-receptive employees will produce people who will play a key part in supporting their peers. Cost is related to Acceptance, since as noted by Ghyasi and Kushchu (2004), the service access devices should be affordable, and the cost of accessing services should be low. In this respect, Carroll (2005) demonstrates a participant bias towards SMS rather than voice calls because of lower cost.

One interesting result was the low percentage (13%) of responses for Partnership with the private sector, considering that mobile networks are often privately owned, and the fact that Al-Khamayseh and Lawrence (2005) and Sandy and McMillan (2005) found this variable to be important in implementing m-Government. Additionally, Legal issues did not rate highly on the survey attracting only 10% of the total response, and this represented another surprise given the close link with telecommunications legislation that is considered important by Abanumy and Mayhew (2005), Goldstuck (2003), Kim et al (2004), and Sandy and McMillan (2005).

To summarise this study, it can be seen that the preliminary results from an online survey of global experts on the success factors of m-Government were presented and discussed, from which it emerged that many of the success factors for m-Government which had been previously identified by the authors, were consistent with expert opinion. From this preliminary survey the authors identified seven as core success factors (those with 48% and over in Table 4.3). However, they also suggested that the success factors should be further refined, possibly to include some groupings in order to avoid potential overlaps, and to explore the success factors from respective views and quantitative ways of measuring success.

4.2.5 Study Five: CSFs for m-Government – Europe

In a study in Italy to show how soft factors are crucial for the success of m-Government initiatives, Capra et al (2007) proposed a reference framework of soft competencies, to support both the implementation of m-Government action and the management of related organisational change. The framework focuses on organisational factors and competencies that act as enablers of successful e-Government and m-Government implementation, and policies are analysed by reference to the framework, which addresses issues including centralisation, involvement, leadership, learning, and soft skills. The fundamental premise is that m-Government is an extension of e-Government, and that from a 'soft' viewpoint all the critical factors which underpin success for e-Government also apply to m-Government.

The framework has been validated through an empirical analysis of 12 countries. The main focus was on nine EU countries: Belgium, Finland, France, Germany, Greece, Spain, Sweden, Portugal, and the United Kingdom. These countries were selected because of their substantial e-Government experience and the diversity of cultural, geographical, and economic contexts of the European Union that they represent. In addition, Canada and the US were included because of their global importance, and Switzerland was also considered due to its specific role in the European context (Capra et al, 2007).

The authors proposed a schematisation of soft skills which managers of public administration, who were interviewed or completed a questionnaire, identified as most relevant. These soft skills are classified according to different job profiles, the main categories being: Leadership, Communication, Co-ordination, ICT vision, Knowledge sharing, Creativity, Project managing, and Customer orientation. Furthermore, the profiles considered are: Top management, Chief executives (middle management), Public servants, ICT experts, and Citizens (Capra et al, 2007).

The authors found soft skills and competencies to be essential, and specifically the following were acknowledged as vital by all the public administration top managers who were directly interviewed from the Central Government of Finland, Sweden, UK, and USA: Leadership, Ability to involve people and upper management (both inside and outside public administrations), Team working, Communication. In relation to the soft skills associated with the ICT world vision, successful e-Government initiatives are likewise the result of an appreciation of either new ICT opportunities (e.g., in Finland) or new services to citizens (e.g., Sweden, UK). The capability to understand how to use ICT, conceive of innovative services, connect and integrate them, and make the vision concrete, is crucial.

Effective leadership is present in all successful e-Government projects, and whilst the concept of leadership is not understood in all contexts in the same way, for instance in Finland it is linked with negative ideas of power and manipulation, nonetheless, the set of reference skills required to manage the change process are the same as in other countries and are concerned with the capabilities to involve and inspire people.

Only a few countries seemed to be able to successfully combine formal, non-formal and informal learning (e.g., UK and Germany), with most being restricted in their capability to the development of formal initiatives only (e.g., Greece, Portugal, and Spain), and it is difficult to know whether these countries take other forms of learning into account. In fact, formal learning is not valued in most countries (e.g., Finland, Sweden, Switzerland), since people are too busy to find the required time. Teamwork appears to be a common way of learning; hence the composition of any

team is critical since it must be constructed to include a variety of skill, knowledge and expertise.

Given the empirical evidence gained related to e-Government initiatives in 12 major countries, the authors suggest a soft framework for m-Government implementation, featuring the following key success factors:

- Decentralisation for local m-Government diffusion,
- Central government support to local projects in order to promote standardisation,
- Soft skills, in particular leadership and communication,
- Skills enhancement on the job rather than formal training,
- Horizontal organisation and bottom-up approaches, but with strong commitment of top management, and
- Early involvement of people, both internal and external.

In the most successful e-Government projects, these success factors are mainly achieved through the micro-organisation of work, for example, the use of co-operation in teams, coaching, and mentoring (e.g., Finland, Sweden, and UK). Only the US and the UK arrange formal learning sessions in respect of soft skills on a continuous basis (Capra et al, 2007).

4.3 Analysis of the Critical Success Factors

The aforementioned studies have concentrated on the public sector, e-Government in the GCC countries, m-Government in different countries, and organisations. This is because most of the early adopters and superior performers of m-Government were in fact companies, and used m-commerce. As such, existing factors are mainly government-oriented, thereby reflecting their situations and needs, and the direct application of these factors into the m-Government context may be inadequate in the absence of a robust appreciation of the particular conditions that prevail in that environment. Moreover, the previous research efforts do not consider

and/or identify CSFs from different perspectives, and have not explored the features, characteristics and situations of all governments. Nor have they examined other factors, which could potentially be more important for m-Government.

New ways of working, managing, and behaving within business organisations have emerged as they have used ICT to improve their communication processes and hence, respond to the new global competition, and the demand for effective service and customer orientation (Davenport, 1991; Womack, 1991). This evolution has brought with it new business organisation paradigms, such as structure and people flexibility, creativity, innovation, and quick response (Kanter, 1982). Additionally, new managerial concepts such as leadership and coaching have emerged, together with managerial competencies development (Bartlett and Ghoshal, 1996). Lean organisation and management by processes on one hand, and new managerial skills and organisational behaviour on the other, were considered as necessary to be successful in the more competitive environment. The industrial sector has changed substantially, and intangible factors such as knowledge and services have become crucial for it to survive the global competition. Teamwork, co-operation, and listening capability are essentials together with abilities among managers to team build, encourage involvement, and provide support. Increasingly, managers are becoming leaders who have to mediate and communicate (Capra et al, 2007).

Furthermore, learning is becoming increasingly crucial in the effort to make organisations more creative, flexible, and lean (Eraut et al, 2002; Wenger, 1998), to anticipate new changes, and to manage the instability of the business and market conditions (Senge et al, 1999). Additionally, ICT skills are becoming more important (Frinking et al, 2005), but in order for these to be effective in unstable environments, they must be complemented with behavioural and soft skills (Dragoni et al, 2005).

Hence, the 1990s focus on enabling skills in the industrial context, has now moved toward public administration and governance processes, thereby enhancing the role of leadership and managerial expertise (OECD, 2003b).

4.4 Proposed Critical Success Factors for m-Government

From the literature it is possible to derive a number of generic factors, e.g. those relating to management leadership and support, culture, technology, strategy, measurement, roles and responsibilities, etc. These are common in e-Government efforts and are therefore also believed to be applicable to m-Government (Chang and Kannan, 2002; Goldstuck, 2003; Kim et al, 2004; Abanumy and Mayhew, 2005; Antovski and Gusev, 2005; Scholl, 2005; Capra et al, 2007). However, one should also consider the needs and situations of m-Government when developing CSFs, since as mentioned earlier, there are some distinctive issues that require considerable attention in the m-Government sector. In order to address these issues and to compensate for the drawbacks of previous studies, new factors should be introduced. By integrating the common factors and introducing some new ones, the Researcher proposes a more comprehensive Ten-Factor Model for implementing m-Government services, which appear in Table 4.4:

Table 4.4: Comparison between the proposed CSFs and other studies

Rosacker and Olson (2008)	**Al-Rajehi (2007)**	**Sandy and McMillan (2005)**	**Al-Khamayseh et al. (2007)**	**Capra, Francalanci and Marinoni (2007)**	**Researcher's Proposition**
1-Project mission 2-Top management support 3-Client consultation 4-Schedule/plan 5-Personnel 6-Technical tasks 7-Client acceptance 8-Monitoring	1-leadership and commitment 2-vision and strategy 3-financing 4-reform 5-transformation of culture 6-utilization of human resources 7-user centered approach	1-Cost 2-Business Re-engineering 3-Education 4-Acceptance 5-Security 6-Access	1-Privacy and security 2-Infrastructure 3- User need 4-E-government 5-Acceptance 6-Cost 7-Standards 8-m-Government Framework 9-Mobile	1-Leadership 2-Communication 3-Coordination 4-ICT vision 5-Knowledge sharing 6-Creativity 7-Project managing 8-Customer orientation	1- e-Government Vision and Strategy 2-Leadership and support 3- ICT Infrastructure and Mobile penetration 4-Transformation of Culture 5- Human Resource Management and Training/ICT

and feedback 9-Communication 10-Trouble-shooting	8-measurement the success of e-Government 9- IT infrastructure 10-e-Government teams 11-inter agency collaboration 12-consultants 13-satisfaction		penetration 10-Infrastructure management 11-Awareness 12-Access 13-Strategy 14-IT literacy 15-Portals and gateways 16- Private partner ships 17-Legal issues 18- Quality		and Mobile Literacy 6- Inter- and Intra Organisation Integration 7- e-Legislation 8- User Considerations – Requirements/ Trust/Privacy Security 9- e-readiness and Marketing 10- Funding

This proposition is the result of a systematic effort that identifies the factors in a holistic, integrative and comprehensive manner. Although there are some similarities with previous studies, new factors have been added.

Having proposed the ten CSFs for implementing m-Government services therefore, the list of CSFs are equally important, this section will discuss each of them in detail:

1. e-Government Vision and Strategy

The last decade has witnessed many government initiatives in e-Government. The World Bank Group (2004:23) defines and describes the benefits of e-Government as *"The use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government"*. It is acknowledged by many governments that mobile devices have achieved a higher penetration in their countries than personal computers, and consequently there has

been a logical drift towards the development of m-Government, using the wireless infrastructure already in place (Al-Khamayseh et al, 2007).

As yet, the progress is restricted in the main, to Short Message Services (SMS) since the whole initiative is in its infancy, but nonetheless SMS is a convenient method of communication with citizens, and as noted by Hossan et al (2005), in Bangladesh it has four important emergency functions: disseminating pre-disaster warnings, disseminating post-disaster warnings, communicating with citizens in the area of relief needs, and exchanging information with citizens about health hazards. Another key user of m-Government is Malta, which allows citizens and their legal representatives to receive notifications via SMS of court-sitting deferments (Al-Khamayseh et al, 2007).

As noted above, most researchers believe that e-Government is the foundation for m-Government, and many developing nations are now computerising their backend processes to achieve e-Government (Al-Khamayseh et al, 2007). Malta, for instance, considers m-Government as a new e-Government delivery channel, categorising it as an integral part of e-Government (E-government Unit, 2004).

The participation of senior government officials in developing a vision on e-Government that is both challenging and viable, and one that shows clear leadership in the move to realising that vision, is essential (Wijsman, 2004). Hence, leaders should ensure that their vision can be accomplished by referring to those responsible for its implementation, and it must be recognised, as Dawes, et al. (2004) argues, that to be successful, an e-Government strategy must reach all citizens, irrespective of their particular circumstances. In Dubai, for instance, Sheikh Mohammed Al-Maktoom leads the e-Government initiative, and his vision and strategy has driven the development of Dubai Mobil e-Government (Al-Rajehi, 2007).

2. Leadership and support

It is well-argued that success is heavily dependent upon effective leadership (Horak, 2001; Ribiere and Sitar, 2003). Pascual (2003) has emphasised that in the case of e-Government, strong political support is critical in order to guarantee the long-term commitment of finance and technical expertise. However, there may be

resistance from some government officials since e-Government may be perceived as a threat to their power and capability (Sanchez-Franco and Roldan, 2005). Nonetheless, strong leadership is vital, which cascades down to the team leader who occupies a crucial role (Leigh and Maynard, 1995), in which respect Adair (1973) suggests a 'function' model whereby the leader must be fully apprised of the needs of the task, the group and individual team members. In identifying the best type of leader, Belbin (1981) found that team performance was optimal when the leader operated as a chairperson, since although the people drawn to this style were not particularly able or creative, they were nonetheless very skilled at getting the best from the other team members. The cross-functional team leader should possess the ability to motivate a diverse group of people to achieve the team goals (Parker, 1994), and be able to facilitate flexible problem-solving and team development (Denison et al, 1996).

3. ICT Infrastructure and Mobile Penetration

Al-Shihi (2006) notes that the most common technical obstacles to e-Government development and dissemination are concerned with infrastructure and that this obtains particularly in developing countries. Indeed, Ghareeb (2000) cites this reason as the major barrier to internet penetration in the Arab world. Likewise, Hasan (2003) in Bangladesh revealed many technical obstacles related to IT infrastructure such as: high internet access cost, expensive and delayed telephone line access, and the fact that only 1.1% of the country's population has electricity. Copper network cables that can be used instead of fibre optics, have slow transmission times and the cables are susceptible to damage. Essentially, the infrastructure should be capable of being embedded into all existing systems, and it should hide the differences and incompatibilities of remote systems from the local transaction service execution (Reinhard, 2005).

Building a strong ICT infrastructure is necessary to achieve an e-Society, but so also are other changes, since many countries have the heritage of inflexible systems that were designed for specific reasons, the absence of shared standards and communication between agencies, and a lack of preparation for technological change. The adoption of new technologies in the absence of a full appreciation of their

implications is a challenge for e-Government (Chang and Kannan, 2003). In fact, according to the OECD (2003), rapid technology development increases implementation costs, and brings a greater risk of failure. Moreover, The National Office for the Information Economy (NOIE, 2003) has confirmed this, noting that the accelerated pace of technology advancements causes problems for public organisations in respect of their being able to meet changing standards of technology, and simultaneously keep their communication focus without surpassing their users' learning habits. In fact, mobile phone penetration rates are rapidly increasing worldwide, thereby encouraging governments seeking to develop their channels of communication with citizens and organisations (Kushchu and Borucki, 2004). Particularly in developing countries, it can be see that m-Government is a much more attractive proposition given that mobile phone penetration is now greater than that of fixed lines. Moreover, as this applies to middle and low income countries (49 and 36 respectively), mobile phones with their capacity for SMS, make m-Government a sound option (Lallana, 2004).

4. Transformation of Culture

Robbins et al (2000:32) define national culture as *"attitudes and perspectives shared by individuals from a specific country that shape their behavior and the way they see the world"*, and as noted by Davenport et al (1998), it is crucial for successful implementation. A country's culture embodies the core beliefs, values, norms and social customs that govern the way individuals act and behave in it, and one that values knowledge and encourages it creation, sharing and application, is generally predisposed towards m-Government. On this theme, Bluedorn and Lundgren (1993) have argued that culture is central to the change process and to the attainment of strategic objectives. Hence, one of the major challenges for governments is to help develop the most appropriate cultural environment to welcome m-Government.

A survey conducted by Chase (1997) confirmed this belief, showing that culture represented the largest barrier facing government organisations in their efforts to create e-Government. One particular aspect is collaboration, in which respect, Goh (2002) has asserted that a collaborative culture is an important condition for the

successful transfer of knowledge between individuals and groups, because these people must liaise in order to interact, exchange ideas, and share knowledge. Lee and Choi (2003) have also shown collaboration to be a significant contributor to knowledge creation.

Likewise, Goh (2002) commented on the requirement for a culture that emphasises problem-seeking and solving, in which individuals are encouraged to challenge the status quo and take action through empowerment (Stonehouse and Pemberton, 1999). Alongside this empowerment, a spirit of openness must prevail in which mistakes are discussed without the fear of punishment. Indeed, learning by trial and error can represent a very valuable source of knowledge acquisition.

It has been suggested by some scholars (e.g. Halachmi, 1997), that government changes should be dramatic and that incremental change is not usually productive. However, other viewpoints (e.g. Light, 1997) argue that successful or partially successful reforms in the USA have resulted from careful deliberation rather than hasty action. In fact, in democratic and open societies, government reform must, by definition, follow from a popular consensus on policy.

5. Human Resource Management and Training/ICT and Mobile Literacy

Human resource management must be delivered with m-Government in mind, since as noted by Al-Rajehi (2007), a well-trained and motivated workforce is critical to e-Government success. People are the originators of knowledge, in which respect, Davenport and Volpel (2001:212) state that *"managing knowledge is managing people; managing people is managing knowledge"*. Supporting this is the work of many authors who have discussed the significance and role of HRM in government organisations and companies (e.g. Soliman and Spooner, 2000; Garavan et al, 2000; Brelade and Harman, 2000).

Clearly, the various dimensions of HRM are important, but employee recruitment, development, and training are of particular significance since it is through these processes that an organisation gains its skills and competences, and as

noted by Wong (2005) the aim should be to recruit people with the skills required to fill knowledge gaps. Additionally, organisations should appoint individuals with a predisposition for knowledge creation and sharing. This requires cultural considerations to be taken into account, with an effort being made by HRM to recruit those who are capable of fitting in with the organisation's culture, and not merely those who meet the criteria for a particular job.

Moreover, once recruited, knowledge workers should undertake continual skill and knowledge development to secure their long-term contribution to the organisation; otherwise their tangible assets will depreciate. Hence, the HRM function has an important role in the provision of professional development activities, and indeed in ensuring adequate career progression commensurate with their professional standing, otherwise, problems of turnover are likely. Thus, HR policies and practices must be designed to allow individuals to meet their personal aspirations (Brelade and Harman, 2000). Equally important, is a working environment in which employees feel comfortable and can achieve job satisfaction.

Horak (2001) has suggested that skills development should occur in the following areas: communication, soft networking, peer learning, team building, collaboration and creative thinking. Similarly, Yahya and Goh (2002) demonstrated that training related to creativity, team building, documentation skills and problem-solving positively influenced the overall knowledge management process. Moreover, as mentioned earlier, the leadership plays an important role in creating a positive atmosphere for change, by ensuring adequate training and rewarding those who approach change favourably (Lanvin, 2002).

Given that ICT literacy among a population is another pre-condition of the success of e-Government and m-Government, levels of such literacy must be closely monitored and upgraded if they fall short of what is desirable for e- and m-Government to be successful. As argued by Wiggins (1996:3), *"computer literacy is almost as critical as learning to read and write. And it will become more critical as time goes on"*. Odeen (1996:3) supports this, noting that *"[t]he skills future workers will need are basic computer skills - how to create word processing, spreadsheets and*

how to operate on a network. All need these skills, regardless of the position they are filling." Sriram and Srinivasan (2004) identified e-literacy as a requirement for everyone in the digital revolution, pointing out that a very real danger exists that the world will be divided into the information rich and information poor without this. They note that m-Government has the potential to either equalise access to government and its services or increase the barriers to participation, and propose that to overcome this difficulty it is necessary to: firstly, ensure the content is in local languages and that interfaces are easy to use; secondly, develop applications that use speech or pictures in addition to or instead of written text; and thirdly, create programmes that include traditional media, like radio programmes or newspaper columns, where citizens can learn about e-Government.

The 1999 report from the National Research Council (NRC, 1999) promotes the concept of IT fluency and outlines several distinctions that are helpful in appreciating the relationships among information literacy, computer literacy, and broader technological competence. The report perceives computer literacy to be concerned with rote learning of specific hardware and software applications, while fluency with technology relates to gaining an appreciation of the underlying technological concepts and the application of problem-solving skills and critical thinking to the use of technology. Essentially, literacy relates to content, communication, analysis, information searching, and evaluation; whereas fluency relates to a deep understanding of technology and the increasingly skilled use of it.

Williams (2003) has concurred with the NRC distinctions, observing that computer literacy has acquired a skills connotation, implying capability in a few computer applications, such as word processing and email. He argues that literacy is not sufficient in the current climate of rapid technological advancement, and that such skills can easily become outdated, requiring adaptation in the user, which in turn requires sufficient foundational material to him/her to acquire new skills independently after the completion of formal education. This need for a deeper understanding is greater than what is implied by computer literacy, and hence fluency is more appropriate since it denotes a higher level of competency (NRC, 1999).

It was also, however, accepted by the NRC that not everyone needed to achieve this fluency, and that it should be an aim of college graduates, whom it equated with *"individuals who want to be able to use information technology effectively"* (NRC, 1999:2). In order to achieve such fluency, the individual must have contemporary skills, foundational concepts, and intellectual capabilities (NRC, 1999).

From this it can be understood that IT literacy is the knowledge and ability to use computers and technology (mobile PDAs, wireless computers) efficiently. A computer-literate individual is one who is able to learn and use new computer programs without large amounts of help.

6. Inter- and Intra Organisation Integration

Inter- and intra-organisational links are essential for enhanced collaboration, efficiency and effectiveness of an e-Government project, alongside which government websites should be developed that address the needs of citizens, and not merely publicise government services online (NOIE, 2003; Gant and Gant, 2003). This approach calls for effective inter-agency communication between public sector organisations and, in some instances, with private sector entities (OECD, 2003). Four basic conditions are suggested by Zwane (2002) for successful e-Government systems in this regard, these being: to know the customer, to be able to identify the user at each visit, to ensure top-level management commitment, and to guarantee a high level of security.

Regional integration and co-operation between organisations will reduce the need for duplication of resources, and save time for citizens and their movements from one organisation to another. In the Sultanate of Oman, all government departments and institutions will eventually be linked to a secure data network, supplying e-Government data and services through a system of multiple outlets, thereby creating an operational framework for e-administration and stipulating the criteria and regulations for the country's IT and telecommunications infrastructure, including the data and network security system (Ministry of Information, Oman, 2008).

7. e-Legislation

e-Legislation describes the availability and the level of enforcement for legislation concerned with online activities. Sriram and Srinivasan (2004:5) identified e-Legislation as one of the most pertinent challenges for developing a successful mobile e-Government, saying *"the application of Information Technology and Communication (ICT) to government may encounter legal or policy barriers. Therefore, policy-makers must consider the impact of law and public policy when implementing mobile e-government"*. Furthermore, Sriram and Srivasan (2004) proposed recommendations in this direction, these being: firstly, consult with stakeholders to assess how existing laws may impede the desired results; secondly, give legal status to online publication of government information; thirdly, clarify laws and regulations to allow electronic filings with government agencies; and fourthly, reform processes by simplifying regulations and procedures.

The provision of a legal framework that permits internet and mobile shopping would seem to encourage citizens, companies and governments to make purchases via the internet and mobile, and at the same time, help procure the required penetration. Moreover, such legal statutes should serve as a deterrent to all hackers and thieves who rely on theft of data across these services.

8. User Considerations – Requirements/Trust/Privacy/Security

The user is probably the most important external factor in contributing to the success of e-Government initiatives, and users' requirements are a vital component of the system's development phase. They should, in fact, determine the layout and design of government portals, since this type of involvement assures their subsequent commitment. Fulton (2003) found technology innovation occurring only when there was a relationship between developers and users, and hence, online services should be selected and examined according to users' needs. Poon (2002) is clear that e-Government systems should be citizen-focussed, and Singh and Laidler (2002) argue that the gap between supply and use of government electronic services should be minimised. NOIE (2003a: xi) states: *"Maximum value can be attained from citizen-*

centric e-government systems that follow life events, rather than being limited by agency boundaries." This presents a challenge for governments aiming to develop high-functioning e-Government portals, to decide which services to publish on their websites (Gant and Gant, 2003). e-Government is unique in this regard, compared to e-commerce applications, as the latter focuses on categories of e-commerce applications (e.g. B2C or B2B) within certain market segmentation, whereas e-Government focuses on all categories and covers all segments of the society.

Many researchers realise the importance of users in building e-Government. Zwane (2002) for example, argues that as e-Government is for the people, they should be treated as customers, and Alsawafi and Sridhar (2003) on the same theme, argue that *"[g]overnments must treat the public first as citizens and then as consumers of government services"*. This requires governments to try to satisfy the users' needs, in which connection Lin (2003) suggests a three-stage process of determining this: firstly, finding out what those needs are, secondly, finding out customers' values, and thirdly, knowing what costs will accrue to the customer. In respect of the latter concern, Collinge (2002) makes it clear that authorities should be careful to properly research their customer base in order to ensure that sufficient online users can be attracted to their electronic services.

According to Chopra and Wallace (2003), three questions concerned with trust are presented when operating in electronic environments. Firstly, how credible is the information found in the internet? Secondly, how truthful are the information systems to be used? And thirdly, how honest and trustworthy are the people we interact with electronically? Gefen et al (2002) classify trust as one of the three main factors predicting the rate of e-Government adoption, with social influence and website ease of use being the other two. They argue that whilst trust issues affect both e-commerce and e-Government, e-Government is affected to a greater extent. And in the same vein, NOIE (2002) has also identified confidence and trust as major cultural dimensions that contribute to user apprehension. Gilding and Critchley (2003) found that Australians trust ICT information from universities, hospitals and scientists but not from their government, major companies and the media. They also note that trust

issues are susceptible to stereotyping and that re-earning trust is very difficult once it has been lost.

However, trust can also be 'contagious', as demonstrated by Poon (2002) who found that in Hong Kong's joint venture e-Government project, which co-hosts government and business organisations within the same portal, whenever a private business product is displayed within a government website, it can be perceived as a government creation and therefore avoided, for example wedding gift products displayed in a wedding registry website. Trust can also be related to the user's level of IT competence (Parent et al, 2004), since those with a high level of IT capability and who retain trust in a government, would have these particular qualities reinforced through their use of e-Government services. On the other hand, the authors state that people who distrust their governments and have poor IT skills will not change their trust according to the medium of delivery. Therefore, they argued that *"if politicians' aim is to increase trust, they would be better-served to focus on non-web-based courses of actions"* (Parent et al, 2004:7).

Trust also constitutes another fundamental aspect of a knowledge-friendly culture (Stonehouse and Pemberton, 1999; DeTienne and Jackson, 2001; Lee and Choi, 2003). In the absence of a high degree of mutual trust, people will be sceptical about the intentions and behaviours of others and thus, be likely to withhold their knowledge. Building a relationship of trust between individuals and groups will help to facilitate a more proactive and open knowledge-sharing process (Al-shihi, 2006).

9. E-readiness and Marketing

The readiness of society to engage with e-Government is also important, and as highlighted by Alsawafi and Sridhar (2003:3), *"E-government vision requires a community that is information and technologically literate to access the information they require"*. Bui et al (2003:5) talk about *"the aptitude of an economy to use information and communications technologies to migrate traditional businesses into the new economy"*, and suggest it is possible to evaluate the degree of e-readiness by eight main factors: knowledgeable citizens, skilled workforce, macro economy, digital

infrastructure, industry competitiveness, culture, ability and willingness to invest, and cost of living.

Clearly it is important to establish which segments of a community are more likely to be able and willing to use online systems and ICT in general, in addition to which, constant e-Government monitoring is vital if minor defects are to be detected before they impede the workings of the system and cause it to fail. The OECD's Working Party on Indicators for the Information Society (1999), has been concerned with the development of indicators to signal e-readiness, but it has been argued that the indicators produced are very technically-oriented (Deiss, 2002), and De Graaf and Muurling (2003) extend these to include mindset indicators that consider stakeholder attitudes toward e-commerce, in an attempt to address the effects of cultural factors on e-commerce.

Marketing is defined as making goods available to buyers in a planned way which encourages people to buy more of them, for example by advertising (Cambridge online dictionary, 2008). According to the Australian Government Information Management Office (AGIMO, 2004), marketing differs from selling or advertising, and is the process of planning and executing the conception, pricing, promotion and distribution of ideas, goods, and services to create exchanges that satisfy individual (customer) and organisational objectives. This process is often considered to be based on the 'Four P's': product, position, price and promotion. Within the context of e-Government, this means: 1) Product - developing the right online service and presenting it in ways that meet users' needs; 2) Position - making the service available to users when they need it and where they expect to access it; 3) Price - minimising the time and effort required to access the service online; 4) Promotion - informing potential users of the availability of the service and encouraging them to use it.

Furthermore, the marketing of e-Government services can help to: firstly, develop or redevelop services to meet user needs better; secondly, change the behaviour of clients using alternative service delivery mechanisms, such as call centres or shop fronts, by providing them with information online, thereby meaning

that clients will be less likely to use the options for basic information enquiries; thirdly, reduce organisational costs by reducing user traffic in other service delivery channels, such as shop fronts; fourthly, empower users by informing them of alternative service delivery channels. Users can then choose the most appropriate service delivery channel (AGIMO, 2004).

10. Funding

Funding is undoubtedly a crucial element in the success of e-Government initiatives (Greenberg, 2006), since without the appropriate resources, such projects cannot be effectively implemented. Hence, e-Government initiatives are best treated as capital expenditure, since this paves the way for funding through long-term financing instruments, such as bonds or leasing arrangements (Mimicopoulos, 2004). However, according to Zhou (2007), all governments are finding the need to allocate sufficient funding for their e-Government initiatives a challenge, and therefore, they all have needs to give much attention to the development of their respective funding mechanisms. Such funding should ideally be integrated into annual budgets and include allocations not only for development, but also for maintenance and upgrading. Moreover, the more collaboration between the various agencies involved the better, since this will promote cross-agency e-Government initiatives, and be more effective in the use of public monies.

The scale of expenditure on e-Government can be enormous, for example in the USA, which had a budget of US$ 48.6 billion in 2002, making the US federal government the largest single consumer of IT in the world (Nicholas, 2003). In the European Community, national, regional and local governments are forecasted to spend increasing amounts in their e-Government efforts, and at the Lisbon summit in 2000, Europe was set the goal of becoming the world's most competitive and dynamic knowledge-based economy. The resulting e-Europe Action Plan aims to exploit the potential of the internet to promote a competitive economy (Newing, 2001).

According to Onag et al (2002), Taiwan earmarked NT$ 36.2 billion (US$1.04 billion) in 2002, to develop a fully-computerised society. e-Government expenditure in transition economies is also advancing rapidly (Interfax News Agency, 2003), and

in 2003, the budget in the Russian Federation for the e-Russia programme totalled 1.43 billion rubles.

Without doubt, funding issues present the main CSF in e-Government, and the challenge is laid down to all governments to find ways of underwriting their efforts in this area, realising that these electronic initiatives are long-term.

4.5 Barriers to Adoption and Diffusion of m-Government

From the literature review in Chapter Three, it was established that m-Government is a complimentary sub-set of e-Government (Östberg, 2003; Kushchu and Kuscu, 2003; Lallana, 2004). Furthermore, most researchers believe that e-Government is the cornerstone for m-Government (Chang and Kannan, 2002; Goldstuck, 2003; Kim et al, 2004; Abanumy and Mayhew, 2005; Antovski and Gusev, 2005; Scholl, 2005). Therefore, some of the typical challenges and barriers for e-Government are naturally shared by the m-Government efforts (Kushchu and Kuscu, 2003). In addition, Cilingir and Kushchu (2004) argue that m-Government must be incorporated into the design of e-Government. Furthermore, the existing technological foundations, applications and services support the idea that m-Government will be a significant part of e-Government efforts. Hence, policy-makers and IT professionals need to make preparations to embrace these developments and participate in the ways to enhance e-Government activities through m-Government (Kushchu and Kuscu, 2003).

Conventionally, anywhere–anytime voice communication has been one of the major actors for the growth of mobile phones. Data communications, however, is now becoming very attractive to many consumers and business users (Kushchu and Kuscu, 2003). That said, despite the fact that ICT systems are valuable communication tools, they also bring many technological and cultural concerns. In this respect, Weisinger and Trauth (2003) have observed that *"[i]t is ironic that Information Technology (IT) is currently serving as both a facilitator of the global economy and as a potential impediment to its advancement"*. This section describes the technical and non-

technical barriers faced by many countries when attempting to adopt m-Government systems.

4.5.1 Technical Barriers

The most common technical barriers to m-Government development and dissemination are concerned with a lack of infrastructure, and this is a particular problem in developing countries. However, the type of infrastructure required is now available in most countries of the world (Al-Khamayseh et al, 2007). According to Foghlu (2005), m-Government infrastructure is comprised of wireless networks and mobile access devices (e.g. mobile phones, laptops, PDAs), and accessing software services. While Al-Khamayseh et al (2007) refer to infrastructure in many ways, the report compiled by Goldstuck (2003) uses the term 'connectivity' to refer to infrastructure and categorises it as the cornerstone of m-Government applications.

Kushchu and Kuscu (2003) also cite infrastructure development as a challenge to the adoption of m-Government, noting that the infrastructure is both physical and soft, embracing the technology, equipment, and network required to implement m-Government as the hard elements, and institutional arrangements and software that make m-Government transactions possible, as the soft elements. They note that although m-Government is still in its initial stages, varied software is available for m-Government services.

Security is identified as another technical barrier. In the USA, for example, Stowers (2003) noted the many challenges confronting federal agency web managers, such as the need to remove sensitive information that may be useful to terrorists, the need to take steps to present hacking, and the need to maintain privacy. According to Al-Khamayseh et al (2007), security of m-Government applications is considered the hallmark of a successful initiative. In this respect, Goldstuck (2003) recommends following the fundamental standards of wireless network security in order to secure controlled and managed access to services. These include Wireless Equivalent Privacy (WEP), Cisco Lightweight Extensible Authentication Protocol (LEAP) and 802.1x protocols.

A further barrier is the potential lack of compatibility between mobile systems and existing e-Government systems, a problem which as noted by Kushchu and Kuscu (2003), may escalate where government offices have legacy systems which may not be easy to integrate both in terms of functionalities and data administration.

4.5.2 Non-Technical Barriers

Non-technical impediments are generally found in relation to those who develop, manage and/or use an e-Government system, and the environment that hosts the system. Hasan (2003) argues that *"[a] country's social, political, and economic composition correlates closely with its e-government program development"*. One country's national culture can, therefore, be very different from another, and as noted by Davison and Martinsons (2003:5) even *"people from the same culture and linguistic group may find it difficult to communicate effectively. However, additional problems arise with interactions across cultures"*. Clearly then, individual predispositions towards m-Government are governed by a range of cultural factors, which may make one person, or group, or even nation, look much more favourably on the prospect of m-Government than another.

In fact, many researchers have explored cultural issues in and between different nations, and particularly in the area of internet-based applications. Lowe and Corkindale (1998) examined value differences between Australians and Chinese with respect to marketing and advertising, concluding that the motivation for a particular type of behaviour in one country may not hold in another. Also investigating the tendencies of Chinese people in relation to e-commerce, Stylianou et al (2003) found that they rely on the use of cash, whereas e-payment operates on the basis of credit cards, hence their predisposition to engage in online shopping is less than other nations.

Other cultural factors that are known to impact upon the adoption and dissemination of m-Government are: trust, language, resistance to change, management support, and users' expectations. The National Office for the Information Economy, now the Australian Government Information Management

Office (NOIE, 2002) identifies confidence and trust as major issues that in themselves, cause problems associated with many other non-technical factors.

Matters concerning trust correlate closely with the level of security and the presence of legislation governing online activities. According to Dix (2002), most e-Government initiatives are not secure against external interference and that is something which is understood by users, and consequently reduces any trust they have. Privacy and security are also raised by Kushchu and Kuscu (2003), who suggest that these issues are the most significant concerns citizens have about m-Government. The fear is that their opinions will never be anonymous because government will be able to trace their mobile numbers when they communicate. This is a real drawback to m-Government and the authorities must find some means of demonstrating that individual privacy is protected. Unfortunately, whilst the encryption of SMS messages is relatively safe, mobile phone numbers and mobile devices are comparatively easy to hack into, and since wireless networks use public airwaves, they are vulnerable, and there are opportunities for the theft of information, and for tampering with it.

Another major problem of a non-technical nature is people's resistance to change, which occurs generally because of the unknown, or an inability to deal with uncertainty. In this respect, the NOIE (2003) reported cultural problems after the introduction of its e-filing initiative that enables litigants to lodge federal court documents online. It was found that traditional law firms, many of the federal court staff, and some litigants, resisted using the system due to the conservative nature of the legal work, as well as concerns regarding privacy and security issues. Another example of resistance to change was seen in an e-voting initiative in the USA, where, as Done (2003) reports, a legal case was filed by the Voting Integrity Project in Arizona against the development and use of an internet-based voting system, because it was argued that white people who were wealthier than African-Americans and Hispanics, were advantaged because they had greater access to home computers. In fact the case did not succeed, and the Arizona government immediately campaigned to promote and prepare for the e-voting system via a strong educational outreach activity to educate disadvantaged people on the benefits and means of e-voting.

Another barrier in some countries, as identified by Kushchu and Kuscu (2003), is the lack of data protection legislation, which articulates the rights of data subjects (citizens) and the responsibilities of the data holders (government). In some cases the law of a country does not recognise mobile documents and transactions, there is no clear legal status for government online publications, no regulations for online filings, online signings, and on online taxable transactions. An example of a related case in the USA was given by Stowers (2003:7) who said that *"several sites within the Department of the Interior were closed in early December 2001 due to the legal decision declaring that any sites containing Indian trust data had to be disconnected from the Internet"*.

In discussing resistance to change, the OECD (2003) notes that this may lead to other barriers to the adoption and dissemination of e-Government, such as poor project management, technology failure, lack of funding, and high political demands and expectations. It is imperative to remove any such obstacles to implementation, since it has been documented (Swanson, 2002) that about 60% of e-Government initiatives fail due to: lack of high-level officials' commitments; funding; and project control. Heeks' (2003) examination of the challenges to e-Government adoption in Africa revealed that lack of finance and an e-readiness strategy may cause a slow diffusion rate, and that many e-Government projects in Africa fail simply because they conflict with some leaders' personal interests.

Another non-technical obstacle can be seen in individual socio-economic status. Kushchu and Kuscu (2003) comment that accessibility is key for the success of m-Government, but factors such as income, education level, gender, age, handicap, language differences and regional discrepancies affect accessibility, and hence citizens' attitudes towards m-Government initiatives. Furthermore, the payment structures in any m-Government project, as already noted, depend on credit cards, yet in many developing countries, there is low credit card penetration, and whilst a person is quite likely to have a mobile phone, s/he is much less likely to have a credit card, so the services offered by m-Government cannot be equally accessible to all the population (Kushchu and Kuscu, 2003).

Clearly, the cost issue is one that applies to populations in all countries, and as Ghyasi and Kushchu (2004) have pointed out, the cost of owning mobile devices and of accessing services should be affordable, and low. Carroll's (2005) survey revealed a bias among participants towards SMS rather than voice calls because of lower cost. Indeed, cost is one major issue in the switch from e-Government to m-Government, as noted earlier. In exploring the potential in the Arab world for e-Government, Al-adwani (2003) found internet cost to be outside the reach of the average citizen. In Oman for example, in 2003, a dial-up connection to the internet cost around £0.39 per hour, or £9.36 a day, and £65.52 a week (Omantel, 2005). On the other hand, according to the Times of Oman (2007), Oman Mobile offers excellent value for its internet service which can be accessed anywhere and anytime in the Sultanate. That said, whilst the service costs only 0.5 baisa (c.£0.014) per kilobyte, for greater usage, the costs are higher, and in fact it can cost £39 monthly which is not cheap for the average Omani citizen.

4.6 Adoption and Diffusion Models

The growth of innovation diffusion research and the resulting new adoption and diffusion models, provide scholars and practitioners with accumulated empirical evidence, and a standard that can be used by technology specialists, economists, educators, and decision-makers alike to apply new ideas in their fields, and to help solve particular research or social problems.

In this respect, a variety of models have been developed in order to explain and predict user behaviours and intentions, the most widely used of these being: (1) Diffusion of Innovations (DOI), (2) Theory of Reasoned Action (TRA), (3) Theory of Planned Behaviour (TPB), (4) Social Cognitive Theory (SCT), (5) Technology Acceptance Model (TAM), (6) Decomposed Theory of Planned Behaviour (DTPB), (7) Task-Technology Fit (TTF) Model, (8) Technology Acceptance Model 2 (TAM2), and (9) Unified Theory of Acceptance and Use of Technology (UTAUT). Table 4.5 provides comparative information concerning these:

Table 4.5: Comparison of 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	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, Behaviour	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	
9	Unified Theory of Acceptance and Use of Technology (UTAUT)	Venkatesh, et al. (2003)	1- performance expectance 2- effort expectancy 3- social influence 4- facilitating conditions		Use to Behavioral intention, Usage behavior	Information Systems, Technology Adoption	An especially important issue of interest in today's societal and workplace environments is creating equitable settings for women and men of all ages (Venkatesh et al. 2003).

However, despite an increasing number of studies that have utilised these models in recent years in connection with the use of mobile phones, technologies, and services, little remains known about consumers' willingness to adopt mobile communication technologies, and the factors that influence the adoption decision and value perception relating to m-technology (Sell, Patokorpi, Walden and Anckar, 2006 cited in Kushchu, 2007). Consequently, one aim of this study, as indicated in Chapter One, is to address this gap in the literature by proposing an integrated model that explores the critical success factors in the adoption and diffusion of mobile government services.

In the development of this integrated model, the study uses two of the models mentioned above, the first being the Technology Acceptance Model (TAM) and the second being the Diffusion of Innovations (DOI). Each of these models has advantages, but at the same time, each has shortcomings, and a combination of the two will allow for a comprehensive approach to the problem identified, i.e., whether m-Government has the potential to be successful in Oman. In order to appreciate the benefits of combining these two models, and hence the justification for using them, each is now discussed in more detail.

According to Straub et al (1997), TAM (developed by Davis in 1989) is widely regarded as a relatively robust theoretical model for explaining IT use. From a practitioner perspective, it is useful for predicting whether users will adopt new information technologies, since it theorises that external variables influence behavioural intention to use, and actual usage of technologies, both directly and indirectly through their influence on perceived usefulness and perceived ease of use. Davis (1989:320) defined perceived usefulness as *"the degree to which a person believes that using a particular system would enhance his or her productivity"*, and perceived ease of use as *"the degree to which a person believes that using a particular system would be free of effort"*.

Davis' Technology Acceptance Model (Davis, 1989) postulates that the two major determinants of whether technology is embraced are its *perceived usefulness* and *perceived ease of use*. Adoption is believed to be the outcome of a user's

intention to implement a system, and that intention is in turn determined by the user's beliefs about it. In other words, the user's attitudes, derived from his/her perceptions, predict the degree of willingness to use the technology.

These perceptions are discussed in a little more detail in the following paragraphs.

Perceived Usefulness:

Perceived usefulness relates to the degree to which individuals believe that their adoption of a new technology will improve their task performance, and much research exists that verifies the influence of perceived usefulness on a person's intention to use a system (Davis et al, 1989; Venkatesh and Morris, 2000). Indeed, there have been many empirical studies demonstrating that perceived usefulness is the primary predictor of IT adoption (Davis, 1989; Davis et al, 1992; Igbaria et al, 1997; Gefen et al, 2000; Venkatesh, 2000; Venkatesh and Davis, 2000). O'Cass and Fenench (2003) observe the appropriateness of the TAM for research in electronic commerce applications since these are based on computer technology. Hence, as m-Government services are an extension of e-Government, it is logical that the model be used to explore consumer intention to adopt favourable attitudes and behaviour patterns towards their use.

Perceived Ease of Use:

Perceived ease of use relates to the extent to which an individual believes his or her interaction with a specific information system or technology is free of mental effort (Davis, 1989). A positive relationship between perceived ease of use and behavioural intention has emerged in many empirical investigations (Davis, 1989; Davis et al, 1992; Igbaria et al, 1997; Gefen et al, 2000; Venkatesh, 2000; Venkatesh and Davis, 2000), and is believed to occur both directly and indirectly. Agarwal and Karahanna (2000) found ease of use to be the predominant consideration in intention to adopt, while other studies found the construct to exert a mediation effect. Certainly, it features as one of the major variables influencing user intention to accept new technology in both the original and the revised TAMs, and it is, therefore, suitable as

a means to establish the likelihood of successful implementation of m-Government services.

The TAM has been extended by Pedersen et al (2001), in a way that can be found generally useful, and Hung et al (2003) in their study of the adoption of WAP services in Taiwan found it to be of value, since both ease of use and usefulness were among the critical factors affecting WAP services use. Additionally, in their exploration of mobile commerce acceptance, Wu and Wang (2005) found that ease of use and usefulness were significant influences upon the use of mobile commerce.

According to Kushchu (2007), compared with others, the TAM is explicitly developed to study the user acceptance of technology and is widely used to explain and predict a user's behaviour in adopting and using information systems in organisations.

However, despite the TAM's comprehensive approach, its basic constructs – perceived ease of use and perceived usefulness – do not fully reflect the specific influences of technological and usage context factors that may affect user acceptance, and this study therefore utilises the Diffusion of Innovations (DOI) to support the use of TAM and provide a holistic approach to the analysis of the situation, i.e. m-Government adoption.

The DOI takes account of the fact that individuals have differing predispositions towards acting innovatively. Rogers (1983; 1995) recognised that some people are able to manage high levels of uncertainty and respond more positively, and Agarwal and Prasad (1997), commenting on the same phenomenon, described this tendency as personal innovativeness, noting that it symbolised the risk-taking propensity existing in some individuals and not in others. Moreover, it is acknowledged that where there is no prior perception of ease of use or perceived usefulness, since little knowledge is possessed about the issue under consideration, it is the extent of a person's innovativeness that influences his or her intention to adopt. Citrin et al (2000) found this to be the case in respect of internet shopping, and given the relative infancy of mobile phone services, it is appropriate to test innovativeness as an influencing variable.

Rogers (1995:11) defines innovation as the *"idea, practice, or object that is perceived as new by an individual or other unit of adoption"*, and diffusion as *"the process by which an innovation is communicated through certain channels over time among members of social systems"*.

A decade previously, Rogers (1983) suggested five characteristics of an innovation that affect the rate at which it is diffused and adopted, these being: relative advantage, compatibility, complexity, triability, and observability, each of which is outlined as follows:

- *Relative advantage* is the degree to which an innovation is perceived as being better than the idea it supersedes. In 2003, Rogers explained this attribute in more detail, stating that it relates to ease, speed, and improved quality.
- *Compatibility* is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters. Again, in 2003, Rogers developed his explanation stating that this relates to norms, values, resources, support.
- *Complexity* is the degree to which an innovation is perceived as relatively difficult to understand and use. In general, more complex, or less well understood innovations are more difficult to adopt. Rogers (2003) considers complexity to relate to ease of use, no effort and no load, easy to learn.
- *Triability* is the degree to which an innovation may be experimented with on a limited basis. Rogers conceives triability as the opportunity to try.
- *Observability* is the degree to which the results of an innovation are visible to others. The rate of adoption increases with visibility. In 2003, Rogers elaborated on this attribute stating that it means the ability to observe what others do.

These dimensions are discussed in a little more detail in the following paragraphs.

Relative Advantage:

For innovations to be adopted, they must bring with them relative advantage over the existing situation, and be recognised as being better than the ideas they supersede. In this respect, a range of variables are considered by potential users, such as for example, economic profitability, degree of risk, decrease in discomfort, savings in time and effort, and immediacy of rewards. Rogers (1995) noted that the latter is the reason why preventive innovations, such as new forms of insurance, generally have a low rate of adoption. Making an assessment of the relative advantage of an innovation can be difficult if there is no appropriate unit of comparison, and this is especially the case with m-Government services. Considerations of economic profitability therefore vary significantly: consumers may be more interested in making savings on their mobile services, while businesses may be keener to increase their cost efficiency in network management. In terms of risk, the main problem associated with m-Government services is their quality, since the replacement of old services with new electronic ones may substantially reduce the quality of mobile services applications to a level beyond that which users are prepared to accept.

Compatibility:

Compatibility relates to a variety of dimensions such as technical features, existing socio-cultural values, past experiences and the needs of potential adopters. When innovations are evaluated, they are compared with their predecessors from both technological and social perspectives (Miles et al, 1998). Technical compatibility in mobile services has been guaranteed by the development of standards, which require inter-operability between hardware and software. That said, users are also familiar with technology that is device-dependent, for example the internet can be accessed by a PC or a laptop, video communication can be seen on a TV, voice conversations can occur on the telephone, and data can be managed on PCs. At this moment in time, users expect reliable internet applications and a high service quality, requiring a clear signal and a smooth conversation. Currently, mobile internet does not meet these standards. Moreover, the efficiency of such applications is also influenced by the socio-cultural context in which individuals live, since people's mobile phone habits

differ tremendously across countries and the technical characteristics of mobile internet (PDA) are not compatible with all these differences, e.g. it is not possible to talk and access the internet simultaneously on the mobile phone.

Complexity:

Another important variable is the perception of users regarding the innovation's relative difficulty in ease of understanding and use, when compared to the old idea. This equates to Davis' perceived ease of use already discussed in the TAM. Users' varying levels of expertise in respect of specific technologies, predispose them to associate differing degrees of complexity with innovations, and for those who have a different knowledge base, a process of social exclusion may occur (Rogers and Shoemaker, 1971). Very many people do not have the skill to configure their PC as a mobile, and have a need for user-friendly solutions, and PC-based configurations still have awkward user interfaces. It is unlikely that social exclusion would be a problem among consumers because most are at a similar stage in their IT appreciation, but business users may be pressured by competition, and thus be more likely to adopt Mobile Internet services in response to it.

Triability:

The opportunity to experiment with a new technology in advance of making the decision whether or not to adopt it is essential from the user viewpoint, hence the triability of an innovation is an important characteristic, and a benefit that early adopters especially require since there is little to learn from other than trial and error. Functioning, real world examples are often more important than arguments about advantages and expected functions (Rip, 1995; Rogers, 1995). However, in terms of growth rate, the numbers trying mobile internet services are significantly higher than those adopting.

Observability:

Observability relates to the extent to which an innovation's performance and associated advantages can be seen by individual users, as well as by the organisation that has introduced it. In respect of mobile internet services applications, a problem

remains in that the possible benefits are not easily observed, and most potential adopters are ignorant of all the existing applications.

These dimensions have been considered in several studies with varying outcomes. Kwan and Zmud (1987) identified relative advantage, compatibility and complexity as the perceived innovation characteristics in their Information System implementation model, which is based on the DOI; O'Callaghan (1998) found the same, with less support for triability and observability. In the particular circumstances being explored in this study, however, it would seem very appropriate for users to be able to try m-Government services, and to observe the benefits. This is supported by early research on mobile banking adoption in the UK, that finds relative advantage over existing services, compatibility of mobile banking with consumer needs and lifestyle, and the ability to test a new service and observe the successful outcomes of other users, increased positive attitudes towards adopting, whilst complexity and risk had a negative effect on attitudes towards adoption (Lee et al, 2003).

In their investigations of the role of particular constructs in predicting adoption, Agarwal and Prasad (1997; 1998) found modest support for the predictive validity of innovation characteristics. Furthermore, they also noted that relative advantage and compatibility in DOI are similar to perceived usefulness and perceived ease of use in the TAM. Furthermore, in his research Leong (2003) found a similar relationship between the two constructs of relative advantage and complexity in IT adoption, and perceived usefulness and perceived ease of use in the TAM. However, it is important to note that the studies of Agarwal and Prasad (1997; 1998) and Leong (2003), were conducted in the context of IT, and not in m-Government services, and it is therefore imperative that in this study relating to the adoption and diffusion of m-Government services in Oman, all these variables are considered, regardless of their perceived similarity, since the varying focus and contexts may have a bearing on how 'relative advantage' and 'perceived ease of use' are actually operationalised.

Table 4.6 provides an example and explanation of the seven dimensions from the two models being considered in this review, and used for the empirical framework:

Table 4.6: Example and explanation of dimensions from the TAM and DOI

Users' Perspectives	Dimensions	Explanation	Examples
Government /	Perceived Usefulness	The perceived usefulness of the mobile service system varies according to users and their work. For example, within the organisation it strengthens good performance bonuses and promotions and other rewards. And in the general public service is provided electronically, being relatively cheap and of high interest leading to positive use.	1- It is faster to access the internet with a mobile phone from anywhere, any time. 2- It is easier to access government services via mobile phone
	Perceived Ease of Use	Perceived ease of use for this research defines how people can easily use m-Government services by cell phone, and how the m-Government approach fits in the government agencies' current work processes.	1- Learning to use m-government services is easy. 2- Shopping via m-government services is easy.
Business /	Relative advantage	For this research, includes the financial and social benefits, which can be gained by implementing m-Government services. Government agencies striving to improve services that are delivered to the general public will use m-Government as part of reinventing their work processes.	1- m-Government services are faster and the quality is higher.
	Compatibility	For mobile services defines how people conceive m-Government initiatives and how the m-Government approach fits in with the government agencies' current work processes. Technological compatibility refers to the compatibility of m-Government technologies with the existing technologies of a government agency. Organisational compatibility concerns the fit with an organisation's work culture and attitudes toward change.	1- Using m-Government services is compatible with my style and habits. 2- m-Government services are compatible with my way to use public services.
Citizens /	Complexity	Complexity is defined as the degree of difficulty associated with the use of new innovations. M-Government requires a process that can facilitate the implementation of new technology, through training and the presence of expertise to facilitate the implementation.	1- m-Government services are easy to learn, without effort and no load.
	Triability	Adoption of mobile services becomes much easier if citizens can try them and access them from anywhere and any time. An innovation on a small scale. The triability of mobile services integrated into the government services and those operated independently could	1- Mobile services give the user the opportunity to try and give his/her opinion to adopt.

Employee		be considered the same, although the citizen would require a minimum size and depth of trial to effectively improve the m-Government services.	
	Observability	Mobile services are of course very visible, the access to the internet process as well as the completed transaction are easy for others to observe. The observation allows parents to watch their children's behaviour when they use the mobile services and they can control them and advise them of the right way.	1- Mobile services give the chance to observe what others do.

4.7 An m-Government Adoption Model for Oman

In order to explore the potential for the adoption of mobile services, the Researcher suggests a model that integrates many of the most important findings on adoption research. This is best achieved by combining some of the features of the TAM and DOI, because these models can provide a framework through which to consider perceived attributes of the proposed system – the use of mobile internet and technologies to connect public organisations and provide services to the general public over a mobile, and a change in organisational work processes. From this consideration, it will be possible to identify the user requirement, technology required and organisational determinants to develop an m-Government adoption model for the Sultanate of Oman initially.

It is evident from the review of relevant literature review in Chapter Three, which explored the concept of m-Government, and its espoused benefits, that one important reason why states are keen to introduce successful m-Government projects is the fact that they are seen to increase citizen welfare. It is also clear, however, from the various commentaries on m-Government initiatives worldwide that have been implemented using different approaches, that the possibility of failure remains very high, with potentially half of those developed not realising their aims. It has been shown in this chapter that m-Government possesses a unique combination of characteristics that act in combination with each other.

The challenge is to identify the precise characteristics and how they need to blend, because irrespective of the potential advantages of m-Government, noted as efficiency improvements in processing tasks and public administration operations, cost saving on data collection and transmission, and improved business processes and services, several obstacles do exist that limit its implementation. These are categorised in Table 4.7 below, which also gives practical examples.

Considering the CSFs identified, such as leadership and support, vision and strategy, and team leadership, it seems obvious that failure to fully explore how and to what extent these are required for any particular m-Government project, will probably result in failure. For example, in the absence of committed leadership and support, the power and authority to continue is unlikely to endure. Moreover, it has been documented that not one characteristic can stand alone as a CSF for m-Government, and that interaction between them all creates the dynamic required.

The integrated framework suggested in this chapter takes account of the need for such dynamics and provides a model that can work equally well for both public and private enterprises. It stands as a blueprint for decision-makers concerned with the development of m-Government projects and their adoption, and in addressing the perceived barriers to effective diffusion; it also offers advice regarding effective implementation. It is crucial to appreciate the barriers that are likely to arise in individual contexts, since this knowledge will signal to the developers the particular challenges associated with m-Government projects. Hence, the CSFs, as emerging from the literature, must be considered at the start of the project, since only by following this critical path, will the number of successful m-Government initiatives increase.

Moreover, the wide-ranging nature and complexity of m-Government projects indicate the need for attention to their progression, and this calls for diligent monitoring, control and evaluation, bearing in mind the outcomes for both internal (the people who work in the organisation) and external (the public citizens) customers. At the same time, it is essential to involve both public and private parties

(Oman Telecommunication) and (Nawras Telecommunication Company) to ensure compatibility of service and effective integration.

The framework shown in Table 4.7 will be used within the Researcher's model to consider the individual case of the Sultanate of Oman, thereby identifying the CSFs to the adoption and diffusion of m-Government, and the dimensions from TAM and DOI required to overcome these challenges.

Table 4.7: Framework for an Adoption and Diffusion Model for m-Government in Oman

Dimensions	Critical Success Factors for m-Government	Barriers to the Adoption and Diffusion of m-Government
1-Usefulness	1-e-Government vision and Strategy 2-User Considerations – Requirements/ Trust/Privacy Security 3- e-readiness and Marketing 4- Leadership and Support 5- Transformation of culture 6-ICT Infrastructure and Mobile penetration	1-User rejection of technology 2- Organisations do not perceive the usefulness of m-Government.
2-Ease of Use	1-Transformation of culture 2- Human Resource Management and Training/ICT and Mobile Literacy 3- User Considerations – Requirements/ Trust/Privacy Security 4- e-readiness and Marketing	1- Language Differences 2-Users may not understand how mobile services work and find it difficult to use and learn them.
3-Relative advantage	1- e-Government vision and Strategy 2- Leadership and support 3- User Considerations – Requirements/ Trust/Privacy Security 4- Transformation of culture 5-Funding 6- e-readiness and Marketing 7- e-Legislation 8- Inter-and-intra-organisational integration 9- Human Resource Management and Training/ICT and Mobile Literacy 10- ICT Infrastructure and Mobile penetration	1-Citizens' attitudes towards m-Government. 2-High political demands and expectations 3-Socio-economic status 4-Resistance to change 5-Lack of funding 6-Poor project management
4-Compatibility	1- e-Government vision and Strategy 2- ICT Infrastructure and Mobile penetration 3- Transformation of culture 4- User Considerations – Requirements/ Trust/Privacy Security 5-Inter-and-intra-orgnisation integration	1-Lack of Infrastructure 2-Lack of Compatibility 3-Lack of Compatibility with other public services 4-Culture

	6- e-readiness and Marketing	
5-Complexity	1-Transformation of culture 2- Human Resource Management and Training/ICT and Mobile Literacy 3- User Considerations – Requirements/ Trust/Privacy Security 4- e-readiness and Marketing 5- Human Resource Management and Training/ICT and Mobile Literacy 6- e-Government vision and Strategy 7- ICT Infrastructure and Mobile	1-Complex technology and no economy of time 2-Education level 3-Technology failure
6-Triability	1- e-readiness and Marketing 2- Human Resource Management and Training/ICT and Mobile Literacy 3- User Considerations – Requirements/ Trust/Privacy Security 4- ICT Infrastructure and Mobile penetration	1-Lack of opportunity for user trials and feedback 2-Differential accessibility in the country's regions
7-Observability	1- e-Legislation 2- User Considerations – Requirements/ Trust/Privacy Security 3- e-readiness and Marketing 4-Funding	1-Age 2-Costs are higher 3- Lack to opportunity to observe others

The absence of any of the constructs will inhibit realisation of the potential benefits of delivering services using advanced technologies. Governments utilise many different mechanisms for the delivery of their services, ranging from counter operations, post, telephone, fax and e-Government services. Given the continual evolution of technological capability, it is not possible to envisage what will be available too far in advance, and consequently, the model will be developed with a focus on the current time, that is to say, on e-Government as it is now conceived, with the intention of moving to m-Government.

Together with the above framework, the model also examines the demographic variables Age, Gender and Education level, and their influence upon intention to adopt m-Government services in Oman, in accordance with the objectives stated in Chapter One.

The resultant proposed m-Government Adoption Model for Oman is illustrated graphically in Figure 4.1:

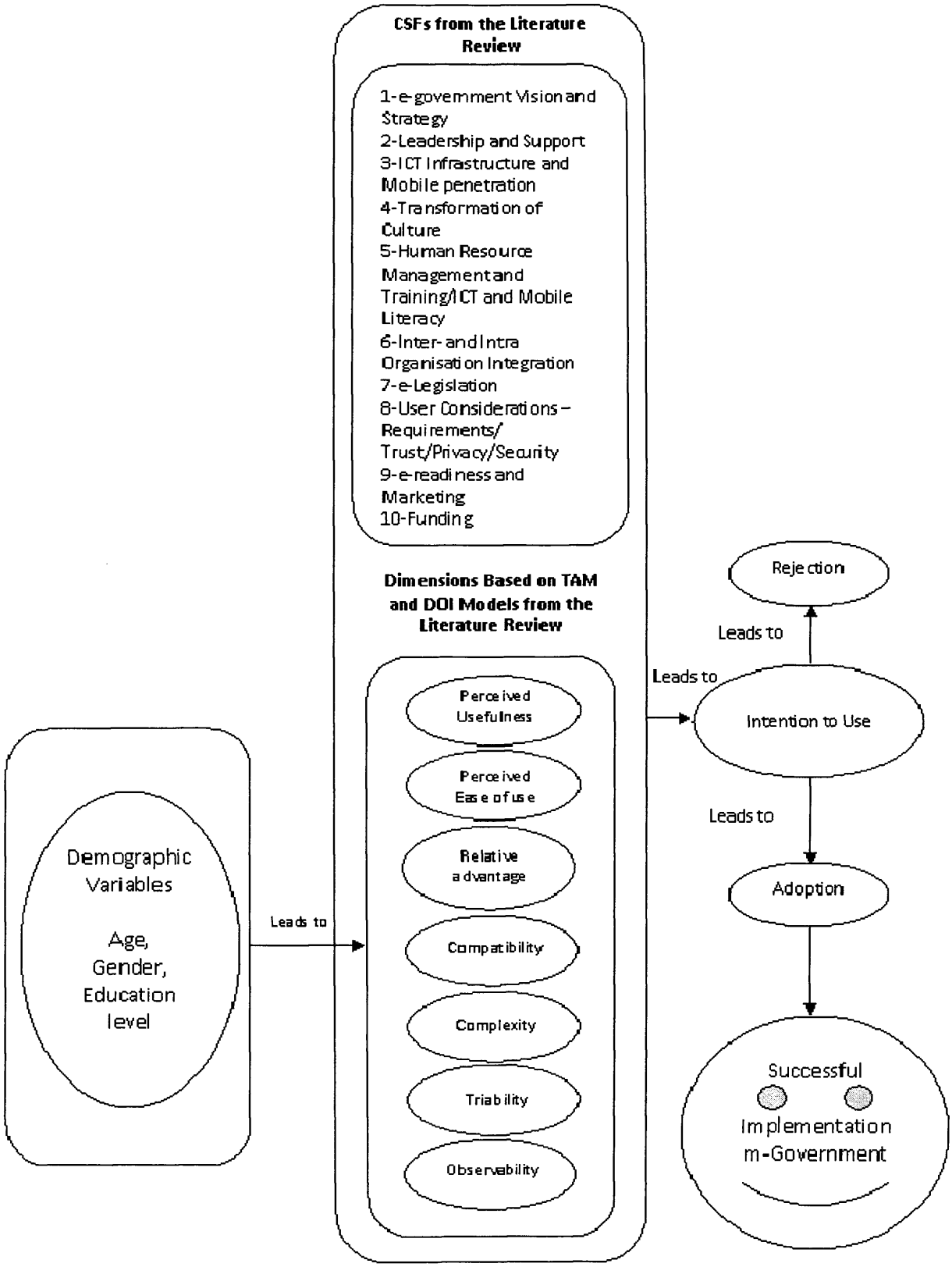


Figure 4.1: m-Government Adoption Model for Oman

4.8 Conclusion

This chapter has covered the body of work that deals with CSFs as they have been identified for e-Government projects. In the Review of Critical Success Factors it was noted that in the history of IT projects there is a marked lack of success, with one in every two projects failing. Hence, given the movement towards e-Government which is gaining momentum worldwide, it has become important to establish what conditions will assist a successful outcome.

Having considered five case studies, two of which relate to GCC countries, it emerged that some CSFs are common to all initiatives, but that depending on the cultural context, and/or the precise organisational circumstances, some CSFs assume greater prominence than others. Moreover, it is accepted that even in the same organisation, the ranking of these might change as a different initiative is introduced.

The chapter has revealed that CSFs are essentially grouped into two categories, those concerned with technical aspects, and those concerned with non-technical aspects. In terms of technical aspects, the development of infrastructure (including a campaign of education and training) and the need to ensure compatibility with already-existing provision is paramount, and this requires much co-ordination with many different agencies.

In respect of non-technical aspects, the human factor is crucial since without commitment from those in leadership positions, adequate funding for the long term is not likely to be allocated, and a poor system will result. Consequently, a range of problems that cause citizens not to want to engage with e/m-Government, such as mistrust of the system, will ensue. Above all, an e/m-Government service must be accessible and affordable, and citizens must have the intellectual capability to use it. Hence, CSFs include a variety of elements relating to citizens' socio-economic and cultural background. Without attention to these, the willingness among citizens to engage with electronic government will be minimal.

The studies explored also show that adoption and diffusion models offer a standard that can be used by technology specialists, economists, educators, and

decision-makers, to apply new ideas in their particular field. Also, these models can be used to apply the research results to a product, or to use the research results of others to solve a particular research or social problem.

Having determined the barriers facing the adoption and diffusion of m-Government and selecting the CSFs associated with the successful adoption and diffusion of m-Government the Researcher has suggested an m-Government Adoption Model for Oman; the model will be utilised to investigate their applicability or otherwise to the two case studies of m-Government in Oman.

Chapter 5
Research Methodology

Principles of Research; Chosen Research Methodology; Actual Conduct of the Research

5.1 Introduction

Having examined the literature to identify the critical success factors believed to have relevance for the adoption and diffusion of new technologies and especially those relating to m-Government, this chapter now presents a detailed report of the research methodology chosen for the empirical work. Many writers have noted that the development of questions to put to a research sample, and the systematic gathering of data to support or reject existing theories, are central parts of research that require an in-depth appreciation of the main ideas and debates about specific methods and the instruments to be selected for a study (De Vaus, 2002; Collis and Hussey, 2003; Punch, 2005). Issues such as whether the study is best suited to quantitative and/or qualitative methods must be considered (Punch, 2005), since the decision eventually reached determines, to a large extent, the instruments to be designed. Moreover, the research methodology adopted for a study must be capable of enabling the research objectives to be met. Hence, this chapter explores in depth, those issues relevant to the conduct of this particular study into the adoption and diffusion of m-Government in Oman, and in doing so it deals with the philosophical paradigm, the research approach, research design, data research instruments, research population and sample, sample selection process, validity and reliability, ethical issues, design of research instruments, and data analysis.

The chapter is structured in two main sections; the first provides a review of the theoretical principles of research and the second details the actual methodology chosen for this study.

5.2 Principles of Research

A considerable body of literature concerning the principles of research exists, in which the many elements, approaches, designs and methods involved are described. The literature also contains debates concerning different practitioners' employment of research methodologies, and even arguments and contradictions over the terminology used in the discipline, to the extent that methodology has itself become a research topic. The aim of this section is not to add to the debate, but to clarify some of the elements prior to elaborating the methodology selected for the current study.

5.2.1 Philosophical Paradigms

Social researchers and philosophers have long debated the issue of the ideal way to conduct research, essentially focusing on the relative value of three fundamentally different and competing schools of thought or inquiry paradigms. The three philosophical paradigms are positivism, interpretivism, and Critical Social Science (Chua, 1986; Neuman, 1996; Hussey and Hussey, 1997). Furthermore, Orlikowski and Baroudi (1991) and Trauth (2001) determine three philosophical perspectives of research methodologies: positivism, interpretivism, and critical theory. As observed by several researchers (Orlikowski and Boroudi, 1991; Myers, 1997; Oates, 2005), IS research can be undertaken using any one of these three possible philosophical stances, depending on the underlying research epistemology. Logical positivism uses quantitative and experimental methods to test hypothetical-deductive generalisation. Among the major implications of this approach is the need for the researcher to be independent from the subject being observed, and the need to formulate hypotheses for subsequent verification. Positivism searches for causal explanations and fundamental laws, and generally reduces the whole to its simplest possible elements in order to facilitate analysis (Easterby-Smith et al, 1991; Remenyi et al, 1998).

On the other hand, interpretivism, also known as phenomenology, uses qualitative naturalistic approaches to inductively and holistically understand human experience in context-specific settings; this approach tries to understand and explain a

phenomenon, rather than search for external causes or fundamental laws (Easterby-Smith et al, 1991; Remenyi et al, 1998). Denzin and Lincoln (2000:49) report that phenomenology is based on how *"to understand a particular social action (such as friendship, voting, marrying, teaching) ... the inquirer must grasp the meaning that constitutes the action"*. Indeed, Klein and Myers (1999) argued that research is interpretivist if knowledge of reality is gained only through social constructions such as language, consciousness, shared meaning, documents and so on.

Critical social science is less commonly used (Neuman, 1996), and hence is not included in further discussion. The two main competing approaches are shown in Table 5.1:

Table 5.1: Two Schools of Thought

	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

Source: Adapted from Neuman (1997:83)

Positivism may be described as a research philosophy assuming that the phenomena being studied have a stable reality measurable from the outside by an objective observer (Pervan, 1994: 487). On the other hand, interpretivism may be described as a research philosophy interested in human meaning in social life and in

its elucidation and exposition by the researcher (Erickson, 1986:119). From this brief outline of the positivist and interpretivist paradigms, it can be understood that the essential difference between them is that positivism assumes there is one truth or reality, whereas interpretivism starts from the position that each phenomenon has several realities, which are moulded by the researcher.

As noted by Orlikowski and Baroudi (1991), over two decades ago 97% of IS research projects adopted a positivist approach, but over the ensuing years non-positivist approaches have been growing in their appeal to researchers.

5.2.2 Research Approach

For any research to be undertaken there is a need to choose an approach that is appropriate for the gathering of data, and that will facilitate answers to the research questions. According to Easterby-Smith et al (1991), researchers must be aware of the debate about methodological paradigms if they are to make appropriate decisions concerning how to collect their data. Within this debate, there are two possibilities, these being qualitative and quantitative approaches, which whilst many suggest are worlds apart, and competing in nature, can as Neuman (1996) has argued, be seen as being related, in that quantitative methods can be seen as a simplification of qualitative methods. Moreover, quantitative methods can also be meaningfully employed when qualitative methods have shown that simplification is possible.

According to Creswell (2003) research approaches can be classified as quantitative, qualitative, or mixed. It is important to consider these three possibilities, and this is done in the following sub-sections.

5.2.2.1 Quantitative Research

In considering quantitative research, Punch (2005) defines it as empirical research where the data are in the form of numbers. Myers (1997) indicated that quantitative methods were originally developed in the natural sciences to study natural phenomena. Examples of quantitative methods that are now well-accepted in the social sciences include survey methods, laboratory experiments, formal methods

(e.g. econometrics), and numerical methods such as mathematical modelling. The emphasis is on 'objective' measurement, and hence as noted by Hancock (1998), any research that collects measurable information about a topic, is referred to as quantitative.

Quantitative research attempts to measure variables or count occurrences of a particular phenomenon (Collis and Hussey, 2003), and as noted by Hancock (1998:6) it is used in order to provide answers to questions like: 'how big is the problem? How many cases are affected by it? How often does something occur? Is one thing more or less important than another?' Hence, this approach is assumed to be objective in nature and concentrates on measuring phenomena by collecting and analysing numerical data and applying statistical tests (Collis and Hussey, 2003:13). Moreover, measurement involves assigning numbers to things, people, events or whatever, according to particular sets of rules. Therefore, to collect quantitative data is to collect measurable information, and then process it by turning it into numbers.

5.2.2.2 Qualitative Research

Qualitative research is a well-established academic tradition in anthropology, sociology, history and geography (Denzin and Lincoln, 1994). Myers (1997) defined qualitative research methodology as a strategy of inquiry which moves from the underlying philosophical assumption to research design and data collection. Punch (2005) adds to the description by saying that qualitative research is empirical research where the data are not in the form of numbers.

According to Hancock (1998), attention is focused on answering questions such as: "why," "in what way," and "what are the implications?" This differs from the situation in quantitative research where the questions are: "how many," "how often," and "how much?" Furthermore, in qualitative approaches, the researcher is the primary instrument in data collection rather than some inanimate mechanism (Creswell, 2003:198). Hence, the qualitative researcher often goes to the site of the participants to conduct research, thereby being able to develop a level of detail about the individual or place and to become highly involved in the actual experiences of the participants (Creswell, 2003:181). By going directly to the social phenomenon under

study and observing it as completely as possible, researchers can develop a deeper and fuller understanding of it (Babbie, 2004). Merriam (1998) proposes that qualitative research provides an understanding of the social event from the participant's view, utilises the researcher as the instrument of data collection, involves fieldwork, and results in a richly descriptive product. Furthermore, the qualitative research method possesses a greater ability to investigate contexts and to deal with a variety of evidence (Miles and Huberman, 1994).

Qualitative methods are usually understood to include: a) qualitative interviews which can range from semi-structured questionnaires to open-ended ad hoc conversations, b) direct observation including participant and non-participant observation, ethnographic diaries, and more recently photography and video, and c) case studies combining different methods to compile a holistic understanding of e.g. individuals, households, communities, markets or institutions.

Based on the above brief introduction to the two approaches, it is concluded that the quantitative method has an objective approach, where data is controlled and measured, whereas the qualitative method is underpinned by the desire to view data from a different perspective in order to try to find understanding and meaning. In this aspect, there are some concerns about the changing and dynamic nature of reality. Table 5.2 shows the major distinctions between quantitative and qualitative approaches, as identified by Dey (1993).

Table 5.2: Distinctions between Quantitative and Qualitative Approaches

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

Source: Dey, (1993)

Both these approaches have strengths and weaknesses, but clearly, the fairly long tradition of their use suggests that they each survive and do so well in certain

situations. Indeed, it was noted by McGrath (1982) over two decades ago, in his study of research choices, that there are no ideal solutions, and merely a series of compromises. The same view is expressed by Patton (1990), who says that: "research, like diplomacy, is the art of the possible".

5.2.2.3 Mixed Methods Research

Mixed methods research is a procedure for collecting and analysing both qualitative and quantitative data in a single study or in a series of studies, based on priority and sequence of information (Creswell, 2003; Tashakkori and Teddie, 1998; Tashakkori and Teddie, 2003). The decision to use a mixed methods approach in which both quantitative and qualitative methods are used has been the subject of discussion by many researchers, such as for example, Bryman (1988), Brewer and Hunter (1989), Brannen (1992), Creswell (1994), and Miles and Huberman (1994). Babbie (2004) has argued that the social researcher who limits himself/herself to a single method, survey or otherwise, severely limits the ultimate ability to understand the world around him/her. All methods have limitations and the adoption of a mixed methods approach means that biases inherent in any single method may be neutralised (Creswell, 2003; Saunders et al, 2007).

The use of mixed methods does not imply any particular timescale or sequence, and as noted by Saunders et al (2007), both quantitative and qualitative data collection techniques and analysis procedures can be used either in parallel, or sequentially.

As has already been mentioned, at a general level, the reasons for combining quantitative and qualitative methods are to capitalise on the strengths, and compensate for the weaknesses, of the two approaches. However, at the same time, the specific reasons for combining the approaches should be considered in particular situations in the light of the practical circumstances and context of research (Creswell, 1994; Punch, 2005). The value of combining methodologies has been understood for a long time, and as long ago as 1988, Bryman (1988) identified ten advantages, which are indicated in Table 5.3.

Table 5.3: Advantages of Combining Methods (quantitative and qualitative)

No	Approaches	Advantages of Mixed Methodology
1	Logic of triangulation	The findings from one type of study can be checked against the findings driving 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 since) 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.
9	Stage in research process	Quantitative and qualitative research may be appropriate to different stages of a longitudinal study.
10	Hybrids	The chief example tends to be when qualitative research is conducted within a quasi-experimental (i.e. quantitative) research design.

5.2.3 Research Design

Having decided on the philosophical and methodological approach to be used in any study, the next question for the researcher is how to design the research effort, and clearly the need in this respect is to ensure that the plan proposed will allow the objectives to be met. Several researchers refer to the importance of the research design in this respect. Yin (2003:20) describes the research design as *"the logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusion"*, other writers (see for example, Bouma, 1996; Hussey and Hussey, 1997) point to the role of the research aim and objectives as the main determinant of the design, since different aims and research questions require different methods to answer them. The way a question is asked has implications for what needs to be done, in research, to answer it. Quantitative questions require quantitative methods to answer them, and likewise, qualitative methods are needed to address qualitative questions. In the contemporary research environment, where quantitative and qualitative methods often sit alongside each other, the matching of questions and methods is even more important (Punch, 2005).

If the data collected are in the form of words and explain conditions, they are classified as qualitative, whereas they are considered as quantitative if they are in the form of numbers (Miles and Huberman, 1994).

One popular way of gathering data in a mixed methods approach is the case study, which allows for deep exploration of a particular phenomenon, using a variety of techniques, the outcomes of which can be compared to gain some degree of triangulation, and thereby support, for the findings. However, it is important to briefly mention the fundamentals of this strategy at this point, in which respect, it can be said that the case study is an in-depth, multifaceted investigation of a single social phenomenon (Orum et al, 1991). Merriam (1998) notes that the case study approach is also normally employed to gain understanding and meaning about a given phenomenon, rather than to test a certain set of variables, that is to say it is exploratory, or explanatory, rather than evaluatory.

5.2.3.1 Research Instruments

Data can be collected in variety of ways, in different settings – the field or laboratory – and from different sources. Collection methods include face-to-face interview, telephone interview, computer-assisted interviews, and interviews through electronic media; questionnaires that are either personally administered, sent through the mail or electronically administered; observation of individuals and events with or without videotaping or audio recording; and a variety of other motivational techniques such as projective tests (Sekaran, 2003).

Case Study

As indicated above, the case study is a popular research instrument since it allows for the collection of multiple and diverse sources of data. It has been reported as an ideal methodology when an holistic, in-depth investigation is required, and furthermore it is appropriate for use in many types of investigation (Tellis, 1997) when the unit of analysis is a critical factor. According to Cohen et al (2007), a case study is a specific example that is usually chosen to illustrate a more general principle (Nisbet and Watt, 1984), being *"the study of an instance in action"* (Adelman et al, 1980:29). Trochim (2000) offers another definition which describes case study as an intensive study of a specific individual or specific context.

Yin (2003:13), who is considered as an authority on case study research, highlights the fact that a *"case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not evident"*. Yin's definition contains four key aspects, these being: the context is relevant; there are many variables of interest; there is a need for multiple sources of evidence (triangulation); and there is a prior development of theory. In expanding his discussion of the nature of case studies, Yin (2003): proposed five components:

1. The study's questions.
2. Its propositions, if any.
3. The unit(s) of analysis.

4. The logic for linking the data to the propositions.

5. The criteria for interpreting the findings.

Eisenhardt (1989) adds that the case study strategy concentrates on understanding the dynamics present within single settings, and Yin (2003) and Cohen et al, (2007) add to this observation by including its appropriateness for multiple settings and numerous levels of analysis. Case studies can be employed as a means to achieve various aims, whether these are associated with generating or testing a theory, or providing an explanation of events (Eisenhardt, 1989; Layder, 1993; Yin, 2003; Cohen et al, 2007). The theory building and testing outcomes of the strategy are achieved by the use of deductive reasoning working from the general, to more specific or inductive reasoning, moving from specific observations to broader generalisation and theories (Layder, 1993; Trochim, 2001).

According to Yin (1994), there are six different sources of data that are possible to collect within a case study, these being:

1. *Documentation*: including letters, memoranda, agendas, administrative documents, newspaper articles, or any document pertinent to the investigation. This variety of documentation allows the researcher to triangulate the findings and thereby corroborate the evidence from other sources. It is also possible to make inferences about events from documents, but there is much potential for any researcher, whether skilled or a novice, to be misled. Yin recommends that the researcher bear in mind the fact that all documents represent communications between parties in the study, and as such may have sub-texts that are only accessible to those involved (Yin, 2003:85-86).

2. *Archival records*: these can be varied, and include for example, service records, organisational records, lists of names, and survey data. It is essential to assess the accuracy of such records before using them, and the point is well made by Yin, that quantitative records carry no guarantee of being accurate (Yin, 2003:88).

3. *Interviews*: these represent one of the most important sources of case study information, and can be held in different forms, these being as: open-ended,

focused, structured, or as a survey. Open-ended interviews require respondents to comment on particular issues. They may propose solutions or provide insight into events. They may also corroborate evidence obtained from other sources. The researcher must avoid becoming dependent on a single informant, and must secure the same data from other sources to verify its authenticity. The focused interview is used in a situation where the respondent is interviewed for a short period of time, usually answering a set of questions. This technique is often used to confirm data collected from another source. The structured interview is similar to a questionnaire survey, and is used to gather data. The questions are detailed and developed in advance, much as they are in a survey (Yin, 2003:89).

4. *Direct observation*: this occurs when a field visit is conducted during the case study, and can be as simple as casual data collection activities, or formal protocols to measure and record behaviours. The technique is useful for providing additional information about the topic being studied, its reliability is increased when more than one observer is involved (Yin, 2003). Glesne and Peshkin (1992) recommended that researchers should be as unobtrusive as the wallpaper.
5. *Participant Observation*: this allows the researcher to become an active participant in the events being studied, and is often used in studies of groups. It offers some data collection opportunities that other methods do not, but has the potential to be problematic since the researcher's participation may change the course of events under study (Yin, 2003:94).
6. *Physical artefacts*: these include tools, instruments, or other physical evidence that may be gathered as part of a field visit. The researcher's perspective on the research site can enhanced as a result of the discovery (Yin, 2003:96).

In considering the framework to adopt for the conduct of a case study, Yin (2003) suggesting the following steps:

1. Determine and define the research questions
2. Select the cases and determine data gathering and analysis techniques
3. Prepare to collect data

4. Collect data in the field

5. Evaluate and analyse the data

6. Prepare the results

As has been indicated earlier in this chapter in the discussion of the philosophical paradigms, and the research approaches, each has strengths and weaknesses, and the case study as a method and a research instrument is no different. Table 5.4 provides a tabulated account of these according to Yin (2003):

Table 5.4: Sources of Evidence – Strengths and Weaknesses

Source of Evidence	Strengths	Weaknesses
Documentation	• Single - repeated review • Unobtrusive - exist prior to case study • Exact - names...etc • Broad coverage - extended time span	• Irretrievability – difficult • biased selectivity • reporting bias – reflects author bias • access - may be blocked
Archival Records	• same as above • precise and quantitative	• same as above • privacy might inhibit access
Interviews	• targeted - focuses on case study topic • insightful – provides perceived casual inferences	• bias due to poor questions • response bias • incomplete recollection • reflexivity – interviewee expresses what interviewer wants to hear
Direct Observation	• reality- covers events in real time • contextual - covers event context	• time consuming • selectivity- might miss facts • reflectivity - observer's presence might cause change • cost - observers need time
Participant Observation	• same as above • insightful into interpersonal behaviour	• same as above • bias due to investigator's actions
Physical Artefacts	• insightful into cultural features • insightful into technical operations	• selectivity • availability

Source: (Yin, 2003)

Questionnaires

Questionnaires are data collection instruments that comprise written questions determined in advance, and that usually require respondents to give their answers within fairly closely-defined alternatives. Sekaran (2003) notes that they are an efficient mechanism for gathering data when the researcher knows exactly what is required and how to measure the variables of interest. It is extremely important – to ensure that the desired information is obtained – to pay careful attention to the design of the instrument, and as noted by Saunders et al (2007) this differs according to how the questionnaire is to be administered and, in particular, the amount of contact the researcher has with the respondents. These are influences which can affect the value of the instrument and if not considered may detract from its potential advantages, which have been reported by various scholars (see for example, De Vaus, 2002; Miller, 2002; Robson, 2002; Sekaran, 2003 and Saunders, et al., 2007). Advantages which have been noted include:

1. The researcher may be able to collect all the completed responses within a short period of time.
2. It is possible to administer questionnaires to large number of individuals at the same time and in the same place (for example in a lecture situation, or on a railway station), thereby being less expensive and less time-consuming than interviewing.
3. Questionnaire exercises can be conducted on a large scale, as for example to determine attitudes of, or gain information about, a country's population at large (e.g. census, referenda).
4. Questionnaires, regardless of the scale of the exercise, do not require the same human resources as interviews.
5. Data can be collected in a standardised form that facilitates statistical analysis.
6. Questionnaires can be mailed to respondents, thereby removing the need for any researcher presence, and can allow for anonymity which increases the chances of a truthful response.

Questions may be open, requiring the respondent to write his/her opinion on a few lines, or closed, in which case the respondent indicates which of the list of answers provided, s/he wishes to give. Babbie (2004) notes that although it can happen that the researcher's structuring of responses may overlook some important responses, closed questions provide greater uniformity of responses, and Saunders et al, (2007) comment that they make it easier to compare responses since they have been pre-determined, and can therefore be used to identify patterns. In addition, it is quicker and easier for respondents to answer such questions since the responses require minimal writing (Saunders et al, 2007).

Pilot Testing the Questionnaire

As noted above, the design of a questionnaire is crucial in facilitating the desired information (Saunders et al, 2007), and as part of the effort to ensure that the final formulation is as clear as possible, it is important to undertake some form of pilot, since as Bell (2005:147) emphasised, *"however pressed for time you are, do your best to give the questionnaire a trial run"*. This enables the researcher to test the drafted questionnaire for acceptability, recognition, familiarity, and relevance among the intended respondents. It will also offer the opportunity to determine the time taken to complete a questionnaire, the cost of its administration, relevant and irrelevant questions, and finally whether questions on vital issues have been neglected (Remenyi et al, 1998). The time taken to complete the questionnaire should not be under-estimated as a potential determinant of whether respondents take part, and a good instrument will indicate at the start, how long it should take to complete. As a final benefit, a pilot exercise allows the researcher to obtain some assessment of the validity of the questions and the likely reliability of the data that will be collected (Saunders et al, 2007).

For a pilot study, the number of participants should be sufficient to include any major variations in the population that the researcher feels are likely to affect responses, and this generally means a minimum of ten respondents (Fink, 2003).

Interviews

Interviews are regarding as one of the main methods of data collection in qualitative research, since they allow the researcher to access people's perceptions, meanings, and definitions of reality (Sekaran, 2003; Punch, 2005). As Punch (2005) observes, the interview is one of the most powerful ways we have of understanding others.

Much has been written on the topic of different types of interviews, over very many years. Patton (1980), for example, distinguishes three main types of interview: the informal conversational interview, the general interview guide approach, and the standardised open–ended interview; and Minichiello et al (1990) provide a useful continuum of interviewing methods, based on the degree of structure involved, these being: structured, semi-structured, and unstructured, which are also confirmed by Fontana and Frey (1994) as being applicable both for individual and group interviews.

Furthermore, it is possible to differentiate between standardised and non-standardised interviews (Healey, 1991; Healey and Rawlinson, 1993; 1994), and as Fielding (1996) notes, to this classification can be added the semi-standardised interview. Semi-structured and unstructured (in–depth) interviews are non-standardised, and often referred to as qualitative research interviews (King, 2004).

As a brief summary of the three types of interview, it can be noted that Sekaran (2003) identifies structured interviews as those conducted when it is known at the outset what information is needed. The interviewer has a list of pre-determined questions to ask the respondents and it is not usual for there to be any deviation from the set text. Moreover, such an interview can take place on a face-to-face basis, via the telephone, or through the medium of a PC. Given the fact that the interview question schedule is fixed, and that the length of answers can be anticipated to a certain extent, it is possible to also predict how long a structured interview might take, and this can be useful in obtaining consent to participate from busy people.

In contrast, unstructured interviews have a slightly different objective, that being to bring some preliminary issues to the surface so that the researcher can determine what variables need further in-depth investigation (Sekaran, 2003). In this

type of interview, the researcher does not have a list of questions, but merely has a number of themes, which may vary from one interview to another, that s/he wishes to explore. This means that the approach may be different in each interview, the same theme may be explored using different questions, some questions may be omitted in particular interviews, the order may be changed depending on the flow of the conversation, and additional questions may be asked by the researcher as the direction of the discussion moves away from a specific issue. Moreover, as the researcher is fully engaged in the interaction, his/her potential for taking an accurate and full record of what is being said is severely impaired, and hence, it is usual to tape record the proceedings (Saunders et al, 2007), which carries with it a number of ethical considerations.

Fontana and Frey (1994) discuss seven aspects of unstructured interviewing that require attention by the researcher intending to use this method. Specifically, they note the need to access the setting, to be able to understand the language and culture of the respondents, to decide on how to present oneself, and on what information to seek, how to gain the trust of the interviewee, and how to actually collect the empirical materials.

This interview technique has the advantages that it allows participants to describe their practices within natural environments, such as an office, home, library or dormitory, and streamlines the collection of richly detailed data that are *"typically generated through field research without committing the investigator to prolonged intrusion into the lives and activities"* (Blee and Taylor, 2002:93) of the information users; it has been recognised as especially useful where *"the goals of the studies are to explore, discover, and interpret complex social events and processes"* (Blee and Taylor, 2002:93). The flexibility in wording and interviewing style which this interviewing technique permits is important because information-seeking practices tend to vary by situations and individual preferences, and the interviewer needs to rephrase or adapt the questions to suit these situations and preferences. Clearly, given the nature of such interviews, the researcher must be skilled in the art and properly

prepared for every encounter, and all participants must be fully aware of the in-depth character of the event.

The third type of interview – semi-structured – is valuable for comparison and requires less interviewing skills (Kumar, 1996) than the unstructured interview. Essentially, the researcher has a pre-determined set of questions, which facilitates the process of estimating the time needed for the whole interview, as indicated earlier in respect of structured interviews, and hence makes it easier to get the agreement of participants. However, the researcher is able to pursue particular responses which throw up interesting ideas, by introducing follow-up questions that are not on the list, but which s/he considers are relevant to the objective of the interview. In this type of interview, the interviewee is often apprised of the questions to be asked beforehand to enable his/her preparation for the event, and to ensure that none of the areas for discussion will cause embarrassment.

Observation

Observation is a recognised method of gathering information without directly questioning those who are of interest to the researcher, and has long been used in both qualitative and quantitative research, since the actions of people can be both counted, and interpreted. Consequently, as Best (1981) notes, it can make a valuable contribution in data collection for experimental studies. Woods (1986) cites one advantage of observation as being its ability to gather information about the behaviour of individuals in their natural setting which would not have been possible to obtain using other methods. That said, the technique has some limitations (Bell, 1999; Woods, 1986), which are indicated as being the relatively demanding nature of collecting data, the need for extensive training on the part of the observer before conducting the fieldwork, and a great deal of effort during the actual observation. Moreover, the issue of how to record what is seen must be settled since memories are never perfect, and there is the potential for forgetting or inventing what has actually been observed.

Cohen et al (2000) make the distinction between structured and less structured observation, and Verma and Mallick (1999) note this differentiation as being similar

to that between structured and unstructured interviews. Less structured observation may be subsequently categorised into two broad types: participant and non-participant observation. The role of the observer determines which type is being used, and that depends on whether the observer stands apart from the observed, or joins in and becomes a member of the group being studied. Non-participant observation is a method of obtaining information in which the researcher observes and records activities but plays no part in them (Verma and Mallick, 1999). In this case, it is possible to observe without having a schedule, and as Simpson and Tuson (1995) comment, this is an important research method. Hopkins (1993:92) refers to this method as 'open observation' and notes that the researcher is free to record key points, thereby being able to gather more frank information than is possible when using a checklist. Moreover, Cohen and Manion (1994) suggest the value of the observer being free to notice the behaviour of those being observed as it happens rather than specifically looking for it, and make notes at the time. Two main advantages as documented by Nunan (1992) are the ability to observe a research sample in an authentic setting, and secondly it offers an ideal way to evaluate the effects of a training programme, being able to demonstrate behaviour before and after the intervention.

Documentation

Documentary evidence is a common source of research material, one reason being that a large amount of written documentation is found in today's society. Consequently, as Bell (1999) argues, documentary analysis can be enough in itself for some research projects, and certainly where access to the subjects of research is difficult or impossible, it is of particular use. Indeed, sometimes the required data cannot be gathered by any other means, or the documented data may be so great that no more is required, and time is saved by not embarking on unnecessary fieldwork. Moreover, as noted by (Oliver, 1997; Saunders at el. 2007), the data may be qualitative or quantitative and lend itself to various types of analyses, particular if there is longitudinal data available, and in such cases, it may be that it can help to develop a research idea. In general, therefore, documentary analysis is believed to be

beneficial to a research project, since it can: help in the selection of relevant documentation; help in the choice of certain topics; help evaluators reveal the extent to which certain modes of presentation are represented in particular documentation. The drawback with written documentation is that there is usually so much, that there is a temptation to analyse everything which is available and that can be detrimental in terms of time, and can cause the researcher to lose focus. Another disadvantage is that in developing countries, there is often a lack of, or incomplete, documentation, thereby making its analysis impossible or partial. In these circumstances it is vital to be guarded in its interpretation, and to support what is available by empirical work.

5.2.3.2 Research Population and Sample

Sampling is an important issue that is afforded great attention in the research methodology literature, with well developed and mathematically sophisticated sampling plans accompanying varying commentaries (Jaeger, 1988). The reason for this consideration is that as noted by Miles and Huberman (1994:27) *"you cannot study every one everywhere doing everything"*, and this applies regardless of whether the research is qualitative or quantitative. According to Punch (2005), the sampling in quantitative research usually means people sampling. Hence, the key concepts are the population (the total target group, who would, in the ideal world, be the subject of the research, and about whom one is trying to say some things), and the sample (the actual group who are included in the study, and from whom the data are collected).

The best way to guarantee a representative sample is to ensure that all organisations in the target population have an equal (or at least known) chance of being included in the sample. Probability sampling is the way to do this (De Vaus, 2002:70). The logic of such an approach is that from the data collected from the sample, the researcher is eventually able to make generalised statements about the whole target population from which the sample is drawn. Figure 5.1 demonstrates this relationship:

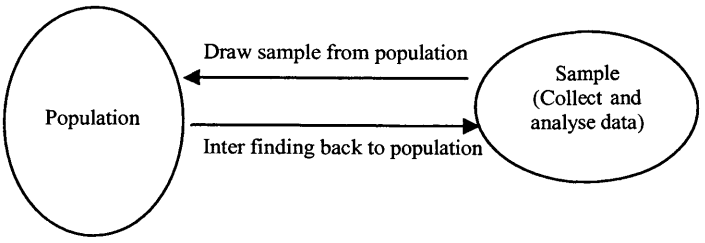


Figure 5.1: Population and Samples (Punch, 2005)

In support of Miles and Huberman (1994), Saunders et al (2000) consider the practicalities involved in research, noting that for many research questions and objectives it is unthinkable that a researcher should try to collect and analyse all the available data from an entire population, since constraints of time, money and often access, prevent this, and hence, it is necessary to sample. They further stated that sampling techniques make available methods that help reduce the amount of data needed to collect, by considering only data from a sub-group rather than all possible cases or elements. There are two types of sampling techniques: probability or representative sampling, and non-probability or judgmental sampling. Probability sampling is where the probability of the selection of each respondent is known, whereas for non-probability, the likelihood of selection of each respondent from the total population is unknown (Robson, 2002).

Probability sampling consists of:

- Simple random sampling which involves the selection of the sample from the sampling frame (Saunders et al, 2000).
- Systematic sampling which involves the selection of samples at frequent intervals from the sampling frame. It involves choosing a starting point in the sampling frame at random and then choosing every person (Robson, 2002:261).
- Stratified random sampling which involves the population being divided into two or more strata (Saunders et al, 2000) where the members of a group share a particular characteristic(s) (Robson, 2002).

- Multi-Stage sampling which involves selecting the samples in stages, i.e. taking a sample from samples. It is used to neutralise problems related to geographically dispersed populations or when it is expensive and time-consuming to construct a sampling frame for larger geographical locations (Saunders et al, 2000).

Non-Probability sampling consists of:

- Quote sampling, which is a non-random sampling technique used for interview surveys (Saunders et al, 2000).
- Purposive or judgmental sampling, which enables the researcher to make a judgment in the selection of cases that will enable him/her to answer the research questions and to meet to the objective (Saunders et al, 2000).
- Snowball sampling, which is a technique used in a situation when it becomes extremely difficult to identify members of a desired population (Saunders et al, 2000).
- Self-selection sampling, which is a technique whereby an individual is permitted to identify his/her desire to participate in the research (Saunders et al, 2000).
- Convenience sampling, which involves the process of selecting cases that are easier to obtain for a sample (Saunders et al, 2000).

5.2.3.3 Validity and Reliability

The quality of empirical social research can easily be challenged if certain precautions are not taken to ensure its academic rigour, and in this respect, Yin (2003) proposes four tests that can be used to establish the quality of case study research. These are: construct validity, internal validity, external validity, and reliability. Table 5.5 summarises how a case study should be designed to satisfy the requirements for each of these.

Table 5.5: Case Study Tactics for Validity and Reliability

Tests	Case Study Tactic	Phase of research in which tactic occurs
Construct validity	• Use multiple sources of evidence • Establish chain of evidence • Have key informants review draft case study report	• data collection • data collection • composition
Internal validity	• Do pattern-matching • Do explanation-building • Address rival explanations • Use logic models	• data analysis • data analysis • data analysis • data analysis
External validity	• Use theory in single-case studies • Use replication logic in multiple-case studies	• research design • research design
Reliability	• Use case study protocol • Develop case study database	• data collection • data collection

Source: COSMOS Corporation in (Yin, 2003)

Construct Validity refers to the degree to which the concept being studied is valid. Yin (2003) acknowledges that in case study research, this can be difficult to achieve because the investigator is often subjective, and therefore it is necessary for him or her to strive to develop a set of measures that are as objective as possible. He notes that this can be achieved by selecting the specific types of changes that are to be explored and relating them back to the initial study objectives, and demonstrating that the measures chosen definitely reflect the types of changes selected. This requires (according to Yin, 2003) that the researcher use three particular strategies, these being: to use multiple sources of evidence so that convergent lines of inquiry are encouraged, to create a chain of evidence, and to make sure that the draft case study is considered by the key informants. By following these procedures, the construct validity of any case study will be significantly enhanced (Yin, 2003).

Internal Validity is defined by Kidder and Judd (1986) as the extent to which a causal relationship, whereby certain events precipitate from other conditions, as distinguished from a spurious relationship, exists within a research design. Campbell

and Stanley (1966) and Cook and Campbell (1979) note that internal validity has received the greatest attention in experimental and quasi-experimental research. Yin (2003) observes that when spurious effects are noted, internal validity is threatened, and cautions that two important issues should be noted, these being firstly that internal validity is only a problem for explanatory case studies, where the researcher is trying to discover whether event x led to event y; and secondly that the concerns about internal validity in case study research may be extended to the broader problem of making inferences. In this respect, Yin (2003:36) stated that *"a case study involves an inference every time an event cannot be directly observed. An investigator will 'infer' that particular event resulted from some earlier occurrence, based on interview and documentary evidence collected as part of the case study".*

In order to achieve internal validity, Yin (2003) suggests that the researcher give attention to pattern matching, explanation building, addressing rival explanations, and using logic models.

External Validity is about the extent to which the findings from a study can be generalised (Kidder and Judd, 1986; Schofield, 1990; Cohen et al, 2007). It is noted (Yin, 2003; Cohen et al, 2007) that generalisability is problematic and that concerns about external validity have surfaced as a major barrier in case study research. Not surprisingly, single case studies come in for criticism, but in response, Yin (2003) argues that such critics are implicitly contrasting the situation to survey research, in which a properly-selected sample generalises easily to a larger population, and that to make such a contrast is to not understand the point of doing case studies. Yin (2003) adds that survey research relies on statistical generalisation, whereas case studies (as with experiments) rely on analytical generalisation, in which the investigator aims to generalise a particular set of results to some broader theory. Other researchers have also argued that qualitative research is generalisable (Schofield, 1990) if it studies the typical since the outcome can be applied to other situations (LeCompte and Preissle, 1993) and if multi-site studies are undertaken.

Reliability relates to the degree to which elements of a study, such as the data collection procedures, can be repeated at a later date, with the same results, and the

same conclusions (Kidder and Judd, 1986; Yin, 2003). Yin (2003) has argued that the emphasis, when searching for reliability in a case, should be on repeating the same case over again, and not on trying to replicate the results of one case by doing another case study, since the goal of reliability is to minimise the errors and biases in a study. According to Yin (2003), two strategies can be used to overcome the reliability test: the case study protocol and the case study data base. He also recommended that a researcher should make as many operational steps as possible and conduct the research as if s/he were being continually monitored and audited.

5.2.3.4 Data Analysis

Raw data have little meaning to anybody but possibly the researcher, and in this respect Robson (2002) states that analysis is an extremely important aspect of the research process. Likewise, Yin (1994) has maintained that each research project starts with a common analytical strategy, which involves the researcher analysing as s/he goes along, in order to recognise when saturation point has been reached, and to assist in the analysis of new data (Hill and McGowan, 1999).

5.3 Chosen Research Methodology

From the brief outline of the positivist and interpretivist paradigms above (Subsection 5.2.1), it can be understood that the essential difference between them is that positivism assumes there is one truth or reality, whereas interpretive research starts from the position that each phenomenon has several realities, which are moulded by the researcher. As noted in Chapter One (Section 1.2), this study is exploratory in nature and seeks to test an overarching hypothesis. Therefore, the philosophical approach chosen for the study is that of positivism.

In terms of the research approach, bearing in mind the potential advantages noted above, the study will adopt a mixed method approach combining quantitative and qualitative methods in order to capitalise on their respective strengths and to compensate for their respective weaknesses. This position serves the purpose of the phenomenon under investigation, as the researcher found no studies exploring m-Government adoption in the Sultanate of Oman.

5.3.1 Research Design

The research design is based on case study. Given the need in this study to appreciate what is currently happening in respect of m-Government in Oman, the case study approach is especially valuable because it can facilitate a deep understanding of the process (Merriam, 1998; Zalan and Lewis, 2004). Moreover, the advice of several scholars is that two or more case studies are better than one, and Oman has a number of m-Government initiatives which lend themselves to examination through the case study approach. Commenting on the value of multiple case studies, Herriott and Firestone, (1983:46), stated *"the evidence from multiple cases is often considered more compelling, and the overall study is therefore, regarded as being more robust"*, and more recently, Yin (2003:53) has commented that *"[e]ven if you can only do a 'two-case' case study, your chance of doing a good case study will be better than using a single-case design. More important, the analytic benefits from having two (or more) cases may be substantial"*. The present study adopts a 'two-case' design since the findings will be regarded as more compelling (Eisenhardt, 1991; Yin, 2003), and two cases can be managed within the restrictions placed upon the PhD.

Moreover, a case study approach is well-suited to IS research (Myers and Avison, 2002; Paré, 2001), being widely used in qualitative IS studies, although it is equally applicable in positivist inquiries (Myers, 1997; Orlikowski and Baroudi, 1991). Using the two-case approach, it will be possible to explore the developments and successes of two Omani m-Government projects, at the same time identifying the critical success factors associated with their adoption and diffusion.

The two case studies chosen are: Muscat Municipality Mobile Parking (MMMP), and the Higher Education Admission Centre (HEAC), both of which have implemented m-Government initiatives. The details of the case studies are as follows:

Case Study One (MMMP)

Muscat Municipality employs 5, 398 people across its six 6 *wilayats* (towns) in Muscat Governorate, and the total population of Muscat is 785,515. Muscat Municipality has developed an m-parking system which enables motorists to pay

parking fees via SMS (Muscat Municipality, 2007). This service has been provided for the public since the end of 2006 in Muscat. The system allows car owners to pay for parking fees in the Muscat area using their mobile phones. The fees are calculated and added or deducted (prepaid users) to the motorist's telephone bill and he/she receives a confirmation SMS for the reservation, and moreover, a reminder SMS when the time is about to expire, with an option to pay for more time. The users of this service are not homogeneous, other than the fact that they are motorists; they vary in terms of their education, gender, age and personal status.

The information given to the service users is as follows:

- Enter Car number and Car Code as the following e.g. 1234 A B.
- Send the message to 90091.
- You will receive a confirmation message including the time that has been reserved for your car parking.
- Five minutes before the expiry time you will receive a reminder message.
- To inquire about the time remaining, send TIME to 90091.
- For help about how to use the mobile parking service, send HELP to 90091.
- The cost of every SMS parking is 60 Baisa per 30 minutes.

Case Study Two (HEAC)

The second case study is the Higher Education Admission Centre (HEAC), which provides an online admissions system. The HEAC is part of the Ministry of Higher Education and employs 1,166 people. Annually, the total secondary students in Oman are approximately 44128 (Statistical Year Book, 2007).

More than 50,000 people apply online annually through the HEAC service. According to the Research Council of Oman (2007), the HEAC service is a successful example of using ICT to develop an inclusive information society. All students at the

secondary school level in different areas in the Sultanate are trained and required to access the services through the internet or through SMS via mobile telephones from anywhere and anytime. On 5th November 2007 in Venice (Italy), the HEAC received the World Summit Award for the best electronic product.

Table 5.6 gives a brief description of how to use the HEAC service:

Table 5.6: Accessing the HEAC Service

	SITUATION	THE MESSAGE	CODE	MESSAGE DESCRIPTION	
1	Active	H	H	Help	List of available services (all the services will be sent by using SMS)
2	Active	I	I	Information	HEAC address
3	Active	ID Number R xxxxxxxx	R	Registration	To know registration Number
4	Active	Registration Number P xxxxxxxxxxxxxx	P	Programs List	The programs list which student had chosen
5	Active	Registration Number S xxxxxxxxxxxxxx	S	Social Security	To know social security situation
6	Active	Registration Number G xxxxxxxxxxxxxx	G	Grade	To request the grade list (Ministry Of Education's Database)
7	Active	Registration Number O xxxxxxxxxxxxxx	O	Offer	To know offers or allocation situation
8	Active	Registration Number A xxxxxxxxxxxxxx	A	Accept	To accept offers
9	Active	Program Code C xxxxxxxxxxxxxx	C	Criteria	Programs criteria

Note:

- When you write SMS messages you should leave one space between each code or details as they are in the above table.
- You will receive a message for each message you send whether it is correct or not after a few minutes, If you do not receive any message this means that the system did not get your message and you should try again.
- The cost will be between 100 to 75 Baisa per one message.
- You will be informed when the services are active.

Source: www.heac.gov.om

The choice of these two particular case studies provides a response on the issue of m-Government initiatives from a range of users from different strata in Omani society, and who therefore represent the most likely targeted users for other m-

Government initiatives nationally, and probably regionally. Both of the case studies involve organisations that provide electronic and mobile services, and have experience in their development, hence they have information regarding the adoption and diffusion of both e-Government and m-Government services.

5.3.1.1 Research Instruments within the Case Studies

To accomplish the objectives of the study, primary and secondary data will be collected from Oman. Primary data to be obtained via the fieldwork will be gathered using questionnaire, interviews, observation and documentation in respect of each of the two case studies. Secondary data will be sourced from official statistics, documents, books and journals, official publications of the Oman government, and dissertations by other authors in the field, since these will add to the contemporary interpretation of events as they are unfolding in m-Government development. Any quotations from material sourced in Arabic will be translated by the researcher. Having reviewed the literature discussed in Chapter Four, and established the generally-accepted critical success factors for the adoption and diffusion of new technologies, the Researcher developed an evaluation model in order to discover those factors that influenced the successful implementation of m-Government services in Oman, and implicitly to identify the barriers associated with this. Using this model, the Researcher designed questionnaire survey templates (see Appendices A and B) and an interview guide (see Appendix C) as data collection tools. The field research will be conducted over two phases within the Case Studies, the first involving administering *questionnaires* to users, and the second involving conducting semi-structured *interviews* with key personnel.

<u>*Questionnaires*</u>

The experience of some Omani researchers (e.g. Shafaee, 2001) reveals that questionnaires are the most appropriate tools of data collection in Oman, given the country's political and social nature. Hence, apart from the fact that logically the use of a questionnaire is the best method of securing information from large populations as is required in the two case studies, there is also the benefit that culturally this is likely to be seen as unobtrusive, and therefore likely to meet with more success.

The two questionnaires were designed according to the four practical guidelines suggested by Leedy (1997) as follows: 1) using clear language; 2) meeting research aims; 3) planning development, sample, distribution and collection; 4) creating a solid cover letter. The questionnaire for the MMMP case was developed in both Arabic and English because Oman has a high expatriate population, among whom English is the medium of communication, and it is unimaginable that some of the respondents to the m-parking questionnaire will not be expatriates. The questionnaire for the HEAC case was, however, only developed in Arabic since the schoolchildren are all likely to be Arabic speakers. That said, the original versions of both questionnaires were constructed in English for the purposes of confirming these with the Researcher's supervisor, and having been written in English, the author translated them into Arabic for use in the field. As a checking mechanism the process of back translation was used, which entails the final Arabic version being translated back into English by a (bi-lingual) third party to establish how close this is to the original English version. The questionnaires were divided into different sections for easy reading and completion, and were accompanied by a short, simple and informative cover letter that informs respondents about the aims and importance of the research. They were written carefully using clear language to encourage participants to provide honest and unbiased information, and emphasise the privacy and confidentiality measures put in place.

Interviews

The semi-structured interview has been chosen for use in this study since it has the advantage of keeping the researcher focused through the use of an interview guide, but at the same time gives the flexibility to follow through comments that are of particular benefit to the research. As an aid during the interviews, and in order to ensure consistency between the various interviews, an Interview Guide was developed (a copy may be found in Appendix C), which clusters questions under the four emergent themes.

Details of the intended interviewees appear in subsection 5.3.1.2. Access to these key people was co-ordinated through various contacts in the relevant

organisations. Overtures were made to the potential interviewees by the Researcher, who also provided an official invitation letter to be issued by the Ministry of Higher Education (as is required for any academic survey in Oman) to support and facilitate access to the key people.

It was intended that the interviews would last between 45 minutes and an hour and a half, and that they would be tape recorded and later transcribed. As soon as they were ready, the transcripts were sent to the respondents by email, with a request for their comments regarding their accuracy, and for any complementary text they felt necessary. This strategy was adopted to increase the quality of the data.

Observation

The researcher aimed to adopt the role of non-participant observer, and conduct open observation, making notes about salient behaviours as they occur.

Documentation

Documentary analysis is used to establish the background to the development of m-Government services in Oman, and the published intentions regarding the growth of these services in the future, and the intended infrastructure to underpin them.

5.3.1.2 Sample Selection Process

Bryman and Cramer (1990:99) argue that *"...researchers should strive to create as accurate as possible a representative sample of the general population or case of study, and that such sample if planned precisely will highly increase the external validity of the research".*

In Phase 1 (questionnaires) the sampling process is as follows:

For the MMMP case, convenience (opportunity) sampling will be undertaken over a period of several days, by the Researcher personally. There is only one way to reach the population of users in respect of the m-parking initiative and that is to be present at the point when they park their vehicles and use the service. Consequently, the Researcher will position himself at the entrance to one or more of Muscat's

municipal car parks and solicit the participation of all users as they arrive. It is intended to obtain a sample of 300 users.

For the HEAC case, since the users are schoolchildren and University students, the completion of the questionnaires must be in a supervised and chaperoned situation. Hence, the questionnaires will be administered in two of Muscat's schools (for Boys and Girls), these being located in Muscat, Sultan Qaboos university and Middle East College; all these students are from different areas within the Sultanate, are in the first and second years, and used the HEAC system last year. This represents different areas within the Sultanate, and therefore provides a good test of the penetration of mobile technology. It is intended to administer 100 questionnaires in each place.

Regarding Phase 2 (interviews), the sampling processes differ and are as follows:

In the MMMP case study the intended interview population comprises high ranking officials, IT managers, and designers, and essentially their participation is intended to provide the researcher with the details of what they took into account when they developed and implemented the m-parking initiative.

As with Case One, the intended interview population in the HEAC case study also comprises high ranking officials, IT managers, and designers, with the intention of gaining information regarding what they considered in the development and implementation of the HEAC initiative.

For both case studies the interviewees are chosen through a non-probability sampling technique, and specifically purposive sampling is used, since the Researcher needs to gain answers from people who have been involved in the development and implementation of the respective m-Government initiatives. However, it is always possible that for various reasons, the desired people may not be found in the numbers required, and at this point it may be necessary to engage in snowball sampling or convenience sampling. The intention is to interview the following:

Muscat Municipality (Directorate of Information Technology)

- General Manager and Head of Information Systems Department of Muscat Municipality
- Head of Information Technology in Muscat Municipality
- Head of Internet and Electronic Services Department in Muscat Municipality
- Designers (4) from the Computer and Information Systems Department of Muscat Municipality

Higher Education Admission Centre

- General Manager and Head of HEAC
- Deputy Manager of HEAC
- Head of the Information Technology Department in HEAC
- Head of Internet and Electronic Services Department in HEAC
- Designers (5) from the Computer and Information Systems Department of HEAC

5.3.1.3 Validity and Reliability

In the current study, construct validity is ensured by the collection of multiple sources of evidence as already described, and by the Researcher's strict log of activity. Internal validity is achieved by a full literature review of the work on adoption and diffusion so as to determine the logical consequences of the presence or absence of particular factors in relation to the design and implementation of m-Government initiatives. External validity is obtained by the use of a two-case study design, which presents opportunities for information to be gathered about a wider section of the Omani population, and m-Government project designers and implementers in different fields. Additionally, the fact that the Omani culture is reflective of that in the Gulf area generally, provides further external validity and greater prospects for generalisation. And finally, reliability is achieved again through

the Researcher's log of activity. Additionally, it should be noted that the recommendations from the research are intended to improve adoption and diffusion rates of m-Government projects, and that it would not be expected that the precise outcomes of these two cases would be exactly the same if the case studies were repeated in five years' time for example, since the implementation of the recommendations should mean better outcomes.

5.3.1.4 Data Analysis

As already indicated, both quantitative and qualitative data are sought in this study; hence the process of analysis will employ techniques that are appropriate for each, detailed as follows:

Quantitative Data Analysis

The quantitative data obtained from the two different questionnaires will be analysed using the Statistical Package for Social Sciences (SPSS). Analysis of Variance (ANOVA) will be used to check for statistical significance among the means of the variables. One-way analysis of variance will be conducted in order to determine the difference between the importance attached to decision-making variables, and correlation analysis will be used to establish the level of satisfaction among the respondents. Further tests will be used from SPSS: Levene's Test of Equality of Error Variance (Runyon et al, 2000), to show variation in the proposed m-Government Adoption Model for Oman, and the demographic variables (age, gender and education level). If the P value is less than 0.05 this means that the demographic variable had some affect which was significant (significance being measured by the P value). To double-check the statistical significance of any such variable, the One Way ANOVA (Test between Subject Effects) (Runyon et al, 2000) will be used, and finally, to investigate this effect and find any statistically significant difference between the m-Government Adoption Model for Oman dimensions a Post Hoc Test (Runyon et al, 2000) will be used.

Qualitative Data Analysis

The qualitative data obtained from the interview exercise in each of the two case studies will be indexed and summarised into main points or themes. The main points will be grouped into several categories. These categories or themes will be used to supplement and refine the results from the quantitative analysis. All of the interview data will be placed in an Excel-file which can perform a number of statistical tasks (Pelosi et al, 1999, in Robson, 2002) with the questions in the columns and the respondents in the rows. This will make it easier to compare the answers per question horizontally.

5.3.2 Ethical Issues

It is worth noting that the Researcher has taken into account ethical considerations for the study through ensuring the following:

- *Voluntary participation*: the respondents will be explicitly informed at the beginning of the questionnaire and interview exercises that participation is voluntary and that although their participation in this study will be greatly valued, there is no compulsion to participate and they are free not to answer any particular question, if they do take part. Moreover, they will be informed that they may leave at any time during the process of questionnaire completion or interview, should they wish to do so, and they will not be asked for an explanation.
- *Informed consent*: participants will be informed about a range of matters relating to the study, for instance, the purpose of the study, the way in which the outcomes will be used, and that participation is voluntary. Respondents will, therefore, be fully briefed before a questionnaire is handed out to them or before an interview commences.
- *Confidentiality*: emphasis will be placed on confidentiality in the sense that all respondents will be assured that all data collected from them will be treated in the strictest confidence, and securely guarded. According to DeVaus (2002:62), there are three main reasons for ensuring

confidentiality: 1) to improve the quality and honesty of responses especially on sensitive issues; 2) to encourage participation in the study and thus to improve the representativeness of the sample, 3) to protect a person's privacy.

These considerations are of particular importance in the Omani context, where cultural influences require certain modes of behaviour, and socio-political concerns may make participants anxious about how what they say is being recorded and reported, and which hence have important repercussions for the researcher in establishing the required degree of trust.

5.4 Actual Conduct of the Research

This section explains the actual conduct of the fieldwork study in Oman, identifying problems that were encountered during its execution, and the steps taken to re-engineer the process as a result. From the above chosen methodology, the intention was to conduct the field research over two phases:

- *Phase 1* – questionnaire surveys relating to the two case studies (MMMP and HEAC);
- *Phase 2* – interviews with senior personnel involved in the development and implementation of the respective m-Government initiatives.

Throughout both phases the Researcher would also employ observation and appropriate documentary evidence. The actual fieldwork was indeed conducted according to these two phases, but with some necessary modifications.

To encourage participants to respond to the questionnaire exercise, and the planned interviews, a supporting letter from the Ministry of Defence was drafted. Then with respect to validity, the researcher dispatched copies of questionnaires and the interview guide to a number of experts who specialise in e-Government at the Sultan Qaboos University, to be assessed. Each tool was assessed by at least three people. Furthermore, to increase validity and improve the quality of the questionnaire, the researcher conducted a pilot study to assess the clarity of questions, whether or not the questions yield relevant information, and the time required to complete the

questionnaire. 40 questionnaires were administered to the targeted group, and the pilot study indicated that the questions were clear and understandable, and were answered precisely by respondents.

However, the Researcher had to overcome some practical problems in conducting the questionnaire surveys. The first problem was how to reach female participants from the two case studies. In Arab culture it is very difficult for males to speak with females; to overcome this limitation the Researcher had to elicit female assistance, which he accomplished by asking a female family member to help by positioning herself, together with the Researcher, at the entrance to Muscat's municipal car parks and at HEAC, to solicit the participation of all female users to the surveys. Another problem in the MMMP survey was that the car parking facilities are in three different locations in Muscat, and the only way to reach the users of the m-parking service was to be present when they parked their vehicles and actually used the service. Consequently, the Researcher enlisted the assistance of three of his work colleagues (from the Ministry of Defence) in gathering the data. In practical terms, the Researcher and his team positioned themselves at the entrance of Muscat Municipality's car parks and solicited the participation of all users as they arrived.

For the second phase the Researcher intended to interview all of the people from Muscat Municipality (Directorate of Information Technology) and HEAC as listed above (Subsection 5.3.1.2). However, after repeated requests it was impossible for the Researcher to interview them all, for various reasons associated with their high rank positions in their organisations and full work schedules. He was only granted interviews with two officials involved with MMMP, and four involved with HEAC. Furthermore, it emerged from the questionnaires that many participants complained directly about several concerns related to the communications infrastructure in Oman (high internet costs, lack of internet and mobile network, lack of security, lack of infrastructure, etc.). Equally, during the interviews, the MMMP and HEAC interviewees complained about misunderstandings and lack of cooperation between their two case studies and the companies which provide communication/electronic services (Omantel and Nawras). Furthermore, they reported problems with the

Information Technology Authority (ITA), which is responsible for implementation of the Oman Digital Society strategy and infrastructure that will ensure the provision of e-Government services for both the public and the business community. Therefore, to explore these problems from the case studies from different perspectives, to investigate the progress of the e-Government project and mobile services, and to gain insight into the factors that influence its success or otherwise, the Researcher secured interviews with two general directors of IT from Omantel and Nawras, and one member of the e-Government team from the ITA.

In all, therefore, nine people were actually interviewed in phase two:

Muscat Municipality:

- *General Manager* and Head of Information Systems Department of Muscat Municipality
- *Designer* (1) from the Computer and Information Systems Department of Muscat Municipality (the person in charge of the MMMP)

Higher Education Admission Centre:

- *General Manager* of HEAC
- *Deputy Manager* of HEAC
- *Designers* (2) from the Computer and Information Systems Department of HEAC (the persons in charge of the HEAC)

ITA:

- One *member of the e-Government team*

Omantel:

- One *General Director of IT*

Nawras:

- One *General Director of IT*

Finally, the Researcher found that the interviewees were uncomfortable with having the interviews tape-recorded; therefore note-taking was employed to record the information.

5.5 Conclusion

For any research study, the importance of choosing the methodology best suited to the aims of the research should not be underestimated. However, it is also important to ensure that considerations of the methodological 'purity' of the study do not overshadow the aims. Having described the principles of research, this chapter then detailed the actual methodology chosen for the research. The chosen methodology is underpinned by the positivist philosophical paradigm to explore and test the main hypothesis that "m-Government is a prerequisite for the success of e-Government in Oman". The methodology employed includes an extensive literature review, which has already been presented in previous chapters, and is driven by the aim and objectives of the thesis. A case study approach is taken, employing both quantitative and qualitative data collection and analysis. The strategy was divided into two phases to ensure validity: questionnaires involving users of the services provided in the case studies; and interviews with key personnel from the two case study organisations. Finally, the chapter explained how the Researcher overcame problems that arose in conducting the chosen methodology, culminating in further interviews being conducted with officials from the organisations responsible for communications provision in Oman and the Authority responsible for implementation of the Oman Digital Society strategy and infrastructure.

The following chapter presents the results and analysis of the field research.

Chapter 6
Fieldwork Results and Analysis

| *Phase 1: Questionnaire Results; Phase 2: Interview Results*

6.1 Introduction

This chapter presents the data gathered from the field research in the two case studies: Muscat Municipality Mobile Parking (MMMP), and Higher Education Admission Centre (HEAC). The research instruments were employed in two phases, beginning with the use of a questionnaire with users, and progressing to the use of interviews with providers, to better understand and interpret the results. In particular, the instruments used were intended to investigate the development and diffusion of m-Government, and to explore the factors that have led to the delayed deployment of e-Government generally in Oman. The chapter is structured into two main sections according to the phases of the chosen research methodology: the first presents the descriptive results and analyses users' responses from the questionnaires; and the second reveals the results from the interviews.

6.2 Phase 1: Questionnaire Results

In Case Study One (MMMP) a total of 250 questionnaires were administered in three different areas in the Governorate of Muscat, to a random sample representing different segments of Omani society. Of these, a total of 219 questionnaires were returned and analysed, representing a response rate of 88%.

In Case Study Two (HEAC) a total of 281 questionnaires were administered to male and female schoolchildren in two schools from Muscat, first year students at Sultan Qaboos University and Technical College, and second year students at Middle East College in Oman. In total, 251 questionnaires were returned and analysed, representing a response rate of 89%.

6.2.1 Case Study1 (MMMP)

The questionnaire (a copy of which may be found in Appendix A) was structured into six parts: background information, computer and internet experience, mobile phone experience, e-Government and m-Government experiences, Muscat Municipality mobile parking project, and critical success factors for the adoption and diffusion of mobile services. The results are grouped according to these sections.

6.2.1.1 Background Information

The aim of this first set of questions was to understand demographic variables relating to the sample. Three main variables were identified in this section: age, gender and education level. The overall age range was from 18 (driving licenses in Oman are issued for those aged 18 and above) to 45+ years. The survey results indicated that the majority of the users (54%) were between the 25 and 34 years of age, the largest category of users being in the age range 30-34.

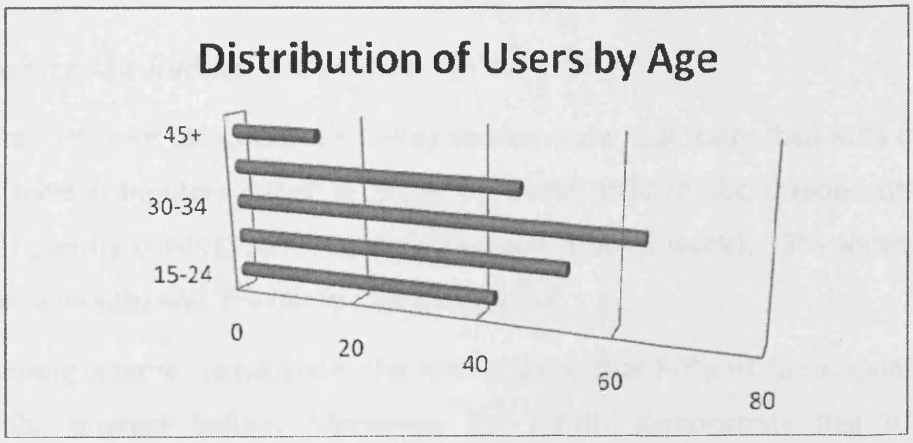


Figure 6.1: Distribution of Users by Age

Table 6.1 below shows the distribution of sampled users by gender; of whom 77% were male and 23% female.

Table 6.1: Distribution of Users by Gender

Gender	Frequency	Percentage
Male	169	77.2
Female	50	22.8
Total	**219**	**100.0**

From Figure 6.2 it can be seen that the majority of users (58%) sampled were of an education level between secondary school and diploma. It is also worth noting that there were users in the sample who had completed only the lowest education level (primary school and middle school).

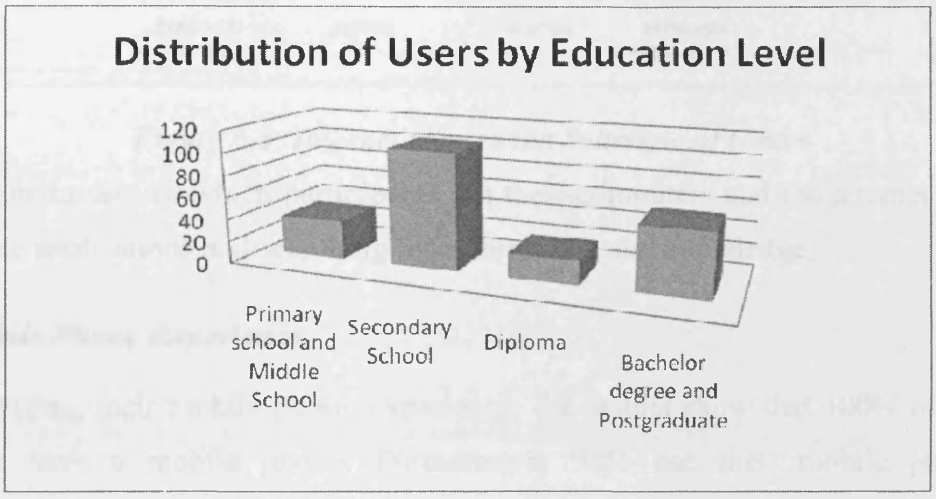


Figure 6.2: Distribution of Users by Education Level

6.2.1.2 Computer and Internet Experience

The results from the questions in this section show that more than 80% of the respondents have computers either at home or work; 45% of the respondents use computers frequently (daily), 16% regularly (several times a week), 13% sometimes (several times a month) and 7% rarely (once a month).

Regarding internet experience, the results show that 80% of the respondents have used the internet before. Moreover, the results demonstrate that of the respondents who have used the internet before, only 32% use it frequently (daily), 16% use it regularly (a few times a week), 20% use it sometimes (a few times a month), and 12% use it rarely (once a month).

When asked about the cost of the internet in Oman, 90% of the respondents either 'strongly agree' or 'agree' that the cost is very high as illustrated in Figure 6.3:

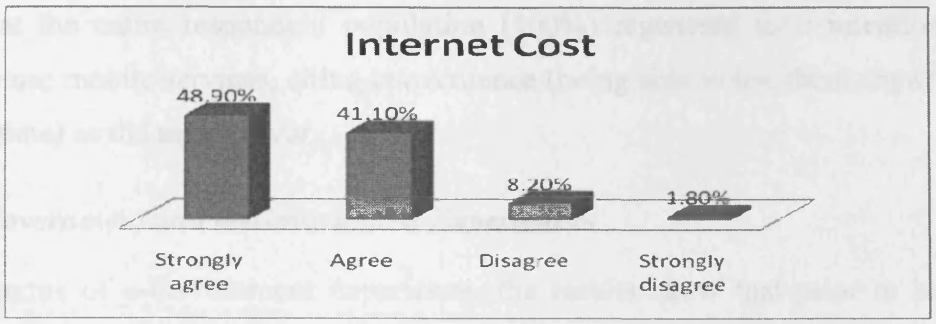


Figure 6.3: Internet Cost in the Sultanate of Oman

The main uses to which participants put their computers and the internet are: e-mail, office applications and searching for information and knowledge.

6.2.1.3 Mobile Phone Experience

Regarding their mobile phone experience, the results show that 100% of the respondents have a mobile phone. Furthermore, 94% use their mobile phone frequently (daily), 4% regularly (a few times a week) and only 2% sometimes (a few times a month).

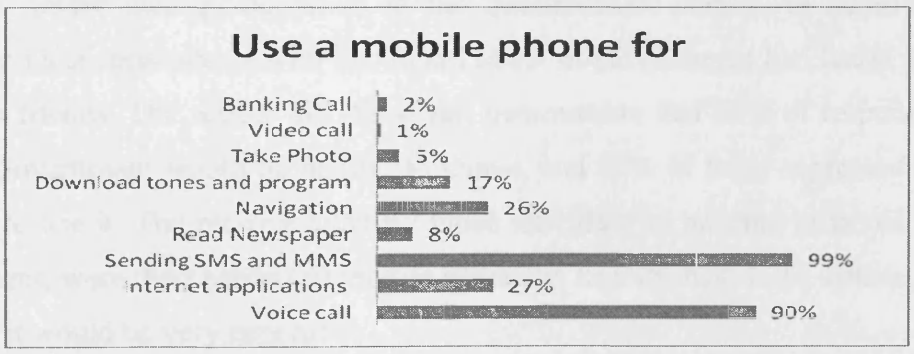


Figure 6.4: MMMP Respondents' mobile phone use

The results illustrated in Figure 6.4 show that 99% of the respondents reported using their mobile phones for sending SMS and MMS, 90% of the participants used their mobile phone for voice calls, and 27% used their mobile phone for internet applications (email, chatting, surfing and searching for information and knowledge, etc). 26% reported using their mobile phone for navigation, and 17% for downloading tones and programs. Using mobile phones for reading newspapers, making video calls, and utilising banking services and paying utilities bills all show insignificant statistics (less than 10%). At the end of this section of the questionnaire, the results

indicate that the entire respondent population (100%) registered their intention to continue to use mobile services, citing convenience (being able to use them anywhere and at any time) as the main driver.

6.2.1.4 e-Government and m-Government Experiences

In terms of e-Government experience, the results show that prior to being involved in the questionnaire survey, 74% of respondents had heard of e-Government and only 26% had not. The results also indicate that 88% of respondents thought that e-Government would be helpful to Oman and 81% of this group expressed their willingness to use it. The main reasons given by the 19% of respondents who indicated that they were not willing to use such services included: that they were not computer literate, did not trust e-Government applications, and considered it to be expensive to do so. It was also found that 81% of the respondents had learned about e-Government from their friends and/or family.

Conversely, the results show that only 17% of respondents had heard of m-Government before their participation in the questionnaire survey. In addition, it emerged that most respondents who had heard about m-Government had learnt about it from their friends. The results did, however, demonstrate that 86% of respondents thought m-Government would be helpful to Oman, and 82% of them expressed their willingness to use it. The reasons cited by those unwilling to become involved with m-Government, were their perceived mobile illiteracy, lack of trust in the system, and a belief that it would be very expensive.

Finally, when asked "Would you like to read about the new services and experience of e-Government by mobile telephone?" 84% of the respondents agreed that they would; the remainder were antagonistic towards the proposition, believing such services to be expensive, difficult to use, or a waste of time.

6.2.1.5 Muscat Municipality Mobile Parking Project

The results from the questionnaire show that more than 86% of the respondents use a mobile phone to pay parking fees via SMS and that most of these people were positive about their experience and were trying to convince their friends

and family to use this service as well. The 14% who still use coins or a ticket system to pay parking fees cited their perception that m-parking would be expensive. In addition, it was found that 85% of respondents considered m-parking services to be more convenient than other means (e.g. using coins or a ticket system).

The results also clearly indicated out that 77% of respondents believed m-parking services to be easy, and 74% of respondents agree that the service requires little explanation. Additionally, there was an almost unanimous (92%) belief that paying for car parking services by mobile phone was easier for those with disabilities than the usual means (e.g. using coins or a ticket system).

93% of the respondents agreed that m-parking services saved time and effort, with 89% noting that m-parking provides an opportunity for fast and accurate payment of parking fees. In terms of the impact upon their lifestyle, 81% of respondents agreed that m-parking was in keeping with this, and more than 82% stated that their positive feeling towards m-parking would predispose them to use other mobile services in the future.

The results also show that more than 84% of respondents were encouraged by their colleagues to use m-parking services, and that 95% said they might encourage their family members and friends to use them. The ease with which such services can be used was clearly valued, 66% of respondents being in agreement that m-parking was not a complicated process, and in fact it required no mental effort.

Moreover, the results show that more than 83% of the respondents believe that a specific period of time should be given free of charge to users in order for them to experience m-parking prior to them making the decision to adopt, and hence, pay for the service in the future, thereby allowing them to try before purchasing.

In terms of availability, the results show that more than 77% of the respondents agreed that it was possible to use the m-parking service at any time, although it was recognised that to date there were only three regions in Muscat where the service was in operation. In this respect 76% of respondents were aware that m-parking was not yet available throughout Muscat, indicating that these people did, in fact, know where it was in operation.

On the negative side, however, 71% of respondents did not believe that m-parking services were secure, and 79% of the respondents did not believe that Omani Law would protect them adequately from any problems that might arise through their use of m-parking services. Moreover, 78% of respondents disagreed with the statement that mobile phone technology is adequately protected, that is to say, to the extent that it would encourage its use for m-parking.

Despite these misgivings, 69% of the respondents rated their satisfaction with the m-parking service as High-Good, with only 31% of choosing the Average-Below Average satisfaction rating. Furthermore, 74% of respondents said they would use m-parking services much more in the future, leaving only 26% not planning to increase their usage, on the grounds that they do not trust the service security, it was not easy to use, and was believed by some to be expensive.

6.2.1.6 CSFs for the Adoption and Diffusion of Mobile services

When presented with the perceived CSFs, the majority of the questionnaire respondents indicated that they 'Strongly agree' or 'Agree' with their importance to the e-Government and m-Government project in the Sultanate of Oman, as summarised in Table 6.2:

Table 6.2: CSFs from MMMP Users' viewpoint

Critical Success Factors	Strongly agree and agree
e-Government Vision and Strategy	95%
Leadership and Support	95%
ICT Infrastructure and Mobile penetration	94%
Transformation of Culture	95%
Human Resource Management and Training/ICT and Mobile Literacy	96%
Inter- and Intra Organisation Integration	98%
e-Legislation	96%
User Considerations – Requirements/ Trust/Privacy/Security	96%
e-readiness and Marketing	97%
Funding	98%

The results from Table 6.2 show that whilst the respondents viewed all of the CSFs to be of similarly high importance, the highest levels of agreement were seen with respect to inter- and intra-organisation (98%), and the issue of funding (98%).

6.2.2 Case Study 2 (HEAC)

The questionnaire (a copy of which may be found in Appendix B) was structured into six parts: background information, computer and internet experience, mobile phone experience, e-Government and m-Government experiences, Higher Education Admission Centre project, and critical success factors for the adoption and diffusion of mobile services.

6.2.2.1 Background Information

As with the MMMP case study, the aim of this first set of questions was to understand demographic variables relating to the sample. Four main variables were identified in this section: age, gender, the respondents' school or university, and the respondents' Governorate or Region.

Secondary school students in Oman fall into the age range 17 and above, whilst university and college students are in the range 20 and above. The survey results indicated (Figure 6.5) that 76% of the users surveyed were <=20 and 24% were 20 years of age or above.

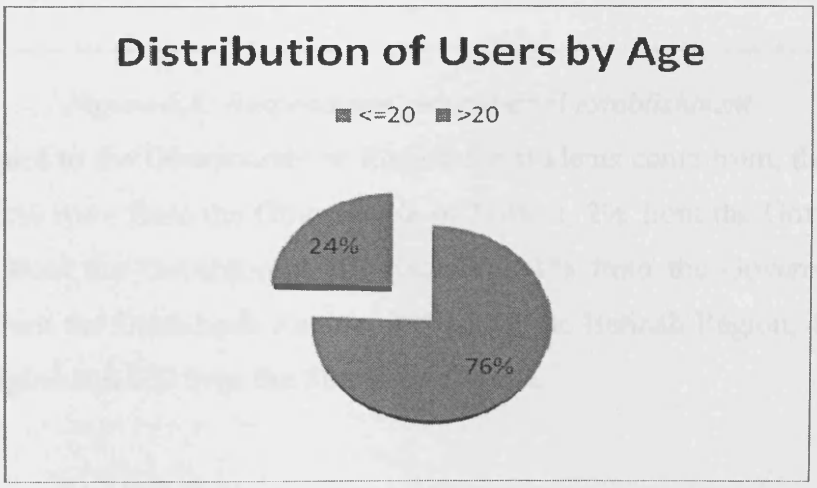


Figure 6.5: Age range of respondents

From Table 6.3 it can be seen that 43 % of the sample was male and 57% was female.

Table 6.3: Gender of respondents

Gender	Frequency	Percentage
Male	108	43
Female	143	57
Total	**251**	**100.0**

The respondents attended five different educational establishments as illustrated in Figure 6.6:

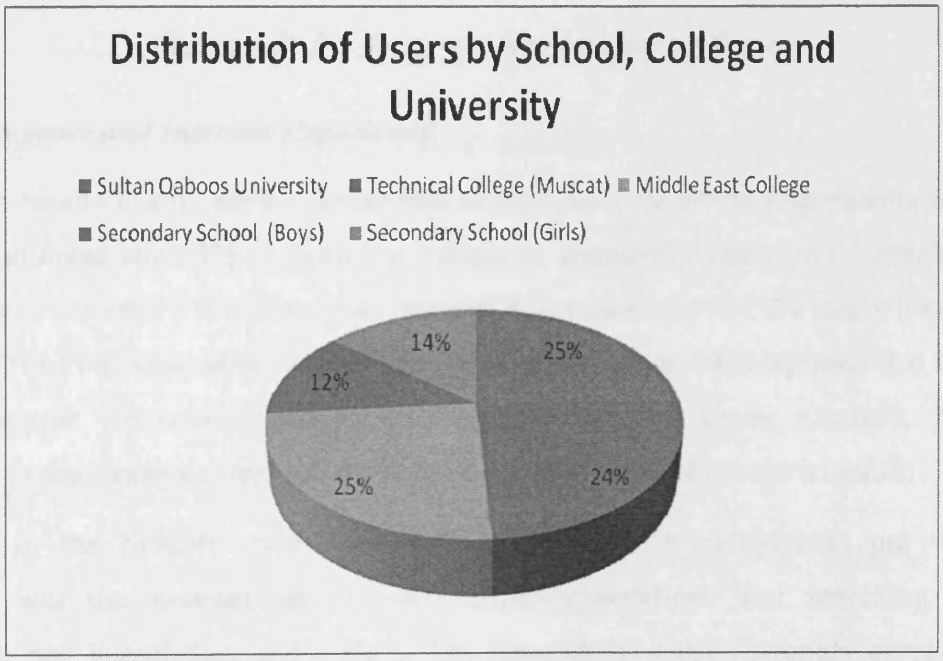


Figure 6.6: Respondents' educational establishment

With regard to the Governorate or Region the students come from, the results indicated that 52% were from the Governorate of Muscat, 2% from the Governorate of Dhofar, 1% from the Governorate of Musandam, 1% from the Governorate of Buraimi, 10% from the Dakhiliyah Region, 21% from the Batinah Region, 4% from the Dhahirah Region and 8% from the Sharqiyah Region.

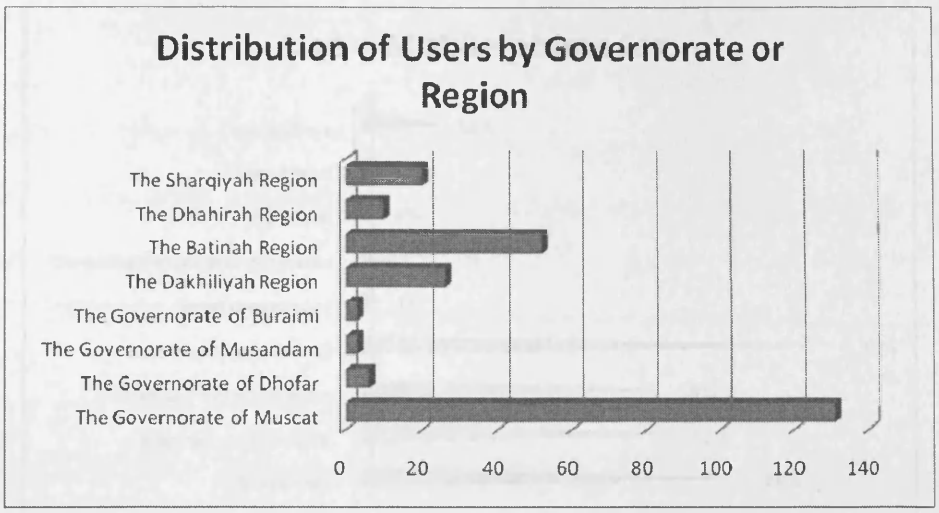


Figure 6.7: Respondents' Governorate or Region

6.2.2.2 Computer and Internet Experience

The results in this section show that more than 97% of the respondents have computers at home and 43% of them use computers frequently (daily), 33% regularly (several times a week), 14% sometimes (several times a month) and 7% rarely (once a month). 97% of the respondents have used the internet before; 34% reported that they use the internet frequently (daily), 33% regularly (a few times a week), 21% sometimes (a few times a month) and 9% used the internet rarely (once a month).

As in the MMMP case, the main uses to which participants put their computers and the internet are: e-mail, office applications and searching for information and knowledge, and 90% of the respondents either 'strongly agree' or 'agree' that the cost of the internet in Oman is very high as illustrated.

6.2.2.3 Mobile Phone Experience

Regarding mobile phone experience, the results show that 98% of the respondents have a mobile phone; 85% of them use their mobile phone frequently (daily), 8% regularly (a few times a week), only 4% sometimes (a few times per month) and 1% rarely (once a month).

Figure 6.8 illustrates the uses to which the respondents put their mobile phones:

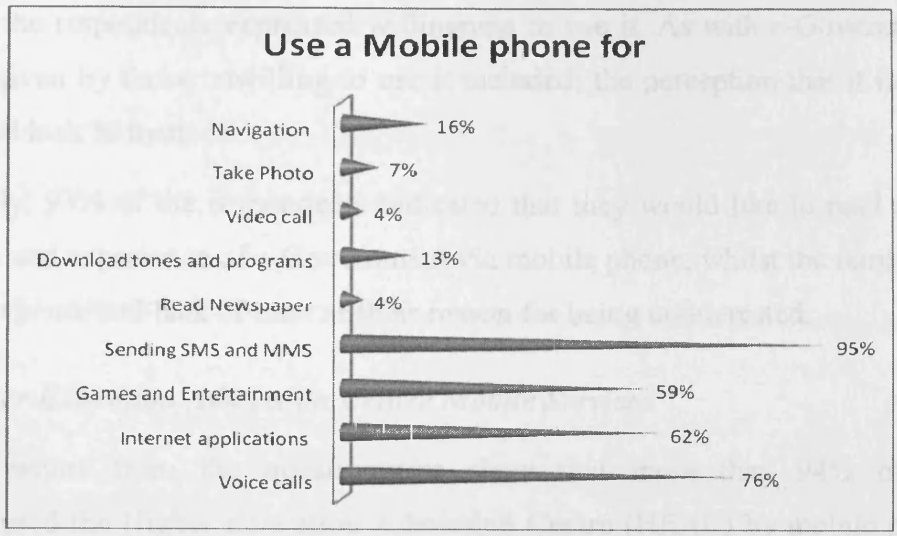


Figure 6.8: HEAC Respondents' mobile phone use

It is clear that sending SMS and MMS is by far the most popular use (95%), followed by voice call (76%), internet applications (62%), and games and entertainment (59%).

At the end of this section, 94% of the respondents reported that they are happy to continue to use mobile services; those who indicated otherwise cited wasting time and the expense as the main reasons.

6.2.2.4 e-Government and m-Government Experiences

In terms of e-Government experience, the results show that 71% of the respondents had heard of e-Government before completing the survey. 98% of the respondents thought that e-Government would be helpful to Oman and 96% of the respondents expressed willingness to use it. The reasons given by those unwilling to use it included: the perception that it is very expensive and lack of trust. 63% of the respondents had heard and shared the experience about e-Government through their friends or family and 18% via school and university.

Conversely, the results show that only 47% of the respondents had heard of m-Government before completing the survey; most of these respondents heard and shared the experience about m-Government through friends. The results also showed that 98% of the respondents thought that m-Government would be helpful to Oman

and 97% of the respondents expressed willingness to use it. As with e-Government, the reasons given by those unwilling to use it included: the perception that it is very expensive and lack of trust.

Finally, 93% of the respondents indicated that they would like to read about new services and experience of e-Government via mobile phone, whilst the remainder again cited expense and lack of trust as their reason for being uninterested.

6.2.2.5 Higher Education Admission Centre Mobile Services

The results from the questionnaire show that more than 94% of the respondents used the Higher Education Admission Centre (HEAC) by mobile phone and the majority were encouraged to use this service by their friends and schools. The remaining 6% registered via the internet website. 85% of the respondents agree that the HEAC service by mobile phone is useful; those who disagreed cited: trust, the perception that it is more expensive than via the website, and perceived lack of security.

90% of the respondents agreed that the HEAC service by mobile phone is very easy to use and requires little explanation. In addition, the results show that 90% of the respondents agree that it is easier for those with disabilities than the more traditional means, 83% agree that it saves time and effort, and 75% agree that it provides faster and more accurate results than the traditional means.

The majority of respondents feel that the HEAC service by mobile phone will agree with their lifestyle (88%) and with their expectations when they use other electronic services in the future (92%).

84% of the respondents indicated that viewing their colleagues using the HEAC service by mobile phone encouraged them to use it, with 78% of them indicating that their use of the service may in turn encourage their family members and friends to use it. The majority of respondents also agreed that using the service via mobile phone requires little mental effort, and is not complicated.

It is interesting to note that the results indicated that 96% of the respondents believe that a specific period of time should be given free of charge to users in order

to experience the HEAC service by mobile phone prior to implementation. The results also showed that 97% of the respondents agreed the HEAC service via mobile phone may be applied at any time, and 75% agreed that is available everywhere in the Sultanate of Oman.

55% of the respondents agreed that the service was secure by mobile phone, and 61% of the respondents felt that Oman Law would protect them adequately from problems that may arise from using it. Moreover, 54% of the respondents felt that a mobile phone has adequate protective techniques to encourage its use.

Overall, the results showed that 69% of the respondents rated their satisfaction with use of this HEAC service as High-Good. Furthermore, 75% of the respondents indicated that they will use HEAC services by mobile phone much more in the future; the reasons cited by those who will not included: difficulty in access via the internet, not easy to use via mobile phone, expense, and (in some cases) resultant mistakes.

6.2.2.6 CSFs for the Adoption and Diffusion of Mobile services

As with the MMMP case study, when presented with the perceived CSFs, the majority of the HEAC questionnaire respondents indicated that they 'Strongly agree' or 'Agree' with their importance to the e-Government and m-Government project in the Sultanate of Oman, as summarised in Table 6.4:

Table 6.4: CSFs from HEAC Users' viewpoint

Critical Success Factors	Strongly agree and agree
e-Government Vision and Strategy	91%
Leadership and Support	89%
ICT Infrastructure and Mobile penetration	87%
Transformation of Culture	89%
Human Resource Management and Training/ICT and Mobile Literacy	92%
Inter- and Intra Organisation Integration	89%
e-Legislation	86%
User Considerations – Requirements/ Trust/Privacy Security	92%
e-readiness and Marketing	91%
Funding	86%

These results show that although the percentage spread is slightly larger than was the case in the MMMP case, all of the CSFs are again viewed to be of similarly high importance; in this case the highest levels of agreement were with respect to human resource management and training/ICT and mobile literacy (92%), and user considerations – requirements/trust/privacy security (92%).

6.3 Phase 2: Interview Results

A total of nine semi-structured interviews were conducted, with the Researcher employing an interview guide to ensure consistency between them. The interview guide (a copy of which may be found in Appendix C) was structured into eight sections: Participants' ICT Knowledge; Organisation and IT Services; Muscat Municipality Mobile Parking Project; Higher Education Admission Centre Mobile Project; e-Government and m-Government Project Management Control; Technical Barriers Facing Adoption and Diffusion of m-Government; Non-technical Barriers Facing Adoption and Diffusion of m-Government; and CSFs for the Adoption and Diffusion of m-Government in the Sultanate of Oman. The interview results are grouped according to these categories.

6.3.1 Participants' ICT Knowledge

The interview data indicated that: the participating officials range between 25 and 43 years of age; all except one are male; they have between 3 and 24 years' work experience in their respective organisations. The interviewees' education ranges between Higher Diploma and PhD degree level. The majority are graduates, having graduated from either the UK or USA, and some hold both Masters' and Bachelors' degrees. The results also indicated that they all have a good overall awareness of e-Government and mobile services.

In terms of computer and internet experience, all of the officials have a computer and internet access both in their homes and their offices; they use their computers for between two and ten hours per working day. They each also use a

mobile phone PDA and use this technology for a range of functions, including: voice call, internet applications (e.g. email, chatting, surfing, etc), SMS and MMS, navigation, downloading tones, other programs and reading newspapers.

When asked whether or not they believed that internet costs in Oman were high, all officials strongly agreed, with the Nawras official stating:

> *"I agree that the cost of internet in Oman is very high and we are planning to reduce this rate. The reason for the high cost is that we use the International Gate; also the link between Oman and Pakistan is by the Sea Cable. Now there is a plan for introducing the 'Way Max' technology which will assist in reducing the rates in the future."*

6.3.2 Organisation and IT Services

The aim of this section of the interview guide was to understand in more detail the organisations involved in the two case studies and how they affect and are affected by e- and m-Government. The results in this category are therefore reported in subdivisions according to the two case studies.

6.3.2.1 Case 1 (MMMP)

The planning and supervision of the mobile parking project is the joint responsibility of the Municipality President, who took charge of the strategy and planning, and the General Manager and Head of Information Systems Department, who is the head of projects and in charge of supervision of all e-services and m-services in this organisation. The results show the budget allocated for the MMMP project to be around 30-40,000 RO, while for the Directorate of Information Systems it was approximately 300,000 RO.

In respect of the vision and strategy in Muscat Municipality in utilising the ICT sector and the internet to improve its day-to-day activities, the General Manager said:

> *"There is no five year plan at present because the information systems are changeable and developing, and in the meantime we are focusing on dissemination of Muscat Municipality mobile services. The staff were*

involved in the design of the strategy; the President of the Municipality has a clear vision and supports all of the staff, therefore Muscat Municipality is moving rapidly in electronic and mobile services."

Also, the interviews revealed that Muscat Municipality is more active than others in the adoption and dissemination of e-Government and mobile services, and on this matter, the General Manager cited:

"1) leadership awareness and the concern given by the officials; 2) the technical cadre is available in the organisation for transforming such normal services to electronic services; 3) the decision makers are highly concerned with IT; 4) the most important reason is that some organisations have no services to provide to the public, therefore their IT activity and concern will be less."

Furthermore, the Designer also spoke on this issue, citing his reasons why Muscat Municipality is more active than others in the adoption of such services:

"1) material and moral support of the Higher Management and their adoption of the e-Government idea; 2) the experience and vision of the IT team for the project development will help disseminate electronic services; 3) good plan and development and training of human resources on IT; 4) financing electronic services and the potential for transforming traditional services to electronic services."

As a result, the officials from Muscat Municipality said they were satisfied with progress so far in the mobile parking project and other e-services in their organisation, and that they were planning to change all manual services in the Municipality into e-systems and mobile services. Furthermore, they were quite satisfied with the public take-up of the mobile parking services, commenting that the number of users was increasing on a daily basis. However, the questionnaire results did indicate the absence of an instruction board explaining how to use the mobile parking service, and that those who actually used the service had come to learn about it from friends and family. Given this failing, the officials from Muscat Municipality agreed to include such instruction boards in their development plan. Moreover, the questionnaire findings indicated that it was very expensive to use the mobile parking service, and that either the service should be free, or the charge should be reduced to 50 baisa as is the cost for the normal ticket system. However, in response to this suggestion, General Manager said:

> *"It is difficult to make it free of charge. If so, what is the return for the Municipality? As for reducing the rate from 60 to 50 baisa, it should be known that an SMS costs 10 baisa and the parking cost is 50 baisa, so the total will be 60 baisa. The advantage of booking by m-phone is that you can use the same booking at several sites until the time specified is over. This is not available with the coin and ticket system."*

The results indicated that the major barriers facing Muscat Municipality in the uptake of e-Government and mobile services included staff awareness, the incorporation of electronic and non-electronic services and the need for administrative procedures relevant to e-Government. Resistance to change was also seen as a major barrier, therefore staff training was viewed as a prerequisite in overcoming these barriers.

The interview findings do show that there is potential for m-Government services to function as a driving force for e-Government adoption in Muscat Municipality, and that they are being considered as an outlet for all electronic services, such that both e-Government and m-Government complement each other.

Concerning issues of speed and security, both officials from Muscat Municipality agreed that it was faster, easier and more secure to make a parking reservation by phone than to use coins in the traditional way, and they were of the opinion that these advantages would help in dissemination of the service.

6.3.2.2 Case 2 (HEAC)

The General Manager of HEAC, who gained his PhD in Management Quality from the UK, is in charge of the strategy/planning and supervision of the HEAC project after consultation with the staff. The General Manager noted that:

> *"Supervision depends on the comments of the Higher Education Council, the students, and public complaints. These comments are re-phrased as objectives to be forwarded to the Ministry of Higher Education for new planning."*

The budget allocated to the HEAC project is 250,000 RO; the overall budget for the General Directorate (of HEAC) is 550,000 RO. The Project makes a return of 50,000 RO p.a. from advertisements, companies, and SMS services by mobile phone.

Regarding the HEAC vision and strategy in utilising ICT to improve its day-to-day operations, the General Manager, who supervises this, stated:

> *"The vision and strategy is also discussed with other officials; there is also a mobile phone SMS service strategy which we hope to develop to the best [of our abilities]."*

The high calibre of the strategy is verified by the fact that HEAC received the World Summit Award for the best electronic product in 2007. The Director General indicated that others organisations are less active than HEAC in the adoption and dissemination of e-Government and mobile services due to various reasons:

> *"1) because the strategy is not clear to other organisations they are not encouraged to work hard; 2) lack of communication and coordination in some organisations; 3) lack of potential for transformation from traditional to e-systems; 4) supporting leadership is not enthusiastic."*

The Deputy Manager added to this point, stating:

> *"It depends on whom you are dealing with. For example, we are dealing with the students and they are forced to use this technology. Therefore, the service was imposed after providing them with all services such as the internet, computers, and SMS service by m-phone. The second reason is the concern given to continuous awareness, which has a major role in the adoption of IT systems."*

As a result, the HEAC officials are satisfied with the progress of the project and other electronic-services in their organisation. The General Manager stated:

> *"I am satisfied and we are trying to develop further. In the first year, for example, there was only the Sorting system. In the second year, the SMS system by mobile phone was introduced because most of the students lost the password. In order to easily communicate with them, and because in some areas email and the internet services are not available to every student, we have entered the SMS service in order to facilitate access to all the students. After that came the idea of registering the students by mobile phone. Some programmes of the Sultan School and the Royal Guard College were not included in the project, so it was difficult for the students of these institutions to enrol through the Centre system, which was then developed in 2008. Now, the students who are studying at their own cost may go to any college or university in Oman and get enrolled directly and easily. They do not need to re-enter their data because it was already stored in the Centre. The college or the university concerned will only enter [a student's] civil number in order to take his*

data from the Centre, which is liked with all the colleges and universities."

The officials also indicated that they are quite satisfied with use of the mobile services in HEAC. The Deputy Manager stated:

"The project is excellent so far. It provides 22 electronic-services by m-phone or by the internet. In the second year the SMS service was introduced to citizens living in the mountains, plains, and the desert. We are ambitious not to stop at a certain limit because IT is continuously developing and the number of students using this service by mobile phone are increasing daily."

The results from the questionnaire, however, show that there is mistrust in using the project (whether by mobile phone or the internet) due to favouritism in student registration. The General Manager clarified this by noting that:

"It is impossible to satisfy all people, but still transparency is observed, and the results are released to everyone. Moreover, the competitive average for all disciplines is provided to all. This will enable the student to know the last average accepted and he shall have the right to appeal at the Grievances and Complaints Committee in case of any error."

Furthermore, he stated that:

"Firstly, students do not know that the project needs transparency. Secondly, sorting out the students and admission will let them know and compare their results. Thirdly, students don't understand that we are enforcing self accountability and criticizing the staff in order to ensure that they serve the project. Fourthly, the student does not read the Directory and put his choices in order as required; for example 90% will choose the Technical College despite the fact they can be admitted to the university."

The questionnaire results also indicated that the students viewed registration by mobile phone to be very expensive and a group of students are demanding that registration should be free of charge. On this point, the General Manager said:

"20% of the charge is income to HEAC. It was 150 baisa previously, and then it was reduced to 75 baisa. All countries impose a percentage that exceeds this rate. It is also noticed that 90% of the fund allocated for seats is obtained from SMS service, which proves that it is easily accessed and available everywhere and at any time. In my opinion it is cheaper than the internet service."

The Deputy Manager's view on this point was:

> *"I agree that it should be free of charge or otherwise minimize the cost; for those on limited income it should be free of charge. But the good thing is that from the feedback of the students as a whole community, they are satisfied with the ease of registration compared with the past, which also cost them more."*

The official from Nawras stated that:

> *"As a Government organization, HEAC is supported by the Government, but companies are owned by persons. I suggest that the Government Organizations should subsidize their e-services in order to reduce the rates for the sake of the citizens."*

In addition, the questionnaire results indicated that some errors are committed during registration and selection of the discipline required. Therefore the students register repeatedly. The General Manager views this as the fault of the individual student by not reading the registration book thoroughly, adding:

> *"...parents should check the students' choices and follow up the registration process. Now, this problem has been solved by providing all the schools with IT and social specialists to direct and help the students during registration."*

The Deputy Manager concurred regarding the students not reading or understanding the student directory, but adding:

> *"I believe that e-Government will assist the students to understand and use technology properly."*

On the point raised from the questionnaire results, that it is difficult to enter the website and that internet service is not available in some areas, the General Manager's viewpoint was that:

> *"It is true that it is difficult to get access to the internet in some areas of the Sultanate, yet this is not the Higher Education Admission Centre's problem. It is in fact the providers' problem (Nawras, Omantel) and the main problem is the ITA's. In spite of that, the Centre exerted time and effort for all the students by providing all the schools in the Sultanate with computers and internet service in cooperation with the Ministry of Education. Moreover, some students use mobile phones as another option for registration."*

He also stated:

"Actually the internet was limited to a certain area. In 2006, 3000 students submitted complaints to this effect. Recently, the issue was solved by contracting with Nawras and Omantel to expand ADSL, and SMS service was added in the areas where the internet was not available. Another problem was that some students did not have adequate information on how to use computers and the internet. This was due to a limited electronic culture and the fact that they had not studied IT. Nowadays the computer has become a basic school subject in all the schools of Oman."

One of the HEAC Designers also clarified that:

"Firstly, if the power is off (and also when power is on), the system sends a message to all technicians registered in the Unified Admission Centre, plus, when the system is defective or there is disaster recovery, a message will be sent to those concerned. Secondly, wireless service has been provided to all schools in remote areas. Thirdly, sometimes coordination is made with nearby schools for registration if the internet is not available in school. Ultimately it is more important that a student may use mobile telephone technology and register easily."

However, the questionnaire results also indicated that it is difficult to register by mobile phone. The General Manager's view was that this may be due to the small size of mobile phone monitors or keyboards, but still the mobile phone is very easy to use and available everywhere in Oman. Further to this point, the Deputy Manager stated:

"Maybe this is due to the small size of the m-phone monitor, but I remember that last year some students had lost the password and PIN, so we had to send an SMS to all the students reminding each of them of his password and PIN to be able to re-register."

A HEAC Designer unequivocally noted that:

"It is impossible to face difficulty in registration by mobile phone because it is merely sending an SMS and selecting the specialization required. As for the specialization and how to select it, the guide for using SMS is being distributed including how to register by mobile phone."

Regarding the major barriers facing HEAC in the uptake of e-Government and mobile services, the General Manager stated:

> *"[the] communications infrastructure is not ready, and there is a lack of public awareness and a clear-cut strategy."*

Further to these points, the Deputy Manager cited:

> *"...spreading public awareness and the dissemination of a technology culture. The information media should play a major role in dissemination of e-culture, e.g. TV programmes (lack of marketing)."*

One of the HEAC Designers stated that the barriers are:

> *"1) none availability of internet in all schools; 2) lack of public awareness and internet illiteracy; 3) lack of integration between the Ministry of Education and HEAC."*

The interview results did show that there is potential for m-Government services to function as a driving force for e-Government adoption in HEAC and that they complement each other. The General Manager stated:

> *"One day the computer will not exist in HEAC and in some international institutions. The mobile phone services and mobile network will dominate. A contract has been concluded with Nawras Company to this effect, i.e. the use of WAP service will enable you to register by surfing the HEAC website via PDA m-phone. That means the m-phone in five years time will dominate all the technologies. One of the disadvantages of the current m-phone system is the difficulty of reviewing all the information available in the website. However, by using WAP all these services can be provided."*

The Deputy Manager's view was that:

> *"...there is a wide potential for mobile phone service to function as a driving force. It has been experienced and proved successful. As the objective of e-Government is to facilitate the flow of information, the mobile phone has a major role in facilitating this process for all the citizens who have no internet service. Among the merits of the mobile phone is the potential to use it anywhere that there is mobile network coverage. It is certain that mobile networks will support e-Government all over the world and not only in Oman."*

The interviewed officials all agreed that booking by mobile phone is faster, easier and more secure and it is these advantages that will help disseminate this service. One of the HEAC Designers stated that:

> *"Mobile telephone is faster, easier and safer. A reply message will be sent from all systems confirming receipt of application. 14 thousand people are accessed by SMS at the same time, which indicates the speed of mobile telephones. Also it will be advertised in newspapers to notify parents of what is happening, and on the same day the student will receive a message from the Centre. Thereafter correspondence will be by SMS."*

6.3.3 Muscat Municipality Mobile Parking Project

The results indicated that the officials interviewed from Muscat Municipality themselves use their mobile phones to pay their parking fees via SMS, asserting that the facility was more useful when compared with the coins and ticket system. On this issue, the General Manager said:

> *"Through this system you can reserve your parking, go shopping or to work, and after half an hour a message will ask you whether or not you want to extend your reservation duration. Also you don't need to carry coins with you everywhere. You just need to send an SMS to the system and then enjoy your time without the need to go back to the car. When the time expires, you just need to send another SMS to the system to extend the duration. And for your information, you can use the same service duration in three parts of the Muscat region thereby using the same reservation to move from one parking place to another within your reservation time. For example, if you reserved a parking for an hour in Mutrah city (part of Muscat), and then had to leave to Ruwi city (another part), after half an hour, you can still use the same reservation you used for Mutrah."*

And the Designer stated:

> *"[the service] is good for all of the users, and the continuous increase in the number of users is the best proof of its success."*

Also, the results indicated that the officials agreed that mobile car parking services can be used easily, requiring little explanation, though they were aware that this is dependent on the user's level of education. In this connection the General Manager noted:

> *"...it is difficult for the illiterate and people with only primary level education, for example. However, being illiterate is not a barrier for using the service, because many illiterate people can still use mobile phones and so can use the service too."*

The Designer also pointed out that the service is especially preferable for the younger generation.

In addition, the results indicated that the officials agreed that mobile car parking services have advantages for people with disabilities, the technical member of staff noting:

> *"...we in Muscat Municipality are allotting special parking lots for the handicapped that can be reserved through mobile phones to make it easier and more convenient for them. This is part of our care for all of the users (nationals)."*

The interviewees strongly agreed that mobile car parking services saved time, enabled fast and accurate payment of fees (because they are automatically collected from the user's telecommunications provider), and would be beneficial to the Municipality in the reduced need for coin operated ticket machines. They also agreed that the services fit well with their lifestyle; Designer noting:

> *"...the world is now heading towards the technology era, and as a technical person, I find these advanced services very convenient with my lifestyle. For example, now when I am done with my work and before going to my house, I send an SMS to the Air conditioner in my room so that the place is cold and appropriate for me to sleep easily when I reach home. This is the benefit of technology and what I am looking forward to because it pertains with my lifestyle and way of thinking."*

As with the questionnaire responses, the interviewees also agreed that they had been encouraged to use mobile car parking services by their friends, and that they might also encourage their own family members and friends to use them. In this respect, the General Manager said:

> *"...our society has its social norms and we have strong relationships with our friends and families; whenever a new service appears you will find people discussing with each other both its negative and positive sides. We usually are affected by the surrounding environment from our friends and families. I personally convinced people from my family to use this service."*

The results notably indicated that the officials agreed with the suggestion that users should be given a free trial of the m-parking service to convince them of its benefits. In this connection, the General Manager noted that any new service should

be put under trial by the user prior to launch, and though this was not done at the initial stage of this service, it is a good idea that should be implemented in the future before launching new systems.

In terms of physical availability, the officials confirmed that m-parking services were not in operation throughout Muscat Governorate, and in this respect the General Manager said:

> *"...we are planning gradually to extend the service throughout Oman after making sure users are accepting it and able to use it without problems."*

Interestingly, the officials completely agreed that m-parking services were secure, with a high level of confidentiality and secrecy for the exchange of information between the user and the Municipality. Indeed, the General Manager noted that:

> *"...the Municipality system guarantees confidentiality and secrecy."*

The interviewees were also confident that Omani Law will adequately protect users from problems that might arise from using m-parking services. In this respect, the General Manager remarked:

> *"His Majesty Sultan Qaboos has built an effective law system in Oman for everything including information technology. All these rules are available on the information technology establishment website."*

However, the Designer was a little concerned in respect of the legal situation, saying:

> *"It is difficult to answer this question because many users are complaining that the money deducted was more than the expected rate and that is causing some problems and legal issues between the users and the telecommunication companies. The Municipality is only taking the fees for the parking. There is a law that protects the users from the electronic mistakes (pitfalls) and the users have to know that such a law exists and learn how and when to use it."*

6.3.4 Higher Education Admission Centre Project

The results indicated that the HEAC interviewees tried the mobile registration service before it was published, and they all agreed that it is more useful than other means (e.g. via the internet or registering in person). The General Manager added:

> *"When we do comparisons between the internet and the mobile phone, then, from my point of view, I would prefer the mobile phone over the internet because the internet can be slow or it might be difficult to access the website. Moreover, unfortunately, some schools especially in the rural and mountainous areas don't have internet services. That's why I believe the mobile phones and the wireless networks will have a major impact (or role) in spreading electronic services."*

It was also unanimously agreed that the HEAC service by mobile phone can be used easily and does not need much explanation, especially as the students using the system are expected to have a relatively high level of education anyway, and it was specifically designed to be user friendly for nationals and foreign residents alike.

In addition, the results indicated that the mobile phone service is easier for those with disabilities than the usual methods. The General Manager stated:

> *"Yes, certainly this program has made it easier for the students with disabilities to register without the inconveniences associated with them attending personally at the registration halls of the universities. This is not only my personal opinion, but also the opinion of the Omani society from the questionnaire provided through the HEAC website."*

The interviewees also agreed that the service saves time and effort and provides faster, more accurate results than the usual means, even allowing a user to register whilst out of the country. Furthermore, the General Manager pointed out that during results time most of the students communicate with the centre via their mobile phones anyway. As with the MMMP project, the HEAC interviewees also agreed that mobile services suit their lifestyles, with the one of the HEAC Designers adding:

> *"Yes, I am very proud to say that I am a technical person who likes to benefit from technology in my day-to-day life. It's the technology era and improvement in technology is a measure of creativity and development of the society."*

The HEAC results were also in accord with the MMMP interview results on various other points including: the uptake of such services through personal recommendations and peer influence; the benefit of being able to access and use the services anywhere and at any time, even during electricity shutdowns and in areas of the country with inadequate internet service; the security of personal information during mobile transactions; and Omani Law providing adequate protection against problems that might arise from using the mobile phone service. Regarding transaction security the General Manager pointed out that program was tested by experts, and the technical staff added the fact that HEAC is dealing with the best international companies to provide the highest levels of security and safety for the users.

Generally the interviewees also agreed that the provision of a free of charge trial period prior to users prior to implementation of new mobile services is a good idea, with the exception of one of the HEAC Designers who added a note of caution:

> *"No, I don't agree on allocating a time in which the service is free because this will create a huge load on the server used by the centre. I suggest that the students can be given free training on how to use the system through mobile phones and the internet. This will help in disseminating awareness about the service and help the students to use the system in the proper and correct way."*

6.3.5 e-Government and m-Government Project Management Control

In terms of e-Government experience, the results show that all of the interviewees had heard of e-Government and were willing to use the related services. In assessment of e-Government initiatives to date, however, opinions varied. One of the officials expressed satisfaction, saying:

> *"I am satisfied with what is provided by the ITA. They are successfully marketing the strategic services with the beginning of electronic payment. In addition, they are planning for the government e-gate and the results will be witnessed by all."*

The General Manager of HEAC stated:

> *"I think the Sultanate should strongly support e-Government without delay. It is noted that commercial exchange has the biggest share and*

therefore we hope that attention will be given to government work and not only the companies. I think that the university and school students are now able to cope, and they can easily transact with e-Government. It is also essential for the staff of all ministries to be electronically educated."

And the ITA official pointed out that:

"Long procedures have been followed in Oman to move to e-Government; according to the statistics, nearly 80% of the work has been completed and services are being provided via the e-Government Gate. As for the ministries, organisations, and authorities which have no electronic sites, the ITA offers assistance for designing their sites, providing communication networking, confidentiality and security."

Conversely, however, the official from Nawras Telecommunication stated:

"I think that the citizens are not yet prepared to use e-Government services. Moreover, the plans of the ITA are not clear enough. The ITA is responsible for phasing e-Government development. The reason why such services are not disseminated and integration of the communication infrastructure is delayed is centralization of work at ITA."

The Deputy Director General of HEAC stated:

"Yes, I have heard of e-Government, but very regretfully, ITA is not marketing it properly. In my opinion ITA lacks planning and needs human resources with electronic sense. We don't see any development with regards to e-Government, because there is neither good vision nor clear strategy. In addition to that, communication skills with others do not exist. Therefore, the objectives should be crystallized, other views should be taken into consideration, and relevant persons should be placed in relevant places."

And the technical staff stated:

"The ITA is good as an information medium, but with regards to staff training and other services nothing is apparent to the citizen and staff."

Regarding m-Government experience, the results show that all of the officials had heard of such initiatives and were willing to see the development of m-Government in Oman, and also to use it, though the General Manager of HEAC noted that prior to the interview he had only known it as a 'service' and not a 'title'. The General Manager from Muscat Municipality noted that m-Government is being well disseminated and is already functional in many ministries of the Sultanate.

All of the interviewees agreed that mobile services would have a major role in the dissemination of e-services generally, bringing the potential for widespread use in Oman, especially in areas where there is no internet service. Commenting on the m-Government strategy, the ITA official said:

> *"The Authority's strategy for e-Government is established and there is a plan for developing some services by using mobile phones, mainly in remote areas. But we will have to complete the basics of e-Government first, and then implement the mobile service because e-Government is the foundation stone. After that, the mobile services will support e-Government."*

The General Manager of HEAC also noted that m-Government is considered helpful for dissemination of e-Government services. One of the HEAC Designers did, however, note that:

> *"e-Government and m-Government potential for Oman depends on the organization and the work it provides to the citizens, and how [the work] can be transformed from manual into electronic."*

The Omantel and Nawras officials both pointed out the benefits of m-Government services in speedily reaching the citizens, quoting the fact that during the Jono Tornado Nawras extended free mobile call and SMS services to subscribers, and also sent out precautionary messages.

6.3.6 Technical Barriers Facing Adoption and Diffusion of m-Government

As noted above, from the questionnaire results it became apparent that there is a group of respondents who experience difficulties in accessing the internet either because of the weakness of the service or because there is simply no connection in the areas where they live. The interview results indicated that the most important technical barrier facing the adoption and diffusion of e- and m-Government in Oman is the incomplete communication infrastructure.

In this respect, the Omantel representative stated:

> *"There are many reasons but the most important is ITA (and may be the topography of mountains in the Sultanate). The mobile phone may have*

> *a major role in the integration of the communications infrastructure and service dissemination in Oman. Wherever you find a mobile phone signal, whether in the desert, on mountains or in the sea, you can enter the internet or finalise your transactions. We are working on development and have started by providing networks to some government and non-government organisations."*

The Nawras official blamed the ITA and the communication companies, alluding to a lack of consultation between them and believing that the citizens are the victims of this situation.

The ITA official, on the other hand, agreed that whilst the communication infrastructure in Oman was not yet complete, it was under constant development and had this to say:

> *"The reason is not the IT Authority as some agencies claim, but it is the deliberation and step by step policy. The ITA has a special network for serving government sectors only. Ministries and government organisations may co-ordinate with the Authority to use this network free of charge. Ministries having insufficient e-services or no experience in this field may join the E-Gate for assistance."*

Another important technical barrier identified by the interviewees was the lack of a data recovery system in Muscat Municipality and most Omani Ministries. The Omantel official indicated that this was the responsibility of the ITA and that it should provide for both the public and private sector in Oman, arguing that:

> *"Data recovery is the responsibility of the ITA. We can provide solutions if we are consulted."*

However, the ITA representative was clear in his comments on this issue, saying:

> *"The Authority has the Data Recovery system. This is not available at most ministries and government organisations. There is also the National Data Centre at the ITA. All the ministries that wish to utilise such services should co-ordinate with the ITA and they are welcome. It is to be noted that these systems are linked with the best services, confidentiality and security."*

The third technical barrier identified was lack of security and privacy; most of the officials interviewed agreed that this was a major obstacle to the dissemination of electronic and mobile services. On this theme, the representative from Omantel said:

> *"I agree that lack of security and privacy can be a major obstacle to the dissemination of any IT project such as e-Government, m-Government or e-commerce. Our role is to provide secrecy and security through the communications infrastructure whereas each website has a fire wall and anti-virus software. The problem lies with the website owners who refrain from paying more money for maintaining the secrecy of their information and data."*

The ITA official and a HEAC Designer both commented that public security awareness should be spread throughout the community and security support systems developed. The ITA official did however indicate that the ITA is currently disseminating cultural and electronic awareness among public and private sector organisations, as well as to the citizens.

On the other hand, the General Manager of HEAC didn't agree that lack of security and privacy is such a barrier and stated:

> *"...nothing is secured in this life. Any person should be positive and always bear in mind that not all programs are 100% secure. He should change his culture by trusting technology along with being concerned with security, but lack of security should not be considered as an obstacle to the dissemination of any IT project. The errors and security gaps should not be exaggerated. Instead, indications of ease should be given to all users'.*

The Deputy Manager of HEAC also expressed reservations, noting:

> *"I don't think that lack of security and privacy can be an obstacle. The real obstacle is refraining from using technology. In my opinion, there are solutions but not a complete system that can provide security and privacy at the rate of 99% after boosting the defence lines which are provided by the project."*

6.3.7 Non-technical Barriers Facing Adoption and Diffusion of m-Government

Several non-technical barriers emerged as concerns from the interview results to varying degrees. These included: legislation and laws; computer literacy levels; awareness; trust; and culture and language.

Effective legislation and laws pertaining to e- and m-Government were considered as the most important non-technical barriers facing the adoption and diffusion of these initiatives, and consequently of any online activities that are crucial to any internet business application. In this respect, most of the officials interviewed noted there are already certain, although limited, laws in existence in Oman to govern online activities, as indicated, for example, by the Nawras representative who stated:

> *"There are Omani laws that govern online activities or marketing by m-phone, but they lack many things. The Central Bank, for example, has no legislation to govern marketing through the internet such as Amazon, e-pay or SMS service. I blame ITA for not consulting with the concerned agencies on this."*

However, detailed knowledge about such legislation was not known by many of the interviewees; for example the official from Omantel commented:

> *"I have heard of such legislation. On my part, I do not know anything in this respect and I have not seen any. This is the responsibility of ITA which should play its role in spreading security and legislation awareness to all IT staff."*

Some clarification was provided by the ITA official, however, who said:

> *"Yes there are Omani laws that govern online activities or marketing. These are available at the ITA electronic site. The site is now recognised by all ministries, and Omani and foreign organisations within the Sultanate, along with the information media and local press."*

The second non-technical barrier identified was the level of computer literacy among the general population, in which respect, most of the officials agreed that many Omani citizens were computer illiterate, and therefore require training and improvement. The Deputy Manager of HEAC stated:

> *"...there is computer illiteracy and therefore it is crucial to disseminate e-culture. The Information media in cooperation with ITA should play the major role to this effect."*

However, one of the HEAC Designers felt that this illiteracy will be altered through the Oman digital initiative, and the ITA official noted that:

> *"...the ITA was established for the purpose of addressing such issues. For example, the Community Training Centre started work in 2007 to train staff and citizens as follows: 1) Training courses at clubs and societies in Salalah Town during the autumn festival of 2007. 2) Training the citizens in Sultan Qaboos Sport Complex, Bausher, free of charge. 3) Two month training courses for the citizens of Seeb City held at Seeb Sport Club during the summer vacation."*

On the other hand, analysis of the results indicated that the level of computer illiteracy in Oman was tempered according to different elements of society and indeed age. For example, the General Manager of HEAC stated:

> *"I don't agree with you that many Omani citizens are computer illiterate for many reasons: 1) The Ministry of Education introduced IT as a school subject in 1997, i.e. 12 years ago. It is being taught as a basic compulsory subject. Therefore, I do not think there is computer illiteracy with school students. However, some of the government employees might be computer illiterate and it is the role of ITA to erase their illiteracy. 2) It is compulsory for every student to have a computer driving license; now 90% of the students who are being registered have studied IT. 3) As per HEAC regulations, parents shall be obliged to recognize this new technology and help erase digital illiteracy."*

With respect to m-Government, however, as noted above, the interviewees saw the potential for m-Government services to function as a driving force for e-Government adoption, therefore computer illiteracy is somewhat negated as people do not need training courses to operate mobile phones. Indeed, the Nawras representative remarked:

> *"Nawras has set up the WAP option in order to erase computer illiteracy by using m-phone."*

Coupled to computer literacy levels is the issue of awareness as a barrier. The General Manager of HEAC stated:

> *"There is lack of public awareness, but the rate will be minimized with the coming of the forthcoming generation and community/parents' education. My planning to cope with low awareness is to utilize information media, broadcasting service, and workshops; to organize educational and identification exhibitions; and to organize symposiums and lectures for parents and school/university students."*

Further to these measures, the Deputy Manager of HEAC added dissemination of services by Omani societies and opening the schools during the summer vacation to provide seminars.

Trust also emerged as an important non-technical barrier. The Nawras representative asserted that:

> *"Trust issues arise when performing financial transactions on the internet or mobile services. The problem is caused by the ITA whose technology is very regretfully not qualified to adopt full secrecy like some other countries."*

This was a criticism which was not echoed by the ITA official, however, who commented:

> *"It is natural that trust concerns will arise when performing financial transactions on the internet. This is due to lack of sufficient awareness and trust of modern technology, but through time such fears will be overcome. Now, some organisations offer such financial services by using IT and payment e-gate, e.g. violation payments to the Royal Oman Police, and bill payments at Omantel and Nawras."*

With respect to culture and language as non-technical barriers, the results were mixed, but overall the feelings were that these would not necessarily prove to be major barriers. Culture, especially the need to promote e-culture, was seen to be more problematic than language, but in the case of the younger generation in particular, neither was viewed as a major obstacle.

6.3.8 CSFs for the Adoption and Diffusion of m-Government in the Sultanate of Oman

In the final part of each interview the Researcher discussed with the interviewee the ten-point CSF model proposed in the thesis (Section 4.4 above). The results were positively in line with the results from the questionnaires, indeed with the

exception of only one interviewee commenting on one particular factor all of the interviewees strongly agreed with the importance of each CSF. Furthermore, none of the interviewees felt that there were any factors missing from the model that would be critical to the success of m-Government in Oman.

Commenting on the *e-Government vision and strategy* factor, the General Manager from Muscat Municipality said:

> *"Without [vision and strategy] it is impossible to build up e-Government. It would be like one who walks aimlessly on the road."*

And the Deputy Manager of HEAC stated that:

> *"Without strategy, and a specific time plan, such projects will not see the light."*

Regarding *leadership and support*, several of the interviewees focused on the importance of political leadership as being critical to the success of such "innovative projects". Commenting on this, the official from Omantel, and the General Manager and Deputy Manager of HEAC each referred to the effect of the Royal Speech at the Council of Oman in 2008 in which His Majesty the Sultan expressed high concern for transformation from traditional government to e-Government and the need to give more concern to technology. As the Deputy Manager of HEAC stated:

> *"The evidence for [the impact of leadership and support] is the Royal Speech of 2008 at the Council of Oman where His Majesty the Sultan focused on the importance of IT. As a result, all organizations have accelerated dissemination of e-services."*

ICT infrastructure and mobile penetration were viewed to represent the most important technical CSF. The official from Nawras gave his opinion in this connection, saying:

> *"I strongly agree that ICT integration is a major success factor in e-projects. Without it, no e-Government or m-Government can be established. This is the main reason why e-Government is not successful in Oman."*

One of the HEAC Designers, from the Admission Centre's perspective, added:

> *"Lack of communication infrastructure integration will hamper access to schools, links with the Ministry, and registration through the system."*

Regarding *transformation of culture*, the interviews revealed that all officials agreed on the importance of persuading citizens of the benefits of using new technologies, and argued that citizens should be made aware of how to utilise ICT as this is crucial in disseminating and facilitating such electronic services.

On the importance of *human resource management and training/ICT and mobile literacy* as a success factor, the main focus, on analysis of the results, was the training element. The unanimous view was that effective human resource management was needed in order to ensure that as many people as possible were trained to understand and use all new developments in the IT field so that they could easily cope with new electronic services. The General Manager of Muscat Municipality gave his views, saying:

> *"Education and training have a big role in the dissemination of electronic services and providing people with the support needed. The more people are aware of the importance of this technology, the easier it will be for them to use it."*

All of the interviewees were of the opinion that *inter- and intra- organisation integration* was indeed a very important CSF. In this respect they highlighted the need for integration and co-operation between the public and private sectors, since this was essential to ensure that structural barriers were removed. One of the HEAC Designers illustrated the point as follows:

> *"For example, cooperation and coordination between the Ministry of Education, Ministry of Social Development, Nawras and Omantel facilitated the Higher Education Admission Centre Project."*

Perhaps unsurprisingly, *e-Legislation* – to ensure legal protection and the establishment of regulation – was viewed as a highly important CSF, and indeed fundamental for e-Government services. The General Manager of HEAC noted that:

> *"Current laws are generally detailed and they need further re-consideration. They should be effective from now and not wait until the project commences."*

With regard to *user considerations – requirements/trust/privacy/security*, it is interesting to note that this was particularly viewed as a CSF by those interviewees in technical positions. For example, the ITA official said:

> *"I strongly agree because the user is a manager and he will use the project. He will know its defects and problems. In order to develop the project, we should take the user's views into consideration."*

It also emerged, from the perspective of these more technically minded interviewees, that focusing on ensuring that users' requirements and views are taken into consideration would in turn maintain their privacy and security, and thereby engender trust.

Speaking on *e-readiness and marketing* as a CSF, the interviewees from HEAC again illustrated its importance with reference to the successful uptake of their project, one of the HEAC Designers noting:

> *"Every project should have informational momentum and marketing. The Higher Education Admission Centre adopted a marketing policy and training for students across all of Oman, which is ongoing."*

The consensus view was that these considerations are absolutely fundamental and require attention right at the start of any project, because it is only when these are considered that the population's e-readiness will increase.

Finally public *funding* was considered by all the interviewees as an important CSF for diffusion of e-Government and mobile services in the Sultanate of Oman, with the General Manager of HEAC stating that:

> *"Even if the cost is high at the beginning, the financial return will be greater in the future. HEAC project is a good example of this."*

And the ITA representative noting that:

"Without [public] funding we will not be able to adopt, disseminate, develop and maintain the new projects. Funding is highly important."

It is worth noting, however, the Nawras official's viewpoint:

> *"I agree but not strongly. The Private Sector and the citizens should contribute to funding e-projects because they are the beneficiaries."*

6.4 Conclusion

This chapter presented the results and analysis from the surveys conducted through the two phases of the research methodology. In terms of investigating the development and diffusion of m-Government, and exploring the factors that have led to the delayed deployment of e-Government generally in Oman, the Researcher's solution to the problems faced in securing interviews proved beneficial to the survey results with the additional interviewees from the ITA and the two telecommunications companies. Equally, these interviewees added richness to the results with respect to the concerns that arose from the questionnaire surveys regarding the communications infrastructure in Oman.

Overall, the results have clarified the barriers facing adoption and diffusion of m-Government, and the Researcher's ten CSFs appear to be validated in these surveys.

The results presented here provide the basis for the discussion in the following chapter.

Chapter 7
Discussion of the Research Findings

e-Government and m-Government Readiness; Barriers Facing m-Government; Critical Success Factors in the Two Case Studies; The m-Government Adoption Model for Oman; Revision of the m-Government Adoption Model for Oman

7.1 Introduction

This chapter presents a discussion of the outcomes from the research fieldwork. The chapter contains five main sections: Section 2 considers e-Government and m-Government readiness in Oman; Section 3 reviews the barriers to m-Government in the Sultanate, subdivided into technical and non-technical barriers; Section 4 studies the CSFs derived from the data and discussion; Section 5 presents the proposed m-Government Adoption Model for Oman linked to the results and findings from the two case studies to check the relationship between those dimensions and the demographic variables, and then discusses the correlation between the CSFs, and the proposed model. In the final section the findings from the discussion lead to a necessary refinement of the m-Government Adoption Model for Oman.

7.2 e-Government and m-Government Readiness

In this section the willingness and capability of the Omani people to use m-Government and e-Government services is examined, as demonstrated by the data gathered during the survey and interviews from the two case studies. These two qualities were examined because, as with any nation, they are believed to be necessary if the Omani government wishes to ensure the effective adoption and diffusion of m-Government services.

7.2.1 Computer and Internet Experience

The computer literacy rate among participants to the surveys was found to be reasonable, with the majority of respondents having computers at home or work,

though a greater proportion of respondents to the HEAC questionnaire fell into this category than was the case with the MMMP participants. On examining the MMMP respondents who did not have a computer at home or at work, the majority were shown to have only primary and middle school education, they were not computer literate, and they were not of the younger generation, some being over 45 years of age. Equally, on further examination of the results, this group had not used the internet before and owing to their low educational attainment and age, their opportunities to gain internet experience were few. This indicates that older age and low education level were negatively associated with the intention to use a computer, and indeed familiarity with the internet, which concurs with findings in the literature (see for example, Thompson, 2001).

ICT knowledge and skill in the Sultanate of Oman is low overall, signalling a need to educate citizens as a pre-condition for the success of e-Government initiatives (Al-Shihi, 2006). However, in this study it did emerge that most participants had both computer and internet experience, thereby reflecting the efforts made by the ITA and the Ministry of Education, through the ITA Training Centre, the compulsory teaching of Basic Computer Literacy in all schools as a separate subject from Grade 0 to Grade 10 in Basic Education, and the taking of the ICDL (International Computer Driving License) in Grade 11. These provisions mark significant steps in overcoming ICT illiteracy in the long term. Furthermore, the success of e-Government projects in neighbouring countries and the economic revolution in Oman suggest that the world is now heading towards a technology era in which the internet and mobile technology will help to sweep away cultural boundaries. As a result, the problem of low awareness should soon dissipate in Oman, so whilst this may currently be a barrier to some sections of the population, it will diminish as the younger generation ages.

90% of all questionnaire respondents did, however, strongly agree that internet costs are excessive in Oman, which confirms the observations of Al-Shihi (2006) and Al-adwani (2003:15), who argues that *"the cost of Internet in many Arab countries is way beyond the purchasing power of the average citizen"*. Likewise, the interviewees expressed the same concern, though the Nawras official did point out that they are

"planning to reduce this rate." Given the overall complaints from the case study participants about the high expense involved in internet usage, it can be argued that low cost of internet services will be positively related to higher levels of intention to use them.

7.2.2 Mobile Phone Experience

The interviewees in both case studies did possess mobile phones (PDA), and the questionnaire results show that 98% of the HEAC respondents possessed a mobile phone. Given that the vast majority of these people were young (pre-university) this indicates the priorities placed by families generally on equipping their children with such facilities. As expected, 100% of the MMMP respondents had a mobile phone. The education levels ranged from primary school to postgraduate in this group, but not all participants possessed a computer, a fact probably explained by the relative cost, and the greater ease of use of the mobile phone for those with lower education (Rain and Maarja, 2005; Oliver and Barrett, 2004; EDUCAUSE, 2010). In this connection, an official from Nawras said:

> *"Nawras has set up the WAP option in order to erase computer illiteracy by using m-phone. This doesn't need a training course to understand it and learn its contents. The advantage of m-phone is that it is easy learn and easy to use from any place and at any time."*

In fact, the Researcher found one respondent over 50 years of age who had only primary school education, but was nonetheless totally committed to using the mobile parking service. Explaining his behaviour, this person said that his daughter had stored a text message in his mobile phone with details of his car number and car code so that he could reserve his car parking at the click of a button. When asked why he preferred this method to the coin or ticket system, the participant said that he once received a violation ticket for overshooting the expiry time but this could not happen with mobile parking because an automatic reminder message was sent. So, despite his lower educational level, this person still preferred to use the MMMP service.

The survey results also indicated that the MMMP case age range was from 18-45+, that the education ranged from primary school to postgraduate, and that mobile

phones were used for voice calls and SMS or MMS. It can be seen, therefore, that whilst higher levels of education are positively related to higher levels of intention to use m-Government services, lower education and greater age are not necessarily obstacles to the use of mobile services.

Interestingly, all female respondents possessed mobile phones, whereas ten years ago cultural (and family) constraints did not allow women such freedom. Clearly, this change is due to the huge revolution in ICT in Oman and neighbouring countries, and the Omani government's commitment to spread ICT literacy across the population. Additionally, Oman's flexibility and openness to new ideas has eased the adoption of certain freedoms such that the traditional constraints upon women are being removed, and just as female students are expected to operate in the same way as their male counterparts in registration processes (such as HEAC), so too must women in employment operate in the same way as men. This demands they have access to mobile phones. Moreover, as MMMP noted, the family and friends network is influential in Oman and there is encouragement and approval within the family for women to be mobile phone users. Clearly, with such a level of equality, gender is unlikely to be a negative influence upon intention to use m-Government services. That said, Al-Shihi (2006:177) found contrasting results, stating that *"[g]ender was also seen as a factor that might be affected by culture in Oman and therefore might influence technology acceptance"*.

On the other hand, the case studies did reveal different usage between men and women, with men being more likely to use their mobile phones for voice calls, messaging, navigation, and entertainment, whereas women are more likely to use messaging services and internet applications (email, chatting, surfing, etc). This result conflicts with Thompson's (2001) finding that men are more likely to engage in browsing, downloading and purchasing activities than women. Whether men or women are greater users of mobile internet, however, the fact is that it is becoming increasingly popular (ITU, 2002).

From the two case studies it is seen that participants spend more time using SMS; simple text messages are cheaper than voice calls. Indeed, Carroll's (2005)

survey revealed a bias among participants toward SMS precisely because of its lower cost. As noted by Rieger et al (2003) and Irani et al (2007), mobile service pricing is market sensitive and inappropriate pricing structures meet with rejection. Cost could, therefore, be a major issue in the switch from e-Government to m-Government. In terms of mobile phone experiences, it was obvious from both case studies that the majority of participants would continue to use mobile services, essentially because of the 'anywhere, anytime' benefit; only a small minority of respondents indicated the opposite, mainly citing cost.

7.2.3 e-Government and m-Government Experiences

The results indicated that the majority of respondents to both questionnaires were aware of e-Government before completing the survey, believed that e-Government would be helpful to Oman, and expressed their willingness to use it. Regarding their education level, those willing to use e-Government ranged from secondary school to postgraduate. A considerably greater proportion of those who rejected the idea of e-Government were from the MMMP case, citing expense, lack of trust in the system, and their own computer illiteracy as their reasons. All of these particular respondents were over 45 years old, and had an education level between primary school and middle school.

On this issue, in the interviews an official from HEAC believed that the ITA is not marketing it properly, and the Nawras official alluded to a lack of preparedness among people. It does appear from the comments by the officials that the ITA's marketing effort is insufficient to promote widespread enthusiasm to adoption of e-Government. However, the ITA official indicated that nearly 80% of the e-Government project was complete and that the ITA Community Training Centre, which opened in 2007, provided free training for staff and citizens in different regions and governorates in Oman, and that in consequence, the opposition from those without computer knowledge should diminish. Likewise, the Deputy Manager of HEAC argued that computer illiteracy would not be an issue among the younger generation as IT is now a compulsory school subject. It is clear to the Researcher that both cases reveal older age and low levels of education to be negatively associated

with the intention to use m-Government, and younger age and higher levels of education to be positively related to higher levels of intention. However, this may alter because of the aforementioned training programme.

An interesting revelation was that 81% of the MMMP respondents and 63% of the HEAC respondents learned about e-Government from their friends. (The schools and universities were responsible for informing 18% of HEAC respondents about the e-admissions service, though this is not surprising given the nature of the application). In fact, Whittaker et al (1994) observe that informal face-to-face-communication is more effective than formal methods; and the Researcher's own observation is that in Oman interpersonal channels are more likely to be influential than the mass media in persuading citizens to adopt e- and m-Government services. In this respect, an MMMP official said:

> *"As you know, Omani people exchange thoughts and experiences through meetings with friends and family members. If the service is effective, then we encourage each other to use it and vice versa."*

Considerably smaller proportions had heard of m-Government before completing the survey, the majority of whom had secondary to postgraduate education levels, were within the 18-34 years age range, and had learned about m-Government through friends and family. It could be argued that there is a lack of marketing by the ITA in this respect. Again, the majority of respondents considered that m-Government would be helpful to the country, and expressed their willingness to use it. The reasons given by those respondents not prepared to use m-Government were mainly because they had no confidence in it, because of the cost, and in the MMMP specifically, because of concerns about its difficulty (computer illiteracy). The officials in both the MMMP and HEAC were convinced of the potential for m-Government services to become a driving force for e-Government adoption, believing the two forms of government to be complementary, and capable of providing all electronic services. The comments from the General Manager and Deputy Manager of HEAC, regarding the potential for mobile phones and the mobile network to be the dominant communications technology, and to play a major role in facilitating the flow of information anywhere and at any time, clearly indicate agreement that the mobile

network would support e-Government throughout Oman, and the world. This finding concurs with Rossel et al (2006:79), who allude to the "...current dominant movement in favour of mobile technology usages". Moreover, in respect of speed and security, the HEAC and MMMP interviewees believed that it was faster, easier and more secure to use mobile services than other services, and that such advantages would help in their dissemination throughout Oman.

Equally, the majority of respondents indicated that they would like to read about new e-Government and m-Government services. From those who said they would not be interested, the reasons given were belief that these services were expensive, untrustworthy, and difficult to use. The majority of these people had only primary and middle school education and were over 45 years old. Again, those with higher levels of education indicated a positive intention to adopt e- and m-Government services. Whilst those with lower levels of education did not necessarily reject their use, they did express concern about their perceived ease of use.

In summary, ICT literacy based on the sampled population is currently between good and average, and there appears to be no difference between males and females, so full citizen participation is theoretically possible. Additionally, there is potential for m-Government services to be a driving force for e-Government adoption as all respondents believed these to be a complementary means of accessing all electronic services. There were no negative feelings about speed and security, and whilst computer illiteracy is still an issue, it is fast dissolving, although both internet and mobile costs should be reduced to encourage the use of mobile services and the move to e-Government services.

7.3 Barriers Facing m-Government

From the literature review in Chapter 4, the barriers facing the adoption of e- and m-Government in Oman were found to fall into technical and non-technical categories (Al-Hadidi and Rezgui, 2009a). Within the fieldwork, questions regarding these barriers were addressed to the interviewees from MMMP, HEAC, Omantel, Nawras, and the ITA. A summary of the results provided appears in Table 7.1:

Table 7.1: Barriers Facing m-Government in Oman

Barriers		MMMP	HEAC	Telecom Organisations
Technical	Lack of infrastructure	✓	✓	✓
	Security	×	×	✓
	Lack of data recovery system	✓	×	✓
Non-Technical	Effective legislation	×	✓	✓
	Computer literacy	✓	✓	✓
	Trust	✓	✓	✓
	Culture and English language	×	✓	Omantel only
	Awareness	✓	✓	×
	Reward System	×	✓	×
	Cost	✓	✓	✓

7.3.1 Technical Barriers

Lack of Communication infrastructure

It is clear from the results reported in the previous chapter that all of the interviewees believed that the Oman communication infrastructure was not yet complete, and that they believed this lack of infrastructure to be one of the greatest barriers to the adoption and diffusion of e- and m-Government currently. This Omani experience concurs with findings in the literature (Fletcher and Wright, 1995; Ghareeb, 2000; NECCC, 2000; McClure, 2000; Heeks, 2001; Layne and Lee, 2001; Themistocleous and Irani, 2001; Dillon and Pelgrin, 2002; Moon, 2002; Kushchu and Kuscu, 2003; Goldstuck, 2003; Foghlu, 2005; Al-Khamayseh et al, 2007), which confirms this to be a particular problem in developing countries.

However, as indicated by the ITA official, it is under constant development, and free co-ordination facilities with the ITA and assistance facilities via the E-Gate are easing the path for ministries and government organisations. This official also noted that the decision-making on a step-by-step basis was the reason for the lengthy delay, and whilst there is still little collaboration between the public and private sectors, the ITA, which has overall responsibility for the implementation of the Oman

Digital Society strategy, has been working to develop an integrated infrastructure to ensure the full provision of e-government services. It is also clear, from His Majesty's Royal Speech of 2008 in which he focused on the importance of IT, all organizations have accelerated dissemination of e-services, so there is a clear vision coming from the country's leadership, and a robust infrastructure is in the process of development.

Lack of Security

Most of the interviewees also agreed that lack of security is a major obstacle to the dissemination of electronic and mobile services. This major finding from the study also concurs with the literature, which indicates that security does represent a technical barrier (Joshi et al, 2001; Gefen et al, 2002; Lambrinoudakis et al, 2003; Al-Khamayseh et al, 2007). As illustrated in Chapter Two however, the Security Policy Framework drafted by the ITA derives from a structured collection of independent guidelines, processes and practices, and both individuals and organisations must be adequately informed about the level of security provided in order to facilitate the adoption and diffusion of m-Government around the country. It is therefore worth noting that some of the interviewees were already taking a more balanced view, with the General Manager and Deputy Manager of HEAC stressing the points that people should be positive and bear in mind that not all programs are 100% secure, and that the real obstacle is in fact refraining from using technology altogether.

Lack of a Data Recovery System

The interview results indicated disagreements regarding the co-ordination of data recovery, with the Omantel official arguing that this is the ITA's responsibility and that it should provide for all Oman's public and private sector, whilst the ITA official commented that the systems are available and all the ministries that wish to utilise such service are welcome to co-ordinate with the ITA.

In the Researcher's opinion, despite the ITA's sterling efforts, the lack of co-ordination between it and other organisations hampers progress. Hence, government organisations and private organisations should improve their co-ordination with the Authority in order to help the diffusion of electronic services in Oman.

7.3.2 Non-Technical Barriers

Effective Legislation

As noted in the previous chapter, effective legislation pertaining to e-Government and m-Government is considered as the most important non-technical barrier facing their adoption and diffusion, and consequently to any online activities that are crucial to any internet business application. Some of the officials interviewed were aware of certain, although limited, laws in existence in Oman to govern online activities, and there was the opinion that it was the responsibility of the ITA to spread security and legislation awareness. Clarification was provided by the ITA official who said that an Omani law did exist in respect of foreign and Omani organisations and that this was publicised on the ITA website. The problem of inadequate legislation was raised by Kushchu and Kuscu (2003) who noted that in some cases the law of a country does not recognise mobile documents and transactions, thus meaning that no clear legal status existed for government online publications, and that no regulations existed for online filings, online signings, and on online taxable transactions. Al Shihi (2006) also found this problem, observing that users in Oman lacked trust and confidence in online systems because of the absence of appropriate legislation. Clearly, the development of robust e-legislation is crucial to support and resolve trust issues, since without it, people may be inhibited and discouraged from using online systems, and therefore the ITA should launch a security and legislation awareness campaign throughout the country.

Computer Literacy

The level of computer literacy among the Omani population was identified as the second most important non-technical barrier, with the interviewees believing that there was an urgent need for training and improvement. On this issue, the official from Muscat Municipality said:

> *"Citizens should be retrained by the organisation and unemployed citizens like fishermen, farmers and the like should be retrained in IT. Therefore, there I see it as a necessity for public awareness to enforce the utilisation of IT whether by computer or m-phone."*

In the literature, Heeks (1999), Chen and Gant (2001), Moon (2002), and Ho (2002) all classify the lack of IT skills as an important barrier to governments' success in their operation of e-Government and m-Government services. It was clear, however, that computer literacy is far greater with the younger generation in Oman with the advent of compulsory IT in schools.

Trust

The interviewees all commented that lack of trust represents a major obstacle to the adoption of e-Government and m-Government in Oman. It was noted that to some extent it is natural that trust issues arise, especially when people perform financial transactions on the internet or mobile services. Despite this, whether or not it is natural for potential users to be concerned about trust, the fact remains that as indicated in the literature (NOIE, 2002; Dix, 2002) confidence and trust in the system are major issues that cause problems associated with many other barriers.

Culture and English Language

The interviewees also highlighted culture as a potential barrier, although English language was not included as part of this. Language was believed by the Designer from MMMP to be no obstacle to e-Government and m-Government adoption and diffusion, and the MMMP General Manager went a step further, expressing the belief that neither language nor culture would act as barriers; the ITA official and Nawras representatives held similar opinions. On the other hand, the officials from Omantel, the General Manager, Deputy Manager, and one of the Designers from HEAC, did believe that conflict between culture and language could be a major obstacle to the adoption of electronic services, a belief that is echoed in the literature by such scholars as Lowe and Corkindale (1998), Hasan (2003), and Davison and Martinson (2003). However, as also noted by the interviewee from Omantel, most of the technology can now be translated into Arabic.

Low Awareness

Low awareness was also perceived to be a barrier, though it was seen to be closely linked with computer literacy. In his research, Al-Shihi (2006) also found a

low level of awareness of the benefits of technology among the Omani population to the adoption of e-Government and m-Government in Oman. From the interviews the general consensus was that it is a phenomenon that exists predominantly among the older population in Oman today.

Lack of Reward System

Only the interviewees from HEAC viewed the lack of a reward system to constitute any kind of barrier. They alluded to the reward system currently in operation in Oman's government organisations not being conducive to encouraging people to commit themselves to the e-Government and m-Government programmes, citing the transfer of human cadres from their organisations to the private sector mainly because of low salaries and allowances. From the literature, Al-Ruzaiqi (2003) found the same problem in Oman's civil service agencies, highlighting that staff retention was low as a result.

Cost

As noted in the previous chapter, cost was seen by the questionnaire respondents to be a major issue, and indeed conducting the interviews with the communication company representatives and the ITA official were in part a result of these concerns. All of the interviewees did concur that the cost of mobile phone services and the internet currently remain high in Oman and, should this remain the case would constitute a barrier to the adoption of electronic services. These comments provide confirmation of views from the literature (Al-adwani, 2003; Al-Shihi, 2006).

7.3.3 Proposed Solution

From the fieldwork results and the literature, as discussed above, the development of an integrated infrastructure, suitable hardware and software that provides full security, and the creation of appropriate legal apparatus to facilitate the easy and secure use of electronic transactions, are crucial requirements to addressing the barriers to m-Government. Moreover, effective marketing is required to inform users about m-Government initiatives, and time is needed to test such initiatives before they are released for public consumption. Significantly, the development of an

e-culture will be of tremendous value in preparing a society for the adoption of m-Government. Important also, is the need for governments to ensure their e-Government and m-Government services are properly developed and that serious consideration is given to the types of service to be offered. Public/user opinion should be canvassed and user-friendly interfaces are imperative, since these actions will promote successful user experiences and help to reduce negative predispositions towards the change.

Table 7.2 shows the potential barriers as identified in the two case studies, with the proposed solutions, gathered from both the case studies and the literature.

Table 7.2: Barriers and Solutions in Respect of m-Government

	Barriers	References	Solutions
Technical	Lack of infrastructure	Fletcher and Wright (1995); Ghareeb (2000); NECCC (2000); McClure (2000); Heeks (2001); Layne and Lee (2001); Themistocleous and Irani (2001); Dillon and Pelgrin (2002); Moon (2002); Kushchu and Kuscu (2003); Goldstuck (2003); Foghlu (2005); Al-Khamayseh et al, (2007)	-Build and develop an integrated infrastructure for mobile and electronic services, such as (Wi-Fi, Wireless Network, etc) and make strong integration across the government system and organisation database. Also, ensure compatibility of the IT infrastructure and integrated information systems, as well as advance technologies for preserving security and integrity. -Furthermore, mobile phones may have a major role in the integration of communications infrastructure in Oman and service dissemination.
	Security	Stowers (2003); Goldstuck (2003); Al-Khamayseh et al, (2007)	-Develop software and hardware for full security, like that used in the banking system. Educate the people, consider user requirements, develop and enforce suitable e-legislation. -Change culture by trusting technology and security awareness should be spread. -Protect people's privacy by developing fully secure databases, and operate the system by fully-protected user names and passwords.
	Lack of data recovery system		-In Oman there is a National Data Centre but most ministries do not co-ordinate with the ITA; all ministries that wish to utilise electronic services should co-ordinate with the ITA and it is to be well-known that these systems are linked with the best services, confidentiality and security. This will lead to Inter- and Intra-Organisation Integration.

Non-Technical	Effective legislation	Kushchu and Kuscu (2003), Al-shihi (2006)	-Develop legislation covering online transactions, and to counter spammers and electronic hackers. - The Central Bank in Oman, should have legislation to govern marketing through the internet such as Amazon, e-pay or SMS service to facilities electronic services.
	Computer literacy	Heeks (1999); Chen and Gant (2001); Moon (2002) and Ho (2002); Kushchu and Kuscu (2003)	-Provide courses for people to improve their IT skills, IT knowledge, and English language, so they can begin to use electronic services. - The Information media in co-operation with the ITA should play the major role in this. - Computer course taught as a basic compulsory subject in schools. - Mobile phone should be the alternative because it does not need a training course for operation.
	Trust	(NOIE, 2002); Dix (2002)	-Explain in detail to users, organisations and companies, the benefits and risks of e-Government and m-Government, and ensure that user privacy is fully guaranteed. -Publication in local newspapers to build good trust.
	Culture and English language	Lowe and Corkindale (1998); Hasan (2003); Davison and Martinsons (2003); Kushchu and Kuscu (2003)	-Transformation of culture, educate the people, ensure effective human resource management and training in the organisation, ensure effective marketing to spread user awareness of the process and benefits, and to gain user commitment. -Regarding language, translate browsers and applications from the local language, and teach people English because this is the international language.
	Awareness	(NOIE, 2003; Done, 2003)	-Canvass users to establish their requirements, explain the benefits to be gained by using electronic services, give examples, educate. - Utilise information media, broadcasting service and workshops. - Organise educational and identification exhibitions. - Organise symposiums and lectures for parents and school/university students. - Open the schools during the summer vacation for organizing seminars. - Circulate posters and publications. - Utilise public places such City Centre for exhibitions and movies.
	Reward System	Al-Ruzaiqi (2003)	-Provide good salary with allowances for employees to remain in the public sector.
	Cost	Ghareeb (2000); Kushchu and Kuscu (2003); Al-adwani (2003);	-Reduce internet access cost through the computer or mobile phone, and also allow the use of a mobile phone from anywhere and anytime to send SMS because this represents a much cheaper option for users than email, which requires the internet.

7.4 Critical Success Factors in the Two Case Studies

Through the comprehensive literature review (Chapter 4, section 4.4), the Researcher proposed the ten CSFs associated with the successful adoption and diffusion of m-Government (Al-Hadidi and Rezgui, 2009b). The CSFs identified were then investigated in terms of their importance within the two case studies (HEAC and MMMP). Table 7.3 summarises the combined results from Phase One of the fieldwork – the questionnaires:

Table 7.3: Combined CSF results from Case Study Users' viewpoint

Critical Success Factors	Strongly agree and agree	
	MMMP	HEAC
e-Government Vision and Strategy	95%	91%
Leadership and Support	95%	89%
ICT Infrastructure and Mobile penetration	94%	87%
Transformation of Culture	95%	89%
Human Resource Management and Training/ICT and Mobile Literacy	96%	92%
Inter- and Intra Organisation Integration	98%	89%
e-Legislation	96%	86%
User Considerations – Requirements/ Trust/Privacy Security	96%	92%
e-readiness and Marketing	97%	91%
Funding	98%	86%

In Phase Two, as noted above (section 6.3.8) the interview results were positively in line with the results from the questionnaires. These results can be summarised as follows:

Case study one – MMMP: Effective leadership and support is the most important CSF in the implementation of m-Government services in the Muscat Municipality. The second CSF relates to vision and strategy, and confirms that the President of the Municipality has a clear vision of electronic services and provides supports for all staff, which is why Muscat Municipality is moving fast in its launch of electronic and

mobile services. The third CSF is identified as the training of human resources in IT and providing a vision for the IT team so that they can develop the project and thereby disseminate electronic services. The fourth CSF is found to be an appropriate budget to underpin the development of the MMMP, which is around 30 to 40,000 RO, while for the Directorate of Information Systems it is approximately 300,000 RO.

Case study two – HEAC: The most important CSF in this case is also leadership, which comes from the Director General of the Higher Education Admission Centre, who is supported by the Under Secretary of the Higher Education Ministry. The second most important CSF is the vision and strategy within HEAC in utilising the ICT sector and the internet to improve its day-to-day operations. The third CSF is the attention paid to User Considerations – Requirements/Trust/Privacy/Security. Indeed, the Researcher's personal observation of this project is that it has a good reputation in Oman because the numbers of students using the HEAC service by mobile phone are increasing each year. Also in regard to trust and privacy, the HEAC officials indicated that the HEAC system is free from favouritism because: 1) transparency is observed, 2) the results are released to everyone, 3) the competitive average for all disciplines is provided to all, and 4) the admissions procedure allows students to compare their results. The final important CSF is funding, in which respect 250,000 RO is allocated for the HEAC project, while for the General Directorate of the HEAC, there is a budget of 550,000 RO. The project makes a return of 50,000 RO from advertisements, companies and the SMS by mobile phones per annum.

The following discussion addresses the combined results according to each of the ten CSFs in turn:

e-Government Vision and Strategy

The results from both phases indicate strong agreement that vision and strategy is definitely critical to success in spreading e-Government and mobile

services in Oman. Indeed, it is believed that without mobile services it is impossible to develop e-Government. Consequently, the participation of senior government officials in developing a vision and strategy on e-Government that is both challenging and viable is required (Wijsman, 2004), as in Dubai where e-Government services are underpinned by the Sheikh Mohammed vision and strategy (Al-Rajehi, 2007).

Leadership and Support

It is clear from the results that e-Government vision and strategy demands strong leadership, indeed the interviewees strongly agreed that without support from the leadership, the implementation of innovative projects would be impossible. Indeed, His Majesty the Sultan's 2008 address to the nation was cited with respect to his hope for a transformation from traditional government to e-Government; accordingly, all public and private sector organisations are concerned to adopt the electronic approach in response to this strong leadership and support, an experience which echoes findings in the literature that demonstrate the role of clear leadership in the e-Government vision (Wijsman, 2004; Horak, 2001; Ribiere and Sitar, 2003).

ICT Infrastructure and Mobile Penetration

ICT infrastructure and mobile penetration clearly represented the most important technical CSF, and it was noted that the infrastructure must be properly structured and designed for it to be a facilitator of e-Government development. In developing countries the infrastructure is often poorly designed, and therefore a hindrance, as has been indicated in the literature (Al-Shihi, 2006). Indeed, Ghareeb (2000) cited this reason as the major barrier to internet penetration in the Arab world. In fact, mobile phone penetration rates are rapidly increasing worldwide, thereby encouraging governments seeking to develop their channels of communication with citizens and organisations (Kushchu and Borucki, 2004). Indeed, the mobile infrastructure in Oman currently covers about 95% of the country (Oman Mobile, 2007a), and a recent estimate indicated that over half the Omani population has a mobile device (Ministry of National Economy, Oman, 2006a).

Transformation of Culture

Throughout the case study surveys it was clear that the respondents believed in the importance of cultural transformation, arguing that the more citizens were aware of how to utilise this technology, the easier it would be to disseminate such e-services. Hence, one of the major challenges for governments is the development of the most appropriate cultural environment to welcome m-Government. Indeed, Bluedorn and Lundgren (1993) have argued that culture is central to the change process and to the attainment of strategic objectives. Also, a survey conducted by Chase (1997) confirmed this belief, showing that culture represented the largest barrier facing government organisations in their efforts to create e-Government. One particular aspect is collaboration, in which respect it is argued that a collaborative culture is an important condition for the successful transfer of knowledge between individuals and groups, because these people must liaise in order to interact, exchange ideas and share knowledge (Goh, 2002; Lee and Choi, 2003).

Human Resource Management and Training/ICT and Mobile Literacy

The primary focus of this perceived CSF was seen to be the requirement for continued training – the feeling that effective human resource management was needed to ensure that as many people as possible were trained to understand and use all new developments in ICT so that they could easily cope with new electronic services. Therefore, human resource management must be delivered with e-Government and m-Government in mind, since as noted by Al-Rajehi (2007), a well-trained and motivated workforce is critical to e-Government success. People are the originators of knowledge, in which respect, Davenport and Volpel (2001:212) state that "managing knowledge is managing people; managing people is managing knowledge".

Inter- and Intra-Organisation Integration

In this respect the fieldwork results highlighted the need for integration and co-operation between the public and private sectors, since this was essential to ensure

that structural barriers were removed. In fact, this shows that inter- and intra-organisational links are essential for enhanced collaboration, efficiency and effectiveness of e-Government and m-Government services. Such links should result in the development of government websites that address the needs of citizens, and not merely publicise government services online (NOIE, 2003; Gant and Gant, 2003). Therefore, inter- and intra-organisational integration must be delivered with e-Government and m-Government in mind, since as noted by Al-Shihi (2006), such collaboration should have the ultimate aim of realising a citizen-centric approach. Regional integration and co-operation between organisations will reduce the need for duplication of resources, and save time for citizens, and their movements from one organisation to another.

e-Legislation

The overall feeling was that the current legislation is too general and that further consideration of e-Legislation is a necessity if e-Government and m-Government projects are to be adopted. In this respect policy-makers must consider the impact of law and public policy when implementing e-Government and m-Government services. This concurs with the literature, in which Sriram and Srinivasan (2004) identified e-law as one of the most pertinent challenges in the development of successful e-Government.

User Considerations – Requirements/Trust/Privacy Security

It is clear from the results that the fieldwork participants collectively view the end user as the most important person in e-service developments. This is strongly in line with the literature, which argues for citizen-focus and viewing the people as customers and consumers of e-Government (Poon, 2002; Zwane, 2002; Alsawafi and Sridhar, 2003). Hence, governments must satisfy user needs, and this requires them to properly research their customer base. Equally, by focusing on users' requirements,

privacy and security are also taken into account, thereby increasing the users' trust in the system.

e-readiness and Marketing

This CSF was viewed to be closely related to those involving culture change and training and education in general. In this respect the clear message from the results was that e-readiness and marketing require attention from the very beginning of any e- or m-Government project to ensure uptake by the population. This again concurs with the literature which states that society's readiness to engage with e-Government is crucial (Alsawafi and Sridhar, 2003), and marketing aids in better meeting of user needs better (AGIMO, 2004).

Funding

The importance of adequate funding was seen as an important CSF throughout the surveys, the officials believing that adoption, dissemination, development and maintenance of all electronic projects would be impossible without the appropriate level of continued investment. These opinions echo the literature (Greenberg, 2006) that confirms the inability to implement such projects without the required resources. That said, as noted by Zhou (2007), all governments find the provision of funding for their e-Government initiatives a challenge, and hence, they must pay attention to the development of funding mechanisms, since these are long-term requirements.

In summary, as was noted in the results chapter, it can be said that the ten CSFs identified are major players in the successful implementation of e- and m-Government initiatives, and that they should be well-considered in the early stages of development to encourage the adoption of the services provided. One important result, however, which is especially evident in the two interviews summaries above, is that not all of the identified CSFs are evident in the two organisations involved in the case studies, and consequently, there are problems with the diffusion of these m-Government services. From this it may be argued that if all ten CSFs *were* to be considered at the planning stage, the diffusion of m-Government projects could be greatly facilitated throughout the country.

7.5 The m-Government Adoption Model for Oman

In Chapter Four (Section 4.7) the Researcher suggested a model to explore the potential for the adoption of mobile services, which integrates many of the most important findings on adoption research. This m-Government Adoption Model for Oman provides a framework through which to consider the perceived attributes of the use of mobile internet to connect public organisations and provide services to the general public.

7.5.1 Dimensions of the m-Government Framework

As noted in Chapter 5 (subsection 5.3.1.4) the quantitative data from the fieldwork were analysed using the Statistical Package for Social Sciences (SPSS), and the qualitative data obtained from the interview exercise in each of the two case studies were indexed, summarised, and categorised to allow comparisons. In this sub-section the triangulated results are used in discussing the dimensions of the adoption and diffusion framework overall.

Perceived Usefulness

It is clear from the Phase One results that the majority of users found both the m-parking and the HEAC service to be more was useful than the traditional methods. Equally, in Phase Two the interviewees confirmed that the usefulness of the m-parking service is proven by the continuous increase in the number of users, and the usefulness of the HEAC service benefits in registering Omani students and helping them enrol in colleges and universities both inside and outside Oman.

From the literature, many other empirical studies demonstrate that perceived usefulness is the primary predictor of information technology adoption (Davis, 1989; Davis et al, 1992; Igbaria et al, 1997; Gefen et al, 2000; Venkatesh, 2000; Venkatesh and Davis, 2000), and that perceived usefulness significantly correlates with both self-reported current usage and self-predicted future usage (Davis, 1989). Whilst some authors found perceived usefulness to have no direct influence on intention to adopt (Horst et al, 2007), and both perceived usefulness and perceived ease of use to be

insignificant in this respect (Gilbert et al, 2004), it is clear from the case study results that perceived usefulness had a strong influence in both case studies on the intention to adopt both m-parking and m-registration.

Perceived Ease of Use

The majority of respondents agreed that m-parking services were easy to use, requiring little explanation, and especially so for users with disabilities. Even greater ease of use was perceived by the HEAC respondents, which is testament to the fact that ease of use was taken into consideration by the designers of the system for users including both nationals and foreign residents.

Past research has found that both perceived ease of use and perceived enjoyment are forms of intrinsic motivation factors (Atkinson and Kydd, 1997), and that a system that is easy to use requires less effort from users, thereby increasing the likelihood of adoption and usage (Thompson, 2001). Equally, Hung et al (2003) found both ease of use and usefulness among the critical factors affecting the adoption of WAP services in Taiwan. Conversely, Gilbert et al (2004) indicated perceived ease of use to be insignificant in the adoption of e-Government services. Contrary to this unusual finding, however, the results in the Omani context clearly indicate the opposite; it can be confidently reported that higher levels of perceived ease of use are positively related to higher levels of intention to use m-parking services and m-registration services in Oman.

Relative Advantage

Relative advantage was perceived in the results for the m-parking services in the form of saved time and effort and the opportunity for fast and accurate payment of parking fees. Likewise HEAC m-registration was perceived to save time and effort and provide the opportunity for fast and accurate feedback.

Wynekoop et al (1992) argued that the greater the perceived benefits before use, the more likely the innovation would lead to successful adoption. However, Schaupp and Carter (2005) found that relative advantage did not directly affect intention to use e-voting in the USA. It is clear from the case studies that relative

advantage was a consideration for users and strongly influential on their intention to adopt m-Government services. Furthermore, and as shown earlier, existing users were keen to persuade friends and family to use the new services because they had identified relative advantages. Undoubtedly, higher levels of perceived relative advantage correlate with higher levels of intention to use m-services.

Compatibility

The results indicated that both services examined fit into the majority of users' lifestyles, and that their positive experiences would predispose them to use other electronic services in the future.

Tornatzky and Klein (1982) examined the relationship between innovation characteristics and the adoption process, finding a positive affect of compatibility on the adoption process. Likewise, Carter and Belanger (2005) found compatibility and trustworthiness to be significant indicators for e-Government adoption in the USA, and Lee and Lei (2007) found these two constructs to explain more than 60% of the variance in intention to adopt e-Government services in Macao.

Further to the majority of participants agreeing that m-Government service agreed with their lifestyles, technical compatibility is guaranteed by the development of standards, which require inter-operability between hardware and software, although users are also familiar with technology that is device-dependent. Undoubtedly, in this study, higher levels of perceived compatibility are positively related to higher levels of intention to use m-services.

Complexity

The overall findings from the results indicate that both the m-parking and m-registration require little mental effort, were not complicated to use, and required little explanation for users.

Tornatzky and Klein (1982) examined the relationship between innovation characteristics and the adoption process, finding complexity to negatively affect the adoption process. The findings from this study confirm Rogers's (1995) argument that complex innovation is less likely to be adopted. In this respect it may be inferred that

users who experience difficulty with m-services reject them and have no intention to adopt others. Many people do not have the skill to configure their PC as a mobile, and require user-friendly solutions, without which they will be deterred from using m-Government services. However, it is also evident that there are overlaps between *complexity* and the *perceived ease of use* and *relative advantage* dimensions.

Triability

It is interesting to note that throughout the surveys the majority of respondents believed that a trial period should be given free of charge in order for potential users to experience m-services prior to their launch and full implementation.

Research on m-banking adoption in the UK found that the ability to test a new service increased positive attitudes towards adoption (Lee et al, 2003), whilst O'Callaghan (1998) found less support for this idea. As the majority of users believed a specific trial period should be given free of charge to provide experience of m-Government prior to the implementation of new services, it may be inferred from this study that higher levels of triability are positively related to higher levels of intention to use m-Government services.

Observability

Observability also 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 (as also noted with respect to *relative advantage*). In 2003, Rogers elaborated on this attribute stating that it means the ability to observe what others do, but with mobile services applications, a problem remains in that the possible benefits are not easily observed. It is especially pertinent in the Omani context, therefore, that the social norms show a predisposition to friends and families discussing both the positives and negatives of any new service, technology, etc. In terms of the adoption and diffusion of m-Government in Oman, therefore, the influence of interpersonal channels must be acknowledged over that of, for example, the mass media. It may therefore be inferred that higher levels of observability will promote higher levels of intention to use m-Government services in Oman.

7.5.2 Affect of Demographic Variables

The literature indicates that only a few studies have analysed demographic factors such as gender and education (for example Akman et al, 2005; Thompson, 2001; Schrammel et al, 2009). As noted in Chapter 1 (Section 1.3), one of the objectives of the study is to examine the influence of the demographic variables of users on their adoption or rejection of m-Government services. To this end, as noted in the methodology chapter (subsection 5.3.1.4), three statistical tests were performed in the analysis of the quantitative data from Phase One of the fieldwork (questionnaires). The demographic variables analysed were: Education level, Gender, and Age. The detailed quantitative analysis may be found in Appendix D; this section briefly discusses the main findings from the analysis according to the seven dimensions of the proposed model.

Perceived Usefulness

Educational attainment does have an impact upon intention to use both m-parking and the mobile HEAC service. One of the primary findings was that the higher the educational attainment of a person, the more likely they are to perceive usefulness in m-services, which may be seen to imply that people who are better educated are more likely to use m-Government services. With regard to the age variable, the analysis reveals some variation in perceived usefulness in the m-parking case with people over the age of 45 being less convinced. On the other hand, the HEAC analysis showed no significant variation on the perceived usefulness dimension, however it should be noted that the age range is much narrower than in the MMMP case. The lesson to be taken from this is that younger people tend to be positive about the usefulness of an e-initiative and hence, will display higher levels of intention to use m-Government services. In terms of gender, the analysis shows *no significant difference* upon the perceived usefulness dimension; gender does not appear to impact upon the intention to use either m-parking or m-registration.

Perceived Ease of Use

The analysis indicated that education level variable was influential only in the m-parking case, with people of lower educational levels tending not to be convinced on the ease of use, which supports the findings regarding perceived usefulness. Equally, with regard to age, this only affects perceived ease of use with those over the age of 45, as in the case of perceived usefulness. The analysis once again indicated no impact regarding gender; both males and females were positive towards the perceived ease of use.

Relative Advantage

The analysis revealed no effect on relative advantage according to age where the m-parking is concerned, but a slight affect regarding the HEAC mobile service. In the HEAC case the education variable is influential since those users in the "One year after school" group were less positive than those in the "Two years after school" group. However, this could be explained by the fact that the "One year after school" group had the negative experience of not being accepted in Sultan Qaboos University, and therefore did not believe there was a relative advantage to using the m-registration service. Concerning the age variable, the detailed analysis revealed that all age groups represented a homogeneous cluster regarding relative advantage, all agreeing that m-services save time and effort. Regarding the gender variable, the analysis revealed no influence with respect to m-parking, but a slight affect with respect to the m-registration service, with females being more positive than males.

Compatibility

In line with perceived usefulness and perceived ease of use, the education level and age variables have similar impacts on compatibility, with only those of lower educational ability, and those over the age of 45, indicating that the m-services did not necessarily fit with their lifestyles. Regarding gender, again the analysis confirmed no impact on the compatibility dimension; both sexes perceive these m-Government services to be equally compatible with their lifestyles.

Complexity

Overall, the deeper analysis showed no significant impact on the complexity dimension by any of the three demographic variables.

Triability

Similarly to the analysis regarding complexity, the demographic variables had little impact on triability. Overall, users strongly value the opportunity for a free trial period before fully adopting m-services. Interestingly gender was revealed to impact (though insignificantly) on triability, as Omani males were slightly more inclined to a free trial period than females.

Observability

In general the analysis showed that educational level and gender had no significant impact on observability, whilst a minor variation was evident with the youngest group using the m-registration service. Overall, as was noted above, the Omani culture tends to imply that people's decisions to use m-services will be influenced by observation of others, regardless of their education level, age, or gender.

7.5.3 Correlation between CSFs and the Dimensions of the m-Government Framework

As indicated in Chapter One, one aim of this study is to address the gap in the literature by proposing an integrated model that explores the CSFs in the adoption and diffusion of m-Government services. Since the dimensions of the m-Government Framework are used as a basis for the proposed the m-Government Adoption Model for Oman, correlation analysis was performed to examine the relationship between the CSFs and the seven dimensions of the framework. Further statistical analysis was also performed in the analysis of the quantitative data from Phase One of the fieldwork (questionnaires). The detailed quantitative analysis may be found in Appendix E; in brief the main emergent correlations are as follows:

Perceived usefulness negatively correlates with *e-readiness and marketing* in terms of the MMMP case, but no direct correlations were found in the HEAC case.

Perceived ease of use positively correlates with *e-readiness and Marketing* in the MMMP case and with *transformation of culture* in the HEAC statistics.

Relative advantage correlated with e-*Government vision and strategy*, *HRM and training/ICT and mobile literacy*, and *e-readiness and marketing* in the HEAC analysis.

Compatibility correlated with e-*Government vision and strategy*, *transformation of culture*, and *HRM and training/ICT and mobile literacy* throughout the statistical analysis, and also with *user considerations - requirements/trust/ privacy/security*, *e-readiness and marketing*, and *funding*, from the HEAC statistics.

Complexity did not correlate with any of the CSFs in the MMMP analysis, but did correlate negatively with e-*Government vision and strategy*, *leadership and support*, and *ICT infrastructure and mobile penetration* in the HEAC analysis.

Observability correlated with *leadership and support* throughout, and with *ICT infrastructure and mobile penetration* and *e-readiness and marketing* (MMMP), and *HRM and training/ICT and mobile literacy* and *e-Legislation* (HEAC).

Triability showed a negative correlation to *transformation of culture* in the MMMP statistical analysis, and positive correlation with *e-Legislation* and *funding* in the HEAC statistical analysis.

In summary the statistical analysis showed that there are strong correlations between the CSF dimensions and those of the proposed m-Government adoption model. For example, strong relationships are found between the dimensions of *compatibility* and *observability* and the CSF dimensions of *e-Government vision and strategy*, *transformation of culture*, *HRM and Training/ICT and mobile literacy* and *leadership and support*. Several similarities between the findings of both case studies are seen to exist, which can be taken to confirm the applicability of the proposed model in the Omani context. Therefore, there is a need for m-Government decision-makers, designers, and implementers to keep these dimensions firmly in mind to

facilitate the development of m-Government initiatives that will be successful in their adoption and diffusion.

7.6 Revision of the m-Government Adoption Model for Oman

The above discussion has highlighted the key findings from the results presented in the previous chapter, and extended the insights to be found from them through further comparisons with the CSFs and the proposed dimensions for diffusion and adoption. In summary there are some key outcomes that lead to a refinement of the proposed m-Government Adoption Model for Oman.

The results indicated that some obstacles did exist in the adoption and diffusion of the two particular case study initiatives, but all ten of the proposed CSFs were identified and highlighted as being important to take into account both in the early stages of development of m-initiatives, and also in their actual implementation. Paying attention to these CSFs will have a two-fold benefit, firstly by addressing the potential barriers (both technical and non-technical) and secondly, thereby encouraging adoption and diffusion.

The correlations that have emerged between the CSFs and the dimensions of the adoption and diffusion framework further emphasize the validity of the CSFs. The Researcher therefore believes that it is important for decision-makers in the field of m-Government to be aware of, and understand, these correlations to ensure that the design and implementation of m-Government services can be tailored to achieve the greatest levels of adoption and diffusion

With regard to the adoption and diffusion framework and models, the discussion has highlighted some similarities between certain dimensions. In some (but not all) cases, these concur with those in the literature (some of which are considered in Chapter Four, Section 4.6). Notably, the above discussion indicates that *relative advantage* and *complexity* are similar to *perceived usefulness* and *perceived ease of use*, which concurs, for example, with Leong (2003). Carter and Belanger (2005) noted that *complexity* is similar (in a reverse direction) to *perceived ease of use.*

Furthermore, Colesca and Dobrica, (2009) argued that *relative advantage* is similar to *perceived usefulness*, and *complexity* is similar to *perceived ease of use*. In this study, the Researcher has found a similar relationship between *perceived ease of use* and *complexity* (the results from the two case studies show that both these constructs achieve the same results), but there was no similar relationship found between *relative advantage* and *perceived usefulness*. Furthermore, Kwan and Zmud (1987) identified *relative advantage*, *compatibility* and *complexity* as the perceived innovation characteristics in their Information System implementation model; O'Callaghan (1998) found the same, but with less support for *triability* and *observability*. The results from this study have found *relative advantage*, *compatibility*, *triability* and *observability* to be motivators in respect of m-Government adoption, finding more support for *triability* and *observability*, which contrasts with the results of O'Callaghan (1998).

The overall findings from the results indicate that both m-parking and m-registration require little mental effort and are uncomplicated. Indeed, because of the fact that people do not require training in the use of a mobile phone – as reiterated in the Phase Two surveys – the technology from the user's point of view is inherently not complex. It may, of course, be argued that complexity as an issue could emerge in the actual m-Government system to be used via the mobile phone, but the results and discussion indicate that the evident overlaps between *complexity* and the *perceived ease of use* and *relative advantage dimensions* negate the *complexity* dimension.

It is evident from the discussion that based on the fieldwork sample, ICT literacy is currently between good and average among the post-secondary school population, and that the 18-34 age range is more likely to adopt m-Government services than other age ranges, and will certainly do so faster. Moreover, users with computer and internet experience, and who are educated to secondary school level and above, are keen to use m-Government services, and might be good role models for other sectors of the population given the importance of social networking in the Sultanate. Those sections of the population with lower educational levels are found to be slightly less inclined towards m-Government but the results of the case studies

indicate that with adequate marketing of m-services, they will not be averse to trying them since most respondents perceived e- and m-Government to be beneficial to citizens as individuals, and collectively to the nation. The detailed quantitative analysis of the affect of the demographic variables confirms both age and education are important considerations for future success in adoption and diffusion of m-Government services. The third demographic variable – gender – does, however, emerge as a much less important variable than the Researcher initially expected.

The user's education level and age both appear to impact on the *perceived usefulness* and *perceived ease of use* dimensions, and to a lesser extent *relative advantage* and *compatibility*. Age also affected the *triability* dimension in that whilst all ages believed in the value of a free trial, older people indicated slightly greater keenness than younger people on such a facility. It is therefore clear that education level and age are influential, whereas only three dimensions were affected by gender, and there was no uniformity in this across the two case studies. Essentially, gender seems not to impact upon the intention to use m-Government services.

In fact, the emergent findings with regard to gender constitute an important result in the study overall. The rate of adoption of m-services by females was higher than initially expected, but on reflection it becomes clear why this is the case. In Omani (indeed Arab) culture, as noted with regard to the actual conduct of the fieldwork, it is very difficult for males to speak with females, and vice versa. With the advent of m-services, females can easily transact their business without recourse to face-to-face contact that may potentially place them in a socially awkward position. In this way, the mobile technology transcends the traditional cultural divide between the sexes. Furthermore, where the male sex appears to differ, for example being more inclined to a free trial period than females, this also is linked with inherent culture in that males strongly tend toward peer review and ultimately, as the results indicate, they are using the m-services anyway.

The points from the above discussion lead the Researcher to necessary refinements to the proposed m-Government Adoption Model for Oman; the revised version is illustrated in Figure 7.1:

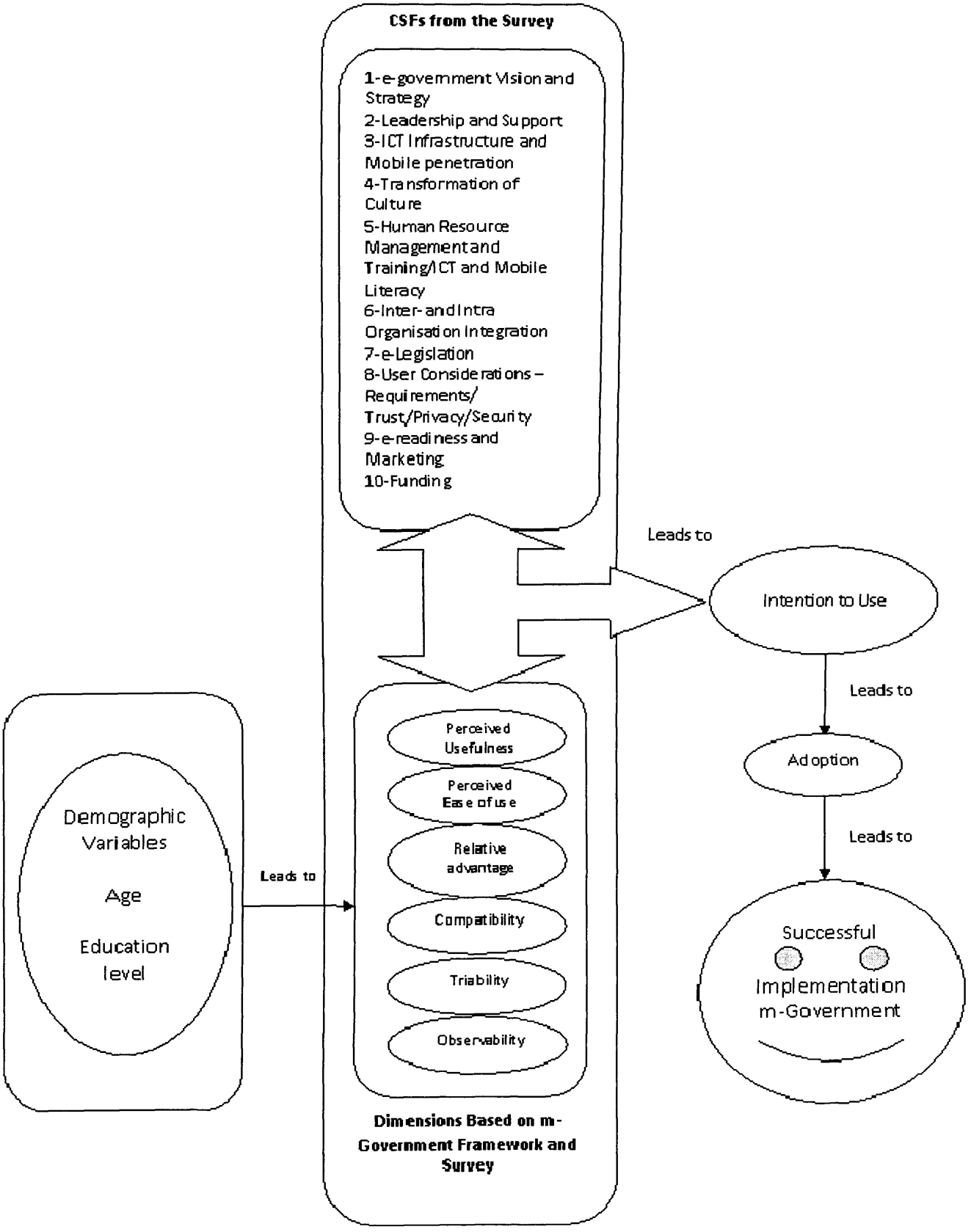


Figure 7.1: Revised m-Government Adoption Model for Oman

It is important to note that through the results and subsequent discussion, the ten CSFs are all retained in the revised model (Figure 7.1). There are three main refinements to note, in comparison with the originally proposed model: 1) the *complexity* dimension is now absent from the adoption and diffusion framework; 2) the strong correlation between the CSFs and the adoption and diffusion dimensions is now clearly illustrated, as they should be considered in tandem when developing m-Government initiatives; 3) the gender variable is now absent as the results and discussion reveal that it does not significantly impact on adoption of m-Government services.

7.7 Conclusion

This chapter has provided a detailed discussion of all the findings from the two case study exercises conducted in Oman. It began by exploring the willingness and capability of the Omani people to use m-Government and e-Government services and the technical and non-technical barriers to m-Government adoption. The CSFs were then discussed in detail, and were found to be validated in their entirety. This then led to a discussion of the proposed m-Government Adoption Model for Oman in terms of the adoption and diffusion dimensions, the impact of demographic variables, which drew on the outcomes of the statistical tests performed on the quantitative data from the surveys, and the correlation between the CSFs and the adoption and diffusion dimensions. The overall outcome was a requirement for refinements to be made to the proposed m-Government Adoption Model for Oman, resulting in a revised version. The Researcher believes that the knowledge emerging from this discussion will be of value to the Omani government in progress towards its vision of m-Government and, ultimately, its aspirations for e-Government, and by implication, other countries that share a similar cultural heritage will also be able to benefit from the proposed model.

Chapter 8
Conclusion

Addressing the Research Questions; Recommendations; Contribution to Knowledge; Limitations of the Study; Directions for Future Research

8.1 Introduction

This chapter concludes the thesis. The following section provides answers to the research questions based on the findings from the study as a whole and then proceeds to test the overarching hypothesis. In the third section the Researcher presents recommendations that he believes should be made as a result of the findings from this study. The fourth section addresses the Researcher's perception of the main contributions to knowledge. This is followed by an account of the limitations of the research, and the final section offers some thoughts on potential future research that have emerged through the process of completing the current study.

8.2 Addressing the Research Questions and Hypothesis

As described in Chapter One (Section 1.2), this study is exploratory in nature and in seeking to test the hypothesis it primarily aimed to identify those factors that have led to the delayed deployment of e-Government in Oman. In so doing, it was necessary to investigate the development and diffusion of m-Government in the Sultanate, as a means to facilitating e-Government in the future. This gave rise to the three research questions, which will be addressed in turn before testing the hypothesis itself.

8.2.1 Research Question 1

"What are the major obstacles to the uptake of e-Government and mobile services in Oman?"

To answer this question the literature was initially reviewed to gain a full understanding of e-Government and m-Government in both Oman and other cultural

contexts. Linked to this, the literature was also reviewed to identify the barriers to the uptake of e-Government and mobile services. This allowed the Researcher to determine the main perceived barriers to the adoption and diffusion of m-Government, drawing the distinction between technical and non-technical barriers in differing cultural contexts (Al-Hadidi and Rezgui, 2009a). These perceived barriers were included in the research instruments employed in the two case studies of m-Government projects in Oman, together with questions relating to specific m-Government experiences.

It emerged that the most significant technical barrier to the adoption and diffusion of m-Government in the two case studies was the lack of an effective communication infrastructure. All officials confirmed this shortcoming, which as noted in the literature, is not peculiar to Oman but rather is a common problem in developing countries. This major technical obstacle in turn impacts on integration between different Ministries, resulting in a lack of co-ordination and collaboration.

Security issues and problems with data recovery are additional technical barriers hampering the adoption and diffusion of m-Government services within Oman; these in turn may also be viewed as logical consequences of the poor communication infrastructure.

The primary non-technical barrier emerged to be a lack of appropriate and effective e-Legislation, which was followed in perceived importance by the low level of computer literacy among the Omani population in general, suggesting an urgent need for training and improvement. Low awareness was also perceived to be a barrier, predominantly among the older population, though it may be argued that this is directly linked with the aforementioned non-technical barriers.

Lack of trust in the systems was a further barrier, which to some extent may be seen as natural, especially when people perform financial transactions on the internet or mobile services; nonetheless, it has the potential to cause problems associated with many other non-technical barriers. Culture was viewed by a limited number of respondents to the surveys as a barrier, as indeed was the lack of an adequate reward

system in Oman's government organisations, which results in valuable people transferring to the private sector mainly because of low salaries and allowances.

The final, but important, non-technical barrier was cost of both mobile phone services and internet connectivity, which currently remains high in Oman. Indeed, this is a problem common to all Arab countries, and hence is one that the Omani government should address with some urgency.

8.2.2 Research Question 2

"What are the critical success factors behind the implementation of m-Government initiatives in the Sultanate of Oman?"

The method employed to answer this question was similar to that for the first research question. It began with a comprehensive review of the relevant literature regarding the CSFs associated with the successful adoption and diffusion of m-Government in differing cultural contexts. From this the Researcher distilled the ten CSFs that were most directly pertinent to m-Government in Oman (Al-Hadidi and Rezgui, 2009b). As with the barriers, the CSFs were then included in the research instruments employed in the fieldwork case studies.

It is clear from the case study data that certain CSFs dominate in the implementation of m-Government services. In this respect, strong and effective leadership and support emerged as the most important factor overall, with survey participants drawing attention to the high degree of concern expressed by His Majesty the Sultan Qaboos about the need to move from traditional government to e-Government. In support of the Sultan's leadership, the individual leaders within the case study organisations have themselves developed a clear vision and strategy, which emerged as the second most important CSF. However, the two do go hand-in-hand as without strong leadership in the first place, the creation of a successful vision and strategy that can motivate staff and produce the desired outcomes will not be possible.

From the m-parking project case study, the third most important CSF was identified as the training of human resources to provide IT experience and a vision for the IT team in respect of project development. In the m-admissions case study the

third most important CSF was user considerations, embracing user requirements and issues relating to trust, privacy and security. In this case, given that the number of students using the HEAC m-admissions service is increasing each year, it can be assumed that HEAC's focus on user requirements is a sensible one. Moreover, the transparency offered by the HEAC system is seen as fair by those using it, and this is a strong encouragement as students can see a great deal of information and compare their own progress with that of other students.

Finally, the issue of funding was identified as a CSF within both case studies, it being said that without an appropriate budget, it will be impossible to ensure the adoption and dissemination of the m-Government applications concerned. Likewise, there was a need for continual development and maintenance of these projects, and an adequate budget was required for this purpose.

Human Resource Management and Training/ICT and Mobile Literacy, and User Considerations – Requirements/ Trust/Privacy/Security premises were viewed to be crucial if effective implementation of m-Government services is to be achieved, and as part of this overall consideration, attention must be paid to e-readiness and marketing since the implementation of such electronic services will require behavioural changes among citizens. All of this does, however, need adequate funding, which undoubtedly is may be viewed as one of the most important elements in the success of m-Government projects.

It is important to note that the respondents to the surveys agreed that all ten of the Researcher's perceived CSFs were indeed crucial to the development and adoption of future m-Government initiatives. Furthermore, when asked if there were any CSFs missing from the list nobody responded in the affirmative. Indeed, it was apparent from that not all ten CSFs were given consideration in the particular projects studied in the fieldwork, therefore the rate of adoption and diffusion was not as fast as desired. In this respect, the survey participants and all the officials interviewed expressed strong agreement with the need for the other CSFs to be taken into account, and they indicated that new projects should consider these as pre-requisites at the design stage of future initiatives.

As noted in Chapter Four, in the history of IT projects there is a marked lack of success, as a result of which it has become important to establish which conditions will assist a successful outcome for the increasing number of electronic initiatives worldwide. From this effort, it has emerged that some CSFs are common to all initiatives, but that depending on the cultural context, and/or the precise organisational circumstances, some CSFs assume greater prominence than others. Moreover, it is accepted that even in the same organisation, the ranking of these might change as a different initiative is introduced. Therefore, these ten CSFs proposed in this study should be considered from the absolute beginning of the project design stage and carry through the implementation, and hence facilitate project success.

8.2.3 Research Question 3

> *"Can a model of m-Government be developed that is appropriate for the Omani cultural context, and that can be effectively adopted and diffused?"*

Having addressed the perceived CSFs for the adoption and diffusion of m-Government in Oman, taking into account the perceived barriers to success, the Researcher also reviewed the extensive literature regarding technology adoption and diffusion models to understand the most important findings on adoption research. From this review he developed a framework for m-Government adoption in Oman, which integrated seven dimensions. This framework was essentially a combination of two of the adoption and diffusion models studied (TAM and DOI), these dimensions constituting the most appropriate to the current study. Again, the questions in the fieldwork research instruments incorporated these concepts to ensure that they were thoroughly tested. In addition to this, the Researcher also believed that it was important to examine the influence of three demographic variables (education level, age, and gender) of users on their adoption or rejection of m-Government services, to ensure that the model to be developed would be comprehensive.

A proposed integrated m-Government Adoption Model for Oman was then developed, taking into account all of the aforementioned elements. In conducting the

fieldwork this model was effectively being tested, to ensure that it was indeed appropriate for the Omani cultural context.

The analysis of the fieldwork results revealed outcomes (some of which were unexpected) that led the Researcher to recognise that the original proposed m-Government Adoption Model for Oman was slightly flawed and required some minor refinements. With respect to the seven dimensions of the adoption framework, the results (and to some extent the literature) revealed that one dimension – *complexity* – ought to be removed as it was superfluous. The other dimensions were all considered to be influential on the intention to adopt m-Government services in the Sultanate. Regarding the examination of the demographic variables, and their influence upon intention to adopt m-Government services in Oman, it became clear that education level and age are influential, but gender is not. In Oman gender seems not to impact upon the intention to use m-Government services, therefore this variable needed to be removed from the model. Finally, the analysis and discussion of the results proved that there were important correlations between the CSFs and the remaining six adoption dimensions.

As a result, the Researcher proposed a revised m-Government Adoption Model for Oman, which he believes is a true reflection of the Omani situation and can be effectively implemented to secure the adoption and diffusion of m-Government. Consequently, having considered the findings from the two case studies and the literature, it is clear that decision-makers in Oman have, via this model, the basis of better planning, design and implementation of m-Government services that are culture-sensitive, thereby enabling greater success in their adoption and diffusion across the Sultanate.

8.2.4 Addressing the Hypothesis

Throughout the study, from the initial realisation of the problem and the extensive review of the literature, to the final development of the revised m-Government Adoption Model for Oman, the focus has been on ultimately testing the hypothesis that:

"m-Government is a prerequisite for the success of e-Government in Oman"

From the research results it is clear that the ICT infrastructure in Oman currently remains somewhat problematic, is certainly perceived as expensive, and to many people is either unavailable or beyond their comprehension. Conversely, communication via mobile devices is easily understood – requiring little or no special training, is used by all age groups and both sexes – ostensibly regardless of educational attainment – and can be employed anywhere and at any time. Furthermore, where conventional ICT is expensive in terms both of equipment requirements and usage charges, a mobile telephone (even a PDA) and simple text messaging is within reach of a far greater proportion of the Omani population. This is clearly evident from the fact that mobile infrastructure in Oman currently covers about 95% of the country, and a recent estimate by the Ministry of Economy in Oman indicated that over half the Omani population has a mobile device, and subscriber numbers continue to increase.

On these grounds, the chances of m-Government being adopted are far greater than those for e-Government.

The research results in this study demonstrated that higher levels of education are positively related to the intention to use m-Government, but that the converse did not hold. Whilst a low level of education, and indeed older age, may be thought to be negative influences, neither condition prompted the rejection of mobile services, as seen, for example, by the wide demographic of people using m-parking services.

From the literature review, it was established that m-Government is a complimentary sub-set of e-Government and various researchers believe that the latter is the cornerstone for the former. Therefore, some of the typical challenges and CSFs for e-Government are naturally shared by m-Government efforts. In addition, some researchers argue that m-Government must be incorporated into the design of e-Government. The essential difference between e- and m-Government services may be seen in the fact that e-Government services are provided through a wired network with interactive and intelligent Web applications, whereas m-Government is wireless and brings capabilities that support mobility of the citizens, businesses, and internal

operations of governments. Specifically in respect of Oman, the wireless connectivity for broadband services is available for adoption in Muscat, and both mobile communication service providers offer a wireless connectivity to access the internet, using a Wi-Fi-enabled laptop, PDA or mobile device. Also, in the surveys, Wi-Max (Worldwide Interoperability for Microwave Access) was discussed and suggested by the two officials from Omantel and Nawras, as being helpful since it enables users to surf the internet on a laptop computer without connecting the laptop to a wall socket. In addition, the Oman Digital Society Report documents that Wi-Max services are currently being evaluated for their suitability to local requirements. It can, therefore, be argued that it is better for the Sultanate of Oman to make a major effort to develop a communication infrastructure for mobile network services, even for those people who do use computers and wired technology. By doing this government services can be delivered in the streets, in people's homes, or any other suitable locations whether on the sea, in the mountains, or in the desert.

The research results also add weight to this argument in that a major advantage of e-Government is that it allows people to access government services without having to visit government offices. This is particularly beneficial to those with disabilities and those who live in remote areas. Furthermore, as one major result from the study shows, it helps to bridge the equality divide between the sexes.

In terms of m-Government serving as a foundation for e-Government in Oman, the interviewee comments indicated that there is much potential for this, considering that both provide an outlet for all electronic services and complement each other. For example, one official noted the objective of e-Government as being to facilitate the flow of information, and that for those citizens without internet access, the mobile phone is key in achieving this goal.

There is also the advantage concerning issues of speed and security, on which officials are agreed. Clearly, it is faster, easier and more secure to use mobile services, and interviewees were of the opinion that these benefits would help to disseminate m-services in Oman and that this move would serve as the foundation for e-Government.

Based on these arguments from the results of the study overall, the Researcher believes that in testing the hypothesis, the result is affirmative – m-Government is indeed a prerequisite for the success of e-Government in the specific context of Oman. Furthermore, the argument will hold true for other countries all over the world, which have similar constraints to those in Oman.

However, a problem arises in Oman, in that the ITA strategy for e-Government is established and whilst it is recognised that mobile networks will be helpful in providing government services in remote areas, the strategy is based on establishing e-Government in the first instance and m-Government second. From the data, however, it appears that there is a lack of communication between the ITA and Omantel and Nawras, and consequently the best way forward is not being followed. Furthermore, the study revealed the need for various other requirements to be met. Therefore, whilst the hypothesis tests positive, it is also conditional on various problems being actively addressed, which emerge as recommendations from the study.

8.3 Recommendations

The Researcher believes that there are several recommendations coming from the study; these are presented below:

1. The study shows the need for a political platform that would encourage government institutions and the private sector to link with the ITA to store their data in a confidential manner, thereby providing effective data recovery or (Disaster Recovery) for Omani organisations in the unfortunate event of loss.
2. The results and discussion demonstrate the need for certain considerations (CSFs) that will assist the deployment of m-Government services, and highlight the need to pay attention to these in the very early stages of development to ensure the removal of any obstacles to success, and thereby help to integrate businesses and governmental organisations electronically.
3. Strong and focused leadership is essential for the successful implementation of m-Government projects, and as a result, leadership at the highest level (such as the

head of state or prime minster) together with visible support from the head of the public organisation concerned, is desirable as this will lead to the adoption of m-Government services in the country.

4. The study demonstrated that improvements in wireless and mobile technology will result in greater acceptance by the public and consequently push e-Government applications and services into the new model that is m-Government; whilst in many cases m-Government will support e-Government activities, it will nonetheless bring its own unique dimensions and benefits. Clearly, the attraction of m-Government services for citizens is mobility, along with the ability to link to networks at any time and from anywhere. Therefore, it is better for Oman and other developing countries to use mobile networks like Wi-Fi or Wi-Max because these are more prevalent in the world.

5. There is a clear and urgent need to support the provision of the internet and mobile communications in Oman by driving down the cost to facilitate their use by all Omani citizens, and especially those on low incomes.

6. A need arises, from the study results, for seminars and television coverage that would enhance the development of Oman's electronic culture. In this respect, the ITA and educational institutions are pinpointed as being responsible, and they should source specialists in ICT to raise awareness of the e-culture and simplify ICT concepts for all users.

7. There is a need to provide continual support for and promotion of education at a range of levels, from primary and secondary, to university and professional, in computer and internet usage in order that the entire Omani citizenry is capable of benefiting from m-Government services. Gradually, with the compulsory ICT education in schools, all Omani generations will become computer literate, a goal which it is vital to achieve because the students of today are the employees of the future, but currently there still remains an essentially disenfranchised sector of the Omani population.

8. The final recommendation is that appropriate e-Legislation should be developed to facilitate electronic transactions, which is currently facing obstacles to its adoption.

All these recommendations are the result of the Researcher's comprehensive examination of the relationship between the CSFs identified in the literature and the particular situation of m-Government as it is progressing in Oman. They are crucial for the success of m-Government projects, and hence, for the e-Government project in the Sultanate.

8.4 Contribution to Knowledge

The study makes a number of contributions to knowledge. Firstly, it has developed an adoption and diffusion model for m-Government services that is suitable for the Omani cultural context, and that can be effectively implemented to ensure the take-up of e-services in Oman. Additionally, the construction of this model makes a theoretical contribution since to date the literature is silent on an adoption and diffusion model that is appropriate for Oman and the Middle Eastern environment, and particularly the Gulf countries. Moreover, there is also a methodological contribution in as much as the method followed of amalgamating the TAM and DOI theory (developed in the West) to investigate the prevailing situation in a developing country in respect of m-Government initiatives, also does not appear in the literature.

Another contribution is seen in the greater understanding of the major obstacles to the uptake of e-Government services in Oman. This enhanced knowledge is useful not only to Omani policy-makers in their consideration of the conditions required to underpin the successful implementation of m-Government services as the foundation for the e-Government project, but it is of value to policy-makers throughout the world in as much as it points to potential areas of conflict arising from cultural imperatives.

Given the nature of the topic – m-Government and e-Government – there is a wider contribution to be made to the e-Government literature which is growing in

scope. In particular, there is a contribution in the study's support for the complementary relationship between e- and m-Government, and in the direction provided for all developing countries, especially those without substantial telecommunications infrastructures. This is a worthy outcome since one of the aims of development is the furtherance of democratic processes. Enhanced knowledge and understanding about the role of m-Government and e-Government, and its capacity to engage large numbers of the population marks a contribution towards this goal.

In practical terms, the study has a contribution to make in that it will allow Oman's decision-makers in the area of e-Government, to gain a comprehensive understanding of the reasons for its lack of success to date, and to move towards implementing the CSFs so that m-Government can be achieved in the longer term. As a short and medium-term measure, m-Government, using the model proposed by this study, will serve as a building block for the nation's development.

As a final contribution, the knowledge that education level and age can influence intention to use m-Government services in Oman will be helpful to the ITA in distinguishing population groups that require ICT training and awareness campaigns.

8.5 Limitations of the Study

Naturally, the research has the limitation that it was focused on the Sultanate of Oman, and therefore it may be argued that the ability to generalise is compromised. However, as indicated in the above section, the models used as a basis for the new framework (TAM and DOI theory) were developed in the West and have been tested in different countries with different levels of advancement, and with different types of innovation. Consequently, the ability to generalise from the application of these models in Oman is not severely damaged, but rather enhanced in cultural contexts that are similar.

A second potential limitation is the concentration on just two case studies, and it might be argued that many other types of m-Government project exist that might produce difference outcomes. However, in response to this criticism it can be said that

from these two case studies that were very different in character and in their user profiles, it was possible to gain in-depth knowledge of the CSFs that promoted their adoption, and that despite the demographic variation seen in the respective users, there was a high degree of concurrence in their attitudes. Therefore, it may be said that there is strong evidence for generalisation across a range of m-Government initiatives.

Finally, there is the limitation that the study did not involve any foreign residents despite the relatively high expatriate population in Oman. It was in fact extremely difficult to reach such a section of the population. That said foreign residents would have constituted another variable which may have detracted from the overall aim of considering the CSFs required for the effective adoption and diffusion of m-Government services.

8.6 Directions for Future Research

Clearly, the findings of this study suggest directions for future research.

Firstly, the critical success factors proposed from this study will lead to further research to suggest a contingent approach for evaluating m-Government services and a mix of technical and non-technical approaches for the evaluation.

Secondly, this study demonstrates the relationship between CSFs and the m-Government adoption model for Oman. Future work may investigate this relationship in more the detail in the context of the intention to adopt m-Government services both in Oman and/or the Arab countries in general. It is important to identify the level of significance and interdependence of each CSF and the m-Government adoption model in order to secure successful implementation of m-Government projects.

Thirdly, mobile services are very popular within the Omani private sector and future work might test the validity of this study's findings on m-Commerce initiatives, using case studies from the Sultanate's private sector.

Fourthly, this study used the TAM and DOI dimensions to develop a model suitable for the Omani context. Future work could test a different model like the

Theory of Reasoned Action (TRA) or the Theory of Planned Behaviour (TPB) because these models focus on beliefs and the evaluation of behavioural outcomes.

Fifthly, the barriers proposed from this thesis will lead to further research to suggest a contingent approach for evaluating m-Government services and a mix of technical and non technical approaches for the evaluation. Future work may investigate these challenges in more the detail in the context of the intention to adopt m-Government services both in developed and developing countries or the Arab countries in general.

Finally, as the results achieved in this study are believed to assist Oman and other countries with similar characteristics in their efforts to design and implement m-Government initiatives, comparative studies are recommended to identify areas of divergence and convergence.

8.7 Final Comments

This study has provided the Researcher with the opportunity to consider, in-depth, an issue of the utmost importance to the Sultanate of Oman, and one which is also of direct relevance to many other countries in the Arab World and the developing world in general. In this respect, the Researcher feels privileged to have been a part of it. Additionally, however, as well as the contribution it has been able to make to the literature concerning innovation adoption and diffusion, it has also provided a foundation for the furtherance of democracy in the specific context of Oman, and again has a wider application to similar environments. Consequently, it is important in the ideas it offers for the true development of the Omani nation, and is a direct contribution to the achievement of the vision for the nation as declared by His Majesty Sultan Qaboos.

References

Abanumy, A. & Mayhew, P. (2005): M-government Implications For E-Government In Developing Countries: The Case Of Saudi Arabia', *EURO mGOV 2005*, Brighton, UK, pp. 1-6

Abraham, S and Irak, L (2005), *M-Government for Digital Cities: Value Added Public Services* Available from http://www.mgovernment.org/resurces/euromgov2005/PDF/31_P135LI.pdf [Accessed March, 15th 2008].

Abramson, M. A. and Morin, T. L. (2003) *E-government: A progress report.* In: Abramson, M.A and Morin, T. L. E-government 2003, Rowman & Littlefield Publishers Inc, USA.

Accenture (2005), Leadership in Customer Services: New Expectations, New Experiences. *The Government Executive series.* Available from: http://www.accenture.com/xdoc/ca/locations/canada/insights/studies/leadership_cust.pdf [Accessd March, 13th 2008].

Adair, J., (1973), *Action-Centred Leadership.* London: McGraw-Hill

Adelman, C., Jenkins, D., Kemmis, S. (1980), "Rethinking case study: notes from the Second Cambridge Conference", in Simons, H. (Eds),*Towards a Science of the Singular, Centre for Applied Research in Education*, University of East Anglia, Norwich, CARE Occasional Publications, No. 10, pp.47-61.

Agarwal, R. and Karahanna, E. (2000), Time flies when you are having fun: cognitive absorption and beliefs about information technology usage. *MIS Quarterly*, 1 (24), 665-694.

Agarwal, R. and Prasad, J. (1997), 'The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies', *Decision Sciences*, vol. 28, pp. 557-82.

Agarwal, R. and Prasad, J. (1998), "A conceptual and operational definition of personal innovativeness in the domain of information technology", *Information System Research*, Vol. 9 No.2, pp.204-15.

AGIMO (2004), Future Challenges for E-government, Volume 1 [Internet], Available from: <http://www.agimo.gov.au/__data/assets/file/31896/Future%20Challenges%20for%20E-government,%20Volume%201.pdf> [Accessed May 15th, 2008].

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl, & J. Beckmann (Eds.), *Springer series in social psychology* (pp. 11-39). Berlin: Springer.

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179–211

Ajzen, I., and Fishbein. M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice-Hall.

Akman, I., Yazici, A., Mishra, A. & Arifoglu, A. (2005). E-Government: a global view and an empirical evaluation of some attributes of citizens. *Government Information Quarterly*, 22, 239-257.

Al-adwani, A. M. (2003) Key Internet Characteristics and E-Commerce issues in Arab Countries. *Information Technology and People*, Vol: 16, pp 9-20.

Al-bayrak, S., Wohltorf, J., Fricke, S., Heßler, A., & Noubissi Noukumo, N. (2003). *Service Engineering - Methodology for 3G beyond 3G Service Development.* Working paper, DAI-Labor of the Technische Universität Berlin, 3.

Al-Hadidi, A. and Rezgui, Y. (2009a), "Barriers Facing the Adoption and Diffusion of m-government: Literature Review", *7th Eastern European e|Gov Days: (eee|Gov Days 2009)*: 456-466. Prague, Czech Republic. ISBN 978-3-85403-255-7.

Al-Hadidi, A. and Rezgui, Y. (2009b), "Critical Success Factors for the Adoption and Diffusion of m-government Services: Literature Review", *The 9th European*

Conference on e-Government ECEG 2009: 21-28. University of Westminster, London, Published by Academic Publishing International. ISBN 978-1-906638-34-4.

Al-Hadidi, A., Rezgui, Y. and Hopfe, C. (2010) "The Economic and Social Impact of Electronic Services on the Public and Private Sectors: A Literature Review", *the 10th European Conference on e-Government (ECEG2010)* at the National Centre for Taxation Studies, University of Limerick, Limerick, Ireland, Published by Academic Publishing International.

Al-khamayseh, S. & Lawrence, E. (2005): Mobile Government – Converging Technologies And Transition Strategies, *DEXA 2005*, Copenhagen, Denmark, pp. 358-365.

Al-khamayseh, S., Lawrence, E. and Zmijewska, A. (2007). *Towards Understanding Success Factors in Interactive Mobile Government*. Available from: http://www.mgovernment.org/resurces/euromgvo2006/PDF/2_Al-Khamayseh.pdf [Accessed March, 21st 2008].

Al-Kibsi, G., Boer, K., Mourshed, M., and Rea N. (2001) "Putting citizens on-line, not in line" *The McKinsey Quarterly*, 2, , pp. 65-73.

Al-rajehi, J. (2007). *Critical Success Factors for E-government in G.C.C*, Research Institute for the Built and Human Envairment (BuHu). University of Salford, Uk.

Al-rashdi, A. (2004) 'Ministry of Manpower Begins an Advanced Electronic Recruitment System', *Times of Oman*, 29th March, p 14.

Al-Ruzaiqi, S. (2003). *Identifying The Technology and Organization Determinates for Development an E-government Adoption Model for Sultanate of Oman Civil Agencies*. Sultan Qaboos University Library.

Al-sawafi, A and Sridhar, S. (2003) E-Governance Technologies for enabling trust in Citizen Relation Management (CRM). In: *Symposium on E-government: Opportunities and Challenges*, Muscat, Oman.

Al-Shihi, H. (2006). *Critical Factors in the Adoption and Diffusion of E-government Initiatives in Oman*. Sultan Qaboos University Library.

Al-Shihi, H. and McGrath, G. (2004). The Oman E-Government Project: Technology Adoption and Diffusion. In *Proceedings of the 18th Annual Conference of the Australian and New Zealand Academy of Management*. (Ed.) Graham Elkin. University of Otago, Dunedin, New Zealand. 1-16 ISBN0-476-01131-0

Alwatan (2004) 'ROP Starts Collecting Custom Fees Online', *Al-Watan*, 2nd June, p5.

Alwatan (2005) 'Muscat Municipality Launches SMS Parking System', *Al-Watan*, 8th October, p3.

AME Info (2005) *Central Bank of Oman's RTGS implementation nearing market rehearsal stage with participants* [Internet], Available from: <http://www.ameinfo.com/63505.html> [Accessed February 10th , 2008].

Anderson, J. W. (2000) Producers and Middle East Internet Technology: Getting Beyond "Impact". *Middle East Journal*, **3**, 419-432.

Antovski, L. & Gusev, M. (2005): M-Government Framework, *EURO mGOV 2005*, Brighton, UK, pp. 36-44

Antovski, Lj. & Gusev M.,(2005) New Mobile Payments Model, *Proc. of the SSGR 2003*, Roma, Italy

Aoki, K. (2000) Cultural differences in e-commerce: A Comparison between the US and Japan [Internet], Available from: http://firstmonday.org/issues/issue5_11/aoki/index.html [Accessed December, 27th 2007].

Arbi, Z.(2001) 'What is Meant by E-governemnt', *Jakarta Post*, Available from http://www.mapnp.org/library/org_thry/np_intro.htm [Accessed March 4th 2008].

Atkinson, M.A. and Kydd, C. (1997), ``Individual characteristics associated with World Wide Web use: an empirical study of playfulness and motivation", *The Database for Advances in Information Systems*, Vol. 28 No. 2, pp. 53-62.

Babbie, E. (2004): *The Practice of Social Research*, Belmont, Wadsworth.

Bagozzi, R. P., Davis, F. D., and Warshaw, P. R. (1992). Development and test of a theory of technological learning and usage. *Human Relations*, 45(7), 660-686

Bandura, A. (1986) *Social Foundations of Thought and Action: A Social Cognitive Theory*, Englewood Cliffs, NJ: Prentice-Hall.

Bartlett,C. and Ghoshal, S. (1996). Release the enterpreteneurial hostages from your corporate hierarch. *Strategy and Leadership*, 24(4), 36-42.

Bassara, A., Wisniewski, M., and Zebrowski, P. (2005). "USE-ME.GOV- Usability-dravin open platform for mobile government". In *Proc. Business Information Systems (BIS) 2005*, Poznan, Poland, 193-202.

Belbin, R. (1981), *Management Teams, Why They Succeed or Fail.* Oxford: Elsevier Butterworth-Heinemann Ltd.

Bell, J. (1999) *Doing your Research Project* (third edition). Milton Keynes: Open University Press.

Bell, J. (2005): *Doing Your Research Project*, Buckingham, Open University Press.

Best, J., (1981), *Research in Education.* New York: Prentice-Hall.

Blechar, J.; Constantiou, I.; and Damsgaard, J. (2005), The role of marketing in the adoption of new mobile services: is it worth the investment?, *Mobile Business*, 2005. ICMB 2005. International Conference on, Volume , Issue , 11-13 July 2005 Page(s): 370 – 376, Digital Object Identifier 10.1109/ICMB.2005.104

Blee, K. M., & Taylor, V. (2002). Semi-structured interviewing in social movement research. In B. Klandermans & S. Staggenborg (Eds.), *Methods of social moments in research.* Minneapolis: University of Minnesota Press.

Bluedorn and Lundgren (1993). The change process and to the attainment of strategic objectives. A culture-match perspective for strategic change. *Research in Organizational Change and Development*, Vol. 7: 137-139.

Bouma, G. D. (1996), *The Research Process*, Oxford University Press, Melbourne.

Boynton, A.C. and Zmud, R.W. (1984), ``An assessment of critical success factors", *Sloan Management Review*, Vol. 25 No. 4, Summer, pp. 17-27.

Brannen, J. (1992), *Mixing Methods: Quantitative and Qualitative Research.* Aldershot: Avebury.

Bredow and Wimmer, (2002), a holistic approach for providing security Solutions E-government *Proceedings of the 35th Hawaii International Conference on System Sciences.*

Brelade, S. and Harman, C. (2000), "Using human resources to put knowledge to work", *Knowledge Management Review*, Vol. 3 No. 1, pp. 26-9.

Brewer, J. and Hunter, A. (1989), *Multi Method Research: A Synthesis of Styles.* Newbury Park, CA: Sage.

Bryman, A. (1988), *Quantity and Quality in Social Research.* London: Unwin Hyman.

Bryman, A. and Cramer, D. (1990) *Quantitative Data Analysis for Social Scientists*, Routledge, London.

Bui, T. X., Sankaran, S. and Sebastian, I. M. (2003) A framework for measuring national e-readiness. *International Journal Electronic Business*, 1[1], 3-22.

Butler Cox Foundation (1986), "Information technology: value for money", CSC Index, Bloomsbury Square, London.

Cambridge online dictionary, (2008). 'Marketing Definition'. Available from: http://dictionary.cambridge.org/define.asp?key=48897&dict=CALD [Accessed May, 25th 2008].

Campbell, D. T., & Stanley, J. (1966). *Experimental and quasi-experimental design for research.* Chicago: Rand McNally.

Capra, E. ; Francalanci, C. And Marinoni, C. (2007), 'Soft Success Factors for M-Government' Cited in Kushchu, I. (2007). *Mobile Government an Emerging Direction in E-government*. IGI Publishing, Hershey, New York.

Carbo, T. and Williams, J. G. (2004). "Some Determinants of User Perceptions of Information Quality on the World Wide Web," *Electronic Journal of e-Government*, Vol. 2, No. 2 pp. 94-105.

Carroll, J. (2005): Risky Business: Will Citizens Accept M-government in the Long Term? *EURO mGOV 2005*, Brighton, UK, pp. 77-87

Carter, L. & Belanger, F. (2005). The utilization of e-government services: citizen trust, innovation and acceptance. *Information Systems Journal*, 15, 5-25.

Census Administration (2004) *Final Results of Census 2003*, Global Press, Muscat.

Chang, A. M. & Kannan, P. K. (2002): *Preparing for Wireless and Mobile Technolgies in Government*. IBM: The Business of Government. Available From:http://www.businessofgovernment.org/pdfs/Chang_report.pdf, [Accessed May 2nd 2008]

Chang, Ai-Mei and Kannan, P.K. (2003) Preparing for Wireless and Mobile Technologies in Government. In: Abramson, M. A. and Morin, T. L. *E-government 2003*, Rowman & Littlefield Publishers Inc., USA.

Chase, R.L. (1997), "The knowledge-based organization: an international survey", *Journal of Knowledge Management*, Vol. 1 No. 1, pp. 38-49.

Chen, Y. and Gant, J. (2001), "Transforming local e-government services: the use of application service providers", *Government Information Quarterly*, Vol. 18 No. 4, pp. 343-55.

Chopra, K. and Wallace, W. A. (2003) Trust in Electronic Environments. In: *Proceedings of the 36th Hawaii International Conference on Systems Sciences*, Hawaii, USA.

Choudrie, J., Ghinea, G. and Weerakkody (2004). Evaluating global e-government sites : a view using web diagnostic tools. *Electronic Journal of e-Government.* **2** [20]: 105-114. http://ejeg.com/volume-2/volume2-.pdf

Christine, B. and Rockart, J.(1981). "*A Primer on Critical Success Factors*," Centre for Information Systems Research Working Paper No. 69.

Chua, W.F. (1986), "Radical Developments in Accounting Thought," *The Accounting Review* (61), 1986, pp. 601-632.

Cilingir. D, and Kushchu, I (2004), *E-Government and m-Government: Concurrent Leaps by Turkey.* Available from: http://www.mgvlab.org.htm [Accessd March, 12th 2008].

Citrin, A., Sprott, E., Silverman, N. and Stem, E., (2000). Adoption of Internet shopping: The role of consumer innovativeness. *Industrial Management & Data System*, 100(7), 294- 300.

Cohen, N., Vallance, D., Barwick, M., Menna, R., Horodezky, N. and Isaacson, L. (2000). The interface between ADHD and language impairment: An examination of language, achievement, and cognitive processing. *Journal of Child Psychology and Psychiatry*, **41**: 353-362, 2000.

Cohen, J., Bloom, D. E. and Malin, M. B. (eds.) 2007. *Educating all Children: A global agenda.* Cambridge, MA: American Academy of Arts and Sciences.

Cohen, L. And Manion, L. (1994) *Research Methods in Education* (fourth edition). London: Routledge.

Colesca, S and Dobrica, L. (2009), 'E-governemnt Adoption in Romania' *International Journal of Business, Economics, Finance and Management Sciences* 1:2 2009. Page 121 to 125.

Collinge, A. (2002) ,Users rule in e-government. *New Media Age*, 1, 15.

Collis, J. and Hussey, R. (2003), *Business Research: Practical guide for undergraduate and post graduate students*, 2nd ed., Basingstoke: Palgrave Macmillan.

Commonwealth Telecommunications Organisation (2002) E-government for Development Information Exchange Project Website [Internet], Available from: <http://www.egov4dev.org> [Accessed March, 22nd 2008].

Cook, M. (2000), *What Citizens Want From E-Government*, Current Practice Research. Centre for Technology in Government, Available from, http://www.netcaucus.org/books/egov2001/pdf/citizen.pdf [Accessed March 6th, 2008].

Cook, T. D., and Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field setting*. Chicago: Rand McNally.

Creswell, J. (2003): *Research Design: Quantitative, Qualitative and Mixed Methods approaches*, London, Sage Publish ions.

Creswell, J. W. (1994), *Research design: Quantitative and Qualitative Approaches*. Thousand Oaks, SA: Sage.

Daniel, D.R. (1961), "Management information crisis", *Harvard Business Review*, September/October, pp. 111-121

Davenport, T. (1991), *Process innovation, reengineering work through information technology*. Boston, USA: Harvard Business School Press.

Davenport, T.H. and Volpel, S.C. (2001), "The rise of knowledge towards attention management", *Journal of Knowledge Management*, Vol. 5 No. 3, pp. 212-221.

Davenport, T.H., De Long, D.W. and Beers, M.C. (1998), "Successful knowledge management projects", *Sloan Management Review*, Vol. 39 No. 2, pp. 43-57.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and user Acceptance of Information Technology. *MIS Quarterly*, **13**:319-340.

Davis, F. D., Bagozzi, R. P. And Warshaw, P. R. (1989), User Acceptance of Comparison of Two Theoretical Models, *Management Science*, 35, 8, 982-1003.

Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. (1992), Extrinsic and intrinsic motivation to use computers in the workplace, *Journal of Applied Social Psychology*, 22, 14, 1111-1132.

Davison, P. (2005), *M-Democracy-Mobile Content*. Available from http://dowire.org/wiki/M-Democracy_-_Mobile_Content [Accessed March, 24th 2008].

Davison, R. and Martinsons, M. (2003) Guest Editorial; Cultural Issues and IT Management: Past and Present. *IEEE Transactions on Engineering Management*, 50[1], 3-7.

Dawes, S., Gregg,V., and Agouris, P. (2004),: Digital Government Research: Investigations at the Crossroads of Social and Information Science. *Social Science Computer Review* 22(1): 5-10

De Graaf, X. J. and Muurling, R. H. (2003) Underpinning the eBusiness Framework - Defining eBusiness Concepts and Classifying eBusiness Indicators. In: *eTransformation*, Bled, Slovenia, 539-550.

De Vaus, D. (2002) *Research Design in Social Research*, London: Sage.

Dearle, (1998), Toward Ubiquitous Environments for Mobile Users, *IEEE Internet, Computing*. Vol. 2,pp, 22-32.

Deiss, R. (2002) The EU surveys on ICT usage of enterprises. In: *Official Statistics and the new Economy* (IAOS Conference), London, 1-15.

Deloitte Research (2003), "Citizen advantage: enhancing economic competitiveness through e-government", *Deloitte Consulting Report*, September, available from: www.deloitte.com, [Accessed March 4th, 2008].

Denison, D., Hart, S., and Kahn, J. (1996), From chimneys to cross-functional teams: Developing and validating a diagnostic model, *Academy of Management Journal*, 39(4), 1005-1022.

Denzin, N. K. and Lincoln, Y. S. (2000). Introduction: the Discipline and Practice of of Qualitative Research. In Denzin, N. K. and Lincoln, Y. S (eds), *Handbook*

of Qualitative Research 2nd edition, Thousand Oaks, London, Sage, California,USA, P.1-29.

Denzin, N. K. and Y. S. Lincoln, Eds. (1994). *Handbook of Qualitative Research.* Thousand Oaks, London, New Delhi, Sage.

DeTienne, K.B. and Jackson, L.A. (2001), "Knowledge management: understanding theory and developing strategy", *Competitiveness Review*, Vol. 11 No. 1, pp. 1-11.

Dey, I. (1993), 'Qualitative Data analysis', in Saunders, M., Lewis, P. And Thornhill, A. (2007), *Research Methods for Business Students* (4th ed.) Essex: Pearson Education.

Dickinson, R.A., Ferguson, C.R. and Sircar, S. (1984), "Critical success factors and small business", *American Journal of Small Business*, January-March, Vol. 8, No. 3, Winter 1984, pp. 49-57, 64, 40

Dillon, J. and Pelgrin, W. (2002), *E-Government/Commerce in New York State*, Office of Technology, New York, NY.

Directorate General of Civil Status (2005) *Civil Status Law* [Internet], Available from: <http://www.civilstatus.gov.om/english/civil_status_law.asp> [Accessed Februry 22nd , 2008].

Dishaw, M.T. and Strong, D.M. (1998) Assessing Software Maintenance Tool Utilization Using Task-Technology Fit and Fitness-for-Use Models, *Journal of Software Maintenance: Research and Practice* 10, 3, pp. 151-179.

Dix, J. (2002) Survey Says Government is Vulnerable. *Network World*, 19, 34.

Done, R. S. (2003) Internet Voting: Bringing Elections to the Desktop. In: Abramson, M. A. and Morin, T. L. *E-government 2003*, Rowman & Littlefield Publishers Inc., USA.

Dong, K., Zhang, M. and Holzer, M. (2004) Frontiers of Public Administration *Proceedings of the Second Sino-U.S. International Conference: "Public Administration in the Changing World"* Beijing, China. Published by: New

York: The United Nations Public Administration Network and Washington, DC: The American Society for Public Administration.

Dragoni, G., Francalanci, C., Marinoni, C. And Tarantini, P. (2005), ICT profession, ICT competences and certifications observatory: An Integrated experience. UPGRADE, *The European Journal for the Informatics Professional*, VI(1), 66-74.

Easterby-Smith, M., Thorpe, R. & Lowe, A. (1991), *Management Research: an Introduction*, Sage, London.

EDUCAUSE, (2010): *THINGS YOU SHOULD KNOW ABOUT...mobile apps for learning*, Available from: http://net.educause.edu/ir/library/pdf/ELI7060.pdf. [Accessed May, 16th 2010].

eEurope (2005), An information society for all. COMMISSION OF THE EUROPEAN COMMUNITIES. Brussels, 28.5.2002 *COM(2002) 263 final.* [Internet], Available from: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2002:0263:FIN:EN:PDF [Accessed March, 2nd 2008].

E-Government in Republic of Kenya,(2004). *e-gvovernment Strategy and Objective*, available from: http://www.ictparliament.org/CDTunisi/ict_compendium/paesi/kenya/KENYA01.pdf [Accessed March 4th, 2008].

E-government Unit (2004) *Achieving E-government 2004: A report on progress towards the New Zealand E-government Strategy* [Internet], Available from: <http://www.e.govt.nz/_NONarchive/policy/research/ready-access-2004/ready-access-2004.pdf> [Accessed February 21st, 2008].

Eisenhardt, K.M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532-550.

Eisenhardt, K.M. (1991) 'Better Stories and Better Constructions: The Case for Rigor and Comparative Logic', *Adacemy of Management Review*, 16(3): 620–7.

Eraut, M., Alderton, J., Cole, G. And Senker, P. (2002). *Learning from other people at work.* In R. Harrison, F. Reeve, A. Hanson, and Clarke (Eds.), Supporting lifelong learning (Vol.1), Perspectives on Learning (pp. 127-145). London: Open University with Routledge/Falmer.

Erickson, F. (1986). Qualitative methods in research on teaching. *Handbook of research on teaching by a project of the American Educational Research Association.* M. C. Wittrock. New York, MacMillan.

Ernst & Young (2002), *E-Commerce Study: Executive Summary*, Gulf Cooperation Coucil, Ryadh, SAU.

ESCWA, (2003), *Regional Profile of the Information Society in Western Asia*, United Nations, New York.

ESCWA, (2005), *The National Profile for the Information Society in Oman*, United Nations, New York.

ESCWA, (2007), *National Profile of the Information Society in the Sultanate of Oman.* Available from: http://www.escwa.un.org/wsis/reports/docs/Oman-07-E.pdf [Accessed March, 10th 2008].

Ewan, M. (2006), *Dubai has ambitious targets for m-government system.* Available from http://www.smstextnews.com/2006/09/dubai_leading_m.html [Accessed March, 10th 2008].

Fielding, N. (1996), 'Ethnography', in N. Gilbert (ed.), *Researching Social Life.* London: Sage Pp.154-71.

Fink, A. (2003): *How to Ask Survey Questions.* Thousand Oakas, Sage.

Fletcher, K. and Wright, G. (1995), "Organisational, strategic and technical barriers to successful implementation of database marketing", *International Journal of Information Management*, Vol. 15 No. 2, pp. 115-26.

Foghlú, M.Ó. (2005): Infrastructures for Mobile Government Services, *EURO Mgov 2005*, Brighton, UK, pp. 192-199

Fontana, A. and Frey, J.H. (1994), 'Interviewing: the art of Since', In N. K. Denzin and Y. S. Lincoln (eds), *Handbook of Qualitative research* . Thousand Oaks, CA: Sage. Pp. 361-76.

Fountain, (2001), *Mobile E-government, The Virtual State: Information Technology And Institutional Chang*. Brooking Institution Press, Washington DC.

Freund, P. (1987). "The Hows and Whys of Critical Success Factors," *The CPA Journal*, Vol. LVII, No. 5, May, pp. 30-31.

Frinking, E., Ligtvoet, A. And Lundin, P. (2005). *The supply and demand of e-skills in Europe*. Interim Report, Rand Europe.

Fulton, B. (2003), Leveraging Technology in the Service of Diplomacy: Innovation in the Department of State. In: Abramson, M. A. and Morin, T. L. E-governmentt 2003, Rowman & Littlefield Publishers Inc., USA.

Galloway, R.L. and Whyte, G.A. (1989), "The information systems function as a service operation", *International Journal of Operations and Production Management*, Vol. 9 No. 4.

Gant, D. B. and Gant, J. P. (2003) *Enhancing E-Service Delivery in State Government*. In: Abramson, M. A. and Morin, T. L. E-government 2003, Rowman & Littlefield Publishers Inc., USA.

Garavan, T.N., Gunnigle, P. and Morley, M. (2000), "Contemporary HRD research: a triarchy of theoretical perspectives and their prescriptions for HRD", *Journal of European Industrial Training*, Vol. 24 Nos. 2/3/4, pp. 65-93.

GCC Statistical Department (2005) *Statistical Bulletin* [Internet], Available from: <http://www.gcc-sg.org/gccstatvol12/EcoStat/eco76.htm> [Accessed November 1st 2007].

GCC-SG (2005) *The Concept and Foundation* [Internet], Available from: <http://www.gcc-sg.org/Foundations.html> [Accessed November 5th 2007].

Gefen, D., Straub, D., and Boudreau, M. (2000) Structural equation modeling techniques and regression: Guidelines for research practice, *Communications of AIS*, 7, 7, 1-78.

Gefen, D., Warkentin, M., Pavlou, P. A. and Rose, G. M. (2002) EGovernment Adoption. In: *8th Americas Conference on Information Systems*, Dallas, USA.

Ghareeb, E. (2000) New Media and the Information Revolution in the Arab World: An assessment. *Middle East Journal*, **54**:395-419.

Ghyasi, A. and Kushchu, I. (2004) Uses of Mobile Government in Developing Countries, *mGovLab*, Available from: http://www.mgovlab.org [Accessd March, 10th 2008]

Gilding, M. and Critchley, C. (2003) Technology and Trust: Public Perceptions of Technological Change in Australia. *Australian Journal of Emerging Technologies and Society*, 1, 1-17.

Glesne, C., & Peshkin, A. (1992). *Becoming qualitative researchers*. New York: Longman.

Godoy S. & Stiglitz J., (2005), *Mobile Infrastructure for Deploying M-government A Top-Down Perspective*. Available from: www.waseda.jp/assoc-cioacademy/pdf/tran.pdf [Accessd March, 14th 2008].

Goh, S.C. (2002), "Managing effective knowledge transfer: an integrative framework and some practice implications", *Journal of Knowledge Management*, Vol. 6 No. 1, pp. 23-30.

Goldstuck, A. (2003): *Government Unplugged - Mobile and Wireless Technologies in the Public Sector*, Centre of Public Service Innovation, Tshwane, South Africa.

Goodhue, D.L. (1995) Understanding User Evaluations of Information Systems, *Management Science* 41, 12, pp. 1827-1844.

Goodhue, D.L. (1998) Development and measurement validity of a task-technology fit instrument for user evaluations of information systems. *Decision Sciences*, Winter 1998.

Government of Malta (2008). *M-government services for citizen* Available from http://www.gov.mt/egovernment.asp?p=106&l=2 html [Accessed March, 10th 2008].

Greenberg, S. (2006), State E-Government Strategies: Identifying Best Practices and Applications, Report for the Congressional Research Service. The University of Texas at Austin. Available from: http://www.utexas.edu/lbj/pubs/pdf/e-government.pdf [Accessed March, 25th 2008].

Halachmi, A. (1997), Value for Money, Best Value and Measuring Government Performance: An Introduction to the Symposium.

Han, S. (2003), Individual adoption of information systems in organisations: a literature review of technology acceptance model, *TUCS Technical Report*, No. 540, pp.1-45.

Hancock, B. (1998): *An Introduction to the Research Process, Trent Focus for Research and Development in Primary Health Care*, Trent focus.

Hasan, S. (2003), Introducing E-government in Bangladesh: Problems and Prospects. *International Social Science Review*, 79[1], 111-126.

Healey, M. J. (1991) 'Obtaining Information from Business', in Healey, M. J., (ed), *Economic Activity and Land Use*, Harlow, Longman, Pp. 193-251.

Healey, M. J. and Rawlinson, M. B. (1993), 'Interviewing Business Owners and Mangers: A Review of Methods and Techniques', *Geoforum* 24: 3, 339-55.

Healey, M. J. and Rawlinson, M. B. (1994), 'Interviewing Techniques in Business and Management Research', in Wass, V. J. And Wells, P.E. (Eds), *Principles and Practice in Business and Management Research*, Alderchot, Dartmouth, Pp. 123-46.

Heeks, R. (1999). "Re inventing Government in the information Age" In *Re inventing Government in the Information Age*. International Practice in IT-Enabled Public Sector Reform, editied by Richard Heeks, 9-21. London, UK: Routledge.

Heeks, R. (2001), *Understanding E-Governance for Development*, Institute for Development Policy and Management, Manchester.

Heeks, R. (2003), Most e-Government-for-Development Projects Fail: How Can Risks be Reduced? [Internet], Available from: http://unpan1.un.org/intradoc/groups/public/documents/NISPAcee/UNPAN015488.pdf [Accessed December, 27th 2007].

Hendry, L. (2003), Critical Factors in the Delivery of e-government Services: Perceptions of Technology Executives. *Communication of the International Information Management Association*, **2** [3].

Herriott, R. E., & Fireston, W. A. (1983), Multisitic qualitative policy research: Optimizing description and qeneralizability. *Educational Researcher*, 12, 14-19.

Hill J. And McGowan, P. (1999), Small Business and enterprise development: questions about research methodology. *Journal of small Business Enterprice development*, Vol. 5, No. 1, p.1355-2554.

Hjelm, J. (2000) *Designing Wireless Information Services*. New York: John Wiley & Sons.

Ho, A.T-K. (2002), "Reinventing local governments and the e-government initiative", *Public Administration Review*, **62** [4]:434-44.

Ho, K. K. W., Yu, C.C. and Lai, M. C. L. (2005) An Exploratory Study on the User Adoption of G2C and G2E e-Government Projects. In: *Proceedings of the 6th International We-B (Working for E-Business) Conference*, Melbourne, Australia.

Hopkins, D. (1993). *A teacher's guide to classroom research*. Philadelphia: Open University Press.

Horak, B.J. (2001), "Dealing with human factors and managing change in knowledge management: a phased approach", *Topics in Health Information Management*, Vol. 21 No. 3, pp. 8-17.

Horst, M., Kuttschreuter, M. & Gutteling, J. (2007). Perceived usefulness, personal experiences, risk perception and trust as determinants of adoption of e-government services in The Netherlands. *Computers in Human Behavior*, 23, 1838-1852.

Hossan, C. G., Chowdhury, M. and Kushchu, I. (2005) Prospects of Using m-Technologies for Disaster Information Management in Bangladish and other LDCs. In: *Proceedings of EURO mGOV 2005*: The First European Mobile Government Conference, Brighton, UK.

Huang, W., Siau, K. and Wei, K. K. (2005) *Electronic Government Strategies and Implementation*, Idea Group Publishing, PA.

Hung, S.-Y., Ku, C.-Y., and Chang, C.-M. (2003), "Critical Factors of WAP Services Adoption: an Empirical Study", *Electronic Commerce Research & Applications*, 2, 1, 2003, 42-60.

Hussey, J. & Hussey, R. (1997), *Business Research*, Macmillan Press Ltd, Basingstoke.

IDABC E-government observatory, (2005), *European eGovernment News Roundup* [Internet], Available from: www.epractice.eu/resource/1213 Accessed December 15th, 2007].

Igbaria, M., Zinatelli, N., Cragg, P., & Cavaye, A. (1997). Personal computing acceptance factors in small firms: A structural equation model. *MIS Quarterly*, 21, 279–305.

Interfax News Agency, (2003), Cited in Mimicopoulos, M. (2004), Available from: http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN021913.pdf [Accessed March, 25th 2008].

ITA, (2006) *Information Technology Authority*. Available from http://www.itec.gov.om/english/mission_vision.html [Accessed March, 11th 2008].

ITA, (2007) *Oman Digital Society Report*, Published by ITA. [Internet], Available from: http://www.ita.gov.om . Accessed November 10th 2007].

ITU, (2002). *The E-government Hand book for Developing Countries*, International Telecommunication Union

ITU, (2005). Data-base. *Cellular Development in Russia and Vietnam, 1991-2004*. International Telecommunication Union

Jaeger, R. M, (1988), 'Survey Methods in Educational Research' in R.M. Jaeger (ed.) *Complementary Methods for research in Education*. Washington: AERA. Pp.301-87.

Joel, M. (2008). *Global Voting One Mobile at a Time*, Available from http://mobileactive.org/international-voting-one-mobile-time [Accessed March, 24th 2008].

Joshi, J. and Ghafoor, A. et al. (2001), "Digital government security infrastructure design challenges", *IEEE Computer*, Vol. 34 No. 1, pp. 66-72.

Kamaruzzaman, A. S., & Kelch, D. R. (2002). Study in Malaysia handbook. (1st International Ed Malaysia: Challenger Concept (M) Sdn. Bhd.

Kanter, R., (1982). The middle manager as innovator. *Harvard Business Review*, 60(4), 95-105.

Karygiannis, T. and Owens, L. (2002), *Wireless Network Security: 802.11, Bluetooth, and Handheld Devices*. Washington, D.C: National Institute of Standards and Technology. Available from http://csrc.nist.gov/publications/nistpubs/800-48/NIST_SP_800-48.pdf [Accessed March, 23rd 2008].

Ke, W. and Wei, K. K. (2004) Successful e-government in Singapore. *Communication of the ACM*, **47**[6]: 95-99.

Kelly and McCarthy, (2006), cited in the Information Economy Report (2006), United Nations Conference on Trade and Development, United Nations (2006). Available from http://www.unctad.org/en/docs/sdteecb20061ch1a_en.pdf. [Accessed April 2nd, 2008].

Kidder, L., & Judd, C. M. (1986*). Research methods in social relations* (5th ed.) New York: Holt, Rinehart & Winston.

Kim, Y., Yoon, J., Park, S. & Han, J. (2004): Architecture for Implementing the Mobile Government Services in Korea, pp. 601-612

King, N. (2004), 'Using Interviews in Qualitative research', in Cassell, C. And Simon, G. (Eds), *Essential Guide to Qualitative Methods in Organisational Research*, London, Sage, Pp.11-22.

Klein, H. K. & Myers, M. D. (1999). A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems. *MIS Quarterly* (23:1), 67 - 94

Kumar, R. (1996) *Research Methodology: A Step-By-Step Guide For Beginners*, Longman, South Melbourne.

Kushchu, I. (2007). *Mobile Government an Emerging Direction in E-government*. IGI Publishing, Hershey, New York.

Kushchu, I. and Borucki, C (2004). *A Mobility Response Model for Government* Available from: http://www.mgovlab.org/library/mgovlab/mgovlab_ikcb.pdf [Accessd March, 14th 2008].

Kushchu, I. and Kuscu , H. (2003), " From E-government to M-government: Facing the Inevitable?" in the *Proceeding of European Conference on E-government (ECEG 2003)*, trinity College.

Kwan, T. and Zmud R. (1987). Unifying the fragmented Model of Information systems Implementation. In Boland and Hirschhheim (Eds.), *Critical Issue in Information systems Research*. New York: John Wiley.

Kwon, Y. (2004), *Challenge to the Mobile Government*, National Computarization Agency, Korea.

Lallana, E. (2004). *E-Government for Development M-Government: Mobile/Wireless Applications in Government* Available from: http://www.egov4dev.org/topic4.htm [Accessd March, 11th 2008]

Lambrinoudakis, C. and Gritzalis, S. et al. (2003), "Security requirements for e-government services: a methodological approach for developing a common PKI-based security policy", *Computer Communications*, Vol. 26 No. 16, pp. 1873-83.

Lanvin, B. (2002), Leaders and Facilitators: The New Roles of Government in Digital Economies. InfoDev, The World Bank. Avialble from: http://www.weforum.org/pdf/Global_Competitiveness_Reports/Reports/GITR_2002_2003/Leaders_and_Facilitators.pdf [Accessed March 4th, 2008].

Lanwin, B. (2002), *A Project of Info Dev and The Center for Democracy & Technology: The Egovernment handbook for developing countries*. Available from http://www.cdt.org/egov/handbook/2002-11-14egovhandbook.pdf [Accessed March, 27th 2008].

Laura, N., Peter, L., Giasemi, V., Mike, S. (2006), *Literature Review in Mobile Technologies and Learning*, University of Birmingham, Available from http://www.futurelab.org.uk/resources/documents/lit_reviews/Mobile_Review.pdf [Accessed March, 27th 2008].

Layder, D (1993). *New Strategies in Social Research*. Polity Press, Cambridge, UK.

Layne, K.J.L. & Lee, J. (2001), "Developing fully functional E-government: A four stage model", *Government Information Quarterly*, vol. 18, no. 2, pp.122-136.

LeCompte, M.D., & Preissle, J. (1993). *Ethnography and qualitative design in educational research.* (2nd ed.), San Diego: Academic Press.

Lee, C. and Lei, U. (2007), 'Adoption of e-government services in Macao. *ACM International Conference Proceeding Series*; Vol. 232

Lee, H. and Choi, B. (2003), "Knowledge management enablers, processes, and organizational performance: an integrative view and empirical examination", *Journal of Management Information Systems*, Vol. 20 No. 1, pp. 179-228.

Lee, M.S.Y., McGoldrick, P.J., Keeling, K.A., and Doherty, J. (2003), "Using ZMET to explore barriers to the adoption of 3G mobile banking services", *International Journal of Retail & Distribution Management*, 31, 6, 2003, 340-348.

Leedy, P.D. (1997). *Practical Research: Planning and Design.* Prentice Hall, London.

Lehner, F., Holger, N., and Hans, N., (2002), Wireless E–Learning and Communication Environment: WELCOME at the University of Regensburg in Germany. Chair of Business Information III .

Leigh, A. and Maynard, M. (1995), *Leading Your Team, How to Involve and Inspire Teams*, Nicholas Brealey Publishing, London.

Leong, L. (2003), *Theoretical Models in IS Research and the Technology Acceptance Model (TAM)*, Central Connecticut State University, USA. Available from www.idea-group.com/downloads/excerpts/2003/DavisEx.pdf [Accessed March, 27th 2008].

Light, A. (1997). "Restoration and Reproduction." Unpublished manuscript presented at the Symposium on Ethics and Environmental Change: Recognizing the Autonomy of Nature, St. John's, Newfoundland, Canada, June 4-5.

Lin, C. C. (2003), A Critical Appraisal of Customer Satisfaction and E-commerce. *Managerial Auditing Journal*, 18, 202-212.

Linnar,V. and Rain, R. (2000), *Mobile Solutions Company*. Available from http://www.mobisolutions.com/en/company.php [Accessed March, 24th 2008].

Lowe, A. C. T., & Corkindale, D. R. (1998), Differences in "cultural values" and their effects on responses to marketing stimuli: A cross-cultural study between Australians and Chinese from the People's Republic of China. *European Journal of Marketing*, 32(9/10), 843-867.

Lyytinen, K. (1988), "Expectation failure concept and systems analysts' view of information system failures: results of an exploratory study", *North-Holland Information and Management*, Vol. 14, pp. 45-56.

Madhusudhana. V, Srinivasa. P, and Mohanty. P, (2005), *M-government: Can it work wonder?* Available from http://www.egovonline.net/articles/article-details.asp?articleid =283&typ =Cover%20Story [Accessed March, 9th 2008].

Magee, A. (2002), *Attitude-behaviour relationship*. Available from: <http://www.ciadvertising.org/SA/fall_02/adv382j/mageeac/theory.htm>.[Accessed July, 27th, 2008]

Mahler, J. G. and Regan, P. M. (2003), *Federal Intranet Work Sites: An Interim Assessment*. In: Abramson, M. A. and Morin, T. L. E-government 2003, Rowman & Littlefield Publishers Inc., USA.

Mathieson, K. (1991), Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research*, 2(3) 173-191.

McClure, D. (2000), "*Electronic government: federal initiatives are evolving rapidly but they face significant challenges*", Accounting and Information Management Division, Available from: www.gao.gov/new.items/a200179t.pdf [Accessed March, 25th 2008].

McGrath, J. E. (1982), "Dilematic: the study of research choices and dilemmas", in McGrath, J. E. (Eg.), *Judgement Calls in Research*, Bverly Hills, CA: Sage.

Merriam Webster online dictionary (2008), [Internet], Available from: http://www.merriam-webster.com/dictionary/democracy%20. [Accessed March, 22nd 2008].

Merriam, S. (1998), *Qualitative Research and Case Study Applications in Education.* San Francisco, CA: Jossey-Bass.

M-government services in Singapore, (2008), Available from: http://www.ecitizen.gov.sg/mobile/index.html [Accessed March 4th, 2008].

Miles, M. B. and Huberman, A. M. (1994), *Qualitative Data Analysis.* Thousand Oaks, SA: Sage.

Miles, G., Miles, R. E., Perrone, V. and Edvinsson, L. (1998). Some conceptual and research barriers to the utilization of knowledge. *California Management Review*, 40(3), 281–288.

Miller, T. (2002), 'Adapting to Motherhood: Care in the postnatal period' Community

Mimicopoulos, M. (2004), *E-government funding activities and strategies.* United Nations New York, 2004. Available from: http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN021913.pdf [Accessed March, 25th 2008].

Minichiello, V., Arony, R., Timewell, E. and Alexander, L. (1990), *In-Depth Interviewing: Researching People.* Melpourne: Long Man Cheshire.

Ministry of Information, Oman (2008). *Sultanate of Oman (2007-2008).* [Internet] Available from: http://www.omanet.om/index.asp [Accessed February, 24th 2008].

Ministry of Information, Oman, (2006) *His Majesty Sultan Qaboos bin Said* [Internet] Available from: http://www.omanet.om/english/history/sultan.asp?cat=hist [Accessed January23 2008].

Ministry of National Economy, Oman (2003), Profile of the Information Society in the Sultanate of Oman. In: *Information Society Profiles for Western Asia 2003*, ESCWA [CD ROM].

Ministry of National Economy, Oman (2005), Monthly Statistical Bulletin, **16** [2]:21

Ministry of National Economy, Oman (2006a), *Statistical Year Book 2005*, Ministry of National Economy, Muscat.

Ministry of National Economy, Oman (2006b), 'Profile of the Information Society the Sultanate of Oman' in *Information Society Profiles for Western Asia 2006*, ESCWA [CD ROM].

Ministry of National Economy, Oman (2007), *Statistical Year Book 2006*, Ministry of National Economy, Sultanate of Oman.

Ministry of National Economy, Oman (2008), *Ministry of National Economy website*, Sultanate of Oman. Available at http://www.moneoman.gov.om/index.asp [Accessed March 11th 2008].

Minna-Kristiina, P., Minna, P. and Taina, K. (2005), *Comparison of Trust in the Use of Internet and Mobile Services*. Available from: http://www.ebrc.fi/kuvat/14-24_05.pdf. [Accessed March, 22nd 2008].

Moon, M. J. (2003), *State Government E-Procurement in the Information Age: Issues, Practices, and Trends*. In: Abramson, M. A. and Morin, T. L. E-government 2003, Rowman & Littlefield Publishers Inc., USA.

Moon, M. Jae. (2004), *From E-Government to M-Government? Emerging Practices in the Use of Mobile Technology by State Governments*, Available from http://www.businessofgovernment.org/pdfs/MoonReport2.pdf [Accessed March, 06th 2008].

Moon, M.J. (2002), "The evolution of e-government among municipalities: rhetoric or reality", *Public Administration Review*, Vol. 62 No. 4, pp. 424-33.

Moore, G. C., and Benbasat, I. (1991): Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research*, 2, 3, 192-222.

Murphy, T. (2002), *Oman e-Government Interim Strategy Presentation: May 1, 2002*, Muscat, Oman [Presentation Handout].

Muscat Municipality, Oman (2007), *Mobile Parking Service* [Internet] Available from: <http://www.mm.gov.om/newweb/smspay/sms_e.asp?lan=E> [February 22nd, 2008]

Myers, M. & Avison, D. (Eds.) (2002). *Qualitative Research in Information Systems* London: Sage, 312 pages .ISBN 0 7619 6632 3.

Myers, M. D (1997), Qualitative Research in Information Systems. *MIS Quarterly*, Vol. 21, No. 2, p. 1-13. Available from: http://www.qual.auckland.ac.nz/.

Naima, J. and Muhammad, J. (2005), *E-government and their applicability in the Sultanate of Oman*. Sultan Qaboos University Library.

National Committee for Information Technology – Oman (2003), *The National Information Technology Strategy*, Muscat, Oman [Brochure].

NECCC (2000), *E-Government Strategic Planning*, National Electronic Commerce Coordinating Council, Las Vegas, NV.

Neuman, W. L. (1996), *Social Research Methods: Qualitative and Quantitative Approaches*, USA: Allyn and Bacon.

Neuman, W. L. (1997). *Social research methods: Qualitative and quantitative approaches* (3rd ed.). Needham Heights, MA: Allyn and Bacon.

Newing, R. (2001), "Governments strive to connect with the people: EU member states aim to streamline public services by making them available electronically", *Financial Times*. Available from: http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN014275.htm [Accessed March, 25th 2008].

Nicholas, T. (2003), "Warning on costs of online public services", Financial Times, Study conducted by Kable, the IT market analyst reported . Available from: http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN014275.htm [Accessed March, 25th 2008].

Nicoll, P. et al. (1999). *Electronic service delivery, including Internet use, by Commonwealth government agencies*. Canberra, Australian National Audit Office.

Nisbet, J. and Watt, J. (1984), Case Study. In J. Bell, T. Bush, a. Fox, J. Goodey and S. Goulding (eds) *Conducting Small Scale Investigations in Educational Management*. London: Harper & Row, 79-92.

NOIE, (2002), *Improving Confidence, Trust and Security* [Internet], Available from: <http://www.noie.gov.au/projects/confidence/Improving/index.htm> [Accessed May 2nd 2008].

NOIE, (2003), *E-government Benefits Study*, Commonwealth of Australia, Canberra NOIE (2002) Improving Confidence, Trust and Security [Internet], Available from: http://www.noie.gov.au/projects/confidence/Improving/index.htm [Accessd March, 6th 2008]

NRC (1999), The National Research Council Cited in Kate Williams, "Literacy and computer literacy: Analyzing the NRC's 'Being Fluent with Information Technology'." Journal of Literacy and Technology, volume 3, number 1, Spring 2003.

Nunan, D. (1992), *Research Methods in Language Learning*, Cambridge: CUP.

O'cass, A. and Fenench, T.(2003). Web retailing adoption: Exploring the nature of internet users Web retailing behavior. *Journal of Retailing and Consumer Services*, 10, 81-94.

O'Malley, C, Vavoula, G, Glew, JP, Taylor J, Sharples, M and Lefrere, P (2003). Guidelines for Learning/Teaching/Tutoring in Mobile Environment Available from www.mobileam.org/results/results.htm [Accessed March, 27th 2008].

Oates, B. J. (2005), *Researching Information Systems and Computing*, Sage Publications, Oxford.

O'Callaghan, R. (1998). Technology Diffusion and Organization Transformation: An Integrative Framework. In Larson and McGuire (Eds.), *Information systems*

Innovation and Diffusion: Issues and Directions. London: Idea Group Publishing.

OCIPED, (2005), *About Oman: Economy* [Internet], Available from: <http://www.ociped.com/aboutoman2.asp> [Accessed December 15th, 2007].

Odeen, P. (1996), CEO of BDM International states. Available from: http://bte.dadeschools.net/Advisory%20Committee/Computer%20Literacy%20Paper.pdf [Accessed March, 25th 2008].

OECD, (2003), *The e-Government Imperative*, OECD publications, France.

OECD, (2003b). *The e-government imperative*. Available from: http://www.oecd.com [Accessed March, 3rd 2008].

Oliver, B. & Barrett, C. (2004). Comfort + ubiquity = adoption: Enhancing first year students' communication skills with handheld computers. In R. Atkinson, C. McBeath, D. Jonas-Dwyer & R. Phillips (Eds), *Beyond the comfort zone: Proceedings of the 21st ASCILITE Conference* (pp. 709-712). Perth, 5-8 December.

Oliver, M. (1997) *A framework for evaluating the use of educational technology*, University of North London, Learning and Teaching Innovation and Development (LaTID) London.

Olson, D. (2004), *Introduction to Information Systems Project Management*, 2nd ed., McGraw-Hill, New York, NY.

Oman Mobile (2007a) Corporate Coverage [Internet] Available from: <http://www.omanmobile.om/english/index_corporate_coverage.jsp> [Accessed January 10th 2008]

Oman Mobile (2007b) General Secondary Certificate results by SMS [Internet] Available from: <http://www.omanmobile.om/english/ss-result.jsp> [Accessed January 15th 2008)]

Oman Mobile (2007c) Smart Investor [Internet] Available from: <https://smartinv.omanmobile.om/> [Accessed January 15th 2008)]

Oman Mobile (2007d) Market Movers [Internet] Available from: <https://smartinv.omanmobile.om/Services_Marketmovers.jsp> [Accessed January 15th 2008)]

Oman Mobile (2007e) Weather News [Internet] Available from: <http://www.omanmobile.om/english/weather_news.jsp> [Accessed January 15th 2008)]

Omantel, (2005), Internet Services Cost [Internet], Available from: <http://www.omantel.net.om/care/internet> [Accessed March 2nd 2008].

Omantel, (2007), Mobile Services, Available from: http://www.omantel.net.om/services/business/internet/Terms_and_condtions_internet_cafe.pdf [Accessed February 5th 2008].

Onag, G., Chan, I. and Khay, M. (2002) "Uneven fortunes, uncertain world" *Financial Times*. Available from: http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN014275.htm [Accessed March, 25th 2008].

Orlikowski, W. J. and Baroudi, J. J. (1991), "Studying Information Technology in Organizations: Research Approaches and Assumptions", *Information Systems Research*, vol. 2, no. 1, pp. 1-28.

Orum, A.M., Feagin, J.R. and Sjoberg, G. (1991), 'The Nature of the Case Study'. In Feagin, J.R., Orum, A.M. and Sjoberg, G. (eds) *A Case for the Case Study*. Chapel Hill, NC: The University of North Carolina Press

Östberg, O. (2003), 'A Swedish View on 'Mobile Government'', *International Symposium on E & M-Government*, Seoul, Korea, <http://www.statskontoret.se/upload/Publikationer/2003/2003128.pdf>.

Pacific Council on International Policy (2002), "Roadmap for e-government in the developing world: 10 questions e-government leaders should ask themselves", *Working Group on E-Government in the Developing World*, Los Angeles, CA, Available From: www.pacificcouncil.org [Accessed 7 May 2008),

Paré, G. (2001), *Using a Positivist Case Study Methodology to Build and Test Theories in Information Systems: Illustrations from Four Exemplary Studies*, École des Hautes Études Commerciales de Montréal, Montreal.

Parent, M., Vandebeek, C. A. and Gemino, A. C. (2004), Building Citizen Trust Through e-Government. In: the *37th Hawaii International Conference on System Sciences*, Big Island, Hawaii.

Parker, G. (1994), *Cross-Functional Teams: Working with Allies, Enemies and Other Strangers*, Jossey-Bass, San Francisco.

Pascual, P.J. (2003), e-Government, e-Primer for the Information Economy, *Society and Polity Series*, UNDP-APDIP, e-ASEAN Task Force. Available from: http://www.apdip.net/publications/iespprimers/eprimer-egov.pdf http://www.developmentgateway.org/download/218309/mGov.doc [Accessed May, 27th 2008].

Patton, M. Q., (1990), *Qualitative Evaluation and Research Methods*, 2nd ed., CA: Thousand Oaks Sage.

Patton, M.Q., (1980), *Qualitative Evaluation Methods*. Newbury Park, CA: Sage.

Pedersen, P.E., Methlie, L.B. and Thorbjørnsen, H. (2001), Understanding mobile commerce end-user adoption: a triangulation perspective and suggestions for an exploratory service evaluation framework. Accepted for presentation at *HICSS-35, Hawaii, US*, Jan 7-10, 2002.

Pelosi G., Emdin M., Carpeggiani C., Morales MM., Piacenti M., Dattolo P., Cerrai T., Macerata A., L'abbate A., and Maggiore Q. (1999). Impaired sympathetic response before intradialytic hypotension: a study based on spectral analysis of heart rate and pressure variability. *Clin Sci* (1999); 96: 23–31.

Pervan, G. P. (1994), A case for more case study research in group support systems. *The IFIP TC8 Conference on Business Process Re-engineering: Information system opportunities and challenges*, Gold Coast Queensland, Australia.

Pinto, J.K. and Prescott, J.E. (1988), "Variations in critical success over the stages in the project life cycle", *Journal of Management*, Vol. 14 No. 1, pp. 5-18.

Pizzella, P. (2005), GovBenefits.gov: A Valuable E-Government Tool for Citizens. *The Public Manager*, **34**[2]: 37-42.

Poon, S. (2002), ESDLife of Hong Kong E-Government Application with an E-Business Spirit. In: *8th Americas Conference on Information Systems*, Dallas, USA.

Portio Research, (2007), *Mobile Fact book, 2007*, Available from http://www.portioresearch.com/. [Accessed March, 16th 2008].

Punch, K. (2005), *Introduction to Social Research Quantitative and Qualitative Approach*, 2nd edn, London, Sage Publications.

Rain, R. and Maarja, S. (2005), *Mobile Services in Tartu Existing services, best practices methodology and suggestions for future development*, Mobile Solutions Ltd Tartu, Estonia. Available from http://www.ega.ee/files/Mobile%20services%20in%20Tartu%20FINAL1.pdf [Accessed March, 10th 2008].

Reinhard, R. (2005), *Engineering E-government Platforms and G2G Solutions*. Department of Informatics, University of Zurich.

Remenyi, D., Williams, P, Money, A. and Swartz, E. (1998), *Doing Research in Business and Management: An Introduction to Process and Method*. Sage, London.

Research Council of Oman, (2007), *The Sultanate of Oman's Efforts in: "Promoting the building of a people-centered, development-oriented and inclusive information society, with a view to enhancing digital opportunities for all people"* Available from: http://www.unctad.org/sections/wcmu/docs/ecn162007s007_en.pdf [Accessed February 22nd, 2008].

Ribiere, V.M. and Sitar, A.S. (2003), "Critical role of leadership in nurturing a knowledge-supporting culture", *Knowledge Management Research & Practice,* Vol. 1 No. 1, pp. 39-48.

Rip, A. (1995), "Introduction of New Technology: Making Use of Recent Insights from Sociology and Economics of Technology", *Technology Analysis & Strategic Management*, vol.7 (4), pp.417-431.

Robbins, S. P., Bergman, R., Stagg, I. and Coulter, M. (2000) *Management*, Prentice Hall of Australia, Sydney.

Robson, C. (2002), *Real World Research*, 2nd edition. Blackwell publishing, UK, USA.

Rockart, J.F. (1979), "Chief executives define their own data needs", *Harvard Business Review*, Vol. 57 No. 2, pp. 81-93

Rogers, E. M. (1983), *Diffusion of innovations.* New York: The Free Press of Glencoe.

Rogers, E. M. (1995), *Diffusion of innovations.* New York: The Free Press of Glencoe. Fourth Edition.

Rogers, E. M. (2003), *Diffusion of innovations.* New York: The Free Press of Glencoe. Fifth Edition.

Rogers, EM & Shoemaker, FF (1971), Communication of Innovations: a cross-culture approach, 2nd edn, Free Press, New York.

Rosacker, K. And Olson, D. (2008), Public sector information system critical success factors. *Transforming Government: People, Process and Policy* Vol. 2 No. 1, 2008 pp. 60-70 Emerald Group Publishing Limited1750-6166.

Rossel, P., Finger, M and Misuraca, G. (2006), ""Mobile" e-Government Options: Between Technology-driven and Usercentric" *The Electronic Journal of e-Government* Volume 4 Issue 2, pp 79 - 86, available online at www.ejeg.com

Rubinstein, D. (2007), "Standish group report: there's less development chaos today", *Software Development Times*, Available from:

http://www.sdtimes.com/printArticle/story-20070301- html [Accessed May 2nd, 2008).

Runyon, R.P., Coleman, K.A. and Pittenger, D. (2000), *Fundamentals of Behavioural Statistics*. 9th Edition. McGraw-Hill.

Sadeh, N. (2002), *Wireless Technologies to Deliver Government Services*. John Wiley and Sons, Inc, Canada and USA.

Sanchez-Franco, M., & Roldan, J. (2005). Web acceptance and usage model: A comparison between goal-directed and experiential web users, *Internet Research*, 15(1), 21-48.

Sandy, G.A. and McMillan, S. (2005): A Success Factors Model For M-Government, *EURO mGOV 2005*, Brighton, UK, pp. 349-358

Saunders M., Lewis P. And Thornhill, (2000), *Research Methods of Business Students*. 2nd edition. Pitman publishing, London.

Saunders M., Lewis P. And Thornhill, (2007), *Research Methods of Business Students*, Essex, Pearson Education Limited.

Schafer G. (2003), "*Security in Fixed and Wireless Networks: An Introduction to Securing Data Communications*". Wiley.

Schaupp, L. C. & Carter, L. (2005), E-voting: from apathy to adoption. *The Journal of Enterprise Information Management*, 18(5), 586-601.

Schneider, G. P. and Perry, J. T. (2000), *Electronic Commerce*, Cambridge MA, Course Technology.

Schofield, J. W. (1990), 'Increasing the Generalizability of Qualitative Research' in Gomm, R., Hammersley, M and Foster, P (eds) (2000) *Case Study Method*, Sage: London.

Scholl, H.J.J. (2005), The Mobility Paradigm in Government Theory and Practice: A Strategic Framework, *EURO mGOV 2005*, Brighton, UK, pp. 377-385

Schrammel, J., Kottel, C. and Tscheligi, M. (2009), '*How Much do You Tell? Information Disclosure Behaviour in Different Types of Online Communities*'. University Park, Pennsylvania, USA. ACM 978-1-60558-601-4/09/06.

Schware, R. 2000. Information Technology and Public Sector Management in Developing Countries: Present Status and Future Projects. *Indian Journal of Public Administration*, **46** (4).

Sekaran, U. (2003), *Research Methods for Business a Skill Building Approach*, USA: John Wiley & Sons, Inc.

Senge, P. et al, (1999), *The dance of change: The challenges of sustaining momentum in Learning organizations*. UK: Nicholas Brealey Publishing.

Shafaee. M. (2001), *Determinants of Job Satisfaction of Doctors and Nurses in Organised Settings*. PhD Thesis. University of Hull.

Silcock, (2001), Institute of Public Administration and Management, University of Liverpool, Liverpool, UK

Simpson M. & Tuson J. (1995), *Using Observations in Small-Scale Research*, The Scottish Council for Research in Education.

Singh, S. and Laidler, T. (2002), The Use of Government Electronic Service Delivery: The Australian Experience. Pacific Telecommunications Council, Jan 15, 1-6.

Slevin, D.P. and Pinto, J.K. (1986), "The project implementation profile: new tool for project managers", *Project Management Journal*, Vol. 17 No. 4, pp. 57-70.

Smith and Jamieson, (2006), *Determining Key Factors in E-government Information System Security*, Director SEAR, Director SAFE, Asia Pacific.

Snellen, I. and Thaens, M. (2008), From E-Government to M-Government Administration?: Towards a new Paradigm in Public. *Administrative innovation, International Context and growth*, Bologna, SPISA, Via Belmeloro, 10-40126 Bologna, January 15th 2008.

Soliman, F. and Spooner, K. (2000), "Strategies for implementing knowledge management: role of human resources management", *Journal of Knowledge Managemen*t, Vol. 4 No. 4, pp. 337-45

Sorenson, O. (2003), From conception to birth: Opportunity perception and resource mobilization in entrepreneurship, Sorensen, J.B., *Advances in Strategic Management.*

Spencer, L. M. And Spencer, S. M. (1993). *Competence at work. Model for superior performance*. New York, USA: John Wiley & Sons.

Sriram, K. And Srinivasan, K. (2004), E-Governance Risk Assessment of Business Needs and IT Requirements. *3rd International Conference on E-Governance ICEG2005*. Available from: http://www.iceg.net/2006/download/E-Governance.pdf#page=52. [Accessed February 22 nd, 2008].

State of California, USA (2001), Online Services. Available from http://www.ca.gov/OnlineServices.html. [Accessed March 10th, 2008].

Stonehouse, G.H. and Pemberton, J.D. (1999), "Learning and knowledge management in the intelligent organisation", *Participation and Empowerment: An International Journal*, Vol. 7 No. 5, pp. 131-44.

Stowers, G. N. L. (2003), The State of Federal Websites: The Pursuit of Excellence. In: Abramson, M. A. and Morin, T. L. E-government 2003, Rowman & Littlefield Publishers Inc., USA.

Straub, D., Keil, M. & Brenner, W (1997), 'Testing the technology acceptance model across cultures: A three country study', *Information & Management*, vol. 33, no. 1, pp. 1-11.

Stylianou, A.C., Robbin, S.S., and Jackson, P. (2003), Perceptions and attitudes about e-commerce development in China: An exploratory study. *Journal of Global Information Management*, 11(2), pp.31

Supaporn, W. (2002), *Exporting I-mode*, Unpublished Master's Thesis, e-Business Management, International University of Japan.

Swanson, S. (2002), The E-government Challenge: About 60% of e-government initiatives fail, according to Gartner analysis. *Information Week*, May 7, 109.

Swartz, N. (2003), British slow to use e-government services. *Information Management Journal*, **37**, 7.

Tan, A. (2006), Mobile Web catching on, *ZDNet Asia*, Available from http://www.zdnetasia.com/news/communications/0,39044192,39369023,00.ht m /. [Accessed March, 10th 2008].

Tashakkori , A. and Teddie, C., (1998), *Mixed Methods research, Combing Qualitative and Quantitative Approaches*. Thousand Oaks, Sage Canada.

Tashakkori, A. and Teddie, C, (2003), *Mixed Methods research, Alternative approaches and Unresolved Issues in Conceptualization and Design of Mixed Methods*. Thousand Oaks, Sage Canada.

Taylor, S. and Todd, P. A. (1995), Understanding information technology usage: A test of competing models. *Information Systems Research*, 6(2), 144-176.

Teemu. (2007). *Mobile Learning-What is it?* Available from http://www.shareideas.org/index.php/News:Mobile_learning_%E2%80%93_what_is_it%3F [Accessed March, 27th 2008].

Tellis, W. (1997). Introduction to case study [68 paragraphs]. *The Qualitative Report* [On-line serial], 3(2). Available form: http://www.nova.edu/ssss/QR/QR3-2/tellis1.html [Accessed May 2nd 2008].

The Performance Institute, (2002) Available from http://www.performanceweb.org/Research/ [Accessed February 10 2008].

Themistocleous, M. and Irani, Z. (2001), "Benchmarking the benefits and barriers of application integration", *Benchmarking: An International Journal*, Vol. 8 No. 4, pp. 317-31.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: Toward a conceptual model of utilization. *MIS Quarterly*, 14, 125-143.

Thompson, S.H. (2001), `` Demographic and motivation variables associated with Internet usage activities", *Internet Research: Electronic Networking Applications and Policy* Volume 11 . Number 2 . 2001 . pp. 125-137 MCB University Press . ISSN 1066-2243

Times of Oman (2005) 'Send an SMS and Park Your Car', *Times of Oman*, 8th October, p1.

Times of Oman (2007), Oman Mobile offers excellent value for its Internet service. *Times of Oman*, 2nd November, p2.

Times of Oman (2008) ,'E-Oman has given a special thrust in the way public sector organisations', *Times of Oman*, 17th February, p1.

Tornatzky, L. G., & Klein, R. J. (1982), Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings. *IEEE Transactions on Engineering Management*, EM-29, 28-45.

TRAI, (2005), Telecom Regulatory Authority of India, August 2005, Available from http://www.trai.gov.in/trai/upload/PressReleases/46/pr10oct05.pdf. [Accessed March, 16th 2008].

Trauth, E. (2001). *Qualitative research in IS : Issues and Trends*. Hershey, PA., Idea Group Pub.

Trochim, W. (2000), *The Research Methods Knowledge Base*: Types of Data. Avilable from: http://www.socialresearchmethods.net/kb/ [Accessed May 2nd 2008].

Trochim, W. (2001), *The Research Methods Knowledge Base*, 2nd Edition. Atomic Dog Publishers, Cincinnatti, OH.

Tsai, V. (2003), Security for Mobile Devices in the Enterprise. *EE Times*. Available from www.businessofgovernment.org/pdfs/MoonReport2.pdf [Accessed March, 23rd 2008].

Turban, A., King, D., Lee, J., Warkentin, M. and Chung, H. M. (2002), *Electronic Commerce 2002: A Managerial Perspective*, Prentice Hall, New Jersey.

UNDP, (2003), United Nations Development Program. Available from http://www.undp.org [Accessed February 08 2008].

United Nations, (2004), *Towards Access for opportunity*. A United Nation Publication. Publication No: UNPAB/2004/11 Available from: http://www.unpan.org/egovernment4.asp [Accessd March, 13th 2008].

United Nations, (2008), *e-Government Readiness Report*, [Internet], Available from http://www.undp.org [Accessed April 15th , 2008].

Venkatesh, V. (2000), Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research*, 11, 342-365.

Venkatesh, V. and Morris, M. G. (2000), Why Don't Men Ever Stop to Ask for Direction? Gender, Social Influence and Their Role in Technology Acceptance and Usage Behaviour? *MIS Quarterly* 24, 1, 115-139.

Venkatesh, V., & Davis, F. D. (2000), A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46, 186-204.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003), User Acceptance of Information Technology: Toward a Unified View, *MIS Quarterly* 27, 3, 425-478.

Verma, G. K. And Mallick, K. (1999), *Researching Education: Perspectives and Techniques*. London: Falmer.

Villafania, A (2004), "Media, tech firms partner for multimedia poll coverage in Philippines", *INQ7.net*, Available from http://www.inq7.net/brk/2004/mar/26/text/brkinf_1-1-p.htm [Accessed March, 10th 2008].

Wallace, P. (2002), *I-mode developer's Guide*, Addison Wesley, Pearson Education.

Weisinger, J. Y. and Trauth, E. M. (2003), The Importance of Situating Culture in Cross-Cultural IT Management. *IEEE Transactions on Engineering Management*, 50 [1], 26-30.

Wenger, E. (1998), *Communities of Practices. Learning meaning and identity.* Cambridge, UK: Cambridge University Press.

West, D. (2000), *Assessing e-government: The Internet, Democracy and Services Delivery by State and Federal Governments*, Brown University, Providence.

West, D. (2004), *Global E-Government, 2004*, Centre for Public Policy, Brown University.

Wexler, J. and Taylor, S. (2004) *2004 Wireless LAN State of the Market Report.* Available from http://www.webtorials.com/main/resource/papers/taylor/paper4.htm. [Accessed March, 27th 2008].

Whyte, G. And Bytheway,A. (1995), Factors Affecting Information Systems' Success. *International Journal of Service Industry Management*, Vol. 7 No. 1, 1996, pp. 74-93. © MCB University Press, 0956-4233

Wiggins, M. (1996), Vice President of Human Resources for Southwire Company Available from: http://bte.dadeschools.net/Advisory%20Committee/Computer%20Literacy%20Paper.pdf [Accessed March, 25th 2008].

Wijsman, T. (2004), The challenge of e-government, Paper prepared for the *4th Working Seminar on Performance Auditing*, Moscow, 20-21, April 2004. . Available from: http://www.intosaiitaudit.org/moscow/Netherlands.pdf [Accessed March, 29th 2008].

Williams, K. (2003), "Literacy and computer literacy: Analyzing the NRC's 'Being Fluent with Information Technology'." *Journal of Literacy and Technology*, volume 3, number 1, Spring 2003.

Womack, J (1991), *The machine that changed the world.* New York, USA: Simon and Schuster.

Wong, K. Y. (2005), Critical success factors for implementing knowledge management in small and medium enterprises. *Industrial Management & Data Systems* Vol. 105 No. 3, 2005 pp. 261-279 Emerald Group Publishing Limited.

Woods, P. (1986), *Inside School: Ethnography in Educational research.* London: Routledg & Kegan Paul.

World Bank Group, (2004), *E-government Definition* [Internet], Available from http://www1.worldbank.org/publicsector/egov/definition.htm [Accessed February 05 2008].

World Bank, (2004), www.worldbank.org [Accessed March 4th, 2008].

World Bank, (2006), www.worldbank.org - [Accessed March 10th, 2008].

Wu, J.-H. and Wang, S.-C. (2005) "What drives mobile commerce? An empirical evaluation of the revised technology acceptance model", *Information & Management* 42, 5, 2005, 719-729.

Wynekoop, J. L., J. A. Senn, et al. (1992). *The implementation of case tools: An innovation diffusion approach.* Amsterdam, Elsevier (North Holland).

Yahya, S. and Goh, W.K. (2002), "Managing human resources toward achieving knowledge management", *Journal of Knowledge Management*, Vol. 6 No. 5, pp. 457-68.

Yin, R. K. (1994), *Case Study Research: Design and Methods*, 2nd edition. Thousand Oaks, Sage, California, London.

Yin, R. K. (2003), *Case Study Research: Design and Methods*, Sage Publications, London.

Zalan, T. and Lewis, G. (2004) 'Writing About Methods in Qualitative Research: Towards a More Transparent Approach'. In Marschan-Piekkari, R. and Welch,

C. (eds) *Handbook of Qualitative Research Methods for International Business.* Cheltenham: Edward Elgar.

Zálešák, M, (2003), *M-Government: more than a mobilized government.* Available from: http://www.developmentgateway.org/download/218309/mGov.doc [Accessed March, 27th 2008].

Zhou, H. (2007), E-Government Funding in China. *The 7th Global Forum on Reinventing Government*, 26 to 29 June 2007, Vienna, Austria. Available from: http://unpan1.un.org/intradoc/groups/public/documents/unpan/unpan025948.pdf [Accessed March, 25th 2008].

Zmijewska, A. & Lawrence, E. (2005): Reshaping the Framework for Analysing Success of Mobile Payment Solutions, *IADIS International Conference on E-Commerce*, Porto, Portugal.

Zwane, D. (2002) Role of E-government is Customer Focus. *Comtex*, May 23, 1.

Appendix A:
Survey Template - Muscat Municipality Mobile Parking Services Project

Questionnaire (English Version)

Dear (Sir/Madam)

This study explores the potential for the adoption and diffusion of mobile-government services in the Sultanate of Oman, as a response to the declared goals of the government, and to international pressure to keep abreast of developments in e-government and the furtherance of democracy. This entails considering the concepts of e-government and m-government, probing the literature to discover what that can offer in respect of best practice relating to the critical success factors (CSFs) required for the implementation of such services, and examining as case studies, two m-government initiatives already in existence in Oman, with a view to deconstructing the development and implementation processes involved, and canvassing opinion from the users.

The study aims to identify the factors that have led to the delayed deployment of e-government in Oman, and to investigate the development and diffusion of m-government in the Sultanate, as a means to implementing m-government in the future.

In order to achieve the desired goals, the researcher is conducting a survey with officials and citizens such as yourself, who are in a position to provide valuable information on attitudes to m-government and related data. We would like to invite you to be part of this study, which will help the researcher to identify the Critical Success Factors for the Adoption and Diffusion of m-government services in the Sultanate of Oman. This study has major significance to the Oman government in general and the Omani people in particular. It will assist Oman in the uptake and planning for e-government and m-government. It will explore the impacts of the national/cultural issues in Oman on m-government, report on impediments and propose solutions. In addition, this project will be committed to addressing and resolving societal needs in relation to IT, and will help to smooth the introduction of e-government and m-government in Oman.

I assure you that all responses will be confidential and I that the anonymity of all participants will be respected and preserved.

Return of the survey form will constitute your consent to participate in the study. However, should you wish, you are free to withdraw from this investigation at any time, and without any need to give a reason.

Thank you in anticipation of your involvement.

Yours sincerely
Ahmed Al-Hadidi
00968 95586786
Email: Al-HadidiA@cardiff.ac.uk

Muscat Municipality Mobile Parking Services Project: Factors Influencing Adoption and Diffusion

This survey is part of a study into the Critical Success Factors in the Adoption and Diffusion of Mobile-Government Services in the Sultanate of Oman. The study aims to identify the factors that have led to the delayed deployment of e-government in Oman, and to investigate the development and diffusion of m-government in the Sultanate, as a means to implementing e-government in the future.

Please place a tick √ by the side of the answer that you wish to give

Background Information

[1] Please indicate your gender?
a) Male b) Female

[2] How old are you?
a) 15-19 b) 20-24 c) 25-29 d) 30-34 e) 35-39
f) 40-44 g) 45-49 h) 50-54 i) 55-59 j) 60 +

[3] What level of education have you completed?
a) Primary school b) Preparatory school c) Secondary School
d) Bachelor degree e) Higher education f) *other please specify*
.....

Computer and Internet Experience

[4] Do you have a P.C at home or Work?
a) Yes b) No
(If *'yes', please mark the level of activity that best describes your use*)

a) Frequently every day b) Regularly (many times a week)
c) Sometimes (many times a month) d) Scarcely (once a month)

(*if yes what do you use a computer for* ***mainly****?*)
.....

[5] Have you ever used the Internet?
a) Yes. b) No.
(*If 'yes', please mark the level of activity that best describes your use*)

a) Frequently every day. b) Regularly (many times a week)
c) Sometimes (many times a month) d) Scarcely (once a month).

[6] Do you agree that the internet cost in Oman is high?
a) I agree strongly b) I agree. c) I don't agree. d) I strongly disagree.

Mobile Phone Experience

[7] Do you have a mobile phone?
a) Yes b) No
(*If 'yes', please mark the level of activity that best describes your use*)

a) Frequently every day. b) Regularly (many times a week)
c) Sometimes (many times a month) d) Scarcely (once a month).

[8] What do you use a mobile phone for ***mainly***? *Choose more than one option if applicable.*

- Voice calls.
- Internet applications (e.g. email, chatting, surfing ...etc)
- Games and amusement.
- Sending SMS and MMS.
- Navigation. (by using the system provided in the mobile telephone to reach a certain location)
- Other (Please define) .....

If you have chosen one answer or more, do you wish to continue using such services if necessary?
a) Yes. b) No. *If 'No', why?*
.....

E-government and M-government Experiences

[9] Have you ever heard of e-government before completing this questionnaire?
a. Yes b. No
If yes, please describe where and how.
.....
.....
[10] Have you ever heard of m-government before completing this questionnaire?
a. Yes b. No
If yes, please describe where and how.
.....
.....
[11] Please describe your opinion of e-government in Oman:
a. Is it going to be helpful to Oman?
a. Yes b. No
If 'No', why?
.....
.....

b. Are you willing to use it?
a. Yes b. No
If 'No', why?

.....
.....
[12] Please describe your opinion of m-government in Oman:
a. Is it going to be helpful to Oman?
a. Yes b. No
If 'No', why?
.....
.....

b. Are you willing to use it?
a. Yes b. No
If 'No', why?
.....
.....

[13] Would you like to read about the new services and experience of e-government by mobile telephone?
a) Yes. b) No.
If the answer is "no", state why?
.....

Muscat Municipality Mobile Parking Project

14) Have you ever used the Muscat Municipality Mobile Parking Service?
a. Yes b. No

If the answer is "yes" state which of the following means was more convincing to you to use such service.
a) Television b) Radio c) Daily Newspapers
d) Friends e) Family f) Internet g) Other (Please define)
.....

15) Do you think that car parking service by mobile phone is useful?
a) Yes. b) No.
If the answer is "no", state why?
.....

16) Do you agree that car parking service by mobile phone is more useful compared with other means (e.g. using coins or ticket system)?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

17) Do you agree that car parking service by mobile telephone is very easy to use?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

18) Do you agree that car parking service by mobile phone can be used easily and does not need much explanation?

a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

19) Do you agree that car parking service by mobile phone is easier for the disabilities than the usual means (e.g. using coins or tickets)?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

20) Do you agree that car parking service by mobile phone saves time and effort?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

21) Do you agree that car parking service by mobile phone provides opportunity for fast and accurate payment of parking fees (e.g. using coins and tickets)?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

22) Do you agree that car parking service by mobile phone will agree with your life style?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

23) Do you agree that car parking service by mobile phone will agree with your expectations when you use other electronic services in the future?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

24) Do you agree that viewing your colleagues using car parking service by mobile phone has encouraged you to use it?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

25) Do you agree that your using car parking service by mobile phone might encourage your family members and friends to use it?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

26) Can we say that car parking service by mobile phone will require mental effort?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

27) Do you believe that using car parking service by mobile phone is usually complicated and not comprehensible?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

28) Do you agree that a specific period of time should be given free of charge to users in order to experience car parking service by mobile phone prior implementing it?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

29) Do you agree that car parking service by mobile phone may be applied at any time?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

30) Do you agree that car parking service by mobile phone is available everywhere in Muscat Governorate?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

31) Do you agree that car parking service by mobile telephone is secure?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

32) Do you agree that Oman Laws will protect you adequately from problems that might arise from using parking service by mobile telephone?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

33) Do you agree that a mobile phone has adequate protective techniques that will encourage the users to use it?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

34) Do you think car parking service by mobile telephone will be used much more in the future?
a) Yes. b) No.
If the answer is "no" state why.
.....

35) How would you rate your satisfaction with the use of this mobile parking service?
a) high. b) Good. c) Average. d) Below average.

Critical Success Factors For the Adoption and Diffusion of Mobile Government services in the Sultanate of Oman

36) The following table constitutes a list of the most important success factors that will help spread e-government and mobile government services which have been tested by many countries. Please specify to what extent these factors are reliable to e-government and mobile government project in the Sultanate of Oman.

Success Factors	Strongly agree	Agree	Disagree	Strongly disagree	If the answer is "Strongly agree or agree" state why?
e-government Vision and Strategy					
Leadership and Support					
ICT Infrastructure and Mobile penetration					
Transformation of Culture					
Human Resource Management and Training/ICT and Mobile Literacy					
Inter- and Intra Organisation Integration					
e-Legislation					
User Considerations – Requirements/ Trust/Privacy Security					
e-readiness and Marketing					
Funding					

37) If you feel there are other CSFs, which were not listed in the above table and are pertinent to Oman's case, please feel free to list them and indicate why you see them relevant?

.....
.....
.....
.....
.....

Thank you so much for your time and assistance

Appendix B:
Survey Template - HEAC Mobile Services Project

Questionnaire (English Version)

Dear (Student)

This study explores the potential for the adoption and diffusion of mobile-government services in the Sultanate of Oman, as a response to the declared goals of the government, and to international pressure to keep abreast of developments in e-government and the furtherance of democracy. This entails considering the concepts of e-government and m-government, probing the literature to discover what that can offer in respect of best practice relating to the critical success factors (CSFs) required for the implementation of such services, and examining as case studies, two m-government initiatives already in existence in Oman, with a view to deconstructing the development and implementation processes involved, and canvassing opinion from the users.

The study aims to identify the factors that have led to the delayed deployment of e-government in Oman, and to investigate the development and diffusion of m-government in the Sultanate, as a means to implementing m-government in the future.

In order to achieve the desired goals, the researcher is conducting a survey with officials and citizens such as yourself, who are in a position to provide valuable information on attitudes to m-government and related data. We would like to invite you to be part of this study, which will help the researcher to identify the Critical Success Factors for the Adoption and Diffusion of m-government services in the Sultanate of Oman. This study has major significance to the Oman government in general and the Omani people in particular. It will assist Oman in the uptake and planning for e-government and m-government. It will explore the impacts of the national/cultural issues in Oman on m-government, report on impediments and propose solutions. In addition, this project will be committed to addressing and resolving societal needs in relation to IT, and will help to smooth the introduction of e-government and m-government in Oman.

I assure you that all responses will be confidential and I that the anonymity of all participants will be respected and preserved.

Return of the survey form will constitute your consent to participate in the study. However, should you wish, you are free to withdraw from this investigation at any time, and without any need to give a reason.

Thank you in anticipation of your involvement.

Yours sincerely
Ahmed Al-Hadidi
00968 95586786
Email: Al-HadidiA@cardiff.ac.uk

Higher Education Admission Centre Mobile Services Project: Factors Influencing Adoption and Diffusion

This survey is part of a study into Critical Success Factors in the Adoption and Diffusion of Mobile-Government Services in the Sultanate of Oman. The study aims to identify the factors that have led to the delayed deployment of e-government in Oman, and to investigate the development and diffusion of m-government in the Sultanate, as a means to implementing e-government in the future.

Background Information

Please place a tick √ by the side of the answer that you wish to give

[1] What is your age?
a. Less than or equal 20 b. Above 20

[2] Please indicate your gender?
a) Male b) Female

[3] From which Governorate or Region are you from?
a. The Governorate of Muscat
b. The Governorate of Dhofar
c. The Governorate of Musandam
d. The Governorate of Buraimi
e. The Batinah Region
f. The Dakhiliyah Region
g. The Dhahirah Region
h. The Sharqiyah Region
i. The Wusta Region

Computer and Internet Experience

[4] Do you have a P.C at home or Work?
a) Yes b) No
(*If 'yes', please mark the level of activity that best describes your use*)

a) Frequently every day b) Regularly (many times a week)
c) Sometimes (many times a month) d) scarcely (once a month)

(*if yes what do you use a computer for* ***mainly****?*)
.....

[5] Have you ever used the Internet?
a) Yes. b) No.
(*If 'yes', please mark the level of activity that best describes your use*)

a) Frequently every day. b) Regularly (many times a week)
c) Sometimes (many times a month) d) Scarcely (once a month).

[6] Do you agree that the internet cost in Oman is high?
a) I agree strongly b) I agree. c) I don't agree. d) I strongly disagree.

Mobile Phone Experience

[7] Do you have a mobile phone?
a) Yes b) No
(*If 'yes', please mark the level of activity that best describes your use*)

a) Frequently every day. b) Regularly (many times a week)
c) Sometimes (many times a month) d) Scarcely (once a month).

[8] What do you use a mobile phone for ***mainly***? *Choose more than one option if applicable.*

- Voice calls.
- Internet applications (e.g. email, chatting, surfing ...etc)
- Games and entertainment.
- Sending SMS and MMS.
- Navigation. (by using the system provided in the mobile telephone to reach a certain location)
- Reading Newspaper
- Down load Tones and Programs
- Other (Please define) .....

If you have chosen one answer or more, do you wish to continue using such services if necessary?
a) Yes. b) No. *If 'No', why?*
.....

E-government and M-government Experiences

[9] Have you ever heard of e-government before completing this questionnaire?
a. Yes b. No
If yes, please describe where and how.
.....
.....
[10] Have you ever heard of m-government before completing this questionnaire?
a. Yes b. No
If yes, please describe where and how.
.....
.....

[11] Please describe your opinion of e-government in Oman:
a. Is it going to be helpful to Oman?

a. Yes b. No
If 'No', why?
.....
.....

b. Are you willing to use it?
a. Yes b. No
If 'No', why?
.....
.....
[12] Please describe your opinion of m-government in Oman:
a. Is it going to be helpful to Oman?
a. Yes b. No
If 'No', why?
.....
.....

b. Are you willing to use it?
a. Yes b. No
If 'No', why?
.....
.....

[13] Would you like to read about the new services and experience of e-government by mobile phone?
a) Yes. b) No.
If the answer is "no", state why?
.....

Higher Education Admission Centre Mobile Services

14) Have you ever used the Higher Education Admission Centre (HEAC) by mobile phone?
a. Yes b. No

If the answer is "yes" state which of the following means was more convincing to you to use such service.
a) Television b) Radio c) Daily Newspapers
d) Friends e) Family f) Internet g) Other (Please define)
.....

15) Do you think that HEAC service by mobile phone is useful?
a) Yes. b) No.
If the answer is "no", state why?
.....

16) Do you agree that HEAC service by mobile phone is more useful compared with other means (e.g. using Internet or register by yourself)?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

17) Do you agree that HEAC service by mobile phone is very easy to use?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

18) Do you agree that HEAC service by mobile phone can be used easily and does not need much explanation?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

19) Do you agree that HEAC service by mobile phone is easier for the disabilities than the usual means (e.g. using Internet or register by yourself)?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

20) Do you agree that HEAC service by mobile phone saves time and effort?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

21) Do you agree that HEAC service by mobile phone provides opportunity for fast and accurate results than the usual means (e.g. using Internet or register by yourself)?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

22) Do you agree that HEAC service by mobile phone will agree with your life style?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

23) Do you agree that HEAC service by mobile phone will agree with your expectations when you use other electronic services in the future?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

24) Do you agree that viewing your colleagues using HEAC service by mobile phone has encouraged you to use it?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

25) Do you agree that your using HEAC service by mobile phone might encourage your family members and friends to use it?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

26) Can we say that HEAC service by mobile phone will require mental effort?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

27) Do you believe that using HEAC service by mobile phone is usually complicated and not comprehensible?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

28) Do you agree that a specific period of time should be given free of charge to users in order to experience HEAC service by mobile phone prior implementing it?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

29) Do you agree that HEAC service by mobile phone may be applied at any time?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

30) Do you agree that HEAC service by mobile phone is available everywhere in the Sultanate of Oman?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

31) Do you agree that HEAC service by mobile phone is secure?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

32) Do you agree that Oman Laws will protect you adequately from problems that might arise from using HEAC service by mobile telephone?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

33) Do you agree that a mobile phone has adequate protective techniques that will encourage the users to use it?
a) I strongly agree. b) I agree. c) I disagree. d) I strongly disagree.

34) Do you think HEAC service by mobile phone will be used much more in the future?
a) Yes. b) No.
If the answer is "no" state why.
.....

35) How would you rate your satisfaction with the use of this HEAC mobile service?
a) high. b) Good. c) Average. d) Below average.

Critical Success Factors For the Adoption and Diffusion of Mobile Government services in the Sultanate of Oman

36) The following table constitutes a list of the most important success factors that will help spread e-government and mobile government services which have been tested by many countries. Please specify to what extent these factors are reliable to e-government and mobile t government project in the Sultanate of Oman.

Success Factors	Strongly agree	Agree	Disagree	Strongly disagree	If the answer is "Strongly agree or agree" state why?
e-government Vision and Strategy					
Leadership and Support					
ICT Infrastructure and Mobile penetration					
Transformation of Culture					
Human Resource Management and Training/ICT and Mobile Literacy					
Inter- and Intra Organisation Integration					
e-Legislation					
User Considerations – Requirements/ Trust/Privacy Security					
e-readiness and Marketing					
Funding					

Thank you so much for your time and assistance

Appendix C:
Interview Guide

Draft Letter to Interview Participants

PO Box 918
PC 121 Al-Seeb
Oman

January 04, 2009

Dear (Sir/Madam)

This study explores the potential for the adoption and diffusion of mobile-government services in the Sultanate of Oman, as a response to the declared goals of the government, and to international pressure to keep abreast of developments in e-government and the furtherance of democracy. This entails considering the concepts of e-government and m-government, probing the literature to discover what that can offer in respect of best practice relating to the critical success factors (CSFs) required for the implementation of such services, and examining as case studies, two m-government initiatives already in existence in Oman, with a view to deconstructing the development and implementation processes involved, and canvassing opinion from the users.

The study aims to identify the factors that have led to the delayed deployment of e-government in Oman, and to investigate the development and diffusion of m-government in the Sultanate, as a means to implementing e-government in the future.

In order to achieve the desired goals, the researcher is conducting a survey with officials and citizens such as yourself, who are in a position to provide valuable information on attitudes to m-government and related data. We would like to invite you to be part of this study, which will help the researcher to identify the Critical Success Factors for the Adoption and Diffusion of m-government services in the Sultanate of Oman. This study has major significance to the Oman government in general and the Omani people in particular. It will assist Oman in the uptake and planning for e-government and m-government. It will explore the impacts of the national/cultural issues in Oman on m-government, report on impediments and propose solutions. In addition, this project will be committed to addressing and resolving societal needs in relation to IT, and will help to smooth the introduction of e-government and m-government in Oman.

I assure you all responses will be confidential and your anonymity will be completely respected and preserved. Could I ask you please to complete the attached Consent Form prior to our interview.

Please note that you are free to withdraw from this investigation at any time. Thank you in anticipation of your involvement.

Yours sincerely,
Ahmed Al-Hadidi
00968 95586786
Email: Al-HadidiA@cardiff.ac.uk

Consent Form for Interview Participants

CERTIFICATION BY PARTICIPANT

Name,.....

From.....

certify that I am at least 18 years old and that I am voluntarily giving my consent to provide information for the above described project entitled: **Critical Success Factors in the Adoption and Diffusion of mobile-government Services in Oman,** being conducted at Cardiff University, Cardiff School of Engineering, by: Mr. Ahmed Al-Hadidi.

I certify that the objectives of the experiment, together with any risks to me associated with the procedures listed hereunder to be carried out in the project, have been fully explained to me and that I freely consent to participate in this project.

Procedures:
Semi-structured interview conducted by Mr. Ahmed Al-Hadidi. 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. Serious measures will be taken to ensure the anonymity and confidentiality of the participant and the information collected.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this experiment 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: .....**

Witness other than the experimenter:

.....

Any queries about your participation in this project may be directed to the researcher (Name: Mr. Ahmed Al-Hadidi, ph. +968 95586786). If you have any queries or complaints about the way you have been treated, you may contact the Secretary, Cardiff University, Cardiff School of Engineering, PO Box 927 Cardiff CF24 0DE (telephone no: +44 (0)29 2087 4404).

Interview Guide

The following is the general framework for the set of questions that will be asked during interviews

Participants' ICT Knowledge

General information to include:
- Gender
- Age
- Organisation and position details
- Education level

Computer and internet/email/intranet usage
Communication methods

Organisation and IT Services

To understand in more detail the organisations involved in the two case studies and how they affect and are affected by e- and m-Government across the Municipality:

Planning and supervision of project, Budget, etc.

What is your view regarding the Vision and strategy in utilising ICT to improve day-to-day operations?

How advanced is your organisations adoption of e-Government and mobile services?

What are the major barriers?

Are there any technical issues?

What is your view on the potential for m-Government services to function as a driving force for e-Government adoption?

Individual Project (MMMP/HEAC)

Do you, or have you ever, personally used the mobile services of your project?

How is the mobile service an improvement? (e.g. more useful, easy to use, easier for disabled users, time saving, agreeable with your lifestyle)

Is there an element of peer recommendation for extending use of the mobile service to others?

What is your view on extending a free trial period for new services to users?

What are your opinions regarding security and legal issues in relation to mobile services?

E-government and m-government Project Management and Control

What is your general e-Government experience?

What is your assessment of e-Government initiatives to date?

What is your general m-Government experience?

Do you think that mobile services could have a major role in the dissemination of e-services generally?

Do you think there is potential for m-government (mobile-government) services to function as a driving force for e-government adoption in your organisation?

Technical Barriers Facing e-Government and m-Government

Examine and discuss:

Communications infrastructure;
Privacy/security;
Data recovery

Are there any other barriers in your opinion?

Non-Technical Barriers Facing e-Government and m-Government

Examine and discuss:

Computer literacy;
Laws/legislation;
Financial considerations;
General awareness and motivation;
Trust issues;
Education and training;
Culture and language;

Are there any other barriers in your opinion?

Critical Success Factors for Implementing E-government and m-government in the Sultanate of Oman

Discuss the 10-point CSF model, examining each CSF in turn.

In your opinion, what other CSFs exist, which are not in this model?

Appendix D: Quantitative Analysis of Demographic Variables

Quantitative Analysis of Demographic Variables on the m-Government Adoption Model for Oman

Three statistical tests were employed to test the seven dimensions of the m-Government Adoption Model for Oman against the three demographic variables (Age, Gender and Education level) from the Phase One results.

Perceived Usefulness

Table D1 shows Levene's Test of Equality of Error Variance on the results from Case Study One (MMMP):

Table D1 Levene's Test of Equality of Error Variance.
Variable1 : Usefulness

F	Df1	Df2	Sig.
2.632	35	183	.000

The variation in the usefulness dimension and the demographic variables (where P-value is < 0.05), demonstrates that at least one demographic variable had some effect on the extent of the usefulness associated with m-parking. In Table D2 (General Linear Model), R Squared= 94.1%, showing the amount of variation relating to the usefulness dimension:

Table D2 Tests Between Subject Effects
Variable1 : Usefulness

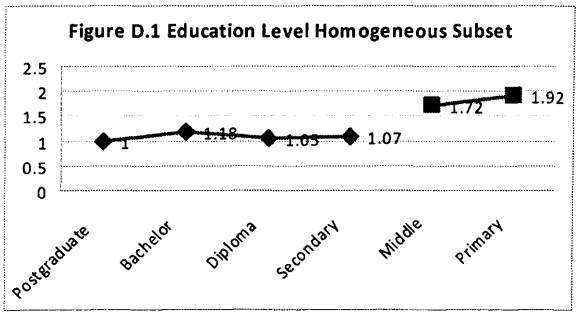
Source	F	Sig.
Education Level	14.934	.000
Age	.515	.725
Gender	.975	.325

R Squared = .941 (Adjusted R Squared = .938)

In order to investigate this effect, the averages of the usefulness dimension were compared across the three variables (Education level, Gender and Age) by using the POST HOC TEST. The results are as shown in Table D3 and Figure D.1:

Table D3 Education Level Homogeneous Subset.
Variable1 : Usefulness

		Subset	
Education Level	Number	1	2
Postgraduate	6	1.00	
Bachelor	51	1.18	
Diploma	22	1.05	
Secondary	105	1.07	
Middle	25		1.72
Primary	10		1.92



Education Level: Table D2 shows that the P-value < 0.05 meaning the result is significant and education level does have an influence. Table D3 and Figure D.1 indicate that by using the POST HOC TEST, this variation was obvious among the

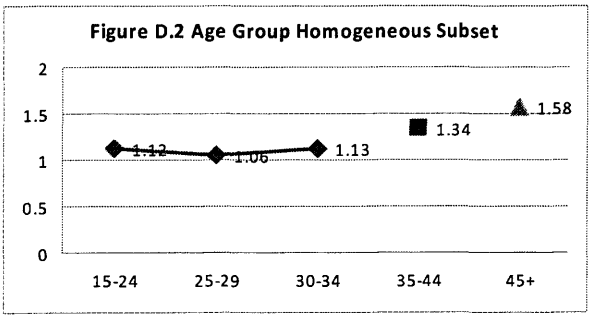
higher educational levels (Postgraduate, Bachelor Degree, Diploma, and Secondary School). Where the higher educational levels tend to show that it is useful to use m-parking for booking car parking areas (marginal mean CLOSER to 1 which is "yes"), the lower educational levels (Primary School, Middle School) tend to show the opposite and prefer to use coins or the ticket system (marginal mean around 2, which is "no").

Gender: Table D2 shows that the gender variable has no effect on the usefulness dimension, P-value > 0.05, showing an insignificant mean.

Age: The General Linear Model in Table D2 shows that neither Age nor Gender has any affect (P-value > 0.05), but after ignoring the Age and Gender variables in the General Linear Model, and using the POST HOC TEST, a variation in the Usefulness dimension and the Age variable emerges, because the younger ages (15-24), (25-29) and (30-34) behave consistently in that dimension, tending to believe that it is more useful to use m-parking than the coin or ticket system. Then, from category 35-44, this variation begins to fall, reaching its lowest point at the 45+ category, in which respondents tend to believe the opposite, (marginal mean closer to 2, which is "no"). This variation is shown in Table D4 and Figure D.2:

Table D4 Age Group Homogeneous Subset.
Variable1 : Usefulness

		Subset		
Age Group	Number	1	2	3
15-24	42	1.12		
25-29	53	1.06		
30-34	64	1.13		
35-44	29		1.34	
45+	31			1.58



The results from Case Study Two (HEAC) are shown in Table D5:

Table D5 Levene's Test of Equality of Error Variance.
Variable1 : Usefulness

F	Df1	Df2	Sig.
12.706	9	241	.000

Table D5 shows the variation in the Usefulness dimension and the demographic variables (P-value is< 0.05). This means that at least one of the demographic variables had some effect on the extent of the usefulness, indicating that the HEAC service is more useful than other means (e.g.Internet or personal application).

The Model in Table D6 (General Linear Model) shows that R Squared= 9.5% of this variation relating to the Usefulness dimension:

Table D6 Tests of Between Subject Effects
Variable1 : Usefulness

Source	F	Sig.
Education Level	9.747	.000
Age	.210	.648
Gender	4.955	.057

R Squared = .095 (Adjusted R Squared = .081)

In order to determine this effect, the averages of the Perceived Usefulness dimension in the three variables (Education level, Gender and Age) are compared using the POST HOC TEST. The results are as shown in Table D7 and Figure D.3:

Table D7 Education Level Homogeneous Subset.Variable1 : Usefulness

		Subset	
Education Level	Number	1	2
Secondary School	66	1.03	
Two Years After School	123	1.14	
One Year After School	62		1.31

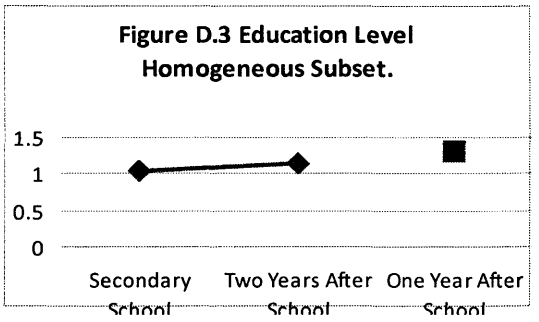


Figure D.3 Education Level Homogeneous Subset.

Education Level: the results from Table D6 show that P-value < 0.05, indicating the result to be significant, and that the education level has an effect. Also, Table D7 and Figure D.3 show such variation by using the POST HOC TEST which divides the Education Level into two homogeneous groups, each having a different view – one from the educational levels incorporating Secondary School, and Two years after school, and the other being One year after school. While the educational levels of Secondary School, and Two years after school tend to show that it is more useful to use the HEAC mobile service than other means (e.g. Internet or self-registration) (marginal mean CLOSER to 1 which is "yes"), only some of the educational level of One year after school show the opposite, preferring to use the Internet or register by themselves (marginal mean around 2, which is "no").

Gender: Table D6 indicates that gender seems to have no effect on the Perceived Usefulness dimension (P-value<0.05), since both sexes were positive about using the HEAC m-service in preference to other means (the marginal mean is CLOSER to 1, which is "yes").

Age: In Table D6, using the General Linear Model, it is seen that age has no effect on the Usefulness dimension. Both age groups were positive about the Usefulness of the system and both preferred to use the HEAC m-service rather than other means. The marginal mean is CLOSER to 1, which is "yes").

Perceived Ease of Use

The results from Case Study One (MMMP) are shown in Table D8:

Table D8 Levene's Test of Equality of Error Variance.
Variable2: Ease of Use

F	Df1	Df2	Sig.
3.008	35	183	.000

According to Table D8, there is variation in the Perceived Ease of Use Dimension and the Demographic variables (P-value < 0.05), meaning that at least one of the Demographic variables had an affect in this respect. The Model in Table D9 (General Linear Model) shows that R Squared= 89.2 % of this variation in the Ease of Use Dimension:

Table D9 Tests of Between Subject Effects
Variable2: Ease of Use

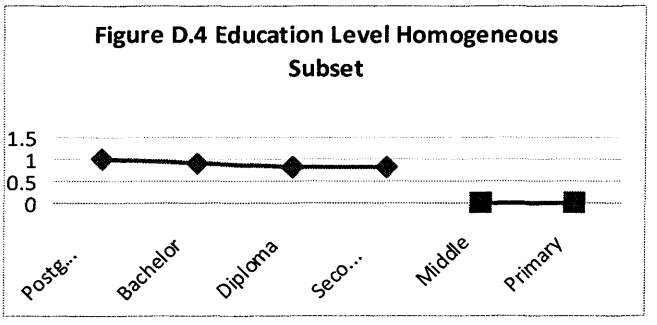
Source	F	Sig.
Education Level	25.107	.000
Age	1.260	.287
Gender	.016	.900

R Squared = .892 (Adjusted R Squared = .886)

In order to investigate such variation a comparison was made between the averages of the Ease of Use Dimension across the three variables. The POST HOC TEST was used for this purpose, and the following emerged:

Table D10 Education Level Homogeneous Subset.
Variable2 : Ease of Use

		Subset	
Education Level	Number	1	2
Postgraduate	6	1.00	
Bachelor	51	.92	
Diploma	22	.82	
Secondary	105	.82	
Middle	25		.00
Primary	10		.00



Education Level: From Table D9, it is seen that the P-value < 0.05, indicating the result to be significant, and hence that the Education level has an effect. Also Table D10 and Figure D.4 indicate such variation through the use of the POST HOC TEST, which divided the Education level into two homogeneous groups, each having a different view. This higher educational levels (Secondary School, Diploma, Postgraduate, and Bachelor Degree) believed m-parking was easy to use (marginal mean CLOSER to 1 which is "yes"); the lower levels (Primary School, Middle School) tending to believe the opposite and that much explanation was needed in this respect (marginal mean around "0" which is "no").

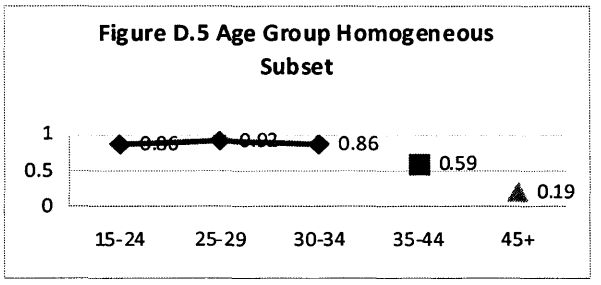
Gender: From Table 8.12, it can be seen that Gender has no effect on the Ease of Use dimension (P-value > 0.05).

Age: In the General Linear Model, the variables of Gender and Age had no affect (P-value > 0.05 as in Table D9), but when these variables were ignored in the POST HOC TEST, variation was found in the Perceived Ease of Use dimension. The Age variable was divided into three homogeneous groups, with the younger ages (15-24),

(25-29) and (30-34) behaving consistently in the Perceived Ease of Use dimension, tending to believe it is easier to use m-parking than the traditional methods (Marginal mean CLOSER to 1 which is "yes"). From the 35-44 year old category this began to fall, reaching its lowest point at the 45+ category. Therefore, from this result, the 45+ category tends to believe the opposite: that m-parking is not easy to use (Marginal mean CLOSER to 2 which is "NO"). Table D11 and Figure D.5 show this variation:

Table D11 Age Group Homogeneous Subset.Variable2: Ease of Use

		Subset		
Age Group	Number	1	2	3
15-24	42	.86		
25-29	53	.92		
30-34	64	.86		
35-44	29		.59	
45+	31			.19



The results from Case Study Two (HEAC) are shown in Table D12:

Table D12 Levene's Test of Equality of Error Variance. Variable2: Ease of Use

F	Df1	Df2	Sig.
3.815	9	241	.000

According to Table D12 there is variation between the Perceived Ease of Use dimension and the demographic variables (P-value < 0.05), indicating that at least one demographic variable had an effect on the perception of the Perceived Ease of Use associated with the HEAC service. The Model indicated in Table D13 (General Linear Model) shows that R Squared= 2.8% of the variation in the Perceived Ease of Use dimension:

Table D13 Tests of Between Subject Effects Variable2: Ease of Use

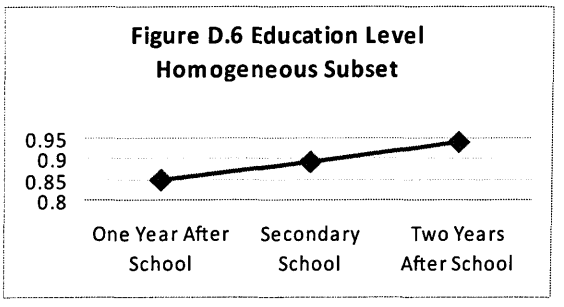
Source	F	Sig.
Education Level	1.835	.162
Age	2.888	.090
Gender	.016	.898

R Squared = .028 (Adjusted R Squared = .012)

Therefore, to determine such affect the averages of the Perceived Ease of Use dimension across the three variables (Education Level, Gender, Age) was calculated using the POST HOC TEST, and the following emerged:

Table D14 Education Level Homogeneous Subset. Variable2: Ease of Use

		Subset
Education Level	Number	1
One Year After School	62	.85
Secondary School	66	.89
Two Years After School	123	.94



Education Level: From Table D13, it is seen that P-value > 0.05 and the Education level variable seems to have no effect on the Perceived Ease of Use dimension. This was confirmed in Table D13 and Figure D.6 by the POST HOC TEST result, which placed the Education Level variable into one homogeneous group only. It was evident from the POST HOC TEST that all educational levels held the opinion that the HEAC m-service was easy to use and did not require much explanation (marginal mean CLOSER to 1 which is "yes" which is positive).

Gender: From Table D13, it is seen that Gender appears to have no effect on the Perceived Ease of Use dimension (P-value > 0.05). Both sexes were positive towards the Perceived Ease of Use (marginal mean CLOSER to 1 which is "yes").

Age: In Table D13, Age is shown to have no effect on the Perceived Ease of Use dimension (P-value > 0.05). Both age groups were positive in this respect (marginal mean CLOSER to 1 which is "yes").

Relative Advantage

The results from Case Study One (MMMP) are shown in Table D15:

Table D15 Levene's Test of Equality of Error Variance.
Variable3: Relative Advantage

F	Df1	Df2	Sig.
1.503	35	183	.046

Table D15 demonstrates a variation in the Relative advantage dimension and the Demographic variables (P-value) >= 0.05, meaning that at least one demographic variable had an effect on this particular dimension. The General Linear Model indicated in Table D16 shows that R Squared = 89.9% of this variation is in the Relative advantage dimension:

Table D16 Tests of Between Subject Effects
Variable3: Relative Advantage

Source	F	Sig.
Education Level	.763	.577
Age	.981	.419
Gender	.197	.658

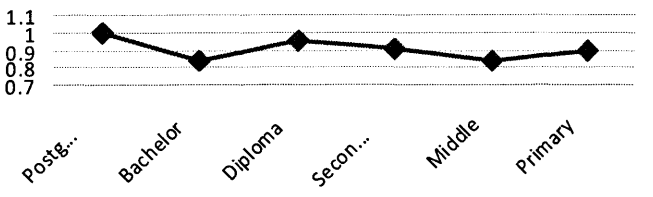
R Squared = .899 (Adjusted R Squared = .894)

In order to investigate this effect, the averages of the Relative advantage dimension across the three variables (Education Level, Gender and Age) were compared using the POST HOC TEST, and the following results were obtained:

Table D17 Education Level Homogeneous Subset.
Variable3: Relative Advantage

Education Level	Number	Subset 1
Postgraduate	6	1.00
Bachelor	51	.84
Diploma	22	.95
Secondary	105	.91
Middle	25	.84
Primary	10	.90

Figure D.7 Education Level Homogeneous Subset



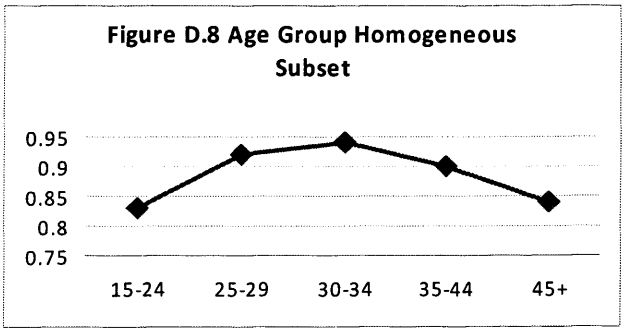
Education Level: There was no affect from this (P-value > 0.05) as shown in Tables D16 and D17, and Figure D.7 after using the POST HOC TEST. The Education Level was not disaggregated, there being one consistent group (marginal mean CLOSER to 1 which is "yes"). It was evident within all educational levels that all respondents perceived a relative advantage of m-parking (saving time and effort).

Gender: Likewise, there was no effect upon the Relative advantage dimension from Gender (P-value > 0.05), as demonstrated in Table D16.

Age: As with the previous two variables, the General Linear Model (Table D16) shows no variation (P-value > 0.05). When ignoring the Age and Gender variables in the General Linear Model, and using the POST HOC TEST, variation was found as seen in Table D18 and Figure D.8, to the effect that all age groups behaved the same in respect of the Relative advantage dimension (marginal mean CLOSER to 1, which is "yes"), thereby confirming that m-parking was perceived by all ages to save time and effort:

Table D18 Age Group Homogeneous Subset.
Variable3: Relative Advantage

		Subset
Age Group	Number	1
15-24	42	.83
25-29	53	.92
30-34	64	.94
35-44	29	.90
45+	31	.84



The results from Case Study Two (HEAC) are shown in Table D19:

Table D19 Levene's Test of Equality of Error Variance.
Variable3: Relative Advantage

F	Df1	Df2	Sig.
41.645	9	241	.000

Table D19 shows a variation between the Relative advantage dimension and the Demographic variables (P-value < 0.05), meaning that at least one of the demographic variables has an influence on the Relative Advantage dimension. The General Linear Model indicated in Table D20 shows that R Squared= 26.2% of variation in the dimension:

Table D20 Tests of Between Subject Effects
Variable3: Relative Advantage

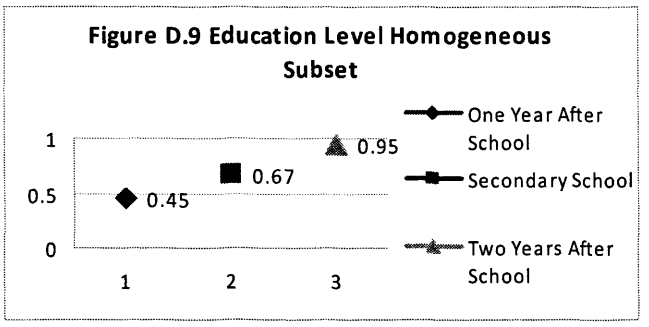
Source	F	Sig.
Education Level	33.222	.000
Age	.710	.400
Gender	8.759	.003

R Squared = .262 (Adjusted R Squared = .250)

In order to establish this effect, a comparison of the averages (General Linear Model) of the Relative advantage dimension in the three variables (Education Level, Gender and Age) was undertaken using the POST HOC TEST. The results are as follows:

Table D21 Education Level Homogeneous Subset.
Variable3 : Relative Advantage

Education Level	Number	Subset 1	2	3
One Year After School	62	.45		
Secondary School	66		.67	
Two Years After School	123			.95



Education Level: the results shown in Table D20 show P-value < 0.05, meaning the outcome is significant and that education level is influential. Additionally, Table D21 and Figure D.9 indicate a variation between the education level and the Relative advantage dimension, which was further demonstrated by the POST HOC TEST. This test divided the education level into three consistent groups. The Two years after school level were positive about the Relative advantage dimension, believing the HEAC m-service to save time and effort (marginal mean CLOSER to 1 which is "yes"), while the One year after school level did not agree (marginal mean CLOSER to 0 which is "no").

Gender: From Table D20, it can be seen that Gender has an effect on the Relative advantage dimension (P-value < 0.05), since females were more positive about this dimension (marginal mean CLOSER to 1 which is "yes").

Age: The results from Table D20 show that Age, on the other hand, has no effect on the Relative advantage dimension (P-value>0.05).

Compatibility

The results from Case Study One (MMMP) are shown in Table D22:

Table D22 Levene's Test of Equality of Error Variance.
Variable4: Compatibility

F	Df1	Df2	Sig.
5.294	35	183	.000

According to Table D22, there is variation in the Compatibility dimension and the Demographic variables (P-value < 0.05), meaning that at least one demographic variable had an effect on the extent of perceived compatibility of m-parking with the users' lifestyles. The General Linear Model indicated in Table D23 shows that R Squared 96.3 % of this variation in the Compatibility dimension:

Table D23 Tests of Between Subject Effects
Variable4: Compatibility

Source	F	Sig.
Education Level	62.846	.000
Age	4.691	.001
Gender	.324	.570

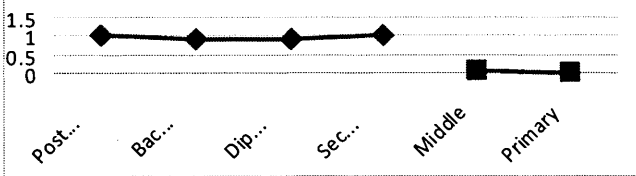
R Squared = .963 (Adjusted R Squared = .961)

Consequently, in order to investigate such affect a comparison was made between the averages of the Compatibility dimension and the three variables: (Education Level, Gender, Age) by using the POST HOC TEST, from which the following emerged:

Table D24 Education Level Homogeneous Subset.
Variable4: Compatibility

Education Level	Number	Subset 1	Subset 2
Postgraduate	6	1.00	
Bachelor	51	.92	
Diploma	22	.91	
Secondary	105	1.00	
Middle	25		.08
Primary	10		.00

Figure D.10 Education Level Homogeneous Subset



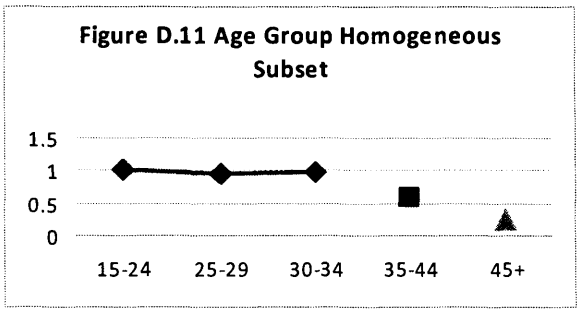
Education Level: the results shown in Table D23 indicate the P-value < 0.05 and the POST HOC TEST results in Table D24 and Figure D.10 confirm such variation. In this test, the Education Level was divided into two homogeneous groups, each of which had a different view. The higher educational levels considered m-parking to be compatible with their lifestyles (marginal mean CLOSER to 1 which is "yes"); the lower levels (Primary School, Middle School) tend to believe the opposite (marginal mean around 0 which is "no").

Gender: From Table 8.26 it can be seen that Gender has no effect on the Compatibility dimension (P-value > 0.05).

Age: Age in the General Linear Model was seen to have an effect, with the P-value < 0.05 as shown in Table D23. When the Age and Gender variables were ignored in the General Linear Model, and the POST HOC TEST was performed, variation was found between the Compatibility dimension and age, the latter being divided into three homogeneous groups. This occurred because the younger age groups (15-24), (25-29) and (30-34) behaved consistently in the Compatibility dimension, tending to believe that m-parking agreed with their lifestyles (marginal mean CLOSER to 1 which is "yes"). From the 35-44 category, this influence began to fall, reaching its lowest point at the 45+ category, which believes the opposite to the younger age groups (marginal mean CLOSER to 2 which is "NO"). Table D25 and Figure D.11 show this variation:

Table D25 Age Group Homogeneous Subset.
Variable4: Compatibility

Age Group	Number	Subset 1	2	3
15-24	42	1.00		
25-29	53	.96		
30-34	64	.97		
35-44	29		.59	
45+	31			.26



The results from Case Study Two (HEAC) are shown in Table D26:

Table D26 Levene's Test of Equality of Error Variance.
Variable4: Compatibility

F	Df1	Df2	Sig.
18.915	9	241	.000

Table D26 indicates variation between the Compatibility dimension and the Demographic variables (P-value < 0.05) meaning that at least one of the demographic variables had an effect on the Compatibility dimension in respect of the HEAC m-registration service. The General Linear Model in Table D27 shows that R Squared= 11.1 % of the variation in the Compatibility variable:

Table D27 Tests of Between Subject Effects
Variable4: Compatibility

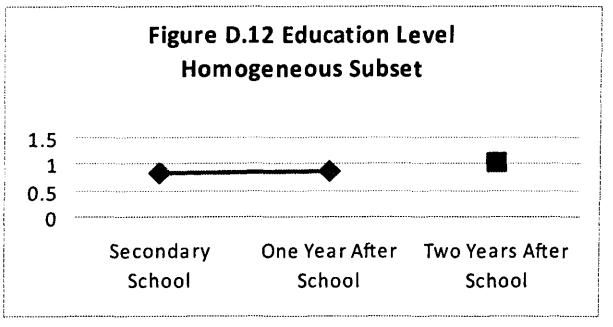
Source	F	Sig.
Education Level	7.548	.001
Age	3.373	.067
Gender	4.659	.052

R Squared = .111 (Adjusted R Squared = .097)

In order to determine the effect, the averages of the Compatibility dimension across the three variables (Education Level, Gender, and Age) were compared by using the POST HOC TEST. The following results emerged:

Table D28 Education Level Homogeneous Subset.
Variable4: Compatibility

Education Level	Number	Subset 1	2
Secondary School	66	.83	
One Year After School	62	.85	
Two Years After School	123		1.00



Education Level: From Table D27 it is seen that the P-value < 0.05, and the results from Table D28 and Figure D.12 confirm variation between the Education level and the Compatibility dimension. This was further proved by performing the POST HOC TEST, which divided the Education Level into two homogeneous groups, each seemingly having the same effect on the Compatibility dimension (marginal mean CLOSER to 1 which is "yes"). However, the Two years after school level indicated greater compatibility with their lifestyles than did the Secondary School and One year after school groups.

Gender: Gender seems to have no effect on the Compatibility dimension (P-value < 0.05) (Table D27). Both gender groups were positive towards the Compatibility variable (marginal mean CLOSER to 1 which is "yes").

Age: From Table D27, it is seen that age in the General Linear Model seems to have no effect on the Compatibility dimension (P-value <0.05), with both age groups being positive in this respect (marginal mean CLOSER to 1 which is "yes") believing that the HEAC m-registration was compatible with their lifestyles.

Complexity

The results from Case Study One (MMMP) are shown in Table D29:

Table D29 Levene's Test of Equality of Error Variance.
Variable5: Complexity

F	Df1	Df2	Sig.
3.927	35	183	.000

Table D29 shows a variation in the Complexity dimension and the Demographic variables (P-value < 0.05) indicating that at least one of the demographic variables had an effect on Complexity. As shown in Table D30, the General Linear Model confirms that R Squared = 60% of this variation:

Table D30 Tests of Between Subject Effects
Variable5: Complexity

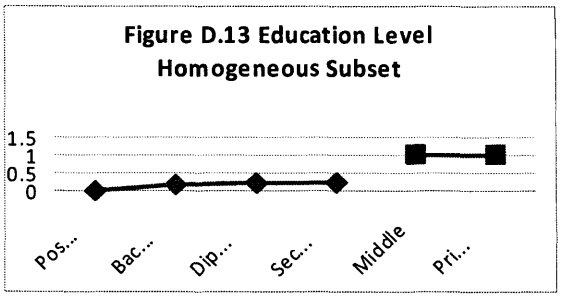
Source	F	Sig.
Education Level	16.950	.000
Age	1.540	.192
Gender	2.593	.109

R Squared = .600 (Adjusted R Squared = .579)

Subsequently, in order to investigate this affect, a comparison of the averages of the Complexity dimension across the three variables (Education Level, Gender and Age) was made by using the POST HOC TEST. The results are as follows:

Table D31 Education Level Homogeneous Subset.
Variable5 : Complexity

Education Level	Number	Subset 1	Subset 2
Postgraduate	6	.00	
Bachelor	51	.14	
Diploma	22	.25	
Secondary	105	.25	
Middle	25		1.00
Primary	10		1.00



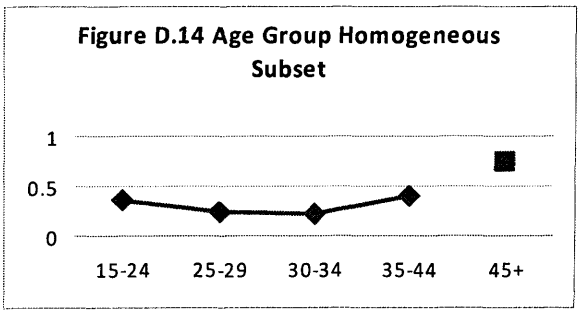
Education Level: Table D30 shows that the P-value < 0.05, and Table D31 and Figure D.13 indicate such variation through the use of the POST HOC TEST. This test divided the Education Level into two homogeneous groups, each of which had a different view. This higher educational levels (Secondary School, Diploma, Postgraduate, and Bachelor Degree) believe that m-parking was not complicated (marginal mean CLOSER to 1 which is "yes"); the lower levels (Primary School, Middle School) tend to believe the opposite (marginal mean around 0 which is "no").

Gender: Gender has no effect on the Complexity dimension, (P-value) > 0.05.

Age: Age also had no effect, with a P-value > 0.05 as shown in Table D30. When the Age and Gender variables were ignored in the General Linear Model, and by using the POST HOC TEST a difference emerged between the Complexity dimension and the Age variable because the 45+ category tends to believe that m-parking was complex (marginal mean CLOSER to 1 which is "yes"). The younger ages (15-24), (25-29), (30-34) and (35-44) tend to believe quite the opposite (marginal mean CLOSER to 2 which is "no"). Table D32 and Figure D.14 show this variation:

Table D32 Age Group Homogeneous Subset.
Variable5: Complexity

Age Group	Number	Subset 1	Subset 2
15-24	42	.36	
25-29	53	.25	
30-34	64	.22	
35-44	29	.41	
45+	31		.74



The results from Case Study Two (HEAC) are shown in Table D33:

Table D33 Levene's Test of Equality of Error Variance.
Variable5: Complexity

F	Df1	Df2	Sig.
2.841	9	241	.003

Table D33 shows a variation between the Complexity dimension and the Demographic variables (P-value < 0.05), meaning that at least one of the demographic variables had an effect on this dimension. The General Linear Model shown in Table D34 indicates that R Squared= 4.6 % of this variation in the Complexity dimension:

Table D34 Tests of Between Subject Effects
Variable5: Complexity

Source	F	Sig.
Education Level	1.521	.220
Age	1.669	.198
Gender	4.617	.053

R Squared = .046 (Adjusted R Squared = .030)

In order to establish the variation, a comparison of the averages of the Complexity dimension across the three variables (Education Level, Gender, Age) was made by using the POST HOC TEST. The results are as follows:

Table D35 Education Level Homogeneous Subset.
Variable5 : Complexity

Education Level	Number	Subset 1
Secondary School	66	.52
One Year After School	62	.50
Two Years After School	123	.36

Figure D.15 Education Level Homogeneous Subset

Education Level: From Table D34, it is seen that the P-value > 0.05 and therefore, the education level variable has no effect on the Complexity dimension. Also, from Table D35 and Figure D.15, indicating the results of the POST HOC TEST, it is seen that the Education Level variable produced only one homogeneous group, and the outcome was negative in respect of the Complexity variable (marginal mean CLOSER to 0 which is "no"). This shows that all the respondents believed the HEAC m-service to be uncomplicated.

Gender: Gender has no effect on the Complexity dimension, (P-value < 0.05), as shown in Table D34 (marginal mean CLOSER to Zero which is "no"). Both males and females were negative in terms of the Complexity dimension, believing the HEAC m-service to be uncomplicated.

Age: Equally, Age in the General Linear Model has no effect on the Complexity dimension (P-value<0.05). Both age groups were negative (marginal mean CLOSER to 0 which is "no").

Triability

The results from Case Study One (MMMP) are shown in Table D36:

Table D36 Levene's Test of Equality of Error Variance.
Variable6 : Triability

F	Df1	Df2	Sig.
3.220	35	183	.000

Table D36 shows a variation in the Triability dimension and the Demographic variables (P-value < 0.05), meaning that at least one demographic variable influenced this dimension. The General Linear Model indicated in Table D37 shows that R Squared= 84.9% of this variation in the Triability dimension:

Table D37 Tests of Between Subject Effects
Variable6 : Triability

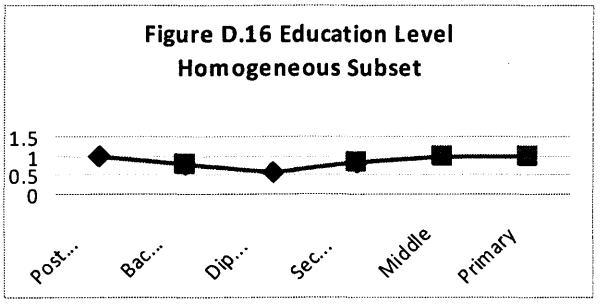
Source	F	Sig.
Education Level	2.440	.036
Age	1.538	.192
Gender	4.758	.030

R Squared = .849 (Adjusted R Squared = .841)

In order to examine this variation, the averages of the Triability dimension in the three variables (Education Level, Gender and Age) were compared by using the POST HOC TEST. The results are as follows:

Table D38 Education Level Homogeneous Subset.
Variable6 : Triabilty

Education Level	Number	Subset 1	Subset 2
Postgraduate	6	1.00	
Bachelor	51	.80	.80
Diploma	22	.59	
Secondary	105	.82	.82
Middle	25		1.00
Primary	10		1.00



Education Level: Table D37 shows that the P-value < 0.05, and Table D38 and Figure D.16 indicate such variation by using the POST HOC TEST which divided the Education Level into two homogeneous groups, each of which held the same opinion. Both the higher educational levels (Secondary School, Diploma, Postgraduate, and Bachelor Degree) and the lower levels (Primary School, Middle School) believed that a free trial period should be given to users in order for them to experience m-parking prior to their adoption of the service (marginal mean CLOSER to 1 which is "yes").

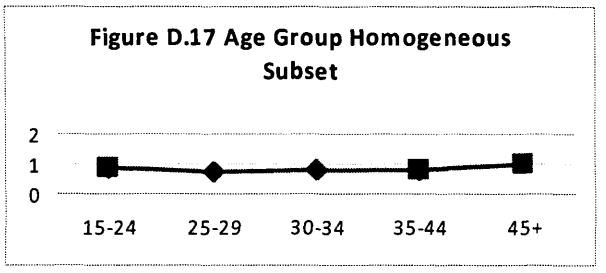
Gender: Gender seems to influence the Triability dimension (P-value < 0.05) as shown in Table D37, with males being more positive than females on this dimension. That is to say that, whilst both males and females believe in the value of a free trial period before becoming committed to m-parking, males were keener on this idea than females.

Age: Age in the General Linear Model has no affect (P-value > 0.05) as shown in Table D37. When the Age and Gender variables were ignored in the General Linear Model, and by using the POST HOC TEST which divided Age into two homogeneous groups, neither had any effect upon the Triability dimension, since both older and younger age groups strongly believed that a specific period of time should be given free of charge to potential users in order for them to experience m-parking

before giving their full commitment to its adoption (marginal mean CLOSER TO 1 which is "yes"). Table D39 and Figure D.17 show this variation:

Table D39 Age Group Homogeneous Subset.
Variable6: Traiabilty

		Subset	
Age Group	Number	1	2
15-24	42	.88	.88
25-29	53	.75	
30-34	64	.77	
35-44	29	.83	.83
45+	31		1.00



The results from Case Study Two (HEAC) are shown in Table D40:

Table D40 Levene's Test of Equality of Error Variance.
Variable6: Triability

F	Df1	Df2	Sig.
1.989	9	241	.041

Table D40 shows variation between the Triability dimension and the Demographic variables (P-value < 0.05), meaning that at least one demographic variable had an influence upon this dimension. The General Linear Model indicated in Table D41 shows that R Squared=1.2% of this variation:

Table D41 Tests of Between Subject Effects
Variable6: Triabilty

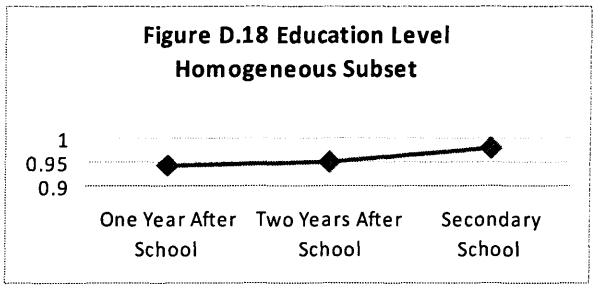
Source	F	Sig.
Education Level	1.357	.259
Age	.972	.325
Gender	.056	.813

R Squared = .012 (Adjusted R Squared = .004)

To determine this influence, the averages of the Triability dimension across the three variables (Education Level, Gender and Age) were compared using the POST HOC TEST, with the following results:

Table D42 Education Level Homogeneous Subset.
Variable6: Triabilty

		Subset
Education Level	Number	1
One Year After School	62	.94
Two Years After School	123	.95
Secondary School	66	.98



Education Level: Table D41 indicates that P-value > 0.05 and that the Education level seems to have no effect on the Triability dimension. Also, from Table D42 and Figure D.18 this was further proved by using the POST HOC TEST, which placed respondents into one homogeneous group with a positive inclination towards

Triability (marginal mean CLOSER to 1 which is "yes"). This indicates their complete agreement that a free trial period should be given to potential users.

Gender: Table D41 shows that gender has no effect on the Triability dimension (P-value> 0.05). Both sexes are positive about this dimension (marginal mean CLOSER to 1 which is "yes", believing a free trial period should be provided to users.

Age: Equally, age has no effect on Triability (P-value>0.05). Both age groups are positive in this respect (marginal mean CLOSER to 1 which is "yes") agreeing that a free trial period should be provided.

Observability

The results from Case Study One (MMMP) are shown in Table D43:

Table D43 Levene's Test of Equality of Error Variance.
Variable7: Observability

F	Df1	Df2	Sig.
3.193	35	183	.000

Table D43 shows a variation between the Observability dimension and the Demographic variables (P-value <0.05) indicating at least one demographic variable as being influential in this respect. The General Linear Model in Table D44 shows that R Squared= 95.4% of this variation is in the dimension:

Table D44 Tests of Between Subject Effects
Variable7: Observability

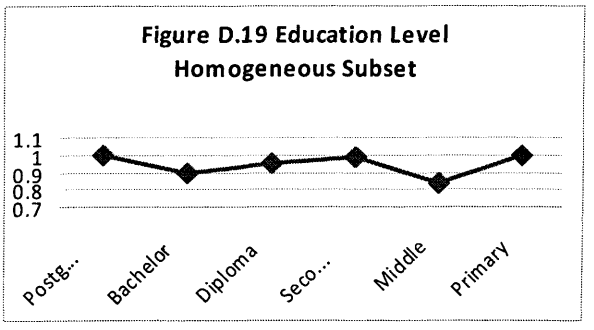
Source	F	Sig.
Education Level	1.709	.134
Age	1.266	.284
Gender	.126	.723

R Squared = .954 (Adjusted R Squared = .952)

To investigate this variation, the averages of the Observability dimension across the three variables (Education Level, Gender and Age) were compared by using the POST HOC TEST, with the following results:

Table D45 Education Level Homogeneous Subset.
Variable7: Observability

Education Level	Number	Subset 1
Postgraduate	6	1.00
Bachelor	51	.90
Diploma	22	.95
Secondary	105	.99
Middle	25	.84
Primary	10	1.00



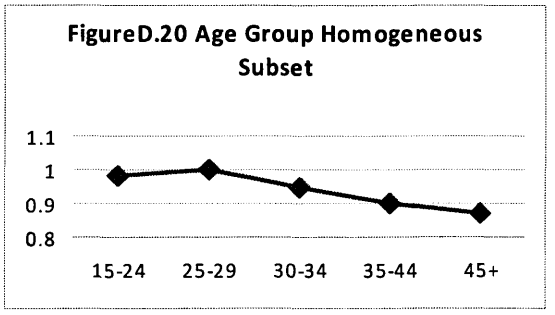
Education Level: Table D44 shows the P-value > 0.05, indicating no relationship between Education level and Observability. And Table D45 and Figure D.19 show the outcomes after performing the POST HOC TEST; there is one homogeneous group in this respect (marginal mean CLOSER to 1, which is "yes"), thereby suggesting that non-users of any educational level may be encouraged by observing the experience of users of m-parking.

Gender: Gender has no effect on the Observability dimension (P-value > 0.05).

Age: In the General Linear Model, Age showed no affect (P-value > 0.05). And from Table D46 and Figure D.20, it is clear that when ignoring the Age and Gender variables in the General Linear Model, and by using the POST HOC TEST, there is one homogeneous group in respect of the Observability dimension (marginal mean CLOSER to 1, which is "yes"), thereby suggesting that non-users may be encouraged by observing the experience of others who do use m-parking:

Table D46 Age Group Homogeneous Subset.
Variable7: Observability

Age Group	Number	Subset 1
15-24	42	.98
25-29	53	1.00
30-34	64	.95
35-44	29	.90
45+	31	.87



The results from Case Study Two (HEAC) are shown in Table D47:

Table D47 Levene's Test of Equality of Error Variance.
Variable7: Observability

F	Df1	Df2	Sig.
15.183	9	241	.000

Table D47 shows a variation between the Observability dimension and the Demographic variables (P-value < 0.05), meaning that at least one demographic variable is influential on the Observability dimension. The General Linear Model in Table D48 shows that R Squared=12.3% of this variation:

Table D48 Tests of Between Subject Effects
Variable7: Observability

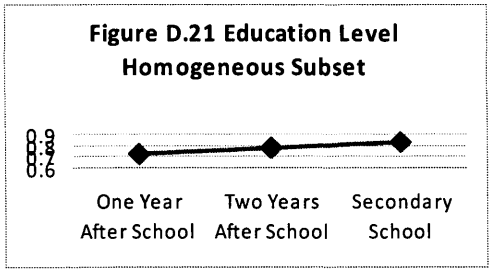
Source	F	Sig.
Education Level	2.633	.074
Age	5.311	.022
Gender	28.366	.000

R Squared = .123 (Adjusted R Squared = .108)

To examine this relationship, the averages of the Observability dimension across the three variables (Education Level, Gender and Age) were compared using the POST HOC TEST, with the following results:

Table D49 Education Level Homogeneous Subset. Variable7: Observability

Education Level	Number	Subset 1
One Year After School	62	.73
Two Years After School	123	.77
Secondary School	66	.83



Education Level: Table D48 shows that the P-value > 0.05 and that Education has no effect on the Observability dimension. Table D49 and Figure D.21 confirm this using the POST HOC TEST, which placed all respondents into one homogeneous group, showing a positive inclination towards the Observability dimension (marginal mean CLOSER to 1 which is "yes"), and indicating that observing their colleagues using the HEAC m-registration had encouraged them to use it.

Gender: Gender has an effect on the Observability dimension (P-value < 0.05). See Table D48 (marginal mean CLOSER to one which is "yes"). In this case, females are more positive towards Observability than males.

Age: Age also has an effect on the Observability dimension (P-value < 0.05). See Table D48 (marginal mean CLOSER to one which is "yes"), with the <=20 group being more positive towards the Observability dimension.

Appendix E: Quantitative Analysis of Correlation between CSFs and the m-Government Adoption Model for Oman

Quantitative Analysis of Correlation between CSFs and the m-Government Adoption Model for Oman

The relationship between the CSFs and the dimensions of the proposed m-Government Adoption Model for Oman is denoted by the level of significance of the overall statistic (Sig). If the Sig value is less than 0.05, the relationship between the CSF and the model is significant. Finally, Pearson's Correlation presents a negative or positive relationship between the variables.

Case Study One (MMMP)

Table E1 summarises the relationship between the CSFs and the seven dimensions of the proposed model from the quantitative results of Case Study One:

Table E1	Perceived Usefulness	Perceived Ease of use	Relative advantage	Compatibility	Complexity	Observability	Triability
e-Government Vision and Strategy	×	×	×	(Sig=0.03) PCorr=(0.15)	×	×	×
Leadership and Support	×	×	×	×	×	(Sig=0.04) PCorr=(0.14)	×
ICT Infrastructure and Mobile penetration	×	×	×	×	×	(Sig=0.01) PCorr=(0.17)	×
Transformatio n of Culture	×	×	×	(Sig=0.04) PCorr=(0.14)	×	×	(Sig=0.02) PCorr=(0.16-)
Human Resource Management and Training/ICT and Mobile Literacy	×	×	×	(Sig=0.03) PCorr=(0.15)	×	×	×
Inter- and Intra Organisation Integration	×	×	×	×	×	×	×
e-Legislation	×	×	×	×	×	×	×
User Considerations - Requirements/ Trust/Privacy Security	×	×	×	(Sig=0.04) PCorr=(0.13)	×	×	×
e-readiness and Marketing	(Sig=0.02) PCorr=(0.16-)	(Sig=0.03) PCorr=(0.14)	×	(Sig=0.02) PCorr=(0.16)	×	(Sig=0.01) PCorr=(0.17)	×
Funding	×	×	×	(Sig=0.04) PCorr=(0.14)	×	×	×

*P Corr= Pearson Correlation; *P value of Sig=0.00<0.05

The correlations in Table E1 indicate that in the case of the MMMP, the m-Government Adoption Model for Oman dimensions correlate with the CSFs at a P value (Sig) < 0.05. The way in which each dimension correlates with the various CSFs is as follows:

Perceived Usefulness:

This dimension negatively correlates with *e-readiness and Marketing* at a rate of 0.16-, i.e. any changes in the *perceived usefulness* dimension will cause a negative change of 2% in the *e-readiness and Marketing* dimension. This is contrary to the expectation that *perceived usefulness* and *e-readiness and marketing* are positively correlated. Hence, if there is no marketing and e-readiness is low in Muscat society, potential users will not be able to perceive whether m-parking offers a useful service or not, and therefore it is important for proper marketing of this service so that potential users will be aware of the benefits of the system and change their behaviour. Ultimately, *perceived usefulness* relates to the degree to which users believe that m-parking will improve their task performance, and this subsequently influences intention to use the system. It can be confidently said that a positive correlation between *perceived usefulness* and *e-readiness and marketing* will promote higher levels of intention to use m-Government services.

Perceived Ease of use:

This dimension positively correlates with *e-readiness and Marketing* at a rate of (0.16), indicating that any change in the *perceived ease of use* dimension will cause a 2% change in the *e-readiness and Marketing* dimension. *Perceived ease of use* relates to the extent to which a user believes his/her interaction with m-parking to be free of mental effort and easy to use. People who have the experience and knowledge to design the system, and potential users who are willing to use m-parking are only produced by their own state of e-readiness, and the correct approach to the marketing of the initiative. In other words, if the *e-readiness and marketing* and the *perceived ease of use* is high, intention to use will be enhanced.

Relative advantage:

This dimension has no correlation with any of the critical success factor dimensions.

Compatibility:

This dimension has correlated with the following critical success factor dimensions:

i. *e-Government Vision and Strategy* correlated positively at a rate of 0.15, indicating that any changes in the *compatibility* dimension will cause about 2% changes in the e-Government *vision and strategy* dimension. M-parking services should be compatible with users' lifestyles, and this issue must be considered by the designers, since a proper match in this respect will increase the attractiveness

of m-parking and hence, the number of uses. Extending this analysis, it can be argued that if those responsible for the e-Government Vision and Strategy consider the need for compatibility in m-Government projects, intention to use will be increased.

ii. *Transformation of culture* correlated positively at a rate of 0.14, meaning that any changes in the *compatibility* dimension will cause about 2% change in the *transformation of culture* dimension. As culture changes, people begin to understand the benefit of using m-parking because it fits with their changing lifestyles. Hence, if decision-makers consider compatibility with lifestyles resulting from gradual culture change, they are likely to be able to increase intention to use m-Government services.

iii. *HRM and Training/ICT and Mobile Literacy* correlated positively at a rate of 0.15, meaning that any changes in the *compatibility* dimension will cause about 2% change in the *HRM and Training/ICT and Mobile Literacy* dimension. Consequently, HRM and training in computer and mobile usage is a requirement for the success of e- and m-Government. If adequate provision is made in this regard, ICT illiteracy will disappear among citizens, who will be prepared for e- and m-Government services and indeed, have expectations of them which will be met if their design and implementation is effective.

iv. *User Considerations - Requirements/ Trust/Privacy Security* correlated positively at a rate of 0.13, meaning that any changes in the *compatibility* dimension will cause about 2% change in the *User Considerations - Requirements/ Trust/Privacy Security* dimension. As the user is the most important external factor in contributing to the success of m-Government initiatives, user requirements are a vital component of the systems development phase. Therefore, trust, privacy and security are crucial for the adoption and diffusion of m-Government services. For example, in western environments, attention to trust, privacy and security have allowed the successful development of online shopping for purchases of every kind of commodity delivered to the home, thereby providing a service which is compatible with a busy lifestyle. Clearly, if decision-makers and designers consider these user requirements, the compatibility of m-Government services with potential users' lifestyles will increase as will their intention to adopt the initiatives.

v. *e-readiness and Marketing* correlated positively at a rate of 0.16, meaning that any changes in the *compatibility* dimension will cause 1.96% change in the *e-readiness and Marketing* dimension. Through the improvement of e-readiness and marketing, the intention to use m-Government services like m-parking will increase. Effective marketing is vital in bringing about behavioural change among citizens, who will be keen to use m-Government services if they are fully aware of their benefits and have the capability to do so.

vi. *Funding* correlated positively at a rate of 0.15, meaning that any changes in the *compatibility* dimension will cause about 2% change in the *funding* dimension. This finding can be interpreted as indicating that if there is no proper allocation of funds for the developers and implementers of m-Government (for example for

adequate marketing and training provide e-readiness) then the project will not be compatible with people's lifestyles, and will consequently fail.

Complexity:

This dimension did not correlate with any of the critical success factor dimensions.

Observability:

This dimension correlated with the following critical success factor dimensions:

i. *Leadership and support* correlated at a rate of 0.14, meaning that any change in the *observability* dimension will cause 1.96% change in the *Leadership and support* dimension.

ii. *ICT Infrastructure and Mobile penetration* correlated at a rate of 0.17, meaning that any changes in the *observability* dimension will cause 2.9% change in the *ICT Infrastructure and Mobile penetration dimension*. Potential users need to be able to observe that the infrastructure to support m-Government is in place, and with this assurance they are likely to adopt.

iii. *e-readiness and Marketing* correlated at a rate of 0.17, meaning that any changes in the *observability* dimension will cause 2.9% change in the *e-readiness and Marketing* dimension. It has already been indicated that effective marketing is required to create awareness among potential users.

Triability:

This dimension correlates *negatively* with the *Transformation of Culture* at a rate of 0.16-, meaning that any change in the *Triability* dimension will cause a 2% change in the *Transformation of Culture*. This is contrary to the expectation that these two dimensions would be positively correlated. The finding can be interpreted as indicating that as people gain experience of an m-Government initiative, and begin to see its benefits, their cultural predispositions not to become involved with such change begin to evaporate and they become keen to adopt systems that provide them with benefits. However, because of the cultural dispositions which are negative in the first place, people need an incentive to try new systems, and therefore, the opportunity to try without cost should be offered. Moreover, once people are convinced as a result of their free trial, they will be good ambassadors for the service, thereby encouraging others to also get a free trial. So, the ability to try without paying will accelerate the rate of adoption and diffusion.

Case Study Two (HEAC)

Table E2 summarises the relationship between the CSFs and the seven dimensions of the proposed model from the quantitative results of Case Study Two:

Table E2	Perceived Usefulness	Perceived Ease of use	Relative advantage	Compatibility	Complexity	Observability	Triability
e-Government Vision and Strategy	×	×	(Sig=0.03) PCorr=(0.14)	(Sig=0.04) PCorr=(0.13)	(Sig=0.04) PCorr=(-0.13)	×	×
Leadership and Support	×	×	×	×	(Sig=0.04) PCorr=(-0.13)	(Sig=0.04) PCorr=(0.13)	×
ICT Infrastructure and Mobile penetration	×	×	×	×	(Sig=0.04) PCorr=(-0.14)	×	×
Transformation of Culture	×	(Sig=0.01) PCorr=(0.16)	×	(Sig=0.02) PCorr=(0.15)	×	×	×
Human Resource Management and Training/ICT and Mobile Literacy	×	×	(Sig=0.03) PCorr=(0.14)	(Sig=0.04) PCorr=(0.13)	×	(Sig=0.03) PCorr=(0.14)	×
Inter- and Intra Organisation Integration	×	×	×	×	×	×	×
e-Legislation	×	×	×	×	×	(Sig=0.03) PCorr=(0.14)	(Sig=0.02) PCorr=(0.15)
User Considerations - Requirements/ Trust/Privacy Security	×	×	×	×	×	×	×
e-readiness and Marketing	×	×	(Sig=0.02) Corr=(0.15)	×	×	×	×
Funding	×	×	×	×	×	×	(Sig=0.02) PCorr=(0.15)

*P Corr= Pearson Correlation; *P value of Sig=0.00<0.05

The correlations in Table E2 indicate that in the case of the HEAC, the m-Government Adoption Model for Oman dimensions correlate with the CSFs at a P value (Sig) < 0.05. The way in which each dimension correlates with the various CSFs is as follows:

Perceived Usefulness:

This dimension has no correlation with any of the CSF dimensions.

Perceived Ease of use:

This dimension positively correlated with the *Transformation of Culture* at a rate of 0.16, meaning that any change in the *perceived ease of use* dimension will cause a 2.56% change in the *Transformation of Culture*. Culture change is central to the effective implementation of change and the achievement of planned aims. The implementation of the HEAC m-application has brought about a change in culture from that which prevailed six years ago when applicants had to present themselves in person in Muscat to register for a university or college place. With the new system, applicants can register from anywhere, hence this brings a complete transformation of the way things are done, bringing benefit to the users.

Relative advantage:

This dimension correlated with the following CSF dimensions:

i. *e-Government Vision and Strategy* at a rate of 0.14, meaning that any change in the *relative advantage* dimension will cause about 1.96% change in the *e-Government vision and strategy* dimension. Clearly, designers need to ensure there is an advantage to the use of new m-services over old traditional methods because potential users respond positively if they can identify the benefits to them.

ii. *HRM and Training/ICT and Mobile Literacy* correlated at a rate of 0.14, meaning that any change in the *relative advantage* dimension will cause 1.96% change in the *HRM and Training/ICT and Mobile Literacy* dimension. Consequently, m-Government decision-makers, designers and implementers must ensure that adequate training is provided since if citizens are capable they will easily perceive the relative advantage of using an m-Government service over a traditional one, and likewise, the designers should ensure that the relative advantages of new initiatives are readily apparent to potential users.

iii. *e-readiness and Marketing* correlated at a rate of 0.15, meaning that any change in the *relative advantage* dimension will cause 2.25% change in the *e-readiness and Marketing* dimension. From this it can be seen that if e-readiness and marketing are high, then potential users will easily perceive the relative advantage and be willing to use the new services.

Compatibility:

This dimension correlated with the following CSF dimensions:

i. *e-Government Vision and Strategy* correlated at a rate of 0.13, meaning that any change in the *compatibility* dimension will cause 1.7% change in the *e-Government vision and strategy* dimensions. As seen in Case Study One, a similar correlation occurred, and hence, the comments as indicated in that discussion, apply here also.

ii. *Transformation of culture* correlated at a rate of 0.15, meaning that any change in the *compatibility* dimension will cause 1.7% change in the *transformation of culture* dimension. The same comments as made in respect of Case Study One apply here since the correlation was of a similar nature.

iii. *HRM and Training/ICT and Mobile Literacy* correlated at a rate of 0.13, meaning that any change in the *compatibility* dimension will cause 1.7% change in the

HRM and Training/ICT and Mobile Literacy dimension. The same general comments as made in respect of Case Study One apply in this case also.

Complexity:

i. This dimension *negatively* correlated with the *e-Government Vision and Strategy* at a rate of -0.13, meaning that any change in the *complexity* dimension will cause a negative change of 1.7% in the *e-Government Vision and Strategy*. This implies that any vision for an m-Government service must pay attention to the degree of difficulty associated with its use because if the issue of complexity is not considered when designing and implementing the strategy, the intention to use will decrease. Simplicity in design is, therefore, essential.

ii. This dimension correlated *negatively* with the *Leadership and Support* at a rate of -0.13, meaning that any change in the *complexity* dimension will cause a negative change of 1.7% in the *Leadership and Support*. The implication is that a system which necessarily has a certain degree of complexity should be introduced with strong support and leadership that can monitor usage and pinpoint any particular problems as they are encountered by users. Additionally, the leadership should set an example and encourage users, showing that such necessary complexities in the system are worth dealing with because of the benefits to be gained, and showing how to overcome such complexities.

iii. This dimension *negatively* correlated with the *ICT Infrastructure and Mobile penetration* at a rate of -0.14, meaning that any change in the *complexity* dimension will cause a negative change of 1.96% in the *ICT Infrastructure and Mobile penetration*. The implication is that without a robust ICT infrastructure and sufficient mobile penetration among the population, it is not possible for m-Government services to be used, as seen in many developing countries where lack of infrastructure and inaccessibility prevents the adoption of e- and m-Government services.

Observability:

This dimension positively correlated with the following CSF dimensions:

i. *Leadership and support* at a rate of 0.13, meaning that any changes in the *observability* dimension will cause 1.96% change in the *Leadership and support dimension*. A similar result was obtained in Case Study One, and hence the comments made in that respect, are applicable here.

ii. *HRM and Training/ICT and Mobile Literacy* at a rate of 0.14, meaning that any changes in the *observability* dimension will cause about 1.96% change in *HRM and Training/ICT and Mobile Literacy*. This implies that a good relationship exists between these two dimensions and that efforts to improve the rate of computer and mobile literacy among citizens should be made on a large scale so that as they observe the benefits of m-Government systems they are provided with the skills to use them, and additionally so that as they appreciate the efforts made in the area of training, they will observe the value of accepting such training.

iii. *e-Legislation* correlated at a rate of 0.14, meaning that any changes in the *observability* dimension will cause 1.96% change in the *e-Legislation*. Citizens naturally want to be assured that they have all the relevant legal protections when using m-Government services and therefore they need to observe the law in action, providing such protection.

Triability:

This dimension positively correlated with the following CSF dimensions:

i. *e-Legislation* correlated at a rate of 0.15, meaning that any changes in the *triability* dimension will cause 2.25% change in the *e-Legislation* dimension. The suggestion here is that a link exists between these two dimensions in as much as the presence of legislation to protect users of m-Government services, and the opportunity to try m-Government services without charge, will combine to influence people to try such initiatives.

ii. *Funding* correlated at a rate of 0.15, meaning that any changes in the *triability* dimension will cause 2.25% change in the *funding* dimension. The suggestion here is also that a link exists between these two dimensions in the fact that in order to provide free trial services for first-time users, the government must allocate sufficient funding to cover the monies that would otherwise have been received. However, as the outcomes of a free trial period become apparent and recommendations are made by satisfied m-Government users to friends and family, wider adoption and diffusion will occur. Ultimately, this will justify the initial funding outlay.