Adoption and Diffusion of m-Government: Challenges and Future Directions for Research

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Abstract. The paper reviews mobile government (m-Government) adoption and diffusion factors in developed and developing economies. m-Government is viewed as a class of e-Government applications and refers to any transaction via mobile technologies, such as laptops, phones or personal digital assistants (PDAs). The most significant features of mobile technology include mobility and portability. The ubiquitous dimension of mobile technologies provides means of accessing services anywhere, anytime, and on the move, thanks to advanced wireless interface technologies. The paper examines the literature base in respect of known obstacles to the adoption and diffusion of m-Government, drawing the distinction between technical and non-technical barriers. Furthermore, the paper discusses the economic impacts achieved by e-Government in many countries following the transfer of public services to electronic services; some examples are given from the developed and developing countries.

Keywords: e-Government, m-Government, technical barriers, non-technical barriers

1   Introduction

E-Government relies on the availability of computer hardware and software, and a favourable citizen predisposition towards the use of electronic communication. Unfortunately, such assumptions about the affluence of individuals, a country's level of technological development, and the predisposition of its citizens towards electronic communication, may not be legitimate, and even some advanced nations are struggling to increase their citizens' adoption of e-Government initiatives [9]. With respect to developing and transitional countries, a survey revealed that 35% of e-Government projects were total failures, 50% were partial failures, and only 15% were successful [7]. M-Government exploits the large adoption of mobile phone technology by citizens to achieve the goal of e-Government. In fact, mobile phones have a much wider dissemination than computers. In 2002, the number of mobile

subscribers surpassed that of fixed-line subscribers in 97 countries [10], 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. This take-up of mobile technology is an encouragement for governments seeking to develop their channels of communication with citizens and organisations [12].

Following the introduction, the paper discusses the relationship between m-Government and e-Government and introduces the main category of barriers facing the adoption of m-Government service. This is followed by the economic impact of e-Government and m-Government in developed and developing countries. Discussion of the study and conclusion are offered.

2   The Relationship Between e-Government and m-Government

E-Government is defined variously, and the vast majority of definitions focus on the role of information and communication technologies (ICTs) in facilitating the delivery of public services to the government, companies and citizens [6; 16]. However, [5] define m-Government as 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.

From the above, it was established that m-Government is a complimentary sub-set of e-Government [13]. Furthermore, most researchers believe that e-Government is the cornerstone for m-Government [9; 18]. Therefore, the real differences between these two deliveries of public services as noted by [13] relate to the mean of access and delivery.   E-Government provides services through wired networks with interactive and relatively intelligent web applications. However, the value of m-Government comes from the capabilities of applications supporting mobility of the citizens, businesses and internal operations of the governments. Furthermore, some of the typical challenges and barriers for e-Government are naturally shared by the m-Government efforts [13]. Further details on e-Government and m-Government technologies can be found in [1].

3   Barriers facing the Adoption and Diffusion of m-Government

Data communications, however, is now becoming very attractive to many consumers and business users [13]. That said, despite the fact that ICT systems are valuable communication tools, they also bring many technological and cultural concerns. In this respect, [9] have observed that "it 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 reviews the technical and non-technical barriers faced by many countries when attempting to adopt m-Government systems.

3.1   Technical Barriers

The most common technical barriers to m-Government development and dissemination involve a lack of infrastructure [13; 9; 2] and this is a particular problem in developing countries. According to [13], m-Government infrastructure is comprised of wireless networks and mobile access devices (e.g. mobile phones, laptops, PDAs), and accessing software services. Another technical barrier is identified as security [14]. In the US, for example, [20] 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 prevent hacking, and the need to maintain privacy. According to [2], security of m-Government applications is considered the hallmark of a successful initiative. In this respect, [9] recommends the fundamental standards of wireless network security in order to secure controlled and managed access to services. And yet another barrier is the potential lack of compatibility between mobile systems and existing e-Government systems, a problem which as noted by [15], may escalate where government offices have legacy systems which may not be easy to integrate both in terms of functionalities and data administration.

3.2   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. The literature highlighted culture as a non-technical barrier for the adoption of e-Government and m-Government a belief that is echoed in the literature by such scholars [9; 15]. Reference [21] investigating the tendencies of Chinese people in relation to e-commerce, found that 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 [15].

Privacy and security are also raised by [15; 12] 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. Another major problem of a non-technical nature, is people's resistance to change, which occurs generally because offear of the unknown, or an inability to deal with uncertainty [15].

Furthermore, another barrier in some countries, as identified by [13], 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. In discussing resistance to change, the [16] 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 [7] that about 60% of e-Government initiatives fail due to: lack of high-level officials' commitments; funding; and project control.

Reference [5] classify the lack of IT skills as another barrier that confronts some hard challenges relating to government's ability to provide e-Government and m-Government services. Reference [13] 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. Clearly, the cost issue is one that applies to populations in all countries, and as [13] have pointed out, the cost of owning mobile devices and of accessing services should be affordable, and low.

4   The Economic Impact of e-Government and m-Government

In spite of such failures and barriers, 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. However, as e-Government and m-Government are still in their infancy [20; 6], effective implementation cannot be taken for granted, and financial, organisational and cultural issues represent the potential for serious obstacles in this respect. Today, governments are trying to reshape their citizens' old perceptions of long queues, cumbersome processes [18] and corruption. Therefore, some examples are given in the following sub-sections, which also identify the benefit to both developed and developing countries from moving towards the e-Government model.

4.1   Developed Countries

According to [4] 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 as well as In Alaska, online vehicle registration costs have dropped from $7.75 to only $0.91 using an online system. Furthermore, according to [15], that Australian e-Government providing services to over 6 million people. It has launched an online system at a cost of AU$600 thousand 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 a AU$1 million, per year for five years.

4.2   Developing Countries

According to [4] eight out of ten Brazilians are filing their income tax forms online. The government of Brazil saved $10 million when eleven million people paid their income taxes online. In addition, the use of 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. Another example form the developing country, that Singapore's 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 [11]. According to [4] the integration of databases of the Moroccan Ministries of Finance and Planning has cut in half 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%.

5   Discussion

Undoubtedly, the development of an integrated infrastructure, suitable hardware and software that provides full security is crucial, as is the creation of appropriate legal apparatus to facilitate the easy and secure use of electronic transactions. 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. Furthermore, as we mention above that in developed and developing countries it is clear that implementation of e-Government and m-Government in these countries and Arab world creates opportunities to save money and facilitate transaction in public and private sector. Also, m-Government initiatives will help give opportunities to increase transparency and reduce corruption, in particular in developing economies. Therefore, the international society need to consider these impacts of economics in m-Government projects to help adoption and diffusion of m-Government project around the world in developed and developing countries.

   The finding of this paper can lead to the following future researches. Firstly, the barriers proposed from this paper 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 paper demonstrates that lack of infrastructure and security represents the main challenge in developed and developing countries. As well, factors such as culture, trust, privacy, lack of funding, People's

resistance, their education level, and Internet cost, are the main challenges facing the adoption of e-Government and m-Government projects. 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. It is important to identify the level of significance and interdependence of each challenge in order to secure successful implementation of m-Government projects.

6   Conclusion

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 and the value of m-Government comes from the capabilities of applications supporting mobility. In addition, this paper has grouped the barriers into two categories, technical aspects, and non-technical aspects. In terms of technical aspects, the development of infrastructure and the need to ensure compatibility with already-existing provision, are 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, the range of problems that cause citizens not to want to engage with e/m-Government occur, 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, barriers 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. Overall, the research provides a better understanding of the complex environment in which e/m-Government is deployed, including the drivers and barriers to adoption. The authors are currently conducting a comprehensive fieldwork study in a developing country to explore government services adoption patterns by citizens. This will be reported in future publications.

7   References

1. Al-Hadidi, A and Rezgui, Y (2009) "Barriers Facing the Adoption and Diffusion of m-Government: Literature Review", 7th Eastern European e|Gov Days: (eee|Gov Days 2009) Prague, Czech Republic. Page: 456-466, ISBN 978-3-85403-255-7.
2. 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].
3. Antovski, L. & Gusev, M. (2005): M-Government Framework, EURO mGOV 2005, Brighton, UK, pp. 36-44

4. Atallah, S. (2001) E-Government Considerations for Arab States SURF-AS [Internet], Available from: http://www.surf-as.org/Papers/e-gov-english.PDF [Accessed March, 6th 2008]

5. Bassara, A., Wisniewski, M., and Zebrowski, P. (2005). "USE-ME.GOV- Usability-driven open platform for mobile government". In Proc. Business Information Systems (BIS) 2005, Poznan, Poland, 193-202.

6. Choudrie, Jyoti, Ghinea, Gheorgite (2004). Evaluating global e-Government sites : a view using web diagnostic tools. Electronic Journal of e-Government. Vol. 2,no 2 p.105-114. http://ejeg.com/volume-2/volume2-.pdf

7. Commonwealth Telecommunications Organisation (2002) E-Government for Development Information Exchange Project Website [Internet], Available from: <http://www.egov4dev.org> [Accessed March, 22nd 2008].

8. Foghlú, M.Ó. (2005): Infrastructures for Mobile Government Services, EURO Mgov 2005, Brighton, UK, pp. 192-199

9. Goldstuck, A. (2003): Government Unplugged - Mobile and Wireless Technologies in the Public Sector, Centre of Public Service Innovation, Tshwane, South Africa.

10. ITU, International Telecommunication Union (2002). The E-Government Hand book for Developing Countries.

11. Ke, W. and Wei, K. K. (2004) Successful e-Government in Singapore. Communication of the ACM, 47[6], 95-99.

12. 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].

13. Kushchu, I. and H. Kuscu (2003) " From E-Government to M-Government: Facing the Inevitable?" in the Proceeding of European Conference on E-Government (ECEG 2003), trinity College.

14. 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.

15. NOIE (2002) Improving Confidence, Trust and Security [Internet], Available from: <http://www.noie.gov.au/projects/confidence/Improving/index.htm> [Accessed May 2nd 2008].

16. OECD (2003) The e-Government Imperative, OECD publications, France.

17. Rezgui, Y. (2007) Exploring virtual team-working effectiveness in the construction sector. Interacting with Computers, 19[1], 96-112.

18. Scholl, H.J.J. (2005): The Mobility Paradigm in Government Theory and Practice: A Strategic Framework, EURO mGOV 2005, Brighton, UK, pp. 377-385

19. Silcock (2001) Institute of Public Administration and Management, University of Liverpool, Liverpool, UK

20. 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.

21. 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

22. United Nations Development Program UNDP (2003). Available from http://www.undp.org [Accessed February 08 2008].

23. World Bank (2004) www.wordbank.org - [Accessed March 4th, 2008].

24. Zálešák, M, (2003), M-Government: more than a mobilized government. Available from: http://www.developmentgateway.org/download/218309/mGov.doc [Accessed March, 27th 2008].