M-GOVERNMENT AND HEALTHCARE MANAGEMENT – IMPLICATIONS FOR DEVELOPING AND EMERGING ECONOMIES

Rhoda C. Joseph
Pennsylvania State University, 777 West Harrisburg Pike, Middletown PA, 17075
ruj1@psu.edu (717) 948-6144

ABSTRACT

This work-progress-paper examines the use of m-government (mobile government) in the application of healthcare initiatives in developing and emerging countries. In many developing and emerging regions of the world the adoption of mobile devices by citizens is pervasive. The primary research question asks how are m-government initiatives used in the application of healthcare services in developing and emerging countries, specifically with the dissemination and collection of healthcare information. This study develops a theoretical construct called the m-government in healthcare index (MGHI) and examines it using multiple data sources. Implications and future directions are discussed.

Keywords: m-government, m-health, developing economies, emerging economies

INTRODUCTION

M-government (mobile-government) is a subcomponent of the larger e-government field. E-government refers to the delivery of government services via information and communications technologies (ICTs). A government can provide both products and services in a web enabled environment to a variety of constituents - including citizens, businesses, employees and other government entities. M-government involves the delivery of e-government services and products via mobile devices.

In many emerging and developing regions of the world the adoption of mobile devices by citizens is pervasive. Interestingly, many developing regions of the world that have lagged behind other countries with respect to the development of telephone lines and wired broadband infrastructure have aggressively developed mobile infrastructure (World Bank, 2008). The diffusion and adoption of cellular phones has grown exponentially in many countries in the Caribbean, Latin America, and Africa, where wired telephone services can be more expensive and less flexible. Affordability and accessibility of these products and services have led to a burgeoning of the cellular market in developing regions of the world. Through mobile technology, many of the world’s poor have an opportunity to access essential services (George Karippacheril, Nikayin, de Reuver, & Bouwman, 2013).

Aspects of healthcare management can be important components in a government’s arsenal of responsibilities. The introduction of m-government services can facilitate information dissemination, management and administration of healthcare projects. In fact, today mobile
applications are key drivers for the transformation of government (Amailef & Lu, 2008). M-government provides a platform for governments to reach citizens directly. Countries stand to benefit from the use of novel technical innovations such as m-government, to improve the overall healthcare infrastructure.

The primary research question in this work-in-progress-paper asks how are m-government initiatives used in the application of healthcare services in developing and emerging countries, specifically with the dissemination and collection of healthcare information. The study will use empirical data from multiple sources to test a theoretical composite m-government healthcare index using information about e-government infrastructure, mobile applications, and healthcare management. The study adds to the existing literature examining e-government and specifically m-government and healthcare in emerging and developing economies.

The remainder of the paper develops as follows. The next section looks at the specific context of developing and emerging economies and discusses why these countries deserve unique attention. Next, the literature on m-government and m-healthcare is reviewed. The theoretical model of the paper defining the m-government in healthcare index (MGHI) is then presented. Since this paper is in the early stages of development, there are no results to present. However, we discuss the implications of this study and present preliminary conclusions.

DEVELOPING AND EMERGING ECONOMIES IN FOCUS

E-government is a global phenomenon that refers to the delivery of government services via ICTs. A government can provide both products and services in a web enabled environment to a variety of constituents including citizens, businesses, employees, and other government entities. Several recent studies have focused on e-government in developing and emerging economies (Brown & Thompson, 2011; Joseph & Jeffers, 2009; Twinomurinzi, Phahlamohlaka, & Byrne, 2012; Wei & Zhao, 2005). Similarly m-government, which involves the delivery of e-government services and products via mobile devices, is also growing in significance.

To frame the discussion in this paper it is first necessary to provide a clear explanation differentiating developing and emerging economies from advanced economies. The International Monetary Fund (IMF) classifies countries into the following categories: advanced economies (34 countries – see table 1), and emerging and developing economies (IMF, 2009). The classification is based on a composite index that includes variables such as output, financial policies, foreign trade, inflation, debt, and balance of payments (IMF, 2006). In general, countries outside of the list provided in table 1 are classified as developing and emerging economies and are the focus of this paper.
TABLE 1: COUNTRIES CLASSIFIED AS ADVANCED ECONOMIES

<table>
<thead>
<tr>
<th>Australia</th>
<th>Denmark</th>
<th>Ireland</th>
<th>Malta</th>
<th>Slovenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Finland</td>
<td>Israel</td>
<td>Netherlands</td>
<td>Spain</td>
</tr>
<tr>
<td>Belgium</td>
<td>France</td>
<td>Italy</td>
<td>New Zealand</td>
<td>Sweden</td>
</tr>
<tr>
<td>Canada</td>
<td>Germany</td>
<td>Japan</td>
<td>Norway</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Cyprus</td>
<td>Greece</td>
<td>Korea</td>
<td>Portugal</td>
<td>Taiwan</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Hong Kong</td>
<td>Luxembourg</td>
<td>Singapore</td>
<td>United States</td>
</tr>
</tbody>
</table>

Source: (IMF, 2009)

In many emerging and developing regions of the world the adoption of mobile devices by citizens is pervasive. In emerging and developing economies the healthcare infrastructure can benefit from novel technical innovations such as m-government. Healthcare administration, as a function of government, varies from one country to the next. The Ministry or Department of Health is typically the functional branch of government that deals with matters pertaining to healthcare administration. From the public sector perspective, the role of a country’s ministry of health impacts healthcare initiatives such as the use of mobile technologies (Anta, El-Wahab, & Giuffrida, 2009).

RESEARCH BACKGROUND

M-Government

Mobile cellular technology has been the world’s most rapidly adopted technology with an estimated 4.6 billion subscriptions at the end of 2009 (International Telecommunication Union, 2009). When compared to e-government applications, the benefits of m-government include faster access to citizens, reduction in the need for wired infrastructure and cost efficiencies for regions with high density and difficult terrain (Trimi & Shen, 2008). M-government adds value to existing e-government applications, and functions as an alternative to traditional e-government by providing information directly to individual personal devices, and allowing user interaction independent of their physical location. The user is no longer confined to the physical parameters of wired ICTs infrastructure.

The primary factors affecting the development of m-government applications are capabilities of technology, acceptance of mobile technologies, telecommunications infrastructure, vendors, governments, and existing business models (Carroll, 2006). Evidently the availability of appropriate wireless infrastructure is critical to the development of m-government. However, the presence of a developed mobile landscape does not necessarily translate to acceptance and adoption of this technology for government services.

Countries with more developed mobile infrastructure are more likely to have a higher penetration of m-government applications. Examples of m-government applications are more prevalent in high income countries such as Canada, United States, England, Japan and Sweden (Trimi & Shen, 2008). This comes as no surprise since wealthier nations have more access to resources.
that are needed to develop m-government projects. However, the growth of mobile applications in low and middle income nations has the potential to also spur the growth of m-government applications.

M-government applications can occur in conjunction with or independent of e-government projects. The development of m-government infrastructure and applications can provide the impetus needed to regain confidence in the transformative potential of e-government. It is estimated that globally as many as 70-80% of e-government projects either partially or completely fail (Misuraca, 2009). These statistics do not necessarily bode well for m-government, but it may illuminate inherent weaknesses with traditional e-government that m-government may overcome.

Challenges related to security, privacy and integration of legacy information systems can retard the pace of growth of m-government applications (Trim & Shen, 2008). Additional factors such as battery life of mobile devices; and organizational and behavioral changes needed for m-government growth can also deter the pace of adoption (Stockdale, Norris, & Mirza, 2008). The lack of needed bandwidth and limited features of some mobile devices also hinders the pervasive use of cellular networks for specific medical systems (Rašković, Milenković, De Groen, & Jovanov, 2008).

**Mobile Health**

Mobility in the healthcare domain can either involve the physical transportation of medical services or the use of mobile devices for various aspects of healthcare management. The use of trailers and different vehicles to deliver healthcare to rural and poorer communities is used to provide increased access to healthcare services, for example telemedicine using mobile hospitals to delivery pre-natal and anti-natal services (Katzenstein, Yrle, Chrispin, Hartman, & Lundberg, 2012). This aspect of m-health is critical for effective prevention, diagnosis and treatment of illnesses. In this study m-health is more narrowly focused on the use of ICTs for healthcare administration. Wireless devices may be physically mounted on vehicles or singularly administered as cellular or hand-held devices. In general, m-health applications can either support clinical applications which deal directly with patient care; or non-clinical applications that provide support services such as scheduling hospital beds (Stockdale et al., 2008).

A more specific example of a clinical m-health application is the use of short message service (SMS), which consists of a text message to wireless devices such as cell-phones. SMS has been an effective way to communicate information to patients. From a clinical perspective, SMS has been used to remind patients to take their vitamins in Canada (Cocosila & Archer, 2009); HIV testing in Zimbabwe (Morin et al., 2006); and mobile dental services for HIV-positive clients in the United States (Zabos & Trinh, 2001). The use of mobile devices in the delivery and management of healthcare is still developing in many regions of the world, but the use of cell phone for disease intervention through phone calls and text messaging has the potential to lower costs associated with the use of healthcare resources (Krishna, Austin Boren, & Balas, 2009).
THEORETICAL FRAMEWORK

Limited evidence of government involvement in the implementation of healthcare initiatives through m-government projects is documented in the current literature. One recent study in Taiwan showed citizen using mobile phones to send information to a government sponsored medical data collection platform (Lin & Yang, 2009). The study further showed that patients’ intention to adopt the technology was influenced by factors such as user attitude, perceived usefulness, subjective norm, perceived ease of use, and innovativeness (Lin & Yang, 2009). Citizen focused studies represent one perspective on m-government applications in the healthcare domain. However, macro level studies examining a set of broader based variables can also provide an alternative perspective on this very important area.

M-government applied in the healthcare industry would involve a wide range of technical and social factors. The actor network theory (ANT) is a useful tool for studying information systems where social, technological and political factors all equally relevant (Tatnall & Gilding, 1999). With complex concepts it is challenging to isolate a single variable to explain a phenomenon. Fortunately, ANT allows for the inclusion for a variety of relevant constructs to explain or support a complex attribute. For m-government in healthcare, a composite index can provide useful information about the state of development in that particular country. The m-government in healthcare index (MGHI) construct consists of both technical and social variables (see figure 1).

FIGURE 1: FRAMEWORK FOR M-GOVERNMENT IN HEALTHCARE INDEX (MGHI)
The technical variables are classified into two categories: 1. mobility development (MD) and 2. e-government development (EGD). The social variables are classified into the following three categories: 1. quality of life (QL); 2. quality of healthcare (QH); and 3. economic position (EP).

The details of each of these five constructs are listed below:

1. Mobility Development (MD):
   1. MU – Number of mobility devices in use.
   2. MC – Number of mobility device carriers.
   3. MI - Mobility device infrastructure.

2. E-government Development (EGD):
   1. ER – E-government readiness.
   2. EI – Number of e-government initiatives.

3. Quality of Life (QL):
   1. HDI – Human Development Index was created by the United Nations (UN) Development Program to measure the quality of human life. The index considers three critical components for its calculation: health, education and income. Countries are ranked into four categories based on the index calculated: very high, high, medium or low HDI.
   2. EE - Education Expenditure measures the percentage of a government’s total expenditure that is spent on education.
   3. UP - Urban Population represents the percentage of the population that lives in city and metropolitan areas. However, different countries define urban areas differently.
   4. CPI - Corruption Perceptions Index measures perceived public sector corruption. The index is calculated on a range of 0 for highest level of corruption and 10 for the lowest level of corruption. The index is compilation of data from different surveys of experts and businesses.

4. Quality of Healthcare (QH):
   1. HE - Health Expenditure measures the percentage of a government’s total expenditure that is spent on health.
   2. HLE - Healthy Life Expectancy in years is the number of healthy years that a person is expected to live from birth.

5. Economic Position:
   1. GDP - Gross Domestic Product measured in US$ dollars.
   2. PPP - Purchasing Power Parity measured in US$ dollars.

**METHODOLOGY**

This study uses secondary data sets for testing. All data is collected from a variety of pre-existing databases. Statistical techniques are used to test the m-government in healthcare index (MGHI). This is a complex composite index derived from multiple indicators. The underlying indicators are first tested to determine how many different factors exist. This is needed to also validate the categories presented in the theoretical model. This work-in-progress project is currently at the data collection phase of the study.
IMPLICATIONS OF THIS STUDY

This study has implications for researchers and practitioners working the field of m-government and m-health. Technical, social, economic and political factors can each independently or collectively facilitate or constrain the development and implementation of m-government healthcare projects. Presenting a comprehensive metric to measure m-government in healthcare provides a finite measure that can serve as a benchmark for growth and progress in the area.

From a research stand point this study captures multiple related constructs and analyzes them through the ANT lens. This approach lays the ground work for more in depth studies involving m-government and healthcare. The study also provides a theoretical framework from which other variables can be introduced to examine this phenomenon. As with all research, limitations of this study exist. The primary issue at this time pertains to the early stage of the work and the untested model.

From a practitioner’s perspective, individuals working in the field of either m-government or m-health can use one or more of the underlying factors to evaluate the current state of progress in that domain. The practitioner can also use data about their own m-government healthcare initiatives to validate or improve constructs presented in this study. Further, champions from government, healthcare and citizen groups can emerge as important leaders and allies for the use of m-government for delivery of healthcare services in developing and emerging economies.

CONCLUSION

Sustainable implementation of mobile technology for healthcare delivery requires cooperation and agreement from multiple stakeholders with different agendas (Kaplan, 2006). The dynamic interplay of competing and sometimes conflicting interests can create a fragile environment for m-government applications for healthcare in developing and emerging economies. Success of initial small scale projects, can serve as best practice models before larger more expensive projects are considered. This study presented a comprehensive model for a complex construct: m-government in healthcare index (MGHI); overlapping between the areas of m-government and m-healthcare. As global and domestic pressures affect governments in developing and emerging economies innovative solutions are needed to address complex issues. A clear understanding of these complex technical, social and economic issues can provide a path for improved public administration in these countries.

REFERENCES


