Usability Evaluation of Korean e-Government Portal

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Abstract. This paper reports the results of an evaluative study of the Korean e-Government portal from the usability perspectives, using a common set of performance metrics from user participation. For fourteen civil affairs service sites, 51 participants performed usability tests and post-test interviews. The results showed that even though the e-Government services are fairly attainable, it takes too many steps and long time for users to complete the given tasks. The overall success rate to complete the tasks on e-Government was 0.69 and it took more than 4 minutes and 12 page navigations on average to complete simple transactions. A strong digital divide could be observed in the use of e-Government services in that the users with different vocations and ages resulted in difference in perceived usability and actual performance. Results suggest that not only are there wide variations in the usability for the services provided, but that significant work still needs to be undertaken in order to make the services of the e-Government more usable, particularly for the older users.

1 Introduction

The rapidly changing information and communication technology forces government agencies to deal with state-of-art technology in order to enhance the agencies' services to the public. The technology presents new opportunities for government to address problems in many conventional services. E-Government embraces the use of modern information and communications technologies to provide information about public services and enable the citizen to conduct transaction electronically with those services. As the use of ICTs becomes more widespread, there is a need to raise the levels of access and participation to ensure that e-Government delivers for all citizens. Provided the service is designed properly, the online delivery may be more user-friendly than that delivered by traditional means [6]. Success of the e-Government portal will largely depend on their accessibility, usability and quality. It is mainly to transform government to be more citizen-oriented [1]. Government exists for the benefit of the citizen and there is a natural expectation that the government recognizes this relationship in the way in which it interacts with its citizens.

1.1   Objectives of the Study

In recent years there has been worldwide increasing pressure for better government, not just in more efficient and effective way but in better customer services. The need to provide a better quality services, focus on the citizen, embrace more efficient and effective work practices and improve its administrative processes motivated governments throughout the world to develop e-Government. At the same time, e-Government presents new opportunities for improved efficiency and effectiveness to deliver government services in an increasingly complex and changing environment. However, the effort to provide a better e-Government should be felt by its citizens to be successful. The purpose of this paper is to describe the issues related to the usability of Korean government web portal as benchmark measures of good e-Government practices, associated with the digital divide issue. Our goal is to evaluate the usability of the e-Government portal as the main theme of the centrality of the citizen in the provision of the services.

1.2   Related Research

UNDP defined the e-Government as "government's use of ICTs to work more effectively, share information and deliver better services to the public" [10]. A Gartner Group report described e-Government as "the continuous optimization of service delivery, constituency participation, and governance by transforming internal and external relationships through technology, the internet, and new media.". The e-Government Act of 2002 defined the e-Government as "the use by the government of web-based Internet applications and other information technologies, to (A) enhance the access to and delivery of Government information and services to the public, other agencies, and other Government entities; or (B) bring about improvements in Government operations that may include effectiveness, efficiency, service quality, or transformation" (116 Sta. 2899, at 2902). While detailing the definition of e-Government in its contextual aspects, Seifert and Relyea [9] argued that governments are obligated to focus on equality and accessibility to public services and information while representing the interests of the citizenry as a whole. Pascual [8] insisted that e-Government ultimately aims to enhance access to and delivery of government services to benefit citizens. As we can see from all the definitions made from many different studies, the concept of government services to its citizen is in the core of the e-Government.

As in the previous studies on the development and evaluation of web sites [5, 7], the question that drives this study is to determine and increase the understanding of how usable an e-Government portal is for its citizen. It is argued that those charged with implementing e-Government need to give careful consideration to the perceptions and expectations of its users to provide more user-friendly services. Lack of technological competence on the part of users, such as a complex interface putting off citizens from using the service, is regarded as one of user-culture barriers to e-Government service development [11]. Vassilakis et. al. [11] also argued that the two most important factors to lead the e-Government to success are legislative issues and user-related issues, where the latter should be addressed at the service design stage to develop more user-friendly interfaces.

It is important to recognize that the citizen need not understand the complex structures of government in order to access the exact information or to get any government service as required in the traditional off-line services. Instead, e-Government will enable the citizen to access the exact information or government service required through a single electronic gateway. This will reduce the time and effort required for citizens to comply with government rules and regulations [4]. The key recognition within the government sector is that e-Government must be seen in the context of organizing around the citizen. In the center of these arguments are the accessibility and usability of the e-Government portal.

However, accessibility and usability are often disregarded in developing and organizing e-Government sites, and governments seldom conduct usability evaluation for the citizens, who should be the major customers using the system, ignoring the needs of real users. Even though governments recognize the key aspect of the online delivery of services to citizens is the interaction between the citizen and government, governments seldom collect feedback from citizens regarding its access and use. In other words, e-Government often becomes just a one-way delivery of services. In that sense, it is recommended that government web sites should show citizens that their involvement matters by developing feedback mechanisms and encouraging their use [4].

2   Usability Evaluation

2.1   Korean e-Government Portal

The web sites that make up the Korean e-Government were mainly G4C sites for citizens to access and use for civil affairs services. Among the sites analyzed are those of major ministries' offices and agencies serving crucial functions of government to citizens, such as health, human services, taxation, education and training for jobs, and regulation. These civil affairs service sites are different from the respective government agency web sites in that actual transactions for civil services are available while the government web sites are only for providing information on the administrative agenda and public relations of the agencies.

Weather report services were available both in wired and wireless internet services through mobile networks. This evaluation included a wireless internet service through mobile phones. It was one of a few mobile web sites available among the e-Government services.

2.2   Usability Evaluation

Tasks. A total of 14 tasks for civil affairs services from the e-Government was evaluated. Each task consisted of a specific service provided by a certain ministry of the government. Participants were asked to complete the task unless they were forced to stop after a certain limit of time. The selected tasks were as follows, with the responsible agency of the services in parentheses:

1. Registration and logging-in to the e-Government portal (Ministry of government administration and home affairs)
2. Reporting a lost social security card (Ministry of government administration and home affairs)

3. Application for a copy of one's family register (Ministry of government administration and home affairs)
4. Registration and upload of one's resume to a Work-net (Ministry of labor)
5. Inquiry of a building registration information to buy a house (Ministry of construction and transportation)
6. Inquiry of a land registration information to build a plant (Ministry of construction and transportation)
7. Inquiry of tax arrears (National Tax Service)
8. Registration of one's mobile phone number for cash receipt (National Tax Service)
9. Inquiry of 4 major welfare-related insurance services (Ministry of health and welfare)
10. Inquiry of job training in job training info net (Ministry of labor)
11. Request for an open public information (Ministry of government administration and home affairs)
12. Report to the Cyber Police of a crime (National Police Agency)
13. Weather report
14. Plug-in installation for e-Government program

Subjects. A total of 51 users participated in the evaluation. The participants were selected based upon their age and vocation. All the participants were the residents of Seoul and Daegu metropolitan areas in Korea. About 39% of the participants were college students (n=20), 33% were blue collar workers (n=17), and the rest of them were white collar workers (n=14). The participants were categorized into four age groups ranging from their 20s (n=16), 30s (n=17), 40s (n=10), to 50s (n=8). There were only 8 participants in the 50s since it was hard to recruit the older users who had had previous internet experiences. Twenty seven of the participants were male and twenty four were female.

Procedure. A repeated measure experimental design was used in which each participant performed the tasks for all 14 sites. The order of tasks was counter-balanced among the participants. Participants were given a task at a time with a simple scenario. The tests were conducted at university laboratories in Suwon and Daegu. Two video cameras recorded the participant's face and computer screen to monitor the participant's behavior. Participants were encouraged to speak aloud as much as possible while completing the tasks, but were not forced. Participants' mouse navigations and clicks on the monitor were captured. The time for task completion was also measured as well as the time spent in errors.

After completing the tests, a post-test interview was held for each participant for additional information. Participants were interviewed for their awareness of the e-Government services and previous experiences. Also obtained from the interview were subjective ratings on each participant's satisfaction with the e-Government services. A 5-point scale was used for the rating in each service to examine 1) how usable the participant perceived the service to be, 2) whether the participant would use the e-Government service again in the future, and 3) whether the participant would recommend others to use the e-Government services. Participants could also make specific comments for their opinion on design and usability.

A notable characteristic of the Korean e-Government services is that some of the civil affairs services require the use of electronic certificate of authentication to access the services in addition to initial log-in process. Tasks 2, 3, and 7 require participants to have obtained an electronic certificate of authentication from financial institutes such as banks or from government-certified attestation companies to access and use the e-Government services. It was rather a complicated process for some participants and was not considered in this usability test since the electronic certificate of authentication is beyond the use of e-Government.

3   Evaluation Results

The data for our analysis consist of an assessment of 14 Korean e-Government web sites by 51 subjects. The analysis on the usability evaluation test data was supplemented by subjective rating data from post-test interviews.

3.1   Results of the Usability Tests

The overall success rate for the selected tasks was 0.69 and overall mean time to complete the given tasks was 269.9 seconds. The mean error time, the time for the participants to spend performing unrelated tasks or navigating wrong pages during a given task, was assessed to be as long as 93.7 seconds. The services required 12.1 web page navigations on average to complete the tasks, and 2.5 navigations on average out of the 12.1 navigations were spent for erratic navigations or unrelated manipulations per task. These results suggest that even though the e-Government services are fairly achievable, it takes too many steps and long time for most users to complete the tasks. It took more than 4 minutes on average to complete simple transactions while most users wasted about a minute and a half in error.

Mean success rates and task completion times significantly differed among the fourteen selected tasks ($p < 0.05$).
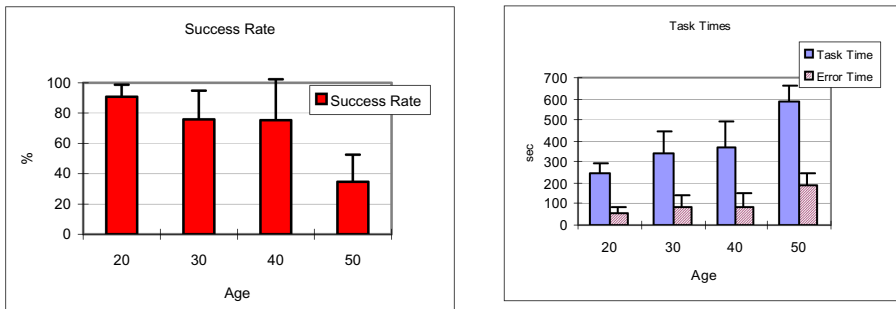

Fig. 1. Mean success rates and task completion times of the participants in four age groups. Participants of the 50 year-old age group showed significantly worse performances than the other groups' participants in all measurements.

A very significant age effect could be observed (p< 0.01). Figure 1 shows the mean success rates and task completion times for overall tasks. The participants in their 50s could only finish less than 40% of the given tasks, while the subjects in their 20s could finish approximately 90% of the tasks. The mean task completion time of the subjects in their 20s was observed to be approximately 240 seconds while the participants older than 50 years of age took almost 10 minutes. The mean error time of the participants of 20 year-old age group was shorter than that of the 50 year-old age group by almost 2 minutes. Especially, the tasks of reporting a lost social security card and tax arrears could not be completed at all for the participants in the 50 year-old age group. Both tasks required the use of an electronic certificate of authentication to access which seemed to be hard for certain users both in concept and in acquisition process. No gender effect could be found.

3.2   Post-Test Interview Results

Awareness. Overall awareness of the e-Government services for the given tasks was so low that only 44.1% of the participants were aware of it and only 9% of the participants had previous experiences. Participants in the white collar worker group and college students showed more awareness than the blue collar workers. No difference, however, among the age groups was found.

Perceived Usability. Overall satisfaction rating on perceived usability of the e-Government services was 3.32 out of 5 points. Usability for the tax reporting service for the tax arrears was significantly worse than other services (p<0.05). No difference, however, among the age groups nor among the vocation groups could be found. The participants of the 50 year-old age group rated the usability the highest even though they scored the lowest in the actual success rate and task completion time in the usability tests. The participants of the 30 year-old age group rated the perceived usability the lowest at 3.24 out of 5 points. It suggests that the younger users with more experiences in internet use were less satisfied with the usability of the current e-Government system and its interface. Younger participants particularly commented on the difficult terminologies used in the interface while older participants did not like the fonts and size of the letters and menu structures used in the interface.

Intention for Future Use. Overall rating on the intention for future use of the e-Government services was 3.71 out of 5 points. There was not any specific service that the participants rated significantly higher or lower than the others. The participants in the 40 year-old age group rated the highest expressing the intention for future use (p< 0.05), followed by the participants in their 50s. The participants of 20 year-old group rated the lowest. The white collar worker group showed significantly more interest in continued future use than the students and blue collar worker groups (p< 0.05).

Recommendation to Others. Overall rating on their willingness to recommend the e-Government services to others was 3.79 out of 5 points. The participants of the 40 and 50 year-old groups were significantly more willing to recommend the e-Government services to others than the participants of 20 and 30 year-old groups (p< 0.05).
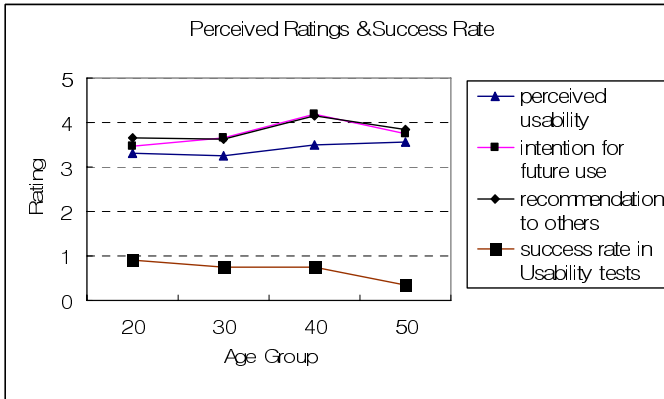
Fig. 2. Mean perceived ratings and success rate in the usability test for the participants' age groups. The aged participants generally showed higher perceived usability, recommendation to others, and intention for future use, while their actual performances in the usability tests were worse than the younger participants.

4   Conclusion

We tried to include all the demographics of the overall population of citizens in this study. Even though the sample size was relatively small, the data reflect a broad diversity of citizens in age, gender, and vocational background. Several issues have been observed that tend to complicate the usability of Korean e-Government.

   A strong digital divide could be observed in the actual use of e-Government in that the users with different vocations and ages resulted in difference in perceived usability and actual performance. The difference was so apparent that older users in their 50s had hard time to use the e-Government services even though they seem to be the users who mostly want to use them. The significantly longer task completion times and lower success rates for the older participants clearly showed the usability of the interfaces would act as a clear barrier to the promotion of e-Government services to these users.

   As major off-line users of the government civil affairs services, the participants in the 40 and 50 year-old age groups were more willing to use the online version of the government services than the younger participants. It is very typical that the students and participants in their 20s, who would have relatively less experiences in the civil affairs services, were less satisfied and had little intention for future use. They also rated the usability of the e-Government services rather harshly, probably because they have had more experiences with other well-designed sites than the older participants have. Users in their 40s and 50s were less concerned about usability and rated higher in perceived usability, and also rated higher in the intention for continued future use. They might have put blame not on the design of interface but rather on their lack of computer skills. Carter and Belanger [2] found that the perceived ease of use was not a factor for increased use intentions of e-Government services for college students in their study. They also suggested that the experienced internet users such as college

students would have perceived the ease of use differently from the overall population of citizens such as aged users. Findings in our study confirmed, as it can be reasoned, the different perception on the ease of use for the older users. In our study, the perceived usability did not affect both the younger participants' and older participants' intention for continued future use of e-Government services, for different reasons. It was noted that unlike their findings, experienced internet users who may have higher levels of perceived compatibility, the younger participants in this case, were not associated with increased intentions to continuously use the e-Government services in the future simply because they did not understand the immediate needs. With different reasons from Carter and Belanger's study [2], however, lack of perceived ease of use was not a significant deterrent of intention for future use of e-Government for the older users in their 50s, who might have apprehension provoked by complexity in the interface. They did have needs to use the civil affairs services and seemed to understand the real benefits from the online services.

Results also suggested that the usability among the different sites was not evenly distributed. This is probably due to the fact the e-Government portal was simply acting as a mere gate to all the ministries' civil affairs service sites, not being a well-structured portal that should be organized and pre-planned as a whole. It was also not very desirable for users to spend more than 5 minutes on a web site to complete simple transaction tasks, particularly for the aged users who are more willing to use the services on a continued basis. This is partly because many services required the users to input their personal information redundantly, clearly showing the e-Government was not a holistic portal that needs to automatically pass the log-in information to all the services. A person's identity details need only be supplied to government once [4]. It should be noted that one of key goal of e-Government is to reduce the burden of authentication and authorization on the citizen while maintaining a certain level of security. Another factor for the low usability was the use of electronic authentication. Many participants, especially the older participants, were uncomfortable with the electronic authentication, having hard time to understand the concept, to obtain one, to memorize the password, and to repeatedly use it for different services.

It should also be noted that the e-Government portal was designed by private Web design companies under contract with individual government agencies. Without specific government guidelines that dictate the accessibility and usability concern, the design tends to focus more on aesthetics and efficiency by young designers of the private design companies. The inconsistent distribution of usability among the services that we observed during the tests also can be attributed to the lack of consistent guidelines that run through all the government ministries and agencies.

Even though Korean government invested a lot to creating and providing e-Government services to its citizens, awareness and experience of the e-Government services were found to be in a very low level. Even though the Korean e-Government web portal was ranked the highest in the world in the 2006 Brown University's Global E-Government 2006 evaluation [12], lots of Korean users are expressing disappointment in its design and services. It can be understood that it might be very difficult to satisfy the citizens in Korea since they are believed to be one of the most advanced and savvy internet users in the world. It seems like the Brown University evaluation [12] just looked at the number of features and transactions the site

provided online without looking at the actual accessibility and usability. Such an assessment is not desirable since it can misguide the government to be satisfied without giving much effort to put the citizen to the center. While such facts as how many online transactions are provided or how much percentage of its database or video clips are accessible are one thing, the facts on how much effort should be given by citizens in time and steps to actually make a transaction online are another. We regard the latter more important in evaluating the usefulness and value of e-Government.

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