

EXPERTS' PERSPECTIVES ON BARRIERS TO THE DEPLOYMENT OF MOBILE GOVERNMENT SERVICES

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Keywords: mGovernment, barriers, evaluation, mobile, services, systems, management.

Abstract: Effective management is considered the crucial factor that decides the success or failure of any mService project. This paper is a further step into a research project that aims to measure the effectiveness of mGovernment services. As a preparatory step to developing a users' opinion survey, this paper analyses and defines barriers to the success of mGovernment service projects from the perspective of mobile government and mobile technology experts from nineteen countries around the world. The outcome is compared to the findings from an extensive literature review. The results show a very close correspondence between the literature review and the opinions of the experts.

1 INTRODUCTION

Mobile government refers to electronic government services capable of being delivered via mobile user interfaces, or in some instances, special mobile services such as location-based services, provided by the government (Suomi, 2006). Government services may also be offered electronically or traditionally in person by different government departments or agencies. Field workers, customs inspectors, immigration agents, local council officers, medical and law enforcement and military personnel can all benefit from access to current data to make better, faster, decisions (AFIRM, 2002). In order for those services to be successful, their initiating projects have to be established on facts about the validity of the mobile service itself. Not every government service can be rendered using mobile technologies, for example, services that require the downloading of large amounts of data to mobile phones which have limited storage capability and small screen real estate. Hence, the investigation of both the government services that can be offered by mobile technologies and the barriers to success of such service projects must be undertaken when initiating a mobile service project.

The authors' ongoing research aims to define and analyse "barriers", which are also known as "challenges" and even "goals" to be achieved, from different perspectives namely end-users',

government officials' and mobile technology experts' viewpoints. This paper represents another link in our research into the success and failure factors of mGovernment service projects initiated by a devised generic mGovernment framework (El-Kiki et al., 2005). Here the authors analyse opinions of experts and academics in mobile technologies from 19 different countries. The objectives of such expert surveys are to precisely develop hypotheses, or extend interpretation of certain social events and processes (Potabenko, 2002). Part 2 of the paper provides a background overview of government ICT projects barriers and Part 3 outlines the methodology of the paper. Part 4 describes the findings of the survey, while the conclusion and future directions are contained in Part 5.

2 BACKGROUND

There have been numerous attempts to define barriers to success of eGovernment projects and, by implication, to mobile government projects (TWGEDW, 2002, CIBS and CCICMT, 2003, Gasco, 2005, OECD, 2003). Researchers such as Heeks (2003) conducted many studies which verified the implementation of eGovernment projects. He suggests that there is always a gap between design and reality, and in order to minimize this gap, he divides factors of success and failure of

eGovernment projects into two categories: drivers and enablers. Other researchers viewed barriers to government electronically-rendered services from different aspects. For example, in England, potential voters, who usually use SMS to send messages to friends, were not willing to use it when voting despite the very low cost, only because they could not surmount that psychological barrier of using an unofficial messaging method to fulfil an official task (Arazyan, 2002). Others (ETSI, 2005) consider negative experiences and failures as a barrier against using a service again. A recent report by the Australian Government (DCITA, 2005) reveals that lack of trust in online transactions also represents a barrier to using an online service. Carroll's (2005) research revealed the following about mobile acceptance that will inform our future research on mobile government acceptance:

- having access to mobile technologies does not mean that they are used for a wide range of activities;
- convenience is important to users;
- participants were unwilling to invest effort into using mobile devices for complex or lengthy tasks;
- physical limitations of mobile technologies including clumsy input and output mechanisms and inadequate screen size influenced usage;
- continuing concerns about privacy and security and vividness of 'urban myths' around mobile technologies have led to continuing distrust of electronic transactions; and
- little access to public sector services; the chief service accessed was transport information.

However, governments are recognising that mobile devices are vital tools for emergency and law enforcement management as they promise to enhance efficiency, effectiveness, responsiveness and accountability at federal, state and local levels (Moon, 2004). The recent major emergencies caused by the Asian Tsunami in December 2004 and Hurricane Katrina in August 2005 provide graphic examples of the failure of government agencies to communicate quickly and effectively with their threatened populations.

Our research reveals a large diversity of opinions about barriers depending on the type of barrier and the perspective from which researchers view it. These comments are aligned to the results of an intensive literature study for verification purposes and are discussed in Section 5 of this paper.

3 METHODOLOGY

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). An extensive review of literature was conducted in order to list most of the opinions about barriers (as mentioned in the background section), and to identify leading mGovernment and eGovernment researchers. The selection criterion for researchers and academics was at least one peer-reviewed journal or conference publication regarding mobile and electronic government. References were accessed through the use of different academic databases such as Proquest, ACM Digital Library and IEEE Explore. Industry experts were sourced from different areas such as communication companies, mobile phone suppliers, application developers and consultants. The researchers also attended eGovernment and mGovernment conferences and trade shows to source likely experts. As Zmijewska & Lawrence (2005) stated, such stakeholders, due to their first-hand experience, are likely to know exactly what helps and hinders successful diffusion of mobile government.

The research involved the deployment of a web based survey to experts who were invited to participate anonymously and/or by providing their contacts for further elaboration. This survey tool was chosen as the most efficient, and economic, method to collect global experts' opinions. This survey is still in progress and currently 35 usable responses have been received and are the subject of this paper.

3.1 The Survey Instrument

UTS Survey Manager was the survey instrument. During three months (June – August, 2006), 116 invitations were sent with the link to the study's anonymous survey. The web-based survey consisted of two sections; the first part elicited demographic information whilst the second part included two open questions about the main barriers to success in mobile service projects and suggestions to overcome them. Analysis of these suggestions is being handled in another paper as this paper only reports on the answers to the barriers question.

3.2 Sampling Technique

This study was based upon stratified purposive sampling, which means that cases were selected from previously identified subgroups (Gorman and

Clayton, 2005). This sampling technique enables gathering of a variety of opinions and perspectives, in addition to enhancing the credibility of data collected from several sources. Accordingly, because it is not used to generalize to the large population, this sampling technique does not need to be statistically representative. Stratified purposive sampling aims to create rich, in-depth information (Liamputtong, 2005, Zmijewska and Lawrence, 2005). The thirty five (35) respondents who completed the web survey are grouped as: university professors and teachers (13), eGovernment officials and consultants (8), mobile telecommunication manager (1), wireless software analysts & architects (2) and wireless and mobile researchers (8). The participants included (21) from European countries, (4) from Asia, (5) from North America, (1) from South America, (1) from Africa, and (3) from Australia (See Figure 2).

As purposive sampling is used to the point of redundancy (Liamputtong, 2005), the sample size, which is the number of participants, is less important than the richness of data. Accordingly, redundancy is the primary criterion that will determine when the sampling in this study should terminate; currently the survey is still up and continuing.

Johnson (1997) suggested a strategy to promote the validity of qualitative research such as our open ended questions (further discussed in part 5). Qualitative research aims to “probe for deeper understanding rather than examining surface features” (Johnson, 1995, Spring). Verbatims (direct quotes) are a commonly used type of low inference descriptors, and therefore this paper utilizes direct quotes from the subjects to improve validity of the research. Such examples of data not only validate the conclusions, but also provide rich illustrations of the topic (Zmijewska and Lawrence, 2005).

4 SURVEY RESULTS

The authors targeted researchers and experts in the field of both eGovernment and mGovernment service delivery. The authors have received 35 useful responses from a preliminary email to 116 persons (30% response rate). Our second survey will take into account any advice received so far as well as extra information from the respondents who are willing to be contacted again for follow-up email, telephone, and/or online conference interviews.

4.1 Demographic Data

The statistics depicted in Figure 1 show 20% female respondents to 80% male respondents. This could reflect the general trend in technology sectors where females are traditionally under-represented.

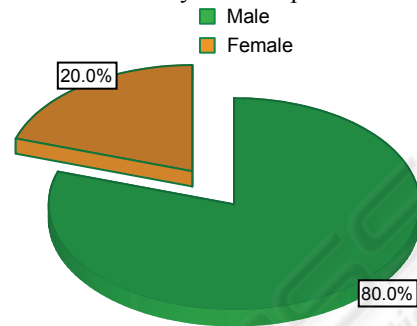


Figure 1: Respondents' gender ratio.

Participants' roles varied from university professors and teachers to wireless and mobile researchers. The respondents' largest sample comes from Europe, as per Figure 2, where most mGovernment service implementations and research are occurring.

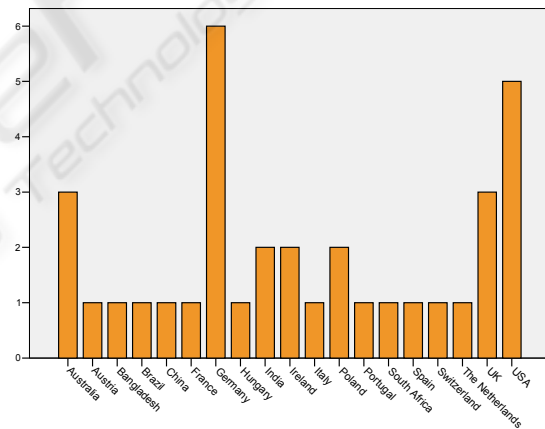


Figure 2: Respondents' participation per country.

In Figure 3, the survey results revealed that 34% of respondents were in the 20-35, 43% were in the 36-50 and 23% in the 51-65 age ranges. This percentage reflects that new mobile technologies and services are gaining the interest of experts aged 20 - 50.

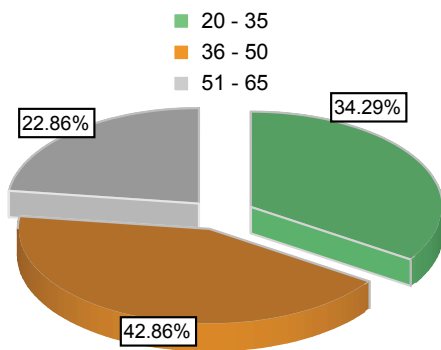


Figure 3: Respondents' participation by age.

It was particularly significant to the authors that over half of the respondents (51%) have been involved in developing a mobile government service (Figure 4). Such a percentage of returns indicates the high level of commitment to these targeted experts and confirms our selection criteria as valid.

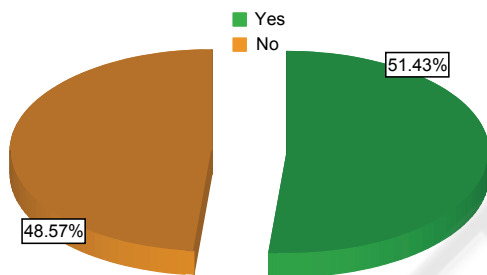


Figure 4: Respondents' previous involvement in a government mobile service project.

The cumulative percentage of success for developed mobile services was 68% as per Figure 5, which is a very encouraging and significant indicator about the expertise of participants.

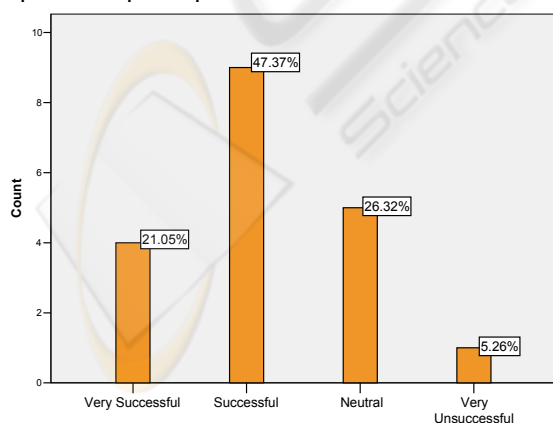


Figure 5: Government mobile service projects success rates.

5 DISCUSSION OF THE STUDY

A web-based survey was conducted to extract opinions from both expert practitioners, and academics, with research expertise, in mobile and electronic government fields. An open question about the main barriers to success in mobile service projects was answered by 83% of participants. Figure 6 illustrates the categorisation of the barriers as identified by the experts across four axes: Organisational, Technical, Governance and Social. The barriers are measured against the findings from the literature survey and are discussed below.

5.1 Organisational Barriers

Leadership issues were identified as inhibitors in the literature review; Cattaneo (2004) mentions conflicts of leadership between different government levels and Millard & Warren(2005) cite a lack of project management skills as a barrier. Our respondents reported 'bureaucratic problems', a 'lack of cooperation among public organisations', inadequate 'involvement of local and government authorities' as well as 'interoperability issues between departments' as working against mobile government service implementations. Another respondent indicated a problem with 'taking citizens for granted, thinking that they will accept and use a new service as long as it is provided by the government' whilst another indicated that 'service is structured by the goals of the administration, not the goals of the citizen user'. Two experts mentioned 'absence of combined e-business/e-governance models' and the lack of 'sustainable business models'. Another expert stated there was a 'reluctance of authorities to alter traditional ways of dealing with their customers (i.e. attachment to offices and office hours).'

Economic and financial issues also feature as barriers according to some of our respondents – 'high development costs', 'lack of infrastructural investments' and 'low budget for mServices' are cited. The legal aspects of mGovernment services were areas of concern in both the literature review and the survey. As mobile government is an extension of eGovernment, it should be able in many cases to use the legal precedents set up for eGovernment. Of course there must also be laws that relate specifically to the unique aspects of mobile government services such as location based



Figure 6: Identified barriers to mobile government projects according to survey of experts.

services. Our literature revealed mobile government in action in legal areas in many countries. For example, in the West Yorkshire Police Force (BlackBerry, 2006), operational officers are able to access critical information from central criminal databases via small Blackberry devices. According to their Head of Information Systems ‘The public has responded well to BlackBerry and it is helping us to do our jobs more effectively. Everyone wants to see their police force employing forward thinking techniques for policing.’

The literature review and survey identified potential legal issues as reported in Table 1.

Table 1: Legal issue as barriers to mGovernment.

Literature review extracts on Legal Issues	Survey Answers on Legal Issues
Developing ontologies, i.e. translating legal clauses into machine-readable policies (IST, 2003) ; translating legal clauses into machine-readable policies	Law related issues – e.g. in Poland most of the documents have to be provided in a way that has a confirmation (stamp, signature)
Multiple digital identities – legal implications of concepts of online identities (IST, 2003, Kubicek et al., 2003)	Adjustments to existing laws
Legal implications of use of online anonymity and pseudonymity. privacy friendly concepts of Public Key Infrastructure and privacy friendly Digital Rights Management (DRM) (IST, 2003, 4th Generation Mobile Communications Committee, 2004)	

In the United States there is a worrying trend for persons to go online to buy someone else’s cell phone records. According to Stone (2006) one potential issue could concern criminals buying the records of an undercover officer and calling his home via his undercover personal mobile phone. The criminals could then connect that phone number back to the agent’s real identity. Legislation is now pending to stop the selling of private phone records.

Finally one expert stated that the task of ‘re-negotiating and reorganizing the work context with the workers’ is vital - ‘It is definitely NOT the technology, which [is] in the way’.

5.2 Infrastructure Barriers: Technology

One expert was quite scathing about people’s ‘lack of familiarity with mobile technologies’ whilst another cited the ‘lack of technical knowledge among Information Technology personnel’ as a barrier. The authors believe this is understandable given the explosion of mobile technologies in the 21st century. Other respondents felt that ‘the lack of interoperability’ was a technical obstacle and also mentioned ‘competition between access channels’ and lack of ‘backend process integration’ as obstructions. One respondent felt ‘the absence of integrated process constructs’ was hindering mobile government whilst others indicated that the ‘absence of ability to bundle information and materials/service together’ were inhibiting factors.

The above aligns with the findings of the literature review which indicated that technical barriers [such as low priority for ICT, interoperability issues and scalability] (Prisma Project Team, 2003, Guijarro, 2003, Millard, 2004) were major problems. The proliferation of tools and mobile networks is a huge challenge to governments as they try to evaluate the business case for implementing mobile government services. There are issues with 'bandwidth and the small screen size of mobile devices' and the lack of availability of 'context aware information'.

Many private and government organizations which have adopted new technologies have often regretted the decision (Wyatt, 2005). In fact, technology fatigue is often a barrier to the adoption of new technology so governments must check carefully before committing to mobile government projects. One promising technology, Near Field Communication (NFC) is already starting to revolutionise the way people use their mobile phones. NFC uses a short range wireless chip that can be placed into mobile phones to enable them to transfer all sorts of data (including credit card details and bus timetables) once the user touches his phone to a NFC paypoint (Flynn Vencat, 2006). This is just one technology that could prove attractive to government officials – for example citizens could pay their parking fees and click through to pay for train tickets, at NFC paypoints, both of which are often controlled by government authorities. The downside, of course, is the infrastructure costs of setting up the NFC paypoints. However, industry pundits are predicting the mobile will replace the wallet by 2010.

5.3 Governance Barriers

Only one expert noted there was a lack of 'combined e-business/e-governance models' yet governance issues featured highly in the literature review. Many researches (Martin and Byrne, 2003, Pascual, 2003, Millard et al., 2004, Millard, 2004, CPSI, 2003, Accenture, 2003, Realini, 2004, Government of Italy & United Nations, 2003) state that accountability, transparency, accessibility and participation can be achieved by eGovernance (or eDemocracy). Gronlund (2003), however, considers accountability as a base for "thin" democracy, which is still vague and impractical to achieve, in contrast to "strong" democracy. Earlier Altman (2002) raised suspicions about the ability of eGovernment to have a positive effect on democratic accountability. . On the other hand, Heeks & Lallana (2004) consider

accountability, publication, openness, transactions and reporting as examples of the types of transparency that eGovernment offers.. The difference among researchers in defining each element of eGovernance makes it difficult to precisely achieve each element in reality, adding more barriers to the success of a project. As well, changing social structures(Prisma Project Team, 2003) hinder the implementation of eGovernance.

5.4 Social Barriers

The literature review identified a lack of awareness as a major barrier (Millard and Warren, 2005, CPSI, 2003, Clarke, 2003, Millard et al., 2004, Accenture, 2003, Pascual, 2003) and this was echoed in the expert survey – there is 'a largely uneducated public in the use of mobile devices for this type of service' and there is a need to let 'people understand why they should use a mobile service'. On usability issues one expert noted that 'ideally services must be simple, be handled with just a few SMS, location based services or just notification services'. Another stated that it was essential to design 'easy-to-use and societal [socially?] interesting services'. One expert noted that a key selling point was 'the level of convenience the mobile services provide in contrast with their tradition counterparts.'

Pricing issues were noted in the survey and the literature review. There are four hierarchical types of pricing: fixed, sale, promotional and dynamic (C. Wyld, 2000), where the dynamic itself is classified into four sub-types which mainly depend on the cardinality of transaction: haggle, bidding, auction and exchange. eGovernment and mGovernment pricing policies should adopt those four types of pricing depending on the transaction model; be it government to citizen (G2C), government to business (G2B), government to government (G2G) or business to government (B2G) in addition to the type of product or service rendered. The experts felt that 'telecommunication costs in many countries [are] too high' and that 'Access charges are too high for everyone'. Privacy fears are a substantial barrier – 'Trust of citizen[s] concerning privacy low'. One expert mentions that 'the anonymity of voters in mobile voting services' is vital and another states that 'fears about confidentiality may also be a barrier'. Security is another area of concern: 'If there is no sound solution to security e-government or m-government will be dream'. There is a 'lack of security for transactional services' and 'probable or real security issues in respect of payment and data protection'.

6 CONCLUSIONS & FUTURE DIRECTIONS

This paper analyses and defines barriers to the success of mGovernment service projects from the perspective of mobile technology experts in nineteen countries around the world. The outcome would appear to confirm the findings from our literature review that potential barriers to mGovernment include the cost of developing mobile applications and the current business strategies of network and mobile device providers such as sport and premium services. High costs are associated with acquisition, maintenance and contracting with third party providers (Moon, 2004). A lack of financial resources, staff, expertise, information about mobile applications and support from elected officials has also been identified as inhibitors for mobile government. Issues about privacy, security, upgrading technology and dealing with online transactions also hamper the adoption of mobile government (Moon, 2004). The path to acceptance of mobile government will not be smooth. However, given the rapid advances in the usability of mobile devices there may be a leapfrogging acceptance of mobile government, especially in developing countries which do not have a wired infrastructure. Our next step involves conducting a real-world survey which will investigate mobile government service barriers from the end users' perspective.

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