



m-Government: Cases of Developing Countries

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Abstract: Mobile Government is one of the new and important developments in e-government. The promise of m-government to provide greater access to government information is progressing in many developed and developing countries. In this paper we present a comparative analysis of mobile applications in developing countries, provide an analysis of trends within development framework and discuss implications for policy makers, government official and IT solution providers.

Keywords: Mobile Government, Developing Countries, m-government Applications, Country Cases

1. Introduction

E-Government is the conventional government services made available for citizens through electronic means such as telephone, digital television and internet connected computers and other devices. Internet is increasingly becoming the medium of delivering government services to citizens in an effective and cheaper way. Recently the development in mobile technologies with the introduction of internet enabled mobile phones, PDA's, Wi Fi and wireless networks has created a new channel to deliver government services to citizens in more effective and cheaper way. These developments have created a new channel to deliver government services called the Mobile Government or simply m-government. m-government is defined as *the strategy and its implementation involving the utilization of all kinds of wireless and mobile technology, services, applications and devices for improving benefits to the parties involved in e-government including citizens, businesses and all government units (Kushchu, 2003).*

Information delivery to public is a key task of government and often not an easy job. It is the responsibility of the government to keep their citizens informed of what is happening around them. Citizens need this information and sometimes are critical for them in making decisions and forming any opinions. Timely information delivery to public promotes democracy in the country and creates accountability. Mobile technologies prove to be a critical channel for governments to provide timely information for citizens also called G2C or Government to Citizens information delivery. In Malaysia, the ministry of agriculture sends Short Message Service (SMS) to farmers' mobile phones alerting them of increased water level thus enabling them to take necessary steps to avoid any potential damage to their agricultural lands (Zalesak, 2003). In addition, mobile technology is also helping in fight against terrorism. In Ireland people can use Multimedia SMS (MMS) to send the photos of criminal suspects to the law enforcement agencies. Several criminals have been caught using this service. SMS is also used in crisis events to keep citizens calmed down. The Hong Kong government sent SMS to some 6 Million mobile phone users during the SARS outbreak to keep them calm and reduce the tense and fear from the public's hearts (Lallana, 2004).

m-government not only improves communication between Government to Citizen (G2C) or Citizen to Government (C2G) but also improves operations among government agencies and Government to Employees (G2E). In Turkey, mobile law enforcement units query vehicle information using their mobile devices in their cars. Vehicle information is then cross checked with several government agencies for road tax expiry, criminal suspicion or owner's validation. In addition, mobile technologies allows government employees get necessary information wherever they are by accessing their office of department systems using their Wi Fi enabled mobile devices such as PDA, laptops or palm tops. This increases the efficiency of government employees in doing their job (Cillingir, 2003)

While it is widely perceived that mobile government will do good to developed countries more, it equally does good to developing countries. The issues related to opportunities for mobile government applications in developing countries are not widely studied. This paper is concerned with a case based study of mobile government applications in developing countries. First, we will have a comparison of e-government and mobile government in context of developing countries. Then, we will study the people's or citizens readiness and factors contributing to barriers in e-government adoption while opportunities for mobile government adoption. Next, we will see the development in mobile communications in those countries. In addition, we will look at various

mobile government applications in developing countries such as Turkey, the Czech Republic and the Philippines. Next, we will see the trends in m-government applications in those countries and study the priority areas where mobile government applications can be applied based on the cases discussed. In the end, we will deliver a comprehensive analysis of the m-government applications in those three countries and come out with a set of recommendations for policy makers, mobile operators to plan and develop effective mobile government applications.

2. E-Government and M-Government

m-Government and e-Government are not two separate entities. E-Government encompasses usage of all technologies to deliver services to citizens and improve the activities of government and streamline their processes. On the other hand, m-government is an add on to the e-government confined to use of mobile technologies such as mobile phones, PDAs (Personal Digital Assistant), Wi Fi enabled devices, blue tooth, wireless networks in delivering services. In addition, m-government is a better option compared to e-Government in delivering services and public information to citizens due to its nature of being available anywhere, anytime and from any internet enabled device (Lallana, 2004).

m-Government is not meant to be a replacement for e-government but a complement to e-government. While the mobile devices provide a faster and timely way of delivering information to citizens, it has some limitations. Mobile phone is considered as the most common medium or enabler of m-government but lacks the ability to transfer large volume of information, especially complex information. In addition they lack several features that the normal internet enabled personal computer has. Examples of this limitation are the Short Message Service (SMS) which can transmit upto 160 characters only while email can transmit large amount of information (Lallana, 2004). These limitations limit m-government services to simple but most critical applications. In case of developing countries, delivering critical information to citizens is one of the most beneficial applications of m-government.

3. People's Readiness

People's readiness refers to the situation in which people are able to access *and* use Information Communication Technologies (ICT) and Internet regularly. While the readiness is high in many developed countries, the situation is different in developing and under developed countries. People in many developing and under developed countries are unable to access ICT with sufficient regularity and use and in some places people are unable to access it at all (Gashghai, 2002). The low level of people's readiness or the digital divide exist due to several reasons such as low level of education and literacy, poor technology infrastructure, wide gap of disposable income etc. In addition, use of Internet requires a fairly complex set of skills and technology know hows. There are certain requirements such as electricity, communication lines, computer workstation and in most cases a reasonable fluency in English. These requirements are difficult to be met in many underdeveloped and developing countries. Due to the lack of people's readiness many e-government applications cannot be implemented and if implemented they fail to succeed and meet their objectives.

On the other hand, mobile government brings lots of opportunities which e-government couldn't succeed. Mobile government applications are accessed using mobile devices such as mobile phones and PDA's. The cost of owning these mobile devices are low. In addition, use of these devices is fairly simple thus making it easy for any common person to use it to access information. Governments can use this opportunity to better reach out to their citizens. Considering the lack of readiness for e-government and increasing use of mobile phones in developing countries and factors such as wide availability of mobile phones, ease of use, low cost of ownership and use, m-government seems to be a better way to reach citizens and interact with them. Development in mobile technologies and their widespread use in developing countries contribute a lot to citizens' readiness towards m-government.

4. Mobile Communications and Developing Countries

Mobile or Wireless communications has penetrated many developing nations. It has been a major competitor to the fixed telephone lines which is owned by the state in many developing countries. In many regions where getting a fixed telephone line takes years and costs a fortune, citizens can now easily get a mobile phone connection by purchasing a phone card and a mobile handset. Due to the infrastructure architecture of mobile telephony, it is easy to setup new mobile phone network in countries where infrastructure is an issue. The mobile telephone system can be setup without facing problems and heavy investment in telephone cables around the country. This makes it a better choice for citizens due to its low cost and thus the mobile phone penetration is very high. People in remote areas where having telephone connection used to be a dream can now enjoy all the benefits of telephone and additional services such as text messaging, information access through their mobile phones (Minges, 2001).

Wireless Internet seems to be a better choice in developing countries as the mobile phones outnumbers the total number of personal computers and fixed phones. Subscribers are enjoying services such as SMS to send and receive text information. The use of SMS in developing countries is exploding. According to Globe Telecom, a leading mobile phone operation in the Philippines, 25 million SMS message is being sent per month by their 2.6 million subscribers. In addition, Celtel Congo, a mobile operator in Congo, one of the poorest countries in the world, introduced WAP to its 14,000 subscribers (Minges, 2001). Subscribers in this least developed country are now able to access local news, check weather reports and access WAP sites launched in other countries using their mobile phones.

Mobile technology allows developing countries to leapfrog in adopting new technologies. This is very important to the development in developing countries. According to ILO, "*acceleration of development can occur through the leapfrogging potentials inherent in the technologies, where leapfrogging is defined as the ability to bypass earlier investments in the time or cost of development. Leapfrogging has first of all a technological foundation: through wireless applications, developing countries can bypass more costly and time-consuming investments in fixed-wire telecom infrastructures*". (ILO Report, 2002)

5. m-Government: Cases of Developing Countries

In developing countries where Internet penetration still remains low due to infrastructure and people's readiness issues and mobile phone and mobile Internet penetration is high, m-government becomes a better option. The total number of mobile phones has already surpassed the total number of fixed lines. This includes 49 middle income and 36 low income countries. In addition to the increasing number of mobile phones in these countries, the use of services such as SMS which is a vital tool for communicating information and a precursor to Internet in mobile phones are also increasing (Lallana, 2004). SMS can be used as a great tool to communicate information with citizens.

Realizing the benefits of mobile and wireless technologies, many countries are now implementing and developing solutions to better deliver government services to public. Developing countries seems to be embracing these technologies too. In this part, various m-government cases are being discussed and their effectiveness is discussed.

5.1 Turkey

In Turkey mobile phones have penetrated 23.3 Million (34%) of 69.6 Million populations compared to 4.3 Million (6%) internet users. The mobile phone penetration rate is high and this rate is increasing yearly. Even though mobile phone penetration rate is increasing the mobile internet penetration rate remains low. Due to this fact, most of the mobile government applications are confined to G2G or basic G2C applications based on SMS and GPRS technologies. These applications are still in their early stages so they still need further improvements but still they are considered to be effective compared to the traditional way of providing the services. The major mobile government applications in Turkey are briefly discussed below (Cilingir, 2004).

5.1.1 MOBESE

Mobese (Mobil Elektronik Sistem Entegrasyon) or Mobile Electronic System Integration is one of the pioneer mobile government applications in Turkey. This application is a G2G mobile government application for law enforcement agency. This project is mainly an infrastructure enabling the law enforcement units to be more efficient and effective. It connects the law enforcement units to their respective police stations via a GPRS internet connection allowing the mobile law enforcement units to query citizens regarding validation of their identity, checking their record history. This service allows the mobile law enforcement units to be more efficient in their job.

5.1.2 TBS

TBM (Trafik Bilgi Sistemi) or Traffic Information System is another major mobile government application in Turkey. Mobile traffic units are equipped with tablet PCs to quickly conduct queries regarding offending drivers' license and vehicle information. This increases the efficiency of the mobile traffic units. In addition, location of each mobile traffic unit can also be located and dispatched to a particular locations such as a traffic incident instantly

5.1.3 Local Government Applications

In addition to the above mentioned major mobile government applications, there are various other applications in local governments. Most of these applications are based on SMS technology. In Sisli municipality, SMS technology is used by citizens to pay their taxes. In addition, local government also uses SMS for polling. Moreover, small applications are being developed to target specific citizens such as sending automatic birthday wishes.

5.2 Czech Republic

In Czech Republic, mobile phones have penetrated in 95% of the 10 million populations, one of the highest in Europe and probably in the world. Currently there are 3 major mobile phone operators namely Eurotel (44%), T-Mobile (42%) and Oskar (14%). Since the mobile phones have penetrated the majority of populations, mobile government applications will prove to be more effective and quick in reaching majority of citizens. Many m-government applications are launched and being tested especially for informing citizens' of crisis and natural disasters.

5.2.1 One way Critical Information Delivery for Citizens

Natural disasters such as floods, earthquakes and man made hazards such as toxic leakages can cause risk to human lives. Protecting citizens of these hazards is the main duty of the government. In early days (70s and 80s), municipalities used to maintain a network of loudspeakers and their operation and maintenance cost a lot to the government. Those loudspeakers were used to inform critical news and alerts to the public. This system was not merely welcomed by the citizens. SMS has replaced the ageing street loudspeakers' network proving to be more convenient, efficient and reliable.

There are various other instances of mobile government applications in Czech republic mainly mVoting by municipalities on various issues such as getting citizen's consensus on a certain issue.

5.3 Philippines

The mobile phone penetration in Philippines is 23.8% which accounts to 20 million mobile phone users out of 84 million populations. This number is a 3.4% increase from 2002. The mobile government applications range from simple G2C applications to more interactive C2G applications. Use of SMS technology is popular in enabling these applications.

5.3.1 TXT CSC

TXT CSC is an SMS service launched by Civil Service Commission (CSC) in Philippines. Its 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 (Lallana 2004). Before this service, other electronic means such as email, telephone hotline was provided but due to its

limitations and costs, the services were hardly used. With the introduction of SMS to send complaints in 2001, CSC made it easier for citizens to send their complaints as the use of SMS was widespread and cheap. This made CSC job easier in tracking the corrupt government employees and government services which needed improvement.

TXT CSC was launched with very little promotion to the public but still it received an average of 1,000 to 1,500 messages per month making it the mostly widely used SMS services provided by the government. The cost of using this service is low too. A single TXT CSC SMS costs only P. 1 (\$0.02) compared to P 2.50 (\$0.05) charged by Bureau of Internal Revenue on citizens to participate in m-Government services.

5.3.2 Reporting Criminal Offence

A text messaging system was introduced in 2002 by the Philippines National Police enabling the citizens to report criminal offences by criminals as well as police officers to relevant authorities to take action. The service was made available to 16 million mobile phone users country wide. The purpose of this service is to allow more transparency in the government offices. The SMS service can also be used by citizens to seek emergency assistance. The complaint is sent by the mobile phone user through a text message to a specified number. The message is then routed by the mobile operator to Complaints Referral Action Center (CRAC) which records the complaint. The message is then delivered to the responsible authority to take action. The SMS sender's information is also recorded and is informed of the status of the case as well as any action taken.

Since the introduction of the service in 2003, it received around 29,000 complaints of which 33% were for assistance, 25% for usage of illegal drug or gambling and 13% against corrupt police officers. The introduction of this service enhances the police complaints procedure. Since the messages are automated and stored without any human intervention, it reduces the barriers to complaints about police officer's wrong doings and increases the capacity to handle more complains since the system is automated avoiding all the bottlenecks caused by clogging police phone lines. The challenges arise when anonymous users send complaints since 90% of the mobile phone users are prepaid users. Taking action against any person or agency without proper authentication of the complainant is a tedious job (Lallana, 2004).

5.3.3 Polling Coverage through SMS

The next general election in Philippines will be held later this year on May. The six big media firms have partnered to multimedia coverage of the elections. Smart Communications will be the SMS and MMS (Multimedia Messaging System) content provider. News content on updated polling information from GMA-7's TV and radio will be delivered by SMS to citizens. Updated polling statistics is the most demanded information by the citizens during election (Villafania, 2004). This service gives the citizens convenience, ease and mobility in getting updated polling information.

6. Comparison and Analysis

The applications of m-government differ from country to country in our case studies based on certain factors. In Turkey m-government applications are mostly confined to G2G where mobile and wireless technologies are utilized within the government agencies to make them effective and efficient. In Czech republic, the m-government applications are used for delivering important messages to the citizens in time of crisis (G2C) while a few applications exist where there is interaction between the government and the citizens (both G2C and C2G) as in case of m-voting. In Philippines, m-government applications are utilized for both G2C and C2G as in case of sending complaints to the government agencies and getting their response in addition to getting instant polling update information on your mobile phone. Based on our study of the m-government country cases we can see a trend in m-government applications. While in developed countries, most of the m-government applications are highly interactive in which citizens carry out various transactions with the government in fast paces, in developing countries, the applications are not that advanced and confined to one way interaction (G2C) or minimal interaction (G2C and C2G) only. In addition use of mobile technologies within the government agencies (G2G) is also popular as in case of Turkey.

Based on the current mobile phone infrastructures (GSM) in developing countries and availability of content and content providers, this pattern seems to be quite reasonable. Internet access through GSM and GPRS phones are limited and costs relatively high. In addition adequate content providers and content is not available. These are some of the factors which tell us why m-government applications are mostly G2G and G2C in developing countries. Mobile internet is enabler of most of m-government applications. Hence, in order to make the use of m-government widespread, the use of mobile internet should be increased too. This requires strategic planning when developing mobile communication infrastructure and content. Following is a set of recommendations for policy makers, mobile operators, content providers and other stake holders:

- Compared to GSM or GPRS which are 2G mobile network, 3G network has more potentials for enabling wide spread use of mobile internet. Policy makers in developing countries should be made aware of 3G network's potentials and need to start outlining their policies for the 3G network introduction
- In the first stage, mobile government applications can be developed for more critical instances such as delivering critical messages in times of crisis etc. to the citizens. Later, as the use of mobile internet increases, more interactive m-government applications can be developed.
- While developing mobile government applications, it should be taken in view to design application content in such a way that it suits the citizens' taste and preference.
- Aid agencies and International Organizations such as UNICEF, UNDP working in health improvement, development, crisis management, and related sectors can benefit the existing mobile phone technologies in developing countries to better reach citizens in times of a disease outbreak, crisis or other events. Their role in here can be financing those m-government applications.
- It is equally important for the policy makers in developing countries to keep in mind various organizational issues in planning and implementing an m-government application. The m-government application planned should be supported by the top government authorities. Since introducing an m-government application means bringing changes and

introducing something new in the government, it might face resistance within the government. The government agencies related to the newly planned m-government application should be highly involved in the planning and implementation phases of the new service.

- The new m-government application should not be seen as new process or service but as a compliment to the existing traditional way of delivering government service to the citizens.
- Successful m-government applications rely on effective backend to support the m-government applications. Necessary considerations and infrastructure should be made available to support all the m-government applications.
- Developing many independent m-government applications might eventually create an island of information where there is no integration between one m-government service and another. When the need arises for integration of these services, the task becomes difficult. In this situation, we would like to recommend that all m-government applications should be taken as a strategic project and planned carefully to reduce the chances of islands of information dilemma.
- Developing an m-government application does not necessary means that it will be used by all citizens. Awareness should be made to the citizens on use of the m-government application.

7. Conclusion

Mobile technologies particularly mobile phones are penetrating the world markets fast. More avenues are being made for business to reach out their customers better than before. Governments are also benefiting from these technological advancements. Mobile technologies pave the way for governments to deliver better, quicker and on time information for its citizens. In addition, citizens' demands are increasing for better government services. As far as the developed nations are concerned, they are already benefiting from their existing wired infrastructure and mobile. Wireless technologies provide them wider opportunities to reach their citizens. Developing countries are as well benefiting from these emerging technologies. In addition, mobile technologies do more good to developing countries than the developed countries. It allows the developing countries to bypass building all the heavy infrastructures, the costs and time association with developing those infrastructures and adopt wireless or mobile technologies. Furthermore, it is very obvious that the mobile phone penetration has already surpassed the fixed lines. This allows the governments to reach more citizens in a better, faster and effective way. In addition, it provides convenience for citizens to access government services whenever they are and wherever they are. There are no such barriers to access information from the government as in case of e-government where lack of technical infrastructure and low level of citizen's readiness becomes a barrier.

Governments in developing countries can start implementing m-government in three different phases. Firstly, applications should be developed to reach citizens in time of crisis such as earthquakes, fire, floods, disease outbreaks etc. These types of services are mainly government to citizen and the flow of information is one way. Secondly, more interactive m-government applications can be developed to allow citizens' participation in government activities. This will encourage citizens' participation and enhance democracy and brings accountability. Thirdly, highly interactive m-government applications can be developed. These applications range from

simple transactions such as payment of taxes, bills and inquiries to mobile identification cards where a citizens' mobile phone functions not only as device for making calls but also an identification card, payment wallet, driving license and health insurance card.

While developing all these applications, it should be taken in view that the m-government applications should serve a specific purpose. Citizens' should be educated on using these services and benefits of these services needs to be highlighted. All the other necessary infrastructure and systems should be built to support these applications. In addition, these m-government applications should be developed based on the requirements of the citizens. It should be more citizens' centred rather than agency centred. The application interfaces should be designed in a user friendly manner making it an enjoyable experience for citizens' to use it. In addition, protecting privacy and providing security for the data and interactions should be an important focus of the application.

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