Factors Influencing Citizen Adoption of SMS-Based e-Government Services

Tony Dwi Susanto[1, 2] and Robert Goodwin[1]
[1]Flinders University of South Australia, Adelaide, Australia
[2]Institute of Technology Sepuluh Nopember, Indonesia
susa0004@flinders.edu.au
Robert.goodwin@flinders.edu.au

Abstract: This paper identifies the factors that determine citizens' acceptance of SMS-based e-government services. It reports on a web-based survey, paper-based questionnaires, and phone-call interviews that collected 159 responses from 25 countries. The results indicate that there are fifteen perceptions toward using SMS-based e-government services that may influence citizens to use or to reject the services: perceived ease of use; perceived efficiency in time and distance; perceived value for money; perceived usefulness; perceived responsiveness; perceived convenience; perceived relevance, quality and reliability of the information; trust in the SMS technology; perceived risk to user privacy; perceived reliability of the mobile network and the SMS-based system; trust in government and perceived quality of public services; perceived risk to money; perceived availability of device and infrastructure; perceived compatibility; and perceived self-efficacy in using SMS. Whether or not a citizen adopts an SMS-based e-government service is influenced by these perceptions. To increase the acceptance of SMS-based e-government services, the systems should address all of these belief factors. An intensive advertising campaign for the services in all mass media channels is critically important to make citizens aware of and to provide detailed knowledge about the services. The advertising campaign should involve people who influence individuals' decision making. These people include friends, family, teachers, experts, public figures, and government officials. This study found that Notification services are the most frequently used followed by Pull SMS, Listen, and Transaction SMS services. Notification services could be an appropriate starting point for governments who want to establish SMS-based e-government services.

Keywords: e-government, SMS, acceptance factors, six Level model of SMS-based e-government, technology adoption, users' behaviour, public services

1. Introduction

Delivering public services through the Short Messaging Service (SMS) channel is becoming popular in developed and developing countries. In December 2008, 54 national government agencies of the Philippines were providing SMS services to augment traditional public services; since 2006 Singapore's citizens have been able to access 150 public services through a single SMS number. In Australia, SMS is used for bushfire alerts in Victoria and notification for public transport timetables in Adelaide. In Ghana, the Philippines and Indonesia, most local authorities provide SMS-based services for listening to people's opinions. In Oman people can apply for jobs via SMS and currently the Bahrain government and the Chichester Council in the UK are developing integrated SMS systems (*SMSeGov.info,* 2009).

The use of Short Messaging Service (SMS) technology to enhance the access to and delivery of government services to benefit citizens, business partners, and government institutions is defined as *SMS-based e-government*. SMS-based e-government systems have enabled governments to communicate with and to provide a range of services for citizens, businesses and other government organizations through the SMS channel. Based on the service and the system complexity, Susanto and Goodwin (2008) classified SMS-based e-government services in a Six Level model: *Listen*, *Notification*, *Pull-based Information*, *Communication*, *Transaction*, and *Integration* levels. Current SMS-based e-government services can deliver most of the typical Internet-based e-government services (Susanto, Goodwin and Calder. 2008).

SMS-based e-government has a strategic role both in developed and developing countries. It has been reported that providing public services through the SMS channel has significantly reduced time and cost; introduced a cheaper, easier and faster information-accessing channel; improved transparency, accountability, communication, and relationship between government and citizens; made the services and procedures easier for the citizens; improved the district political image; engaged more people and increased citizens participation; and promoted e-Democracy (Lallana, 2004; Rannu and Semevsky, 2005; Bremer and Prado, 2006).

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For developing countries, SMS-based e-government allows more people to access and to use e-government services. In the Philippines, for example, people prefer to contact their government using the SMS-based channel (87%) rather than Internet (11%) (Lallana, 2004: 30). People prefer a technology channel that is more familiar, simple and easy to use, supports their native language, uses a readily available device and infrastructure and is low cost. Therefore, in order to engage more people, Susanto and Goodwin (2006) argued that SMS-based e-government should become a front-line system for delivering e-government services in developing countries.

For government in developed countries, SMS-based e-government is popular as a complementary channel of existing Internet-based e-government. The advantages of SMS are: it is simple, easy to use, extensive in coverage, reliable in delivering the message, low in cost, and can reach citizens anywhere anytime including areas with no Internet access. These are reasons why the local authorities provide this alternative channel. In developed countries SMS-based services are provided to deliver information about emergency situations, reminders, or any other business activity which needs a prompt action by the clients such as a reminder of a tax due date or warnings of extreme weather. Some of the developed countries have also provided SMS-based transaction services such as purchasing a bus ticket or a parking ticket, paying tax, and voting via SMS (*MonashUniversity* 2005).

Despite the high number of the initiatives and popularity of SMS-based e-government, no study of the acceptance of the services can be found in the literature. Most existing studies on e-government investigate Internet-based e-government, covering PC-based as well as mobile-based implementations (Cilingir and Kushchu, 2004; Ghyasi and Kushchu, 2004). In terms of the investigated aspects, the existing studies on e-government have covered wide-range topics including the adoption, development stage models, applications, infrastructure, and the business models (Lee and Hong, 2002; Dalziel, 2004; Choudrie and Dwivedi, 2005; Khosrowpour, 2005; Coursey and Norris, 2008). There is not a single study of the acceptance of SMS-based e-government. Current studies found in the literature are case reports (Lallana, 2004; Rannu and Semevsky, 2005; Lallana, 2008).

A study of the factors affecting the acceptance of SMS-based e-government is essential since in some cases the popularity of SMS itself does not guarantee the success of the SMS-based e-government service. Lallana (2004) and Alampay (2003) showed that even though SMS is very popular in the Philippines, some SMS-based e-government applications failed to engage people due to poor replies and back-office management which led to the lack of public trust of the services. Other experiences in Denmark and Sweden also showed that the cost of each SMS-based service is another determinant which influences citizen to use or not to use the services (Westlund, 2008). Hence, it is important to understand what factors might influence citizens' intentions to engage in government services provided by SMS. For governments and e-government practitioners, the understanding is necessary in order to devise practical methods for evaluating their existing SMS-based e-government systems, predicting how citizens will respond to the services, improving user acceptance by altering the nature of the systems and the services, and justifying the investment in the system.

This paper aims to answer the following questions:

- What influences a citizen to use or to reject an SMS-based e-government service?
- What should the local authorities do to ensure as many as citizens as possible use SMS-based e-government services?

2. Methodology

In most research on technology adoption particularly technologies for public use, it seems impossible to obtain information from all users (a census). Therefore, present research on technology adoption selects from 24 up to 1,099 users as the sample and limits the conclusions to particular contexts (Rogers, 2003: 26; Carter and Belanger, 2005; Choudrie and Dwivedi, 2005; Kortemann, 2005; Titah and Barki, 2005; Hung, Chang et al, 2006; Philip, 2006; Horst, Kuttschreuter et al, 2007; Awadhi and Morris, 2008). Validations of the models are conducted afterwards by other researchers across different organizations and populations. In the end, the models which are validated and applicable to many contexts become accepted and are the prominent models, such as the *Technology Acceptance Model* (TAM) and the *Unified Theory of Acceptance and Use of Technology* (UTAUT).

Conducting a survey involving all SMS-based e-government users around the world is impossible. Thus, to survey users from many countries with different backgrounds, this study conducted a *mixed-mode design survey* (Biffignandi and Toninell, 2005). In this study data was collected using a web-based survey, paper-based questionnaires and phone-call interviews and then integrated.

The web-based survey used both *internal* and *external approaches* to get respondents (Biffignandi and Toninell, 2005). The internal approach included *web advertisements* publishing the survey on some websites and on a social networking site (Facebook). The external approach was conducted by sending invitation emails to 31 mailing lists (the lists covered countries in Asia, Africa, America and Europe) on different topics (daily life, religion, culture, education e-government, ICT, Human Computer Interaction, e-government, governance, and telecommunication) as presented in Table 1.

Table 1: List of the email-groups as the sampling frame of the study

No	Name of the Mailing List	Topic	Country
1	Egov4dev	e-government	International
2	Electronic Government	e-government	Indonesia
3	Jatengonline	e-government	Indonesia
4	Egov-indonesia	e-government	Indonesia
5	E-Pemerintah	e-government	Indonesia
6	e-cilacap	e-government	Indonesia
7	eGovINDIA	e-government	India
8	India-egov	e-government	India
9	E-gov_Australia	e-government	Australia
10	Center-for-good-governance	governance	International
11	Dunia_ICT	ICT	Malaysia
12	ICT_of_Bangladesh	ICT	Bangladesh
13	Bangla_ict	ICT	Bangladesh
14	DigAfrica	ICT	Africa
15	Telematika	ICT	Indonesia
16	APWKomitel	ICT	Indonesia
17	SCSJeddah	ICT	Saudi Arabia
18	DigitalFilipino	ICT	The Philippines
19	Muslim_Its	IT	International
20	Mastel-anggota	Telecommunication	Indonesia
21	Usability matters	Computer Human Interaction	International
22	Experiencedesign	Computer Human Interaction	International
23	Nycchi	Computer Human Interaction	USA
24	Sandchi	Computer Human Interaction	USA
25	Hciidc	Computer Human Interaction	USA
26	Movement_of_Islamic_Unity	Religion	International
27	Eramuslim	Religion	Indonesia
28	Philippines_students	Education	The Philippines
29	eCulturalCenter	Culture	International
30	Iatss-alumni	Japan-Indonesia relationship	Indonesia
31	World Citizen	Daily Life	International

Technically, the users who were registered on the mailing lists were contacted via an email which provided a link directing them to the survey page and the research website http://smsegov.info. This survey page also recorded the respondents' IP addresses in order to identify any respondent who answered the questionnaires more than once. All responses to the survey were voluntary and all participants were encouraged to complete all questions in the survey.

The questionnaire used in this study contained closed questions and opened-ended questions (Appendix 1). The open-ended questions were designed to obtain qualitative information (free answers) about motivation and people who influence citizens to use or not to use SMS-based e-government services. The questionnaire had been tested previously on a group of international students and an expert in e-government. Since the web-survey sample does not cover other citizens

who do not have access to or the skill to use the Internet, as a complement to the web-based survey, this study used phone-call interviews and paper-based questionnaires to involve people with no Internet access and skill. The same questions as in the web-based survey were asked.

3. Respondents profile

The web-based survey was run for 3 months (April – June 2009) and received 142 responses from respondents in 25 countries as shown in Table 2. Of these participants, the two largest nationalities were Indonesians and Indians (51.39 percent and 15.28 percent of the total respondents), following by Americans (6.25 percent), Bangladeshis and Tanzanians (3.47 percent each), Australians (2.08 percent), and the other 18 countries (0.6 up to 1.4 percent each).

Table 2: Respondents of the web-based survey based on countries

Countries	Percent (N=142)
Indonesia	51.39
India	15.28
United States of America	6.25
Bangladesh	3.47
Tanzania	3.47
Australia	2.08
Iran	1.39
Ireland	1.39
Nigeria	1.39
Pakistan	1.39
Spain	1.39
Austria	0.69
Bahrain	0.69
Brazil	0.69
Canada	0.69
Gambia	0.69
Guatemala	0.69
Hongkong	0.69
Italy	0.69
Kenya	0.69
Norway	0.69
Oman	0.69
Philippines	0.69
Tokelau	0.69
Zambia	0.69
No country answer	1.39

In terms of gender, there were more male than female respondents (76.1 percent compared to 23.2 percent). In terms of age, the majority of the respondents were 31 to 40 years old (36.6 percent). Table 3 summarises the respondents by age and gender.

Table 3: Gender and age of respondents of the web-based survey (N=142)

Age	Male	Female	Null	Total	Percent
18-20	0	1	0	1	0.7
21-25	19	4	0	23	16.2
26-30	25	6	0	31	21.8
31-40	37	14	1	52	36.6
>40	27	8	0	35	24.7
Total	108	33	1	142	
Percent	76.1	23.2	0.7		100

As a complement to the web-based survey, phone-call interviews and paper-based questionnaires were conducted involving 17 Indonesians who did not have access to the Internet due to the lack of infrastructure or skill. They consisted of farmers, unemployed people, students, house wives and street vendors. The age and gender of the respondents are summarised in Table 4.

Table 4: Gender and age of respondents of the phone-call interview and paper-based questionnaire (N=17)

Age	Male	Female	Total	Percent
18-20	1	1	2	11.8
21-25	5	1	6	35.3
26-30	1	1	2	11.8
31-40	1	2	3	17.7
>40	2	2	4	23.5
Total	10	7	17	
Percent	58.8	41.2		100

In total, there were 159 respondents from 25 countries involved in this study with the gender and age compositions as shown in Table 5.

Table 5: Gender and age of all respondents, web-based survey, paper-based questionnaires, and phone-call interview (N=159)

Age	Male	Female	Null	Total	Percent
18-20	1	2	0	3	1.9
21-25	24	5	0	29	18.2
26-30	26	7	0	33	20.8
31-40	38	16	1	55	34.6
>40	29	10	0	39	24.5
Total	118	40	1	159	
Percent	74.2	25.2	0.6		100

The data indicated that the majority of the respondents in this study were from Indonesia and India, male and 31-40 years old. Overall, the survey involved respondents from Asia Pacific, America, Africa, and Middle East countries, and included respondents who have Internet access and ones who do not. The characteristics of this sample will be taken into account as a limitation in the conclusions.

4. Findings and discussion

4.1 Citizens awareness and adoption of SMS-based egovernment services

This study investigated the level of awareness and adoption of SMS-based e-government services among respondents. It categorized the percentages of the citizens into: (i) those who used SMS-based e-government services; (ii) those who were aware of, but did not use them; and (iii) those who were not even aware of the services. Figure 1 illustrates these findings. The results indicate that 43% of the respondents in this sample had used SMS services. Of the remaining 57% respondents, 27% stated that they were aware of but did not use the services and the remaining 30% were not even aware of SMS-based e-government services in their countries (Figure 1).

Of the citizens who were aware of the services (103 people), the percentage of those who did not use the services is 33% (34 of 103 people, see Figure 2). It means that a third of the people who were aware of the services did not use the services. This figure suggests that awareness of services is not sufficient to encourage citizens to use SMS-based e-government services; there are other factors to be considered and actions needed to encourage use of the services.

4.2 Citizens age and awareness and adoption of SMS-based e-government services

It was found that as the citizens' age increased, there was more awareness of and adoption of SMS-based e-government services (Figure 3). The absence of the awareness as well as adoption among the 18 to 20 age group may be because of the very small number of respondents from this age group (3 people compared to the other groups which are 29 to 55 people). While most age groups (except the 18-20 age group) have similar levels of awareness, the majority of the adopters were between the

ages of 31 and 40 years: 53% (29 of 55 respondents in this group) used the service. In a further study, it will be interesting to see detail of the trends for the respondents in the 40 years and above category by breaking down this group into smaller ranges. The findings also suggest that older citizens are aware of and use SMS-based e-government services.

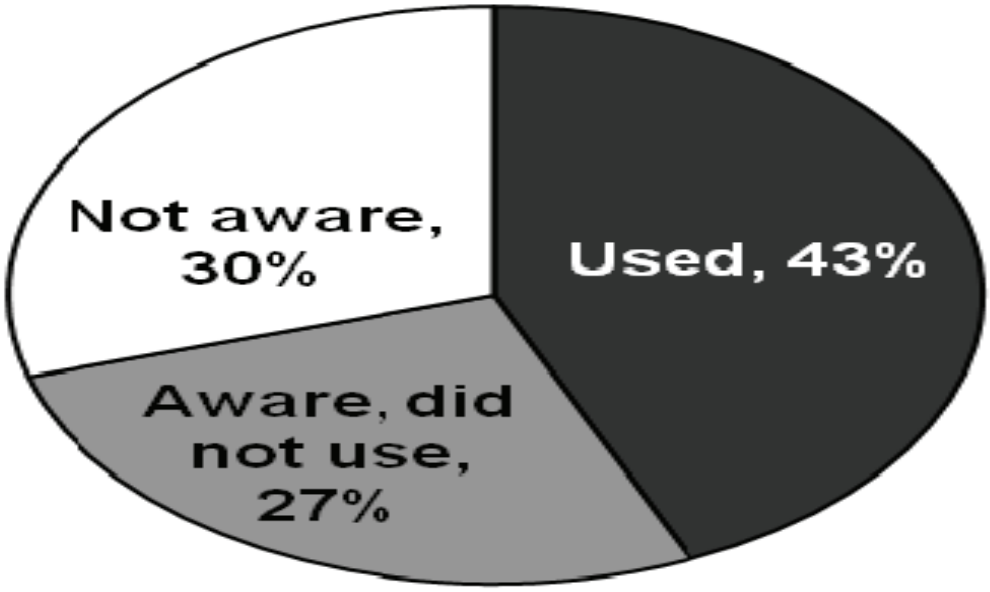

Figure 1: Awareness and adoption of SMS-based e-government service (N=159)

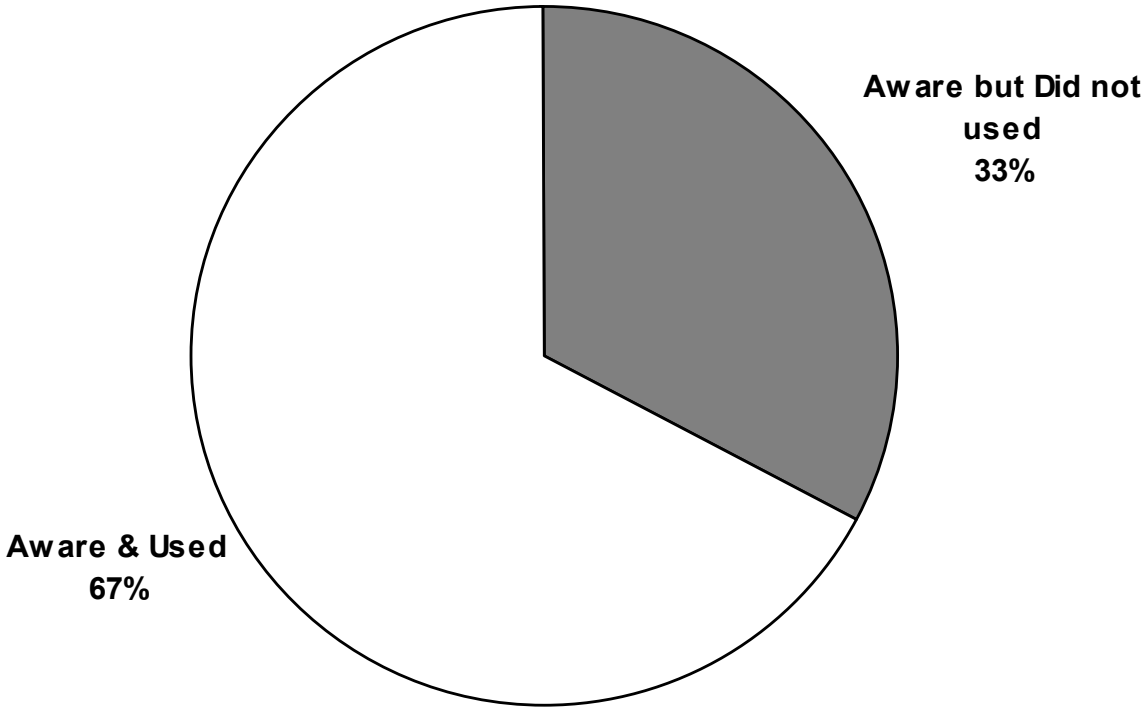

Figure 2: Adoption of SMS-based e-government service among respondents who were aware of the services (N=103)

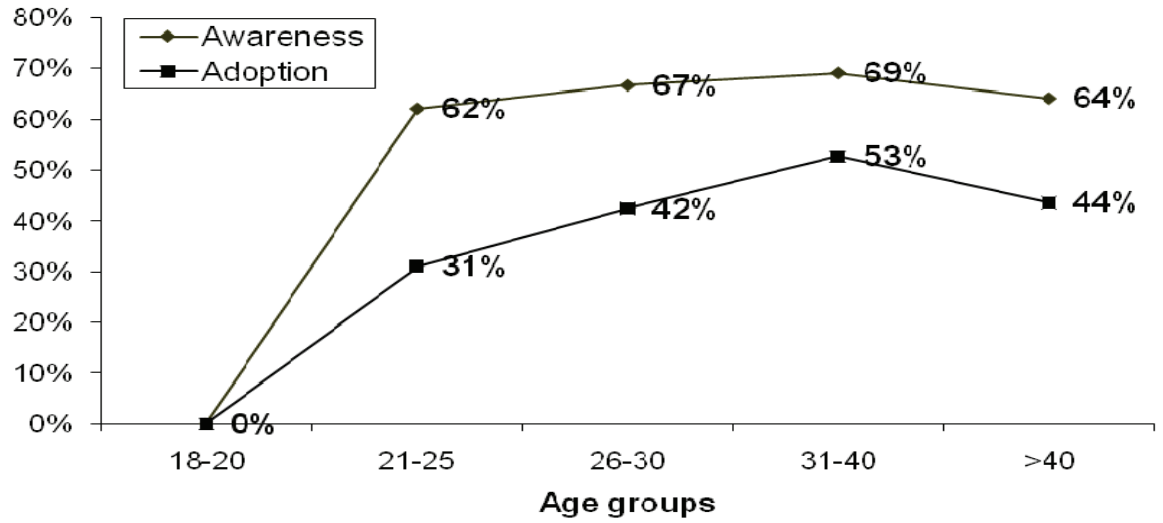

Figure 3: Awareness and adoption of SMS-based e-government services by age group

4.3 Citizens gender and awareness and adoption of SMS-based e-government services

Figure 4 illustrates that more males than females were aware of and used SMS e-government services. Of the 118 male respondents, 83(70%) were aware of and 57 (48%) used the services compared to the 40 female respondents, 20 (50%) were aware of and 12 (30%) used the services. The percentage of male respondents who are aware of and adopt SMS-based e-government services is 69% (57 of 83 people), while the percentage of females who are aware of and adopt the services is 60% (12 of 20 people). This suggests that at the initial stage of implementation of SMS-based e-government services males are more likely to drive the adoption.

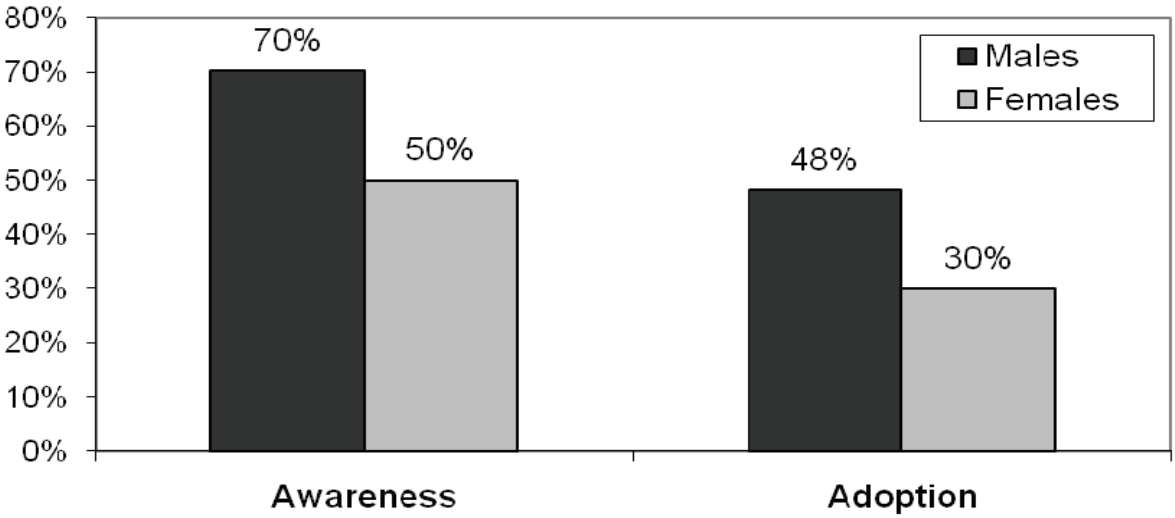

Figure 4: Comparison of awareness and adoption of SMS-based e-government services by males and females

The findings in Section 4.2 and 4.3 suggest that the higher the awareness of the service the higher the likelihood of citizens using SMS-based e-government services. This is congruent with most diffusion theories which suggest that awareness or individuals' knowledge about the existence and functions of an innovation is an initial step toward an adoption-decision process for the innovation (Rogers, 2003: 169).

The findings also suggest that male citizens aged 31 to 40 years are the most likely adopters of the services. While the adoption levels of the males and the females who are aware of the services are relatively similar (69% and 60%), both in awareness and adoption levels the females are fewer than the males (see Figure 4).

Accordingly, in order to increase the adoption of SMS-based e-government services, governments should run intensive advertising campaigns about the services to make sure people are aware of the services. Since there are more female citizens who are not aware of and do not adopt the services than males, the campaigns should pay more attention to making females aware of the services. However, as suggested in Section 4.1 and referring to the *Diffusion of Innovation* theory, the *Hierarchy-of-Effects* and the *Stage-of-Change* models (Rogers, McGuire, and Prochaska in Rogers 2003:198), individuals' decisions toward using an SMS-based e-government service require more stages than just awareness and each step involves variety of factors. Section 4.5 will discuss these factors.

4.4 Popular SMS-based e-government services

For local authorities who want to develop an initial SMS-based e-government service, recognizing what type of the SMS-based service is most likely to be used by citizens is necessary. The understanding may assist government to justify the investment in the system and to assist them in delivering the service effectively and efficiently.

Refering to the *Six-Level model* of SMS-based e-government, the survey asked citizens about the kinds of SMS-based e-government services they have used. The questions provided five answer-options: *Listen*, *Notification*, *Pull SMS*, *Transaction*, and others. Each option was explained by definition and example. The 'others' option was for respondents who had difficulty classifying the service, it was then defined using the explanation of respondent. Table 6 illustrates the findings.

Table 6: Kinds of SMS-based e-government services used by respondents

Kinds of service	Number of people	Percent of all respondents (N=159)	Percent of all respondents who used the services (N=69)
Listen	28	17.6	40.6
Notification	49	30.8	71.0
Pull SMS	34	21.4	49.3
Transaction	22	13.8	31.9

It was found that *Notification* is the most popular service. Of the 159 respondents, 49 people had used *Notification* services. It means 30.8% of all respondents or 71% of respondents who used the SMS-based services had experience using *Notification* services. The *Notification* service is a one-way broadcast SMS service from government to citizens, such as weather warnings, changes of bus timetables, or tax due-date reminders. The popularity of this service may be because citizens can easily register for and unsubscribe from the service, and commonly the use of this service is free of charge.

The second favorite service is *Pull* SMS. This service enables citizens to 'pull' specific information by sending a request SMS.
The third frequently used service is a *Listen* service, which is an SMS channel for citizens to send report, complain, or to make suggestions to government.

Finally, the least popular is a *Transaction* service such as paying bills, taxes or parking fees via SMS. This may be because citizens' consider that the service usage has more consequences such as risk of money loss or risk privacy.

4.5 Thinking like citizens think: what citizens think about using an SMS-based e-government service?

Adoption research has extended the traditional approach to technology acceptance which is studies of ergonomic or usability concerns to studies of individuals' behaviour when using technologies. The traditional approach believed that if the technology is easy to use or the intended users are able to

use the technology then they must be using the technology. In reality this approach does not cover all aspects of user acceptance. Rogers (2003) and Dillon (1996) argued that while ability to use any technology is obviously necessary, it is not sufficient to ensure acceptability; many technologies that are demonstrably usable are never accepted by the target users. Technology adoption theories show that usability is just one of many factors that influence individuals to accept a technology. It is suggested that in order to be accepted, a technology should meet the mind of the target users.

Specifically for SMS-based e-government, this study found that there are 15 beliefs which may influence citizens to use or to reject an SMS service (Table 7).

Table 7: Individual's beliefs which influence citizens to use or not use SMS-based e-government services

No	**Factors**	Percent (N=159)
1	Perceived ease of use	20.8
2	Perceived efficiency in time and distance	17.6
3	Perceived value for money	12.6
4	Perceived responsiveness	12.6
5	Perceived usefulness	11.9
6	Perceived convenience	9.4
7	Trust in the SMS technology	5.7
8	Perceived relevance, quality and reliability of the information	4.4
9	Perceived risk to user privacy	3.8
10	Perceived reliability of mobile network and system performance	3.1
11	Trust of the government and perceived quality of public services	3.1
12	Perceived risk to money	3.1
13	Perceived availability of device and infrastructure	1.9
14	Perceived compatibility	1.9
15	Self-efficacy in using SMS	1.3

4.5.1 Simplicity is the main reason

The findings indicate that the main reason why citizens use SMS-based e-government services is because they believe that the services are easy to use. The degree to which an individual perceives that an SMS-based e-government service is free of difficulty to use is defined as *perceived ease of use*. Respondents said that they used the services because the services are simple, practical, less hassle, easy to access, easy to use, and the service numbers are easy to remember. The more citizens perceived that an SMS-based service is easy to use the more likely they are to use the service. Accordingly, simplicity should become a main advantage of the services. The simplicity of SMS-based e-government services should cover the procedure to register for and to unsubscribe from the services, the information on how to use the services, the steps taken to get the information, and the reply message.

To make sure the registration for an SMS-based e-government service is easy for all citizens, the system should enable people to register through various channels such as SMS, Internet (web-based form), phone, fax, or by coming to the office. The registration data should be simple and easy to fill in. A number of options for unsubscribing from receiving *Notification* services should also be available for users. Providing an easy to use unsubscribe method will encourage users to join since they know they can easily discontinue their subscription to the service.

The service should provide information on how to use the service. A respondent to the survey rejected a service because an unclear instruction meant the service could not be used. This information can be provided as a brochure, a web page, or a 'help' feature on the SMS system (users may ask assistance on how to use the service by typing and sending 'help' word).

The way in which to use the service should be simple. For the Pull-based service, for example, the text format for the request-SMS should be simple, not case sensitive, and easy to remember. The information requested by clients should be sent in one SMS (the system should not send the client other options or instructions).

Moreover, the information sent to the citizens should be concise, clear and easy to understand. If it is needed, the system may use capital letters or punctuation marks to emphasize important words.

4.5.2 Perceived value for money: citizens are sensitive in SMS cost

Most of the respondents had perceptions that SMS is cheap; this is one of the reasons why they used SMS-based services. People are sensitive in terms of the SMS cost. This explains why some respondents rejected services which charged users more than the standard SMS cost (premium SMS charge). Even people who really need to use the services will weigh whether or not the benefits justify the SMS cost.

The *Perceived value for money* factor also relates to the perceived comparison between SMS and phone call cost. Some respondents did not use the SMS-based service if they could make a phone call at low cost for unlimited time. They expect SMS-based e-government services to be free or cheaper than phone calls. The *Diffusion of Innovation* theory (Rogers, 2003) explains this service attribute as the *relative advantage* factor; it suggests that individuals are more likely to adopt an innovation when they perceive that it is better than the idea or product it supersedes. The degree to which an individual perceives that an SMS-based e-government service is better value for the amount paid is defined as *perceived value for money*.

4.5.3 How much time and effort could be saved by using the service?

The third belief influencing citizens to use an SMS-based e-government service is *perceived efficiency in time and distance*. It is the degree to which an individual perceives that the service will reduce the time spent and effort to go to the public service office or to use another channel. Respondents said that they prefer to use SMS-based services because they are quick, take less time and provide faster services than the traditional services and the Internet channel. Accordingly, in order to be accepted government should ensure that their SMS-based services require less time and effort compared to other e-government channels.

4.5.4 Perceived responsiveness: People do not want to talk with machine

One of the advantages of SMS-based e-government channel is that people feel that they communicate with the government person-to-person. Some respondents used the service because they perceive they communicate directly with the decision makers.

However, as a consequence of the person-to-person perception, users of SMS-based services expect a quick reply. When they do not get any replies or responses, they reject the services. Specifically for the *Listen* services, citizens in the survey said that they did not use the services because they were pessimistic that their SMS would be received and forwarded to the right officials, responded to quickly and satisfactorily, and they will be informed of the progress of their message. They perceived that sending a report or complain to government via SMS is like sending a letter to an empty house. The degree to which an individual believes that his or her SMS will be responded by government quickly, appropriately and satisfactorily is defined as the *perceived responsiveness*. The higher the *perceived responsiveness* toward an SMS-based service, the more likely the person will use the service. Accordingly, to encourage people to use *Listen* services and to build the *perceived responsiveness* of the services, each citizen's message should be replied to quickly and each sender should be informed that their messages have been received and read by the right officials. Senders should be informed of the response to and the progress of the message.

Additionally, in order to make messages in the *Notification* service seem personal for each receiver the service could add the client's name to each message. This could improve the relationship between government and citizens.

4.5.5 Perceived usefulness: Does the service really address citizens' needs?

The fifth belief is *perceived usefulness*, which is defined as the degree to which a citizen believes that using the SMS-based e-government service will help them to get what they want and make their life easier. Before deciding to use a service, the survey's respondents wondered whether or not the SMS-based service provides information or functions relevant to their needs. If the service is relevant and satisfied their needs, they were likely to use the service.

4.5.6 Perceived convenience: Is the service easy to access anywhere anytime?

Another belief which influences citizens to use SMS-based e-government services is *perceived convenience.* It is associated with the degree to which a citizen perceives that the services can be accessed anytime anywhere. Since SMS is a basic feature of all mobile phones and mobile networks cover a larger area than the Internet respondents in this study perceived that they could receive, send or reply the messages anywhere anytime they want to.

4.5.7 Trust in SMS technology

Respondents who used the services explained that they trusted SMS-based e-government services since the messages are recorded by mobile phones and the SMS-based system, so they could recall the data and confirm a transaction anytime, they could not miss a message sent to them and they can check whether their messages have been delivered to the system or not. The respondents perceive that the SMS channel is concise and accurate.

On the contrary, respondents who did not use the services had perceptions that SMS is an informal channel so government would not pay serious attention to their messages, the number of characters in an SMS message is too limited to send a message, and they do not trust SMS security. The degree to which a citizen believes that using an SMS channel is safe and will not initiate any problems for him or her is one of the factors that influences citizens to use SMS-based e-government services. This factor is defined as the *trust in the SMS technology*.

4.5.8 Perceived relevance, quality and reliability of the information

Relevance, quality, and reliability of the information provided by the SMS-based services are another issue for citizens. People tend to reject *Notification* and *Pull* SMS services when they find that the information is not updated, is not relevant to their needs, unclear, not precise or insufficient in detail, not accurate, and of no value. The concern with the reliability of the information is higher when using SMS-based transactions and getting information about weather forecasts and timetables. The degree to which a citizen perceives that the information is relevant for him or her, reliable and of high quality is another factor which influences citizens to use or to reject an SMS-based e-government service.

4.5.9 Perceived risk to user privacy

In addition to the *perceived trust in the SMS technology*, when using SMS-based e-government services citizens also consider the risk to their privacy due to the SMS system or the government agency. Respondents who used SMS-based services for sending complaints and reports to local authorities said that they used the services because they do not have to meet person-to-person and disclose their names or other personal information. People who did not use the services perceived that using the service might initiate and propagate repetitive SMS marketing which is irritating and infringes their privacy. They worried that the agency or the SMS service provider will sell their mobile numbers or data to other organizations and businesses or use the information for other purposes. The degree to which a citizen perceives that using SMS-based e-government services and dealing with the government agencies may divulge his or her personal information and pose problems for his or her privacy (*perceived risk to user privacy*) is another determinant of service usage.

4.5.10 Perceived reliability of the mobile network and the SMS-based system

The survey also found that citizens put the performance of their mobile networks and performance of the SMS-based system as consideration factors when deciding to use or to reject SMS-based e-government services. Some respondents did not use the services because they were not confident that mobile networks provided the coverage and good connection performance (reliability and initialization speed) needed to use SMS-based e-government services. The performance of the SMS-based system itself also influences citizens, especially the response time and reliability of the services. The degree to which a citizen is confident that his or her mobile network is reliable when using an SMS-based e-government service and the SMS-based system is also reliable are other determinants toward using SMS-based e-government services.

4.5.11 Trust in the government and perceived quality of the public services

The degree to which citizens trust the government and perceive that the public services have been delivered well is another belief that influences citizens to use or to reject available SMS-based e-

government services. Some respondents of the survey did not use the service because they did not trust on the government and perceived that the quality of public services is poor. Since they found that the traditional public services were poor, they were sceptical that the electronic-services would be better. Moreover, the low accountability of the government made citizens afraid of sending reports, suggestions or even complaints. Instead of getting solutions from government, they believed that their messages might cause another problem for them.

4.5.12 Perceived risk to money

This factor refers to individuals' belief that using the service might cause financial problems. Survey respondents stopped using SMS-based e-government services when they had the experience of receiving an unwanted SMS message for which they were charged. Also, they worried about SMS fraud and risks associated with SMS-based transactions.

4.5.13 Availability of device and infrastructure

Respondents pointed out that they used the SMS-based e-government services because they have the device (mobile phone) and the mobile network is available for them. The degree to which an individual believes that the device and infrastructure for using SMS-based e-government services is available for them is another determinant of the services' usage.

4.5.14 Perceived compatibility

This factor refers to the degree to which a citizen perceives that the service is consistent with the existing public service channels and the popular communication media. The respondents, particularly from the United States of America, indicated that they did not use SMS-based e-government services because SMS is not a common or a popular communication channel for delivering public services in their country. They reject available SMS-based e-government services simply because most people do not use SMS; they use the Internet and land-line telephone. People tend to use a new technology or service when it is consistent with the existing values and past experience of the potential users (Rogers, 2003).

4.5.15 Self-efficacy in using SMS

Whether or not a citizen uses SMS-based e-government services is also influenced by his or her confidence in using SMS. The survey found that some respondents did not use the services simply because they had no idea of how to use SMS. The degree to which an individual perceives his or her ability to use SMS is one of the factors which influence a citizen to use or not use an SMS-based e-government service.

Overall, this study found 15 beliefs (or perceptions) that influence citizens to use or to reject SMS-based e-government services. In order to increase the acceptance of SMS-based e-government services, governments take into account these factors when designing and delivering the services.

4.6 Communication channels and influential persons

In addition to the beliefs factor, Rogers (2003) suggests that the success of an innovation also depends on the communication channels. The communication channels are the means by which information about the innovation spreads from one individual to another. Further, Rogers (2003:18) classified the communication channels into mass media channels, interpersonal channels, and interactive communication via the Internet. The choice of communication channel may determine whether the innovation will be or will not be transmitted to and influenced the target users.

The survey found that mass media channels are the most effective means of informing and influencing citizens about the existence and benefits of SMS-based e-government services. The majority of the respondents said that information in the mass media had made them aware of the services and influenced them to use the service.

In terms of interpersonal channels, the findings (Table 8) show that citizens were influenced to use SMS-based e-government services by friends, family, experts, public figures, teachers, and government officials. Most of the respondents sought advice and information about SMS-based e-government services from their friends and families.

Table 8: External factors which influenced citizens to use or reject SMS-based e-government services

No	External factor	Percent (N=159)
1	Media	22.0
2	Friend	8.8
3	Family	4.4
4	Expert	1.3
5	Public Figure	0.6
6	Teacher	0.6
7	Government officials	0.6

Referring to the *Diffusion of Innovations* (DOI) theory and the Valente and Saba study (1998), these findings suggest that the mass media play a critical role in increasing awareness and detailed knowledge about available SMS-based e-government services. Personal networks, particularly those that involve friends and family of the target users, experts, public figures, teachers, and government officials are associated with all steps to services adoption. The steps include: the awareness of, detailed knowledge about, attitude toward, and intention to use the services. Individuals who lack personal contact with users of SMS-based e-government services may turn to the mass media for information about the services. The interactions between the mass media, personal networks, and an individual are shown in Figure 5.

This study suggests that governments should advertise services on all the mass media channels in order to make citizens aware of and to provide detailed knowledge about the services. These mass media campaigns are expected to initiate inter-personal networks influence toward using the services and to influence individuals particularly those who lack personal contact with other users of the services. To improve the effectiveness of the advertising, governments should involve families and friends of the target users and use opinion leaders such as experts, public figures, teachers and government officials. In terms of the content, the advertising should convince people that the services accommodate their perceptions, as discussed in Section 4.5, toward new SMS-based e-government services.

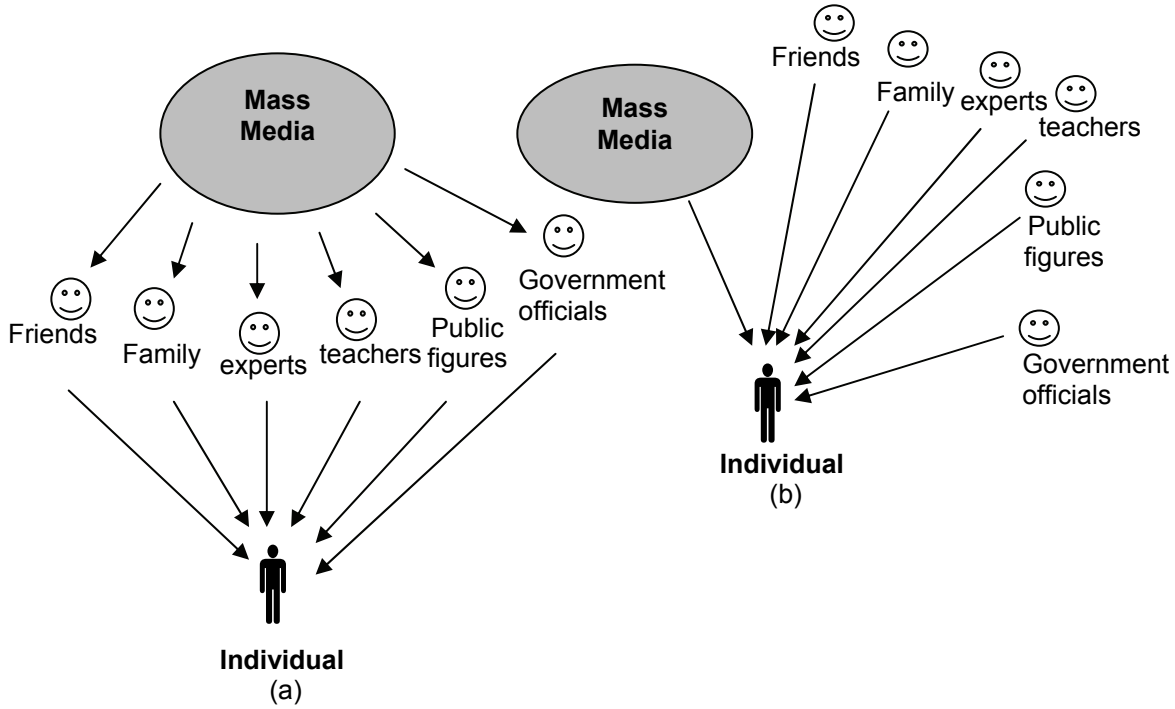

Figure 5: The interactions between mass media, personal networks, and individual: (a) The mass media reinforce interpersonal communication in influencing the use of SMS-based e-government services, (b) the mass media substitute for interpersonal communication in influencing using the services (adapted from Valente and Saba, 998)

5. Conclusions, limitations, and next study

To design and to deliver SMS-based e-government services, local authorities should consider the expectations and the perceptions of citizens toward using the services. This study indicates that whether or not citizens adopt SMS-based e-government services is influenced bythe fifteen beliefs about using SMS-based e-government services: *perceived ease of use*; *perceived efficiency in time and distance*; *perceived value for money*; *perceived* convenience; perceived *availability of device and infrastructure*; *perceived usefulness*; *perceived responsiveness*; *perceived relevance, quality and reliability of the information*; *trust in the SMS technology*; *perceived risk to user privacy*; *perceived reliability of the mobile network and the SMS-based system*; *trust in the government and perceived quality of public services*; *perceived risk to money*; *perceived compatibility*; and *self-efficacy in using SMS*.

Among the factors *perceived ease of use*, *perceived efficiency in time and distance*, *value for money, perceived convenience,* and *perceived availability of device and infrastructure* are the most important in influencing the use of SMS-based e-government services. Therefore, governments should focus on these advantage factors in promoting SMS-based e-government services.

Common factors which discourage citizens adoption of available SMS-based e-government services include: *perceived usefulness*, *perceived responsiveness*, *perceived relevance, quality and reliability of the information*, *trust in the SMS technology*, *perceived risk to user privacy*; *perceived reliability of the mobile network and the SMS-based system*, *trust in the government and perceived quality of public services*, *perceived risk to money*, *perceived compatibility*, and *self-efficacy on using SMS*. Hence, in order to minimize resistance to the services, government should address all of these factors. For example, to increase *perceived usefulness* of an SMS-based e-government service, government should make sure that the service meets citizens' needs by conducting a preliminary survey before designing the service; to increase *perceived responsiveness* of a *Listen* SMS service, government could setup an automatic reply system and assign a group of staff to manage incoming SMS messages; to increase *trust in the SMS technology*, government could use encryption with each message; and to minimize *perceived risk to user privacy* and *perceived risk to money*, the government could publish a privacy statement, assure the confidence and security of the senders, and setup an easy and reliable system for verifying each transaction including a refund procedure.

In terms of popularity, the *Notification* service is the most frequently used SMS-based e-government service, following by *Pull SMS*, *Listen*, and *Transaction*. *Notification* services are appropriate initial SMS-based e-government services.

In order to increase usage of SMS-based e-government services, governments should make people aware of and provide information about the services. Governments should run advertising campaigns on using the services in all mass media channels. The advertising should involve family and friends of the target users and be delivered by experts, public figures and teachers. In designing and delivering the services, government should address the 15 perceptions about SMS-based e-government services. This should give citizens positive attitudes towards using the services which will lead to intention to use and actual use of SMS-based e-government services. The relationships among the beliefs, intention to use, and actual usage of SMS-based e-government services will be investigated further in the next study.

This study incorporates a number of features, including a mix of web-based survey, paper-based questionnaires, and phone interviews to obtain an appropriate mix of respondents from 25 different countries (the respondents include people who interact with public services, people who have Internet access and people who do not have Internet access, and citizens with a variety of occupations and levels of education); the open-ended questions enables a variety of answers from the respondents. These lend significant strength to the study. However the demographics of the respondents, the majority were from Indonesia (51.39%) and India (15.28%), male (74.2%), aged 31-40 years old (34.6%), and mainly people who have Internet access (89%) should be taken into account in any attempt to generalize the findings.

6. Appendix 1: Survey questionnaire

Citizens' Motivation to USE or NOT TO USE
an SMS application for public services

Part A. Demographics

1. Sex: ○ Male ○ Female
2. Age (years): ○ 18-20 ○ 21-25 ○ 26-30 ○ 31-40 ○ >40
3. Nationality: Country Options

Part B. Motivation to Use or Not to Use an SMS application for Public Services

4. **Are you aware** of an SMS application for public services in your country? ○ YES ○ NO

*(*SMS applications for public services are any public services provided by government through Short Messaging Service channel, for example sending complain/report to government via SMS, getting information about bus timetables using SMS, paying tax via SMS)*

5. **Have you ever used** the SMS service? ○ YES ○ NO

6. If **YES, Which kinds of service** have you used? (*You can choose more than one*)
   - ☐ Sending SMS about opinions, complains, or reports to government official/institution.
   - ☐ Receiving SMS notifications, such as messages about disaster warnings, bills, or news update.
   - ☐ Sending SMS in order to get some information, such as sending SMS to get information about bus timetables or weather.
   - ☐ Doing transactions via SMS, such as paying bills using SMS.
   - ☐ Others:

7. **WHY** DID or DID NOT you use the service:

8. Who is/are **person(s) who influenced you** to use or not to use the service?(if any):

SUBMIT

Thank You Very Much for Your Time and Participation

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