A STUDY ON THE ADOPTION OF A MOBILE GOVERNMENT MODEL FOR THE KINGDOM OF BAHRAIN FROM THE PERSPECTIVE OF THE GOVERNMENT AND SERVICE PROVIDERS

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Abstract

M-government is the utilization of mobile and wireless communication technology to enhance the delivery of e-government services. Due to the advanced status of e-government and the high mobile phone penetration, there is a great opportunity to utilize mobile technologies to improve the delivery of e-government services in Bahrain. This utilization is currently moving in a slow pace relatively to the utilization of traditional non-mobile technologies. Some of the small services are delivered through the mobile portal and can be accessed through the limited interface of mobile phones, however many of the more complex services that require large amounts of data and involve complex transactions are more difficult to deliver as mobile services. This research was an attempt to study m-government in order to develop a model to guide the adoption of m-government in Bahrain's government organizations. It followed two research paths, one was to study the level of readiness of Bahrain's government organizations to the adoption of m-government, and the other was to study the services provided by the government organizations in order to tackle their complexity and to develop a method to simplify their delivery as mobile services. The first path involved the distribution of a questionnaire to IT professionals involved in the development and support of e-government services. The second path involved the analysis of a sample of 40 government services. The main finding of the first path was the identification of important strengths that should be exploited and weaknesses that should be addressed to enhance the adoption of m-government by Bahrain's government organizations. The main finding of the second path was the conclusion that an effective approach to utilize mobile technologies in a complex government service is to break the service into components and to identify the components that can be delivered through the mobile phone interface instead of attempting to deliver the whole service as a mobile service. The results of the two research paths were combined to build the target M-Government Adoption Model for Bahrain. That model outlined the important steps required to enable the adoption of m-government in Bahrain.

APPROVAL PAGE

I certify that I have supervised / read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in quality and scope, as a thesis for the fulfillment of the requirements for the degree of Doctor of Philosophy.

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Declaration

I hereby declare that the thesis is submitted in fulfillment of the PhD degree is my own work and that all contributions from any other persons or sources are properly and duly cited. I further declare that the material has not been submitted either in whole or in part, for a degree at this or any other university. In making this declaration, I understand and acknowledge any breaches in this declaration constitute academic misconduct, which may result in my expulsion from the programme and/or exclusion from the award of the degree.

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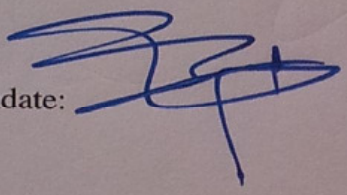
Signature of Candidate: 

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Publications

The following papers have reported the progress and results of the work related to this thesis:

Sowaileh, A. and AlSoufi, A. (2011a). Tackling m-government service complexity: the case of Bahrain. *International Journal of Technology Diffusion* **2**(1).

Sowaileh, A. and AlSoufi, A. (2011b). Evaluating the readiness to m-government adoption in Bahrain. *Proceedings of the IADIS e-Commerce 2011 Conference*. Rome, Italy. 21th-23rd July 2011.

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Chapter 1
Introduction

1.1 Background

Governments around the world are responsible for the delivery of high quality services to their citizens through ministries and government organizations. The higher the quality of government services, the higher the productivity and satisfaction of citizens (Saxena, 2005; Hazlett & Hill, 2003). The availability of accurate, secure and reliable information is crucial to the success of governments (Bassara, Wisniewski & Zebrowski, 2005; Heeks, 2002). The advancements in information and communication technology (ICT) in the last century opened up great opportunities for governments to improve the quality of their services by distributing government information and providing citizens and organizations with services 24 hours a day, 7 days a week (West, 2004). The revolutionary changes caused by the Internet affected all types of organizations including governments. Governments realized the great opportunity to increase the efficiency and effectiveness of service provision by utilizing the Internet. This led to the creation of a new term, the e-government (Stoltzfus, 2005; Anzinger, 2006). West (2004, p. 16) defines e-government as "the delivery of government information and services online through the Internet or other digital means."

E-government oriented technologies and services are advancing very quickly and are being used to improve governments' fundamental functions (Jacobfeuerborn & Muraszkiewicz, 2009; Saxena, 2005). These functions are now spreading the use of mobile and wireless technologies and creating a new direction: the mobile government (m-government) (Kushchu & Kuscu, 2003).

Ostberg (2003, p. 2) defines m-government as "the use of mobile and wireless communication technology within the government administration and in its delivery of services and information to citizens and firms."

The number of people having access to mobile phones and mobile Internet connection is increasing very rapidly (Botha & Van Deventer, 2009; Feldmann, 2003; Novay Networked Innovation [NOVAY], 2009; Roggenkamp, 2007). The mobile access anywhere and anytime is becoming a natural part of daily life (Jacobfeuerborn & Muraszkiewicz, 2009; Barton, Zhai & Cousins, 2006). M-government seems to have a substantial influence on the generation of set of complex strategies and tools for e-government efforts and on their roles and functions (Al-Khamayseh, Hujran, Aloudat & Lawrence, 2006a; Roggenkamp, 2007). With the continuous advancements in wireless technologies and the new opportunities to provide government services through those technologies, m-government seems to be inevitable (Kushchu & Kuscu, 2003; Sadeh, 2002).

Advances in mobile and wireless communication infrastructures are pushing governments to think seriously about utilizing this technology to improve the delivery of their services and provide more constituent satisfaction. Governments that utilize these advances effectively are the prime movers of the next stage of e-government adding benefits to those governments (such as cost reductions and greater work efficiency and effectiveness), and to their citizens (such as faster access to public services anytime, anywhere) (Al-Khamayseh & Lawrence, 2006; Teasdale, 2005). Considering the lack of readiness to e-government in developing countries and factors such as wide availability of mobile phones, ease of use and low cost of ownership, m-government seems to be a better option to reach out to

citizens and communicate with them (Ghyasi & Kuschu, 2004; Kushchu, 2007).

M-government can also improve communication and operation between different government organizations and between governments and their employees and increases the efficiency of government employees in performing their jobs. It enables employees to get necessary information wherever they are by accessing their office of department systems using their wireless-enabled mobile devices such as PDAs, laptops and palmtops (Ghyasi & Kuschu, 2004).

In addition to its advantages, M-government also has its challenges. Although using wireless technologies reduces costs, adding a wireless channel to the existing channels of service provision creates additional costs at the beginning. This continues until the wireless channel is well established and the costs start to reduce significantly (Lallana, 2008b). Wireless devices also have limitations due to their small sizes and limited bandwidth. These limitations should be taken into consideration when adding support for wireless devices to government applications (Al-Khamayseh et al., 2006a; Germanakos, Samaras & Christodoulou, 2005; Mallick, 2003). There are other technological and non-technological challenges that are discussed in detail in the coming chapters.

Given the availability of the Government Data Network (GDN), the e-government project and the high mobile phone penetration, there is a great opportunity to implement m-government in Bahrain and to exploit the benefits that wireless technologies provide (AlAmer, 2006; eGovernment Authority, 2007; Bahrain's Telecommunications Regulatory Authority [TRA], 2010).

Mobile phone penetration in Bahrain is very high. Many individuals, citizens and

foreigners, and from different social and economical levels own one or more mobile phones and are registered with one or more service providers (TRA, 2010). By the end of September 2010, mobile phone penetration rate in Bahrain reached about 126 per cent, with the number of mobile subscribers increased to 1.6 million. This rate has the potential to reach 164 per cent by the year 2012, and 177 percent by the year 2014 (Business Monitor International [BMI], 2008, 2010).

The government of Bahrain recognized the important role of information and communication technologies in the process of building and developing the country. It started adding ICT to its services more than thirty years ago. The Governmental Data Network (GDN) was established more than fourteen years ago. And the e-government project started more than ten years ago (AlAmer, 2006). Based on the high penetration of mobile phones in Bahrain and the advantages of mobile technologies, the researcher concludes that adding support for mobile devices to the government's applications would significantly improve the efficiency and effectiveness of service provision to the citizens and constituents of the government.

Bahrain's main e-government channel is the web based eGovernment Portal. Since this channel is accessed mainly through personal desktop computers, it will be referred to in this study as the PC portal to distinguish it from the other channels, especially the mobile channel. By the end of November 2010, there were more than 150 services on the PC portal. The mobile portal is a channel that hosts services that are customized for access through mobile phones. By the end of November, 2010 it hosted 45 services. Most of those services were informational services. Due to the limitations of mobile phones, it is more difficult to customize services for the mobile portal than for the PC portal. Mobile phones have less memory and storage

capacities, lower resolution screens, and more keyboard restrictions (Al-Khamayseh et al., 2006a; Germanakos et al., 2005; Mallick, 2003). Without thorough understanding of the various dimensions of information delivery, it is difficult to provide effective guidelines for establishing mobile government (Kim & Albers, 2001).

1.2 Problem statement

Due to the advanced status of e-government and the high mobile phone penetration, there is a great opportunity to utilize mobile technologies to improve the delivery of e-government services in Bahrain. As will be discussed later in Chapter 2, mobile phones offer many opportunities for increasing the efficiency and effectiveness of e-government services; and many countries have already taken advantage of wireless technologies and implemented new and innovative mobile government services.

The utilization of mobile services in Bahrain is moving in a relatively slow pace when compared to traditional e-government services that are customized for access through traditional desktop computers. Most services are implemented on the PC portal first. Some of the informational and simple transactional services may have their way to the mobile portal, but many of the more complex services that require large amounts of data and involve complex transactions are more difficult to deliver as mobile services. This is clearly justified since mobile phones are limited in terms of size and bandwidth when compared to desktop computers. Complex services that are easily provided through the PC portal may require more analysis and reengineering before they can be delivered as mobile services (Olmstead et al., 2007).

As part of this study, investigation revealed that there was a lack of research on the adoption of mobile services in Bahrain. There are efforts by the eGovernment Authority to provide e-government services through the mobile portal. However, due to the special requirements of mobile services and the differences between mobile and traditional services, more effort is needed to tackle mobile service complexity and to study the adoption of m-government in order to utilize mobile technologies to the best possible extent.

This study aims to investigate the readiness to the adoption of m-government in Bahrain's government organization in order to identify the strengths that should be utilized and the weaknesses that should be overcome in order to enable government organization to adopt m-government. M-government adoption in the context of this research is the government organizations' ability and willingness to implement and support m-government by providing their services through the mobile portal.

This research also aims to study the services provided by Bahrain's government organizations in order to tackle their complexity and to develop an appropriate method to simplify the design and development of mobile government services.

The approach that this study follows is to treat m-government as an innovation of e-government where wireless and mobile technologies, services, applications and devices are deployed to enhance e-government. This approach is explained in more detail in Chapter 3.

To identify the factors that affect the adoption of m-government, this study attempts to utilize the Diffusion of Innovations (DOI) theory developed by Everett Rogers (Rogers, 2003) to describe how, why, and at what rate new ideas and technology

spread through cultures. DOI has been used in diverse areas such as business, marketing, anthropology, public health, and education (Couros, 2003).

Rogers (2003, p. 12) defines an innovation as an "idea, practice, or object perceived as new by a unit of adoption."

According to Rogers (2003, p. 1) "getting a new idea adopted, even when it has obvious advantages, is difficult. Many innovations require lengthy periods of many years from the time when they become available to the time when they are widely adopted. Therefore, a common problem for many individuals and organizations is how to speed up the rate of diffusion of an innovation".

DOI is explained in more detail in Chapter 3.

This research is guided by the following research questions:

1- What are the factors that affect the readiness to m-government adoption by Bahrain's government organizations?

2- What is the status of each readiness factor in Bahrain's government organizations?

3- What are the main characteristics of Bahrain's government services and what are the attributes that affect the ability to provide them through the mobile interface?

4- What is the appropriate method to design and develop mobile government services in Bahrain?

5- What are the overall steps required to establish m-government in Bahrain?

The aim of the first two research questions is to evaluate the level of readiness of Bahrain's government organizations to adopt m-government by identifying factors that affect the readiness to the adoption of m-government, and then to measure each factor to identify the strengths that should be utilized, and the weaknesses that should be overcome in order to enhance the ability to adopt m-government in Bahrain.

The aim of the third and fourth research questions is to clearly understand the nature and anatomy of government services, and to identify the factors that can facilitate or hinder their implementation as mobile services in order to identify solutions to implementation barriers and to set guidelines to simplify and streamline the design and development of mobile services.

The results of the first four research questions are combined to answer the last question. The intended result is to develop a model that outlines the important steps required to enable the adoption of m-government in Bahrain.

1.3 Research objectives

The objectives of this research are to:

1- Identify the perceived factors that affect readiness to the adoption of m-government in Bahrain's government organizations.

2- Measure the level of each of the perceived readiness factors in Bahrain's government organizations.

3- Identify the characteristics of Bahrain's government services and the factors that affect the ability to provide them as mobile services.

4- Develop a method to guide the design and development of mobile government services in Bahrain.

5- Develop a model outlining the steps required to establish m-government in Bahrain.

This research follows two parallel paths (Figure 1.1). The first path analyzes the readiness of the government organizations, and the second path analyzes the services provided by those organizations. The results of the two paths are used as inputs to the target stage which is the development of an m-government adoption model.

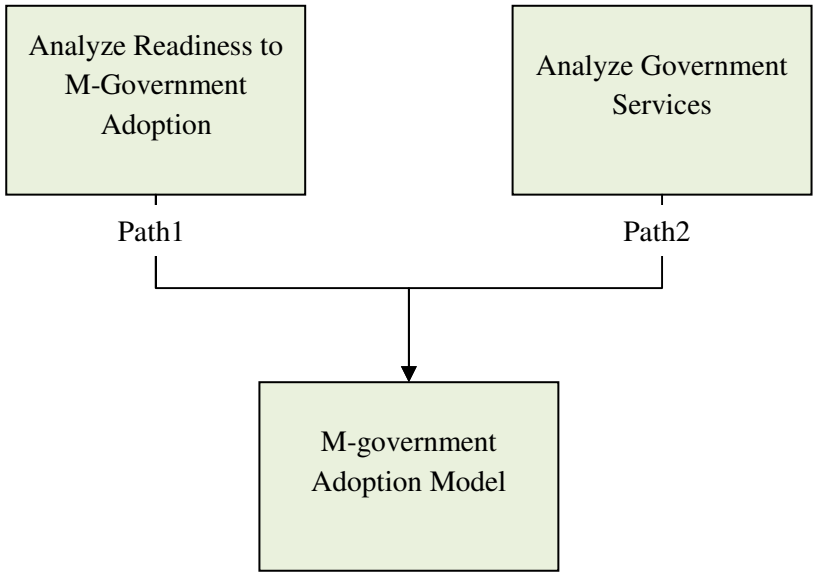

Figure 1.1 Research Paths

This research studies the adoption of mobile services by organizations in the government sector. It does not cover organizations in the private sector.

This research studies m-government from the perspective of the government

organizations. The adoption of m-government in the context of this research is the government organizations' implementation and support of m-government services and not the end-user's use of the services. However, the government is already encouraging people to use e-government services and the intended result of this study is to improve the ability of Bahrain's government organizations to provide high quality mobile services to satisfy the needs of the end-users.

1.4 Significance of the study

This study aims to fill the gap in m-government research in Bahrain and to assist government organizations in the design, development and support of m-government services. This would help increase the ability of Bahrain's government organizations to adopt m-government and optimally utilize mobile technologies to enhance the delivery of their services.

This study identifies the factors that can enable or hinder the organizations' readiness to adopt m-government. Identification of such factors at early stages can greatly streamline the process of implementing and adopting m-government and increase its effectiveness and efficiency by reducing risks and saving time and resources. It also measures the level of each factor in Bahrain's government organizations to identify the areas of strength that should be utilized and the areas of weakness that need to be fixed.

As stated earlier, developing mobile services is not as easy and straightforward as developing traditional Internet services. This study involves thorough analysis of government services and identifies the factors that affect the design and development of mobile services. It develops a method that can help reduce the complexity of government services and simplify their delivery through the limited

interface of mobile devices.

This study develops a model for implementing m-government in Bahrain that can be used by e-government authorities to establish a systematic and effective m-government project with a clear mission and target.

With a collection of international case studies of mobile technology usage in different countries, this study can be used as a rich resource for researchers studying the implementation of mobile services. It also includes valuable information about the current status and history of mobile and information technology in Bahrain's government that can be used by researchers studying e-government and m-government in Bahrain.

By using DOI, this study contributes to the important area of Diffusion of Innovations. As an applied research of DOI, this study can help researchers studying the adoption of different technologies understand DOI and the way it can be applied to study the adoption of new innovations.

1.5 Definition of terms

M-government is defined as "the use of mobile and wireless communication technology within the government administration and in its delivery of services and information to citizens and firms" (Ostberg 2003, p. 2).

M-government adoption in the context of this study is the government organizations' ability and willingness to implement and support m-government by providing their services through the mobile portal.

The terms **wireless** and **mobile** are used interchangeably in this research to refer to

the same term. Mobile or wireless devices are information and communication devices that are not bound to a specific location and use wireless communication instead of fixed-line cables for communication. This study concentrates mainly on the pocket-sized mobile phones due to their high penetration.

Government organizations term refers to both ministries and government agencies.

Traditional e-government services are e-government services that are mainly accessed through desktop computers. In general, the term **traditional** is used frequently in this research to describe **non-mobile** technologies, mainly services and systems that use desktop computers as their main interface.

Mobile phone penetration is the number of mobile phones owned by citizens.

In the services analysis path, the terms **fully-mobile**, **partially-mobile** and **non-mobile** are used. A **fully-mobile** service is a service that can be implemented and delivered as a whole through the interface of the mobile phone. A **partially-mobile** service is a service that only part of its components can be implemented and delivered through the interface of the mobile phone. A **non-mobile** service is a service that does not include any component that can be implemented and delivered through the interface of the mobile phone.

1.6 Limitations of the study

Although the regression result would be better with a larger sample size including the public, this research is limited by the number of IT professionals involved in the development and support of e-government services in Bahrain. However, this should be a sufficient and better condition since those professionals are the ones