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ADDRESSING USABILITY QUALITY ATTRIBUTES IN TECHNO-SPIRITUAL APPLICATION

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ABSTRACT. Usability studies are conducted extensively for web sites and other applications. One of the domains that need attention is techno-spiritual application. To date, the demand for techno-spiritual application is increasing. This suggests that the application design must inhibit usability and also positive user experience. Thus, this study is conducted to explore its' usage usability. The Post-Study System Usability Questionnaire (PSSUQ) has been used to gather the user's feedback focusing on the mobile Holy Quran, one of the techno-spiritual type application for Muslims. The results show that improving the usability attributes of techno-spiritual mobile application can have a positive influence for the mobile application usability and adoption. The study will be beneficial for the application provider in the field of techno-spiritual software development industry.

Keywords: techno-spiritual application, Mobile Quran usability evaluation, usability attributes

INTRODUCTION

Usability evaluation research has been widely conducted in many areas such as electronic medical record (EMR) (Smelcher, Miller-Jacobs, Kantrovich, 2009), e-learning (Junus, Santosa, K. Isal, Utomo, 2015; Ssemugabi & de Villiers, 2010), e-commerce web sites (Agarwal and Venkatesh, 2002; McKinney, Yoon & Zahedi 2002), email applications (Brian and Lazar 2011) and many other. Nielsen (Nielsen, 2000; Nielsen 2012) define usability as "quality attribute that assesses how easy user interfaces are to use". The word "usability" also refers to methods for improving ease-of-use during the design process". Usability is one of the important factors that support users to either loyal with the application or searching for other application that could provide a better interaction between the users and the computer.

Human Computer Interaction (HCI) discipline has broadened the research horizon not only focusing on the people at work but also to users lifestyle. One of the categories that fall into lifestyles domain is spiritual. People who experiences difficulties in life for example: death, tragedies, terminal sickness demonstrate greater spirituality compared to people who never faced threatening events (Smith, 1994). People thought that spirituality and religion are similar, but they are not. However, these two concepts are related to one another. Researchers have started to examine how people use technology to support religious practices (Bell, 2006; Woodruff, Augustin, Foucault, 2007; Wyche, Hayes, Harvel, Grinter, Georgia, 2006). As reported in one of the designing religious research, the design of this domain must go beyond efficiency and productivity (Wyche, Caine, Davidson, Artiga, Grinter, 2008). However, our

research is focusing on the usability evaluation of Islam Holy Book Application. We argue that, before we could go beyond the usability attribute, the application must achieve usability quality attributes. Once these has been achieved, these can encapsulates “beyond usability” quality and user experience (UX).

The objective of this paper is to report the usability evaluation to Islamic Holy Book application. Then, we propose few design improvements on the Islamic Holy Book application based on the results.

This paper is organized as follows. In the following section we will review the background literature of the study context. Next, the methodology utilized in this research is presented, followed by findings and results. Finally, the paper will end with the summary of the research.

RELATED WORKS

Usability Attributes

There are various quality factor implemented in software engineering for measuring the applications. Quality measure the capability of applications fulfills the requirements and expectations of the users. One of key attribute recognized in quality measurement is usability (Lepmets, Ras, & Renault, 2011). Usability helps developer measures application characteristics which are beneficial to users depend on the nature of the user, the task and the environment (Abran, Khelifi, & Suryan, 2003). Nielsen (Nielsen, 2000; 2012) model underlines five elements in usability that influences the acceptance of applications.

The model by International Organization for Standardization (ISO) 9241-11 suggest three usability elements consisting of effectiveness in achieve application goals, efficiency resources expended and satisfactions towards the use of application (Abran et al., 2003). Comparing the Nielsen model with the ISO 9241-11 does not include elements of learnability, memorability and errors but it's considered under the definitions of their three elements. As example the error rates reflects in efficiency (Harrison, Flood, & Duce, 2013).

Usability evaluation

Usability evaluation is categorized into two parts: evaluated by the experts or evaluated by the end-users. Both types of evaluation have its pros and cons. The usability evaluation performed by real users provides the designer information about their new design or to detect usability issues with the existing designs. If the development followed the user-centered approach, the evaluation is conducted throughout the development process. Usability evaluation has been conducted in health domain such as the usability of electric medical record (Edwards, Moloney, Jacko & Sainfort, 2008, Veer, 2010, Smelcer et al., 2009), e learning (Junus et al., 2015, Alelaiwi & Hussein, 2015) and e commerce (Hassan et al 2013).

Techno-spiritual application

Technology has been used to support many range of religion practices (Bell, 2006). Catholic believers have been receiving Pope's notion through SMS, Orthodox Jews employs “kosher phones” and Protestant Christians transferring religious songs as ringtones (Katz, 2006). Momentarily few research works have been studied how technologies are used for religious work purposes (Woodruff et al., 2007; Wyche et al., 2006) less attention has been given to assess the usability of spiritual application.

Islam has been chosen in this research because of its growing faiths worldwide. Islam is the main religion in Malaysia. In addition, historically Muslims produced many well-known scientists for example Al-Farabi, Al-Battani, Ibn-Sina and many others (Wikipedia, 2016).

Since spirituality and religion are related, we present other research works which are relevant to our research.

Sun Dial (Wyce et al., 2008) conducted a study which consisted two parts:narrowing the research focus and evaluated the Sun Dial application. They have designed a mobile Islamic Call to Prayer application called Sun Dial. In this design, they have stressed on the sacred images used in their design (Wyche, Caine,Davidson,Artega & Grinter, 2008).

(Ihsan and Razak, 2013) worked on techno spiritual on elderly Muslims. At the early stage of their research they have to identify the technology usage among the elderly. With this understanding, they could extend their study to properly design techno spiritual application.

Few studies about evaluation of Islamic websites content reliability conducted by (Mohammad, Mahmud & Mansur, 2015) and exploring Islamic websites features (Madan and Duvey, 2012) that focused on religion.

(Ahmad,Zainal, Abd Razak, Wan Adnan, Osman ,2015) focused on the user experience evaluation on mobile spiritual application for older people. From this study they concluded that the best method to do user experience evaluation for older people are: observation and interview.

METHODOLOGY

Preliminary Study Data Collection Instrument

This study used a questionnaire survey instrument for data gathering, which later handed out to targeted participants. It adopted from an existing Post-Study System Usability Questionnaire (PSSUQ) that has a 19-item instrument for assessing user satisfaction with system usability (Aeberhard, 2011; Lewis, 1995; Lin, Lin, & Roan, 2011) and also referring the instrument develop by (Hussain & Kutar, 2009; Tahir & Arif, 2014).

The questionnaire consist of three sections, the first part consisted questions about demographical information about respondents such as: gender, age and experience of using the application. The second part encompassed questions that mapped the usability factors of effectiveness, efficiency and satisfaction. The third and final section gather opinion from respondents about add-ons features of Al-Quran mobile application would they like to see in the future. The details categorization of questions is shown in Table 1.

Table 1. Categorization of Questions for Survey

Section	Description	No. of Question
A	Demographic	6
B	Effectiveness	7
	Efficiency	6
	Satisfaction	6
C	Opinion	1

	Total Questions	26
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Sample Selection

Based on PSSUQ studies (Lewis, 1995), the usual recommendation distribution for this questionnaire would be around 90 participants. It also suggested that it would be prudent to collect more data in different circumstances to extend the generalizability of the findings.

In this study, simple random sampling was applied randomly into targeted participants. The questionnaires which consist of 26 questions were distributed around 200 participants both males and females. The data was distributed to the Al-Quran reading classes and working offices. Participants involved in the study, were in the age group from below 15 and up to above 60.

The process of pre-survey was deployed within two weeks of time periods and managed to collect 187 feedbacks from respondents.

Evaluation Metrics

The questionnaire consists of 19 statements with their rating scale for evaluation based on the 7-point Likert-type scales. For each statement, respondents stated their agreement level from strongly disagree = 1, disagree slightly = 2, disagree = 3, neutral = 4, slightly agree = 5, agree = 6 and strongly agree = 7 (Lewis, 1995). These rating scale were measured in ordinal where data ranked in some measure of magnitude. Rating scale assigned to groups express a greater than relationship but how much greater is not implied (Boone & Boone, 2012; Lewis, 1995).

A quantitative data gather from questionnaire then interpreted and analysed into the degree of severity level which shows the usability issues facing by techno-spiritual application. Each group of statements represents respondents merit point for the each usability factor (Chiew & Salim, 2003). The scores are based on the arithmetic mean for each effectiveness, efficiency and satisfaction (Abdul, Wan, Isa, Lokman, Wahid, Sulaiman, 2014; Redzuan & Hassim, 2013; Roy & Pattnaik, 2014). It categorized the severity level and calculated using mathematical formula stated below:

$$\text{Usability point for a category, X} = \frac{[\sum (\text{Merit for each question of the category})]}{[\text{number of questions}].}$$

The result of usability point X, being a single number value creates issues on how the numeric score translates into an absolute judgment of usability. Therefore by adding this adjective rating scale it help researchers' interpreting and give clear define explaining about the scores (Suominen, 2013). Refer Table 2.

Table 2. Usability severity level towards usability points

Level	Point X
Bad	$0.00 \leq x < 2.00$

Poor	$2.00 \leq x < 4.00$
Moderate	$4.00 \leq x < 5.00$
Good	$5.00 \leq x < 6.00$
Excellent	$6.00 \leq x \leq 7.00$

Pilot Study

Pilot studies are a crucial element in survey research because providing information for planning and justifications of initial data before perform the actual outcome measurements. In this research work, the pilot study was conducted as a trial run in the small scale responders to know, whether the proposed usability evaluation are appropriate or too complicated (van Teijlingen & Hundley, 1998). The questionnaire instrument used in pilot study was same with the actual study intentions where it comprises of three usability factors for mobile application. After that, the questionnaires randomly distributed to user of techno-spiritual mobile application. The numbers of 10 respondents are involved in this pilot test and feedback given was taken into consideration for instrument enhancement.

Result from the pilot test show that process of filling up the form can be done within a 10 minutes period of time. The only limitation found in the pilot study was the usage of the English language which affects longer time for respondent answering the questions. Based on respondent's comment about the language used in the questions, we provided dual language questionnaire for the participants.

Reliability Test

The psychometric is method of measurement the composite reliability, discriminant validity and factor loadings. It provide technique for researchers to development and evaluation of standard questionnaires to assess subjective usability (Hung, Chang, & Kuo, 2013). Reliability test was conducted on this questionnaires and shows the Cronbachs Alpha result for this study to be 0.83. This means the questionnaire used in this study has good reliability and appropriate for the study. The closer Cronbach's alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale (Gliem & Gliem, 2003; Lewis, 1995).

Descriptive Statistic on Preliminary Study

The evaluation study was conducted on targeted techno-spiritual mobile application users who participated voluntary and no financial incentives were offered as rewards for the feedback. At the stage of preliminary study analysis, around 187 participant responses have been gathered based on three factors of usability: effectiveness, efficiency and user satisfaction. The snippet of descriptive statistics by respondents that participated in the survey presented in table 3.

Table 3. A snippet of few factors answered by respondents

Factor	Category	Frequency	Percentage
Operating system used	Apple iOS	26	13.9
	Android	149	79.7
	Others	12	6.4
Type of mobile application.	Quran Android	88	47.1
	iQuran	39	20.9
	Quran Reciter	17	9.1
	Quran Explorer	15	8.0
	Quran Majeed	9	4.8

	Quran Touch	15	8.0
	Others	4	2.1
Frequency of used.	Once a month or less	43	23.0
	Once a week	45	24.1
	Several time a week	44	23.5
	Every day	38	20.3
	Several times a day	17	9.1
Location frequently used.	At home	88	47.1
	At mosque	34	18.2
	At office	34	18.2
	At school	6	3.2
	At public area	11	5.9
	In a car	14	7.5

A total number of 187 respondents participated in the study were 36% male and 64% were female. Almost 80% respondents used the techno-spiritual mobile application in Android platform with 47.1% used the Quran for Android application and followed by 20.9% used the iQuran.

The survey also shows that accumulatively 77.5% of respondents age around 31 until 60 years old. The respondents mostly used the applications at home with 47.1% of responses capture and have various percentages between frequencies of used.

Findings in Preliminary Study

In this phase, the numbers of respondents are presented graphically based on the severity level of each usability factors.

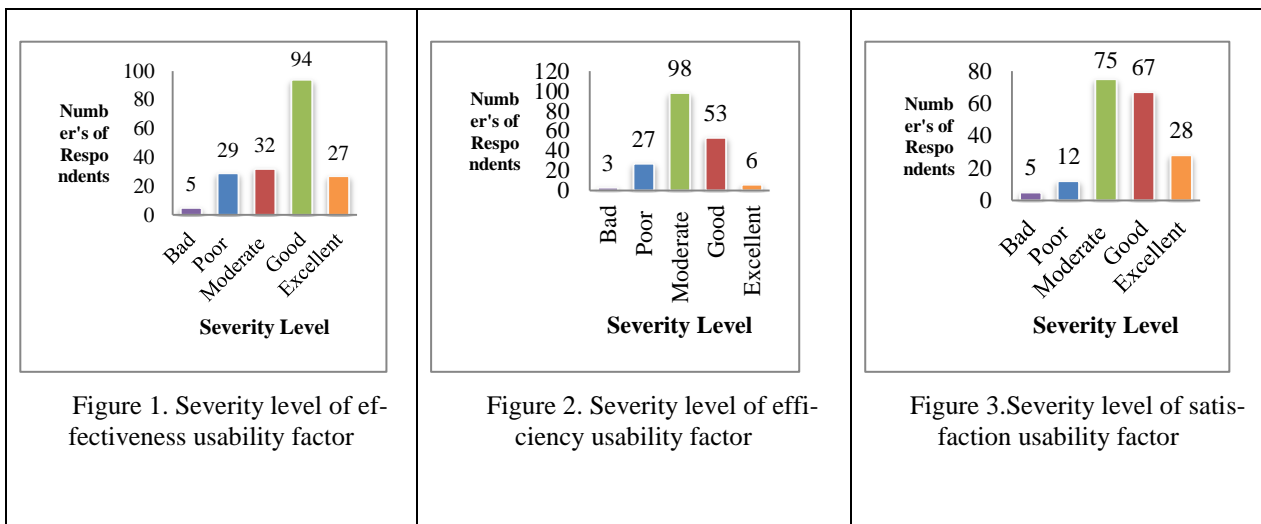


Figure 1, describes majority of the respondents were satisfied with the effectiveness of techno-spiritual mobile application where 94 out of 187 respondents give usability rating as good. Only 5 respondents rated the usability level to be bad. From these findings, we can conclude that the effectiveness usability level of techno-spiritual mobile application was rated towards good level.

In the figure 2, shows the usability level of efficiency of techno-spiritual mobile application where the majority of 93 respondents have rated their responses at the moderate level. It follows with 53 respondents have given rated at the good usability level. These conclude that the efficiency usability level of techno-spiritual mobile application was rated only at the moderate usability level.

Similarly with the figure3, representing the satisfaction usability level efficiency of techno-spiritual mobile application where the majority of 75 respondents have rated their responses at the moderate level. It follows with 67 respondents have given rated at the good usability level. The margin of difference between the two levels is very small. We can conclude that the satisfaction usability level of techno-spiritual mobile application was rated also at the moderate usability level.

The summary of the usability evaluation of the techno-spiritual mobile application is shown in Table 4.

Table 4. Usability point for each factor

Factors	Usability level	Usability Point
Effectiveness	Good	5.03
Efficiency	Moderate	4.56
Satisfaction	Moderate	4.90
Overall	Moderate	4.83

The techno-spiritual mobile application obtained good usability severity level in terms of effectiveness and moderate usability severity level in terms of efficiency and satisfaction from the respondents. The overall usability mean value for the techno-spiritual mobile application is 4.83, which is described as moderate on the usability severity scale.

CONCLUSION

Techno spiritual application comprises many categories. In our study, we focusses on the holy book from Muslims domain. It ranges from Quran Android, iQuran, Quran reciter and many others preferred by the user. We conducted a usability study to this type of application to analyse its usability quality attributes. As a result, we acquired a usability level of good for effectiveness and moderate for both efficiency and satisfaction. We concluded that techno spiritual application usability could be improved by designing its user interface to achieve its high degree of usability factors hence provide a positive user experience. This improvement could facilitate various type of users that love to use techno spiritual application anytime and anywhere.

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