AN SMS-BASED E-GOVERNMENT MODEL

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Abstract: More than one-third of e-government initiatives in developing countries are total failures, half are partial failures and just one sixth are successful, showing that e-government development in developing countries has many problems. According to Heeks (2003), one of the failure factors of e-government in developing countries is unrealistic design. This paper will focus on this factor, particularly the mismatch of the technological design for accessing e-government systems and the skills and access to the technology of the citizens. Many developing countries face problems of lack of internet infrastructure, internet illiteracy and high internet costs. When governments implement web-based e-government models which require citizens to access the system by the Internet/web medium, the failure rate is high as few citizens can participate. There is technology gap between design and reality. In the same countries, mobile phones are widely used, are low in cost, and citizens are more familiar with the short message service application (SMS) than the Internet and Web. This paper proposes an SMS-based e-government system as a first step toward a future Internet/web-based e-government system in order to increase public (citizens and businesses) participation.

1 WHAT IS E-GOVERNMENT

The World Bank definition of e-government is the use of information technology by government to provide better services to people, to business and to facilitate cooperation among government institutions. The use of e-government is expected to empower the community through public access to the information resources available. Based on the above definition, there are at least three important components of e-government. Firstly, e-government provides services and facilitates communication between government and citizens (G2C). Secondly, e-government provides services and facilitates communication between government and business (G2B). Thirdly, e-government facilitates communication within government institutions and between government institutions (G2G).

The strategic objective of e-government is to support and simplify governance for all parties (government, citizens, and business). Externally, e-government has the objective of fulfilling the needs and expectations of business and citizens by providing satisfactory online services and simplifying the interaction with various government departments. Internally, e-government facilitates a speedy, transparent, accountable, efficient, and effective process for performing government administrative activities.

2 AN SMS-BASED E-GOVERNMENT MODEL

Much of the current discussion on the implementation of e-government focuses on the Internet (Siebel, 2005). Current e-government models, such as the Gartner Model (Backus, 2001), the Universal Access Model, the Broadcasting/Wider-Dissemination Model, the Interactive Service Model and the Comparative Analysis Model (Digital Governance, 2005.) assume the Internet as the base medium in all the phases, recommend governments to build Internet infrastructure, and urge people to use the Internet to access the system.

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What if a country lacks Internet infrastructure, has high Internet costs, low Internet penetration and its citizens are Internet illiterate? Are these web-based e-government models appropriate for the country? These questions arose when (Ndau 2004) investigated e-government and ICT situations in developing countries. For example, in Indonesia, after 5 years implementing e-government using the Gartner model, as of 2003 the success level is just 2%: 3 out of 169 e-government systems have achieved the Interaction and Transaction levels. 98% of the local government e-government systems in Indonesia still operate at the lowest level (Web Presence only) and are characterized by static and insufficient information that is infrequently updated, few interactive features, non-existent online service, and low citizen participation (Rusdiah, 2003). Moreover, a survey by (Heeks 2003) regarding the success and failure rates of e-government in developing and transitional countries shows that most of the e-government initiatives in developing countries have not yet been successful and more than one-third of initiatives are total failures, half are partial failures and only one-seventh are successful.

Further (Heeks 2003) identified that the three critical failure factors in the failed e-government projects in developing countries are: unrealistic design, inadequate technological infrastructure and lack of requisite competencies. A realistic e-government model should be appropriate to the current situation of the country; otherwise there will be a gap between the model and reality. The larger this gap, the greater the risk that the e-government project will fail (Heeks, 2003). Hence, the current web-based e-government models are likely to fail if implemented in developing countries.

In developing countries, which lack Internet infrastructure but have mobile infrastructure and citizens lack Internet literacy but are familiar with mobile phones and SMS, it is appropriate to propose an e-government model that uses mobile phones and SMS as the main communications channel (not just as an additional feature of a web-based e-government system as in current e-government models). The model is more appropriate for these countries as it reduces the gap between design and reality, particularly for accessing e-government systems by citizens. An SMS-based e-government model enables citizen participation.

3 PROPOSED MODEL

The Gartner model is a popular web-based e-government model, recommended by the World Bank, implemented in developing countries (InfoDev, 2002). The Gartner model consists of four-phases: information (web presence to provide information), interaction (web presence plus various applications for searching, sending email, and downloading), transaction (complete transaction processing) and transformation (one single web address for all services) (Backus, 2001). This model can serve as a reference to evaluate where an e-government project fits in the overall e-government strategy. This paper proposes modifying the Gartner model to formulate an SMS-based e-government model.

Additionally, since the objective of the proposed model is to increase public participation in an e-government system, the proposed model will focus on G2C and G2B services. Interactions between government and citizen and government and business in each phase of the model use SMS technology. Internet/Web technology is still needed for data communication between government institutions (G2G). The proposed model encourages governments to focus their public services through SMS technology rather than Internet/web technology, in order to minimize technology costs and technological literacy problems.

A five phase model is proposed. The five phases are: Delivery, Presentation, Communication, Transaction, and Integration.

The first phase is the **Delivery phase**. In this phase there is one-way delivery of information, from the Government to citizens and businesses (G2C and G2B) via SMS technology using government SMS servers. This system will provide an easy, fast, and efficient system for disseminating official government information, in a concise format, to the public (G2C and G2B). This information could include: tax payment dates, disaster warnings, bank interest rates, currency rates, notification of publication of new government policy/regulation, weather reports, and other official information. Examples of applications which could be included in this phase are: the 'disaster warning-SMS' developed by Thailand and Malaysia which, when a potential disaster like a tsunami or earthquake is forecast, informs government officials in areas likely to be affected. Government units including the police, fire fighters and rescue teams can then immediately implement evacuation plans. News of possible disaster is also broadcast through SMS to

all citizens in the area with a request to follow instructions for evacuation. In Malaysia, the Ministry of Agriculture sends SMS messages to farmers' mobile phones alerting them of increased water levels enabling them to take the necessary steps to avoid any potential damage to their agriculture lands (Automo, 2004).

This stage is similar to mailing-lists in web-based systems. The public should have a choice whether or not they receive government SMS messages and the information that is sent to them. Therefore, the success of the phase will depend on the interest and relevance of the government information.

The government should post information of value to people in their daily lives and provide interesting features for the SMS system, then advertise them on other media continuously in order to get as many citizens as possible involved in the e-government system.

The phase requires government to build a database of citizens with mobile phones. This information is available from phone companies. In some countries it's not compulsory for new mobile phone customers to register their personal data and number with the provider or government agency. In this case the government has to cooperate with all mobile phone providers to establish an easy registration system.

The value of this phase to government is that all new information from the government, or alerts about new information can be disseminated to the public (particularly to mobile subscribers and through mobile subscribers to other citizens) in a simple, fast and efficient manner. This phase's value to public is that people can receive up-to-date information quickly at minimal cost. The phase will also stimulate information awareness among the public. It's an important phase for starting an information society, a society that is interested and eager to get, distribute, and learn about information.

The second phase is the **Presentation phase**. It's called presentation, because in this phase, in addition to 'passive' one-way official information, the SMS system also lets the public access the Government SMS server actively by SMS to obtain information that they need. In this phase, query statements for getting information are standard and provided by the SMS servers; the public choose from information options provided, such as information about transportation services, weather, news and due dates for submission of documents. Therefore, in order to keep the information options of the system up-to-date, the government should survey the public's need regularly and actively.

Examples of applications that may be included in this phase are: employment services by SMS in Sweden, which allow an employment seeker to access the SMS server and choose an employment area, then the SMS server sends appropriate employment information

This stage not only provides an easy way for governments to disseminate up-to-date information to the public but also gives the public the opportunity to access, to choose and to get information actively at any time.

The third phase is the **Communication phase**. The communication phase allows two way SMS-based communications between the public and government. In addition to the services of phases one and two, people can also send questions and get replies in a short time. The questions may be answered by computer or by an official depending on the query. For example, people can ask questions about their electricity or gas or tax bill account, ask about government policy, or report an accident.

An example of current applications which can be included in this phase is as follows. In Ireland, The Office of the Revenue Commissioners, Ireland's tax collection agency, receives as many enquiries by SMS as by telephone which allows citizens to claim tax credits and request a number of tax forms and information leaflets by sending SMS from their mobile phones. Forms and leaflets requested by users are then sent to them via postal mail. For tax credits, users receive text messages letting them know the progress of their claim, and once the claim has been successfully processed, they receive a Tax Credit Certificate by post (IDABC, 2005)

For this phase to be successful, answers must be consistent and received promptly. New and difficult questions should be acknowledged and information sent about when the answer will be given, by whom, and how the explanation will be given (by letter, email, phone, or meeting). This phase will require additional complexity of the Government information technology; no change in the public technology and the value to the public is higher.

The public now has the opportunity to communicate with their government directly, efficiently and quickly.

The fourth phase of this model is the **Transaction phase**. This phase's name is taken from the third phase of Gartner model, which is similar. The transaction phase of the SMS-based e-government model is achieved when the public can complete transactions by SMS without going to an

office, such as applying for a tax number, applying for an identity card, or making a tax payment. This phase will be more complex as authentication, verification, non-repudiation and security issues must be addressed.

This phase must take into account current legislation in relation to transactions and format and design techniques for getting information by the limited capabilities of SMS. Current applications which can be included in this phase are: the parking payment system by SMS in London and Austria, US, Ireland which drivers can use to pay their parking meter by registering their mobile phone, credit card and licence number details; the drivers also get a reminder message 10 minutes before they need to move their vehicle. Another application is the 'SMS-Vote system' used by the Sheffield City Council, which enables citizens to vote completely by SMS.

The dominant values of this phase are efficiency and customer satisfaction, that is the citizens and businesses have been treated as customers by government. Additionally, security and trust will be key issues of this level.

The ultimate phase of this model is the **Integration phase**. In this phase each SMS system is integrated with the other SMS systems and all other e-government systems, including Internet/web-based e-government systems. The public can access all SMS services by sending SMS messages to one address or by accessing the Internet at one web address. This phase accommodates the situation that when Internet penetration has become much greater and the Internet/web literacy of the public has increased. The government gives the public the choice of continuing to access the e-government systems by SMS or changing to the Internet/web medium. This is the ultimate goal of this model. By the time this stage has been reached mobile phones are likely to be web enabled.

4 CONCLUSIONS

This paper has proposed an SMS-based model for e-government that can be used in developing countries to enable citizens without the necessary Internet technology and literacy to gain electronic access to e-government services. It provides a suitable path to the Internet/web-based e-government models used in first world countries as it utilizes the currently widely available mobile phone technology and existing skills of the public. Most of the Information Technology infrastructure and skills development needed is in the provision of the services by the government. Additional costs and skills training for the public are minimized.

During implementation, all government institutions don't have to be in the same phase at the same time. Each institution can stop at the appropriate phase as determined by the institution's need, infrastructure, and public demand. For example, the climate and disaster department can be just in phase one, the police department can be in phase three, and in the same time the tax department can be in phase four. Also, the model indicates that in its current phase, an institution must provide the services of the previous phases.

Issues needing further investigation include: the presentation of information using SMS, using SMS messages to access databases and future directions of mobile phone technology.

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