



Impact of Mobile Technologies on Government

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Abstract: Use of mobile technologies to enhance government activities leading ways for mobile government, and applications and services developed are becoming increasingly popular. While governments seem to be very effective in providing better or more significant services through these new technologies, there is yet little evidence how these developments influence the operations of governmental organisations. In this paper, we present a government "response model" in order to explain the impact of mobile technologies on the government itself.

Keywords: e-Government, mobile government, impact of mobile technologies.

1. Introduction

Governments around the world have engaged in the process of developing a wide range of electronic (e-government) services by using information technologies, particularly, web-based internet applications. Understandably, these technological advances have tended to occur at a much slower rate in less-developed countries. Nonetheless, as governments increase the use of information and communications technologies, demands by the public for more effective services increase. In response, governments are aiming to meet the rising expectations of citizens for better, more comprehensive services using innovative information technologies and various service delivery channels in addition to the World Wide Web. Recently introduced mobile internet and related technology are among the most advanced delivery channels that are leading to a new era of mobile government (hereafter referred to as mGovernment) services and business models. It is no longer a matter of whether or not e-government professionals, practitioners, and researchers should acquire necessary skills to prepare for the new move towards mGovernment, it is a matter of how fast they can acquire the skills essential to meet the growing services demands of multiple stakeholders (e.g., the public, private and public companies, and intra-organizational agencies).

In our view, three interrelated initiatives are the seedbed for the development of what we call mGovernment (mobile government). These are: (1) advancements in mobile and wireless technology, (2) the wider acceptance of these technologies by the public, and (3) the development of government applications and services. Interestingly, "Product – Push" and "Market – Pull" forces are simultaneously at work here. Technological developments spawned by R&D initiatives in the private sector in concert with increasing consumer demands (public expectations) for improvements in e-government efforts are the foundation for mGovernment.

In the private sector, businesses are already adopting mobile technologies and have found that they can enhance productivity and profitability. However, in the context of e-government, similar adoption processes pose potentially significant challenges. Bureaucracies, synonymous with "red tape," are known to be slow and inflexible. This paper is concerned with the issue of whether or not mGovernment initiatives will improve the efficiency and effectiveness of bureaucratic governments. The introduction of mobile technologies seems inevitable, but conclusions have yet to be drawn regarding its impact on governmental structure, decision-making processes and political culture. It is unclear whether governments are well-prepared for the consequences and whether or not they are initiating various changes in parallel to ensure the success of the diffusion of mobile technologies in order to benefit from the types of efficiency gains currently enjoyed by companies in the private sector.

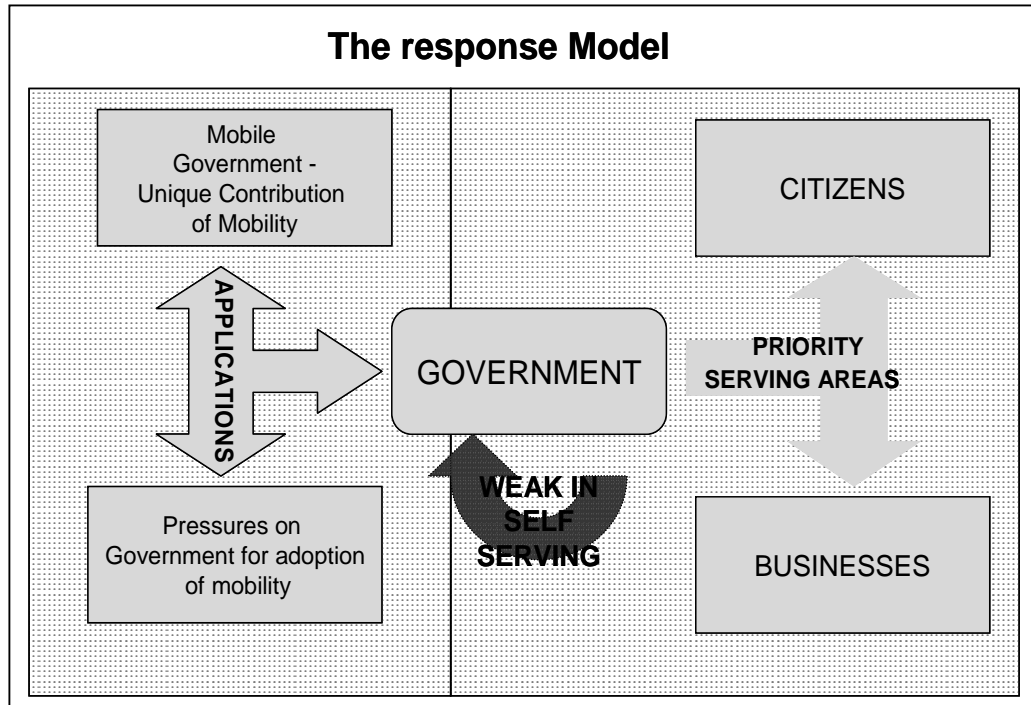
Governmental administration can be complex and in comparison to business enterprises, it has some unique characteristics. Based on our examination of a number of mobile government applications within various countries, we observed that mobile business applications may not be easily applied to governmental administration, yet there are compelling reasons for doing so. Is it unreasonable for citizens, for example, to expect technology-enabled services from their government similar to the services available to them from private sector organizations such as airlines, banks and utility companies where flight reservations, currency exchanges and bill payments are now possible without human intervention? As such, there is an increasing need to study the impact of the introduction of mobile technologies on governmental organizations.

In this paper, we study this impact with a "response model" (please refer to Figure 1). This "response model" specifies three interrelated issues: First, it introduces what is special about mobile technologies as a set of unique characteristics of mobile government developments.

Second, it identifies various pressures on bureaucratic governments in adopting mobile technologies and transforming themselves into effective and efficient administrative organizations. Finally, based on examination of various mobile government applications (Cilingir, 2004, Ghyasi, 2004, Yu, 2004, Zalesak M., Dec, 2003), it enumerates the efforts (i.e. the "response") of governments to keep up with those pressures. Our response model suggests that much remains to be done for current mGovernment applications to be able to serve governments with effective tools of administration. Instead, it suggests that adoption of mobile technologies primarily serves external parties to governmental institutions such as citizens and other businesses but has not yet resulted in significant improvements in effectiveness or efficiency for governmental agencies or units. In this context, we define a *transitive state* of government organizations where there are significant gains in providing fast, efficient and effective services to external parties, but small improvements in government units themselves.

We argue that it is important to understand the impact of mobile technologies on government administration as this may have implications for the success of well-planned, integrated, and widely adopted mGovernment applications. This may also be true in the case of e-government. In both cases, a technology-influenced state of administrative efforts (e-Government, mGovernment) can potentially lead to the redefinition of job descriptions and duties; reinforcing relations with citizens and other governmental agencies; and promoting new policies for enhancing services. However, it does not necessarily result in essential changes in organizational structure, hierarchical decision-making processes and a politically-oriented culture. We argue that the inherent characteristics of governmental administrations will likely endure, at least in the short run, but there will likely be various efficiency gains in terms of speed, improved services, and possibly cost savings.

Having introduced mobile technologies and their utilization in the governmental sector, the remainder of this paper is organized as follows. In the next section we provide an overview of mobile government and its evolution and importance followed by an assessment of the impact that mobile technology has on governments. We then review and evaluate the typical responses that governmental organizations have exhibited in response to the pressures that mobile technology is causing. We next discuss the transitive state of governments where significant gains in productivity, efficiency, and effectiveness have been achieved, though within the context of governmental administrations where characteristics of traditional bureaucracies remain visible and strong. We close the paper with a discussion of key observations and implications for future research.



2. What is Special about mGovernment?

mGovernment involves a strategy and implementation of governmental services through a mobile platform to provide its users, both citizens and civil servants, the benefit of getting services and information from anywhere at anytime. (Arazyan, 2002, Kushchu, 2003 Zalesak M., 2003). The use of mobile technologies and applications differentiates mGovernment from any other developments in the public sector using new technologies, including e-government. Based on various studies on mobile government applications (Yu, 2004), and their use in practice (Cilingir, 2004), a number of differentiating factors can be identified in terms of better precision and personalization in targeting users and in delivering content, more convenient accessibility and availability, and a larger and wider user base.

- *More convenient accessibility and availability (power of pull):*
 - mGovernment enhances the adoption of online governmental services by citizens through the improved convenience it offers. Citizens can use the online governmental services not only "anytime" but also "anywhere".
 - Mobile devices are always on. This is different from personal computers where most mobile devices are always switched on. Usually, these devices stay at an inactive state, but applications can "wake up" the device. This is very different from e-government applications.
 - Mobile devices are designed to be carried around. As mobile devices are always carried around by the user, applications can be designed to provide instant

information to the users. An example is to send out warnings during emergencies.

- *Better precision and personalisation in targeting users and delivering content (power of push):*
 - A computer can be shared among different users, but mobile devices are designed to be used by a single user. This means that personalized information can reach the same user at any time through that one specific device.
 - mGovernment increases the acceptance, adoption and the usage of online governmental services by reaching the citizens through a more personal, familiar and friendly device.
- *Larger and wider user base (power of reach):*
 - mGovernment reaches a larger number of people through mobile devices, which often far exceeds the wired internet user community.
 - mGovernment reaches a variety of audiences, including people who have no training or experience with computers and the internet, but are active users of mobile communication.

3. Mobile Technology's Pressures on Governments

The impact of these often unique aspects of mobile technology and mGovernment results in severe pressures on governments. These pressures vary. Some are technology related and some others are often related to public expectations and the governments' position to improve its services and business. These pressures may be summarized as follows.

- *The pressures towards meeting increased expectations:* Trends in a high rate of adoption of mobile internet applications and services in the mobile business arena lead to higher expectations from government organizations. When people are aware that a new service is available in the commercial sector, they will expect more in governmental services. This in turn requires more efficient government units with employees who need more accurate and timely information readily available regardless of where they are working (Yu, 2004).
- *Pressures towards adoption of new technologies:* The emergence of the mobile internet and the high level of mobile penetration all over the world is creating pressure on government organisations to catch up with the developments in the technology. With the development of 3G mobile network services, the capability of providing services through mobile devices is greatly improved. This development makes the provision of mobile government applications possible and more accessible than using the wired Internet. The evolution of mobile internet technologies, standards and protocols allows faster and more sophisticated (voice and multi-media) application developments (Yu, 2004).
- *Pressures towards further improving e-government efforts:* mGovernment is not a replacement of e-government but is often complementary to it. People can access the applications from a new platform from "anywhere" through mobile devices. However, there are certain applications that are only possible with mobile technologies such as location

dependent information delivery (Yu, 2004, Cilingir, 2004).

- *Pressures towards catching up with globalization in various areas government activities:* The developments in sophisticated applications and their successful use and adoption naturally leads to the use of these mobile applications not only within a country but also internationally (Awan, 2004).
- *Pressures for increased efficiency and effectiveness, and cost reduction considerations of governments:* The essential value of mobility is often observed in faster responses and reach to a wider user base. This leads naturally to economies of scale in performing various governmental tasks.
- *Pressures for supporting economic development, especially for rural areas of developing countries:* Mobile applications in many developing countries are being used as a replacement for wired e-government efforts where there is not enough infrastructure of wired Internet in terms availability of networked computer and skilful users of computers (Ghyasi, 2004).

A closer look at these pressures reveals that almost all of them suggest that in order to respond properly to these pressures, significant improvements in the internal structures, decision making processes and culture of the government organizations may be warranted. Mobile technologies offer the potential for new, and often better ways of approaching revolutionary efforts started by the e-government within government organizations. Although provision of these developments is mostly related to improving government services for external users, such improvements would be incomplete without bringing significant changes to government organizations themselves. Based on our evaluation of various applications (reported in detail elsewhere in Ghyasi, 2004; Cilingir, 2004; and in Zalesak, 2003), it appears that governments are giving more priority to satisfying the requirements of external stakeholders such citizens and businesses rather than intra-governmental agencies, units, departments, and so forth at local, state, and national levels.

4. Typical Responses

In order for governments to deal with the above pressures, they have been developing and implementing various mGovernment applications and business models. Current examples include various applications in the areas of fire fighting, law enforcement, education, transportation, and health care systems.

These efforts may be viewed broadly from two different perspectives: responses complementing e-government efforts and responses exploiting the unique essence of mobility.

- *Upgrading efforts:* Here there are already various applications and governments aim to upgrade their applications and services to keep up with the pressures coming from technological and user expectation pressures. These include those mGovernment applications that are complementary to e-Government applications. Such applications should not be seen as new process or service but as a complement to the existing or traditional way of delivering government service to the citizens. These add-on mobile applications aim to increase the value provided by the e-Government applications. For example, in case of tax payment systems, the technological infrastructure is not specially built for the mobile application. However, the mobile application further enhances the value offered by the system. Citizens' convenience is increased significantly with the add-on mobile application.

As a result, this category of services enhances the value of electronic government applications by adding the “anywhere” component to the “anytime” component of the value.

- *Innovative efforts:* These efforts aim to build mGovernment applications that create a novel and unique set of benefits stemming from unique characteristics of mobile technologies and the nature of mGovernment applications. This category of mGovernment applications pertains to applications that are not built on existing e-Government applications and which enables functionalities that can only be facilitated using the mobile applications. A new definition of value is created with the implementation of mobile applications and this category of services is not dependent on e-Government applications and the real value stems from the mobility itself.

These broad perspectives translate into various forms of responses. Some of the responses may be grouped as those reflecting stages of application development and the others may be grouped as those supporting the overall efforts for mobile government. The former group, named as transitive responses, comprise a larger set of current applications.

Transitive Responses:

- *Rapid response efforts:* Benefiting from developments in technology and mobile business applications, governments aim to be pro-active in dealing with emergency issues. With this goal, various mobile government applications can be developed for critical instances such as delivering critical messages in times of crisis, and so forth, to the citizens. These are for information/communication models. Later, these applications may be upgraded and used in other domains. In this way, more advanced and interactive m-government applications can be developed.
- *Integration efforts:* Developing many independent mGovernment applications might eventually create islands of mobile systems developed by various governmental units where there is no integration between one mGovernment service and another. When the need arises for integration of these services, the task becomes difficult. In this situation, gradually all m-government applications should be viewed as a strategic project and planned carefully to reduce the chances of emergence of the islands of information systems dilemma.

As part of integration, various organizational issues in planning and implementing an m-government application are also important. The planned m-government applications should be supported by the top government institutions. Since introducing an m-government application represents change from old ways and practices, it might face resistance, conflict of interest and lack of coordination. In order to avoid this, government agencies related to the newly planned mGovernment application should be highly involved in the planning and implementation phases of the new service as stakeholder participation in dealing with the problem can result in a sense of ownership of the solution.

Also, successful mGovernment applications rely on effective backend systems to support integrated mGovernment applications. The planning process should include various provisions in making infrastructure available to support all m-government applications.

- *Globalisation efforts:* While successful mobile applications may be implemented locally and within a country, there is strong potential (and desire) for mobile applications to be available internationally and shared by various other governments. A good example of this is a mobile ID card (mID) (Awan, 2004). There is a growing interest to standardize the mID cards to make them interoperable among various countries. Mobilization of mID card, that is, its uses within a country, is as important as globalisation, or its uses in the international arena. It should be available everywhere as well as on all devices so that globalisation can be realized. The global standards should be implemented in such a way that it is easy for every country to implement, though admittedly, gaining consensus among nations to a common standard may not be an easy task. Furthermore, the countries should be free to choose or reuse their in-built infrastructure so that the cost for globalization is minimal and cheap.

Auxiliary Responses

- *Promotion efforts:* Developing an mGovernment application does not necessarily mean that it will be used by all citizens. The public should be educated and made aware of the utility of the mGovernment application. In the process of developing mobile government applications, the design of the application and content should be such that it suits the citizens' tastes, needs and preferences.
- *Financing Efforts:* Increased implementation of mGovernment applications and services often leads to various difficulties in financing them. Insufficient financing may lead to incomplete, un-integrated and eventually poor mGovernment implementations.

5. The transitive State of Government Organizations

We define a transitive state of government organizations where there are significant gains in terms of providing fast, efficient and effective services to external stakeholders but small gains in terms of improvements to government units themselves. We identified five forms of transitive responses, though there may also be others. Arguably, these responses cater much more to the needs of external stakeholders such as the public and outside private and public sector companies than to intra-governmental units or agencies at all levels. Though external stakeholder demands have been strong and persistent, there are increasing calls to attend to the need of intra-governmental stakeholders.

Each of the five forms of transitive responses also have intra-governmental implications. Crises such as was evident with the 9/11 terrorist attacks, place heavy demands for cross-level intra-government inter-unit communications, coordination and control such that national agencies, for example the FBI in the U.S., needed to be able to exchange information with state and local agencies, such as police and fire departments, and international counterparts such as Interpol, and members of governmental agencies as well as the public utilized cell phones to assist with rescue efforts. This example represents an extreme case, though it clearly illustrates that mGovernment applications offer the capability to facilitate communications in situations where traditional land-based technologies may be limited, overwhelmed, and/or perhaps may fail or be destroyed. The challenges are to develop and implement integrated systems whereby inter-organizational agencies can seamlessly accomplish their missions. The example cited above regarding the mobile ID card, too, is compelling in terms of its implications for the efficiency and

effectiveness of international governmental communications regarding global responsiveness. Immigration officials in charge of passport control in most developed countries and some less developed countries utilize land-based scanning technologies to speed up security checks and processing of people in transit. Here, in the aftermath of 9/11, justifications for the need of accurate but fast security checks require no elaboration. In this example, the introduction and advancements in mGovernment applications in the form of mID cards affords an opportunity to achieve the goal of globalisation through greater inter-agency coordination and integration.

Servicing the needs of intra-governmental stakeholders via the introduction and adoption of mGovernment applications falls short of the attention that has been paid to external stakeholders. Important to note is the reciprocity of relationships between external and internal stakeholders, the implications of which are that failure to attend to internal stakeholders needs and demands may subsequently affect the quality and speed of developments in servicing external stakeholder groups.

6. Discussion and Conclusions

This paper has argued that mGovernment applications have enhanced the efficiency and effectiveness in the delivery of services to external stakeholder groups, and several examples have been cited as evidence. Yet, where difficulties lie are in the development of intra-governmental applications and services. Though these technologies are in a nascent stage and there are obvious constraints (e.g., bandwidth, small-sized screens on mobile or hand-held devices, computing power), successive generations will increasingly provide new and more powerful applications that will be of benefit to all stakeholder groups.

However, increasing technological capabilities are necessary, but insufficient conditions for facilitating the diffusion and optimisation of mGovernment applications with governmental administrations. Vestiges of bureaucratic control, traditional organizational structures supported by hierarchical decision-making, and politically-oriented cultures are impediments to optimising these emerging technologies within governments at all levels. Though there are examples of "enlightened" administrations that embrace and harness the potential of mGovernment applications, these are clearly the minority. Technology can drive and enable change, but stakeholders make change happen. Yet technology continues to change at a faster rate than governments are capable of.

Though we recognize that external stakeholders (e.g., citizens and private companies) have been and probably will remain prioritised beneficiaries of mGovernment applications, and that new generations of applications arguably should be first targeted to external stakeholder groups, there must be a conscious effort to improve intra-governmental diffusion and optimisation. This can be realized through a carefully planned integration of systems though the emphasis should not be placed solely on "hard" issues such structural changes, technologies, applications and systems, but also "soft" issues such as cultural change and empowered decision-making. Attending to both the "hard" and "soft" issues are essential steps to achieving the goals of citizen reach and business reach through coordinated efforts of intra-governmental agencies optimising mGovernment applications.

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