Mobile Interface for m-Government Services: A Framework for Information Quality Evaluation

Ikhlas Zamzami and Murni Mahmud

Department of Information Systems, Kulliyyah of Information and Communication Technology, IIUM

ikhlas_zamzami23@hotmail.com & murni@iium.edu.my

Abstract— Today, mobile devices have become a channel through which many organisations launch and market their services to the users. However, mobile devices that serve as channels for accessing government services have been the critical concerns by many government organisations. The quality of information provided through m-Government mobile technologies is seen as one of the most critical dimensions towards organisational achievement and success. In fact, User interface designed for mobile device is the main concern in designing applications. Currently, there is few of research that particularly evaluates the quality on m-Government services. Therefore, the information quality of Government sites in mobile interface, which is important for user convenience, has not been evaluated. In this paper, m-Government services will be examined in three main areas: mobile interface design from different government sectors, the information quality of the applications, and whether this information has met user satisfaction.

Index Terms— mobile interface, information quality, user satisfaction, m-government

————————————— ◆ —————————————

1 INTRODUCTION

Nowadays, citizens are faced with sophisticated mobile interfaces that provide many m-Government services. Thus, the issues of information quality and acceptance have become serious concerns among the citizens. According to Rossel et al. (2006), "mobile government (m-government) has become a relatively consensual perspective progressing towards the triple goals of; 1) Providing better services to the citizen, 2) Empowering the private economy both in terms of private-public partnerships or inter-enterprise capabilities at all levels and, 3) Re-enforcing process flexibilitiation intra- and inter-administrative and government-wise".

However, mobile devices that serve as channels for accessing government services have been the critical concerns by many government organisations. This is particularly when citizens have access to public services from multiple government agencies via internet through their mobile devices. The quality of information provided through m-Government mobile technologies is seen as one of the most critical dimensions towards organisational achievement and success. The information quality in terms of location-awareness, information provided, and channel used may be improved over time.

Furthermore, the small size of mobile interface is the main concern in designing running applications. Because of the friendly nature of mobile phones and their interactive applications, many organisations have created their services using mobile technologies to reach their audience. Some researchers have examined the satisfaction in mobile context and they found that information quality is the key element for mobile internet. Good information also enhances user loyalty in making use of mobile device.

Currently, there is lack of research on the framework for evaluating the quality of m-Government. The evaluation of information quality on mobile interface design for government site is unclear. The m-Government services will be examined in three main areas: mobile interface design from different government sectors, the information quality of those applications, and how this information has met user satisfaction.

2. LITERATURE REVIEW

A. Overview of Information Quality (IQ)

According to DeLone and McLean (2001), information quality refers to "quality of information within what system produces". Information system rates the information quality as a measure of semantic success of information system. Lee et al. (2004) grouped the information quality into four criteria: a) intrinsic IQ, which implies that information has quality in its own right such as accuracy, reliability, credibility, consistency, and objectivity; b) contextual IQ, which refers to the main requirements that the information must be faced within the contexts of the task at hand such as timeliness, relevance, completeness, and currency; c) representational IQ, which refers to the way of presenting the information within specific context; and (d) accessibility IQ, which emphasises on the importance of computer systems that present the information (Lee et al., 2002).

Moreover, Jeong and Lambert (2001) explained that IQ can be measured based on three main dimensions that will lead users to make decision making. The first dimension is the information content, which refers to the accuracy, relevance, security, validity, and completeness of the information. The second dimension is the information format, which emphasises on the design and links. Finally, the third dimension is the physical environment, which is related to user accessibility.

Several other studies (Auster & Choo, 1993; Culnan, 1985; Miller, 1996; and Smith, 1996) have expanded those three IQ dimensions introduced by Jeong & Lambert (2001). The studies categorised the dimensions into three, namely perceived usefulness, perceived ease of use, and perceived accessibility.

The first dimension named perceived usefulness focuses on the importance and unstableness of the information. This dimension concerns on how relevant, informative, meaningful, important, helpful, and significant is the information for user's decision making. It is more about website delivery – how accurate, relevant, timely, secure, and valid the information is.

The second dimension is perceived ease of use, which is more about self-efficacy (Bandura's, 1982). In general, perceived ease of use refers to ease of learning, understandability, controllability, skilfulness, and usefulness. It is also more about free of effort and difficulty when searching for information. This dimension focuses on web design, format, navigation, clarity, links, and colour appropriateness.

Lastly, the third dimension is perceived accessibility that can be measured using three other dimensions. The first one is physical access to the information source, followed by the interface between system and user, and lastly the ability to physically retrieve the desired information. The distinguishing factor between perceived ease of use and the other two dimensions (namely perceived usefulness and perceived ease of use) is the concerns about website's connectivity, interactivity, load ability, retrievability, and search options.

B. Mobile User Interface Design

User interface and mobile size are the two main concerns in designing mobile device (Goyal et al., 2003). Currently, the competition among mobile devices manufacturers in producing mobile devices that are small and thin but with wide screen size is increasing. User interface on mobile devices is part and parcel of any applications that allows users to use and interact with the mobile devices (Goyal et al., 2003). This interface shows content screen, windows, menus, control, and any parts that user can see and use. User will keep on using and interacting with interesting and attractive interface, and vice versa. There are three principles that need to be followed in designing user interface: 1) let the users be in control of the interface, 2) reduce user's memory load, and 3) make the user interface consistent (Wiley & Sons, 1997). Rayport and Jaworski (2001) conducted a study on design elements of customer interface. They highlighted seven factors named 7C's that can be used to evaluate the user interface of electronic services in e-commerce. The 7C's are context, content, community, customisation, communication, connection, and commerce. A brief discussion about the 7C's is as follows:

1. Context is to whom the system is being developed and the way of delivery such as pages seamlessly, navigation, and scrolling up-and-down. It should have two dimensions and functionality within two issues; firstly organising all information into sales of pages (layout), and secondly providing the users with capabilities of navigation (performance). The layout has three areas: section breakdown, which refers to how a piece of information is partitioned into sets of pages; linking structure, which refers to how each page would be linked with others; and navigation tools, which are equipped within site.

2. Content focuses on what the system/site would present or deliver to the users, and who the system will interact with in disseminating the information and knowledge, and in making the information available, easy to access, clear for the users. This dimension has a few sub-dimensions: offering mix, which refers to how this site will mix with the information about product and services; appeal mix, which refers to promotion and communication messages; multimedia mix and content type, which refers to the degree of time sensitivity, current content, and reference content.

3. Community refers to the interaction between the system and users. The information exchange method is done by using short messaging services (SMS). The short messages appear in the small screen.

4. Customisation refers to the extent where users can have their personal preference towards the interface and the site can tailor that preference.

5. Communication refers to the dialogue between the site and users. The examples of communication are interactive, broadcast, and hybrid communications.

6. Connection presents the links between sites, how much the sites can be connected with one another to meet the user's need.

7. Lastly, commerce refers to the payment interface within a site like a shopping cart and order tracking.

In addition, Lee & Benbasat (2003) have extended the 7C's framework to cover two important issues. The issues are grouped into mobile device constraint and mobile setting. This extension happened to make the framework more fixable to work within mobile environment. Because of this extension, the framework has advance capabilities that can be implemented in other area such as in developing mobile interface for e-Government services.

Mobile Device Constraints

Mobile device has fewer sources than the normal desktop computer. In comparison to desktop computer, mobile device has lower performance such as limited input/output, less convenient, lower multimedia and processing capabilities, smaller screen size that could affect the navigation activities, lower number of scrolling within one page, and limited content and delivery within a page (Lee & Banbasat, 2004). Moreover, mobile device has short-term memory, which would limit the activities and thus subsequently cause low user performance.

Mobile Setting

Mobile setting refers to the mobile environment where mobile users can perform their tasks in terms of time, place, and context. The setting mostly converges at three points of view: 1) spatiality concern where the user can carry the mobile anywhere and anytime, 2) temporality in which mobile users can

access the internet even when engaged in normal phone call, and 3) context ability, which means that the circumstance at the level of interaction with others. However, regardless of what the information holds and contains, the issues are how the users can find information to his/her satisfaction. Mobile setting could be an infrastructure, location, resources nearby, context, application, system, and time (Jones & Brown, 2003).

C. User Satisfaction Concept

User satisfaction refers to the feelings received by the user before, during, and after communicating with a website (Pérez-Mira, 2010). According to DeLone and McLean in information system success model, user satisfaction can be measured from recipients' response to the use of the output of an information system. Next, Naylor et al. (1980) defined satisfaction as "the result of the individual taking outcomes that have been received and evaluating them on a pleasant-unpleasant continuum".

1. Yao and Zhao (2010) built user satisfaction model with six dimensions:
2. Citizen expectations, which refers to citizen's expectation towards e-Government before using it.
3. Perceived quality, which evaluates the overall quality of the system, services, information, and application after using it.
4. Perceived value, which refers to citizen's perception towards the benefits of electronic service that they can obtain from the e-Government.
5. Government image, which refers to what would be remembered from e-Government experience.
6. Citizen reliability, which refers to citizen's confidence and support towards online services; whether they will re-use the services or not.
7. Citizen participation, which refers to the initiative of the citizens to participate in online services.

D. Mobile Government Services

Mobile Government services are defined as strategy of using mobile and wireless technologies to deliver services in order to improve the benefit of electronic government (Antovski & Gusev, 2005). Government sectors can gain advantages from using mobile and wireless technologies as delivery channels because they have these features: continuous availability, location-centric, convenience, customisation, and identifiability (Mahatanankoon, Wen, and Lim, 2006).

Moreover, m-Government services are strategy and implementation that contain all types of wireless and mobile technologies, services, application, and devices by: 1) pushing the information to citizens, 2) pulling the information from citizens, and 3) reaching a wide source (Abramowicz et al., 2006). The types of m-Government services are Government to user, Government to employees, and Government to business (Kushchu & Kuscu, 2004. Naqvi & Al-Shihi, 2009).

Among the benefits of using mobile technology to deliver ser-

vices and products are: 1) the delivery becomes more efficient and effective; 2) the services and products can be accessed anytime and anywhere; 3) exchanging knowledge and information is possible; and 4) it could remove infrastructure constraints (Sheng, H. & Trimi, S., 2008). However, m-Government applications are still in early stage of development. The perfect m-Government services and application have not been produced yet (Abramowicz et al., 2006; Naqvi & Al-Shihi, 2009; Thunibat et al., 2010, Thunibat et al., 2010).

M-government, like any other technologies, has many challenges that have been the limitations for its wide implementation. The first challenge is information quality. This is because government sectors hold a lot of sensitive information and this information needs to be delivered in good quality to meet user satisfaction. Other challenges include technical challenges such as interface design, screen size, and capabilities of devices (Misuraca, 2009). In addition, privacy and security issues of using mobile devices also pose challenges to achieve user trust especially when the information exchanged involves third parties (Chatzintas et al., 2006; Kushchu and Kuscu, 2004). The accessibility of the services and information within time requested is also a challenge of m-Government. Finally, there are also challenges related to infrastructure capabilities. These include soft infrastructures such as institutional arrangement and physical infrastructure, which refer to technologies used, equipment, and network (Kushchu and Kuscu, 2004).

3. CONCEPTUAL FRAMEWORK

The research model highlights the relation between dimensions of the study. In this research model, the users will browse those services and they will determine the information quality based on the three information quality dimensions namely perceived usefulness, perceived ease of use, and perceived accessibility. As the result, users will have an intension to use the information when the desired information has been provided, and the intension to use will guide users to the actual use of information. This then will determine the level of satisfaction towards the given information which can be either high or low. Finally, the overall satisfaction and association between the 7C's factors towards m-Government will be determined.
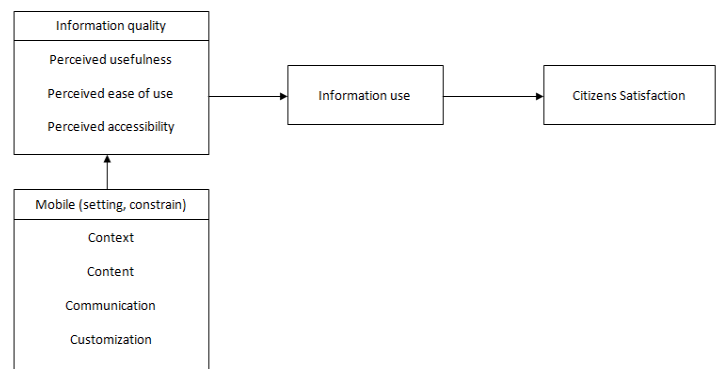

Fig 1: Information quality for mobile interface of m-government

4. RESEARCH HYPOTHESES

The research hypotheses would be drowning depends on the conceptual framework as a following:

No	Statement hypotheses
H1a H1b H1c H1d H1e H1f	information usefulness of mobile context interface has significant related with general information use information usefulness of mobile context interface has significant related with specific information use information ease of use of mobile context has significant related with general information use information ease of use of mobile context has significant related with specific information use information accessibility of mobile context has significant related with general information use information accessibility of mobile context has significant related with specific information use
H2a H2b H2c H2d H2e H2f	the usefulness of mobile interface content significant related to general information use the usefulness of mobile interface content significant related to specific information use the ease of use of mobile interface content significant related to general information use the ease of use of mobile interface content significant related to specific information use the accessibility of mobile interface content significant related to general information use the accessibility of mobile interface content significant related to specific information use
H3a H3b H3c H3d H3e H3f	usefulness of mobile interface communication is significant related to general information use usefulness of mobile interface communication is significant related to specific information use ease of use mobile interface communication is significant related to general information use ease of use mobile interface communication is significant related to specific information use accessibility mobile interface communication is significant related to general information use accessibility mobile interface communication is significant related to specific information use
H4a H4b H4c H4d H4e H4f	usefulness of mobile interface customization is significant related with general information use usefulness of mobile interface customization is significant related with specific information use ease of use of mobile interface customization is significant related with general information use ease of use of mobile interface customization is significant related with specific information use accessibility of mobile interface customization is significant related with general information use accessibility of mobile interface customization is significant related with specific information use
H5a H5b	General information use has a positive relation with user satisfaction Specific information use has a positive relation with user satisfaction

5. CONCLUSION

In this paper, the researcher have been viewed the three dimensions of the study which are information quality, mobile interface, user satisfaction, and m-Government . This study also comes up with conceptual framework that highlights the relations between interface design elements and information quality within each of them, and to determine the level of user satisfaction towards the information used besides determining how the information quality is going to influence m-Government services.

Being this a research in progress, the researchers intent to test the hypotheses to validate the framework of the study . the future study shall employed the smart phone uses to examine the user satisfactions of information provided by m-government services

REFERENCES

[1]. Abramowicz, W., Bassara, A., Filipowska, A., and Zebrowski, P.,(2006). Mobility implications for m-government platform deign . Cybernetics and system: an international journal, 37:119-135, Taylor&Francis Group, DOI: 10.1080/01969720500428255

[2]. Bandur, A., (1989). A social cognitive theory of action . An international perspectives (pp.127-138). North Holland: Elsevier

[3]. Delone, W. and Mclean, E. (2003). The Delone and Mclean Model of Information Systems Success: A Ten-Year Update. Journal of management Information Systems/spring 2003. 0742-1222/2003..

[4]. Jeong, M., and Lambert, C. (2001).Adaptation of an information quality framework to measure customer' behavioral intentions to use lodging web sites . Hospitality management , Elsevier, PLL:S0278-4319(00)00041-4.

[5]. Lee, Y., and Benbasat, I.(2004).A framework for the study of customer interface design for mobile commerce . international journal of electronic commerce / Spring 2004, Vol.8,No.3,pp.79-102

[6]. Lee, Y., Strong, D. Kahn, B. and Wang, R. (2002). AIMQ: a methodology for information quality assessment. Information & Management 40th (2002). PP:133-146. PII:S0378-7206(02)00043-5

[7]. Mahatanankoon, P., Wen, H., and Lim B., (2006). Evaluating the technological characteristics and trust affecting mobile device usage. International Journal of mobile communication, Inderscince Enterprises, pp662-681,Vol 4, 06

[8]. Sheng, H., and Trimi, S., (2008). M-governmnet : technologies, applications and challenges. Electronic government An international journal, Vol. 5 No,

[9]. Kushchu, I., and Kuscu, M.,(2004). From e-government to m-government : Facing the inevitable . Mobile Government Lab, http://www.mgovlab.org

[10]. Rayport, J., and Jaoworski, B., (2001). Introductions to e-commerce . New York: McGraw-Hill

[11]. Rossel, P., Finger, M. and Misuraca, G. (2006). Mobile e-government Options: Between Technology-Driven and User-Centric. The Electronic of e-government. Vol.4, No.2. PP:79-86

[12]. Naylor, J. C., R. D. Prichard, and D. R. Ugen,(1980) . A Theory of Behavior in Organizations. Academic Press, New York

[13]. Chatzinotas, S., Ntaliani, M., Karetsos, S., and Costopoulo, C.,(2006). Securing m-Government Services: The Case of Agroportal. www.mgovernment.org/resurces/euromgvo2006/.../8_Chatzinotas

[14]. Naqvi, S., and Al-Shihi, H., (2009). M-government Services Initiatives in Oman . Issues in informing science and information technology 6,2009

[15]. Goyal, D., Chong, H., Shum, P., Tong, Y., Wang, X., Zuo, Y., and Kuek, W., (2003). Design &Implementation of User Interface for Mobile Device . IEEE 0-7803-8185-8/03

[16]. Thunibat, A., Zin, N., and Ashaari, N., (2010). Mobile Government Services in Malaysia: Challenges and Opportunities. IEEE,978-1-4244-6716-7/10/.

[17]. Antovski, L., (2007). Improving Services Matching in M-government with soft technologies. IEEE international symposium on personal, indoor and mobile radio communication , 1-4244-1144-0/07

[18]. Yao, J., Lin, Y., and Zhao, P., (2010). E-government evaluation based on citizen satisfaction and its implementation . IEEE, 978-0-7695-3997-3/10, DOI: 10.1109/ICEE.2010.143

[19]. Pérez-Mir , B. (2010).validity of delone and mclean's model of information systems success at the web site level of analysis. PhD thesis , Louisiana State University.