

Mobile Application 'DOOgether' Evaluation With Usability And User Acceptance Approaches

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Abstract. DOOgether is an electronic commerce as a sports venue booking platform that provides easy access to various types and sports venues in Jakarta area, Indonesia. It uses mobile application media for its sales. The number of visitors increased from year to year in line with improvements made. Apparently there are still problems in the operation of DOOgether. From interviews information it has not been optimal so that it affects the initial process to the end of ordering the sports venue. Therefore, a study was conducted aimed at evaluating and finding problems in the mobile application with usability and user acceptance approach. The study propose to improve a better mobile application user interface. Usability evaluation was done by measuring effectiveness with the task completion rate metric, efficiency with time-on-task metrics, and user satisfaction with questionnaire calculations. The study involved 30 participants were grouped into initiator participants (never used a DOOgether mobile application) and non-initiator participants (never a DOOgether mobile application). The results showed that the system was effective for non-initiator participant groups. Then eight errors were made by the participant and given many proposed improvements based on improvements to the search feature; removal of the 'book' button, display 'complete payment' options, and navigation display.

Introduction

The increasing development of technology goes hand in hand with changes in buying and selling behavior. This changes the activities or sale and purchase transactions which are usually done directly, now began to change with the activities carried out online, or internet-based. Buying and selling transactions through this internet network are generally called electronic commerce. One e-commerce in Indonesia which is engaged in services is DOOgether. DOOgether is a sports venue booking platform that makes it easy to access various types and sports venues in Jabotabek, especially in the Jakarta area. According to DOOgether's historical data, every year there is an increase in the number of DOOgether mobile application users, but there are still opportunities for improvement in the appearance of DOOgether's mobile applications seeing a preliminary study of user dissatisfaction with mobile applications.

To maximize improvements to the appearance of an e-commerce mobile application, previous studies [1] [2], show that improvements to mobile applications can be done through usability and user acceptance evaluations. Usability parameters used to measure DOOgether mobile application in this study are using ISO 9124-11. This parameter is one of the usability measurement methodologies commonly used. There are three usability parameters owned by ISO 9124-11, namely effectiveness, efficiency, and satisfaction. These parameters become usability measurement factors used in evaluating the user interface of this DOOgether mobile application.

In this study, usability measurements were carried out using the performance measurement method by measuring effectiveness and efficiency and Questionnaire for User Interaction Satisfaction (QUIS) to determine user acceptance and opinion of the interface of a display, including aspects of ease of use, system capability, consistency, and learning [3]. While the user acceptance approach is used to see how users accept and use a system / technology [4].

With knowledge related to these matters, it is expected that DOOgether can make improvements to make it easier to use and well received by its users so that it is expected to increase user satisfaction and increase sales by DOOgether. So that this evaluation can be input for DOOgether to make improvements to mobile applications in the future.

Literature

ISO 924-11. According to ISO 924-11, usability is the extent to which a product can be used by certain users to achieve certain goals effectively, efficiently, and users become satisfied in the context of usage. In general, the notion of usability is an attribute of quality that is used to evaluate how easily an interface is used.

Effectiveness (effectiveness). The product made must be able to be used for certain tasks. Or it can be said how well a product is doing the work that needs to be done.

Efficiency. Efficiency is associated with how quickly the user can reach the goal when using the product.

Satisfaction. Satisfaction refers to user perceptions, feelings, and opinions of a product that are usually obtained from written or oral questions. Generally users are asked to rate or rank the product they are trying.

Performance Measurement. Performance is what the user actually does when interacting with the product. Performance can be measured by several things including the measurement of the time the task is done, the success of the task, and the frequency of errors made by users [5]. Efficiency is the speed at which users complete tasks accurately and precisely. Efficiency is generally measured in units of time. While effectiveness is the extent to which the product behaves in accordance with user expectations and user convenience to use the product as he wishes. Effectiveness is generally measured by the level of error or error.

QUIS. QUIS was developed by the Human-Computer Interaction Laboratory (HCIL) team from the University of Maryland. The Questionnaire for User Interaction Satisfaction (QUIS) consists of 27 statements that are used to determine user acceptance and opinion on the interface of a display, including aspects of ease of use, system capabilities, consistency, and learning with a range of 9-point scale [3]. The purpose of QUIS is to subjectively determine user satisfaction with a mobile application. In this case, satisfaction is defined as comfort and acceptance of the work system for users and other individuals who are affected by its use.

Electronic Commerce Acceptance. Electronic Commerce Acceptance is the involvement of consumers in an exchange relationship with a website or mobile application provider. Whereas online transactions can be seen as part of marketing communication. According to Pavlou [6], there are several elements in the electronic commerce user acceptance model. Among them are the desire to conduct transactions, trust, risk perception, perceived usefulness, and perceived ease of use.

Design User Interface. An effective user interface design can attract consumers online, along with that many studies have been conducted which among them show that the way in which information is displayed in graphic quality and can improve user experience [7]. According to Garrett [8], there are 6 classifications in user experience, including visual design, information architecture, information design, navigation design, content, and interaction design.

Methodology

Preliminary research was carried out by interviewing DOOgether. In the preliminary study, DOOgether stated that there is still a mobile application display DOOgether that still has a chance for improvement. This is reinforced by the presence of a preliminary study in the form of questions given to users of the DOOgether mobile application as selected respondents as many as 15

respondents using purposive sampling technique. The results of the question stated that of the 15 respondents there were 7 people or 46.7% of respondents who were dissatisfied in using the DOOgether mobile application. With this preliminary study, this research will be useful to improve the appearance of DOOgether mobile applications.

The study was conducted using 30 respondents DOOgether mobile application users who were divided into two characteristics, namely 15 beginner respondents and 15 non-beginner respondents. Sampling is done by convenience sampling. Convenience sampling is a type of non-probability or non-random sampling where there are limitations in the target population such as accessibility, location limitations, time availability, or willingness to participate. This sampling aims to gather information from participants that are easily accessed by researchers [9]. There is no consensus in determining the number of samples in usability testing. However, it is recommended that for general usability testing data about 8 to 12 samples are needed so that it can detect 80% of usability problems that occur.

There are several types of data collected, including performance data consisting of effectiveness data, efficiency data, user satisfaction data through Questionnaire for User Interaction Satisfaction, and user acceptance data through the Consumer Acceptance of Electronic Commerce questionnaire. Respondents were asked to do a predetermined task scenario then the performance of the respondent was assessed based on completion time, the number of mistakes made, and the presentation of the success of a task can be completed. Furthermore, respondents were asked to fill in Questionnaire for User Interaction Satisfaction to determine the value of satisfaction and Consumer Acceptance of Electronic Commerce to find out the value of user acceptance which in turn will be known which sub-characteristics are not appropriate by conducting a Paired T Test. So that the proposed improvements based on these sub-characteristics.

Data Processing. This research was conducted using performance measurement calculations, Questionnaire for User Interaction Satisfaction (QUIS) questionnaires and Consumer Acceptance of Electronic Commerce questionnaires. In performing performance measurement, there are two criteria which are assessed based on ISO 9241-11, namely effectiveness and efficiency. The efficiency of the DOOgether mobile application is measured using time-on-task metrics for both beginner and non-beginner participant groups. In Table 1. the average completion time for each group of participants can be seen.

Table 1. Task Completion Time

Participant Group	Mean (sec.)	Standard Deviation
Initiator	147.6	34.8
Non-initiator	86.8	15.92

In measuring the level of effectiveness measured by using the task completion rate metrics. This can be seen through Table 2 – Table 3 which explains the presentation of success for each participant group. This success is measured by a binary number that is 1 for a task that was successfully completed and 0 for a task that failed to complete. Whereas in Table 3. the percentage of success in calculating the overall task done without looking at the distribution of participant groups for each task, obtained task groups with an effectiveness value below 70%, namely T2, T3, T4, T5, T8, and T11. Then from observing the completion of the task scenario, there are eight types of mistakes made by respondents that can be seen in Table 4.

Table 2. Percentage of Success Based on Participant Groups

Participant Group	Percentage of Success
Initiator	51.11
Non-initiator	83.89

Table 3. Percentage of success based on task group

Percentage of Success (%)	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
	86,7	56,7	53,3	60	66,7	80	86,7	60	76,7	73,3	40	70

Table 4. Percentage of Errors by Group of Participants

Code	Type of Error	Initiator	Non-Initiator
K1	Error entering account name and password	2 (13%)	2 (13%)
K2	Do not find the specific place because the search was done manually	8 (53.3%)	5 (33.3%)
K3	Incorrect to input the place name	9 (60%)	0
K4	Do not use the 'schedule' menu option to see the available schedules	10 (66.67%)	4 (26.67%)
K5	Choose the wrong schedule	9 (60%)	2 (13%)
K6	Return to the previous menu to repeat the process	8 (53.3%)	3 (20%)
K7	Do not choose the 'complete payment' menu option to proceed	9 (60%)	3 (20%)
K8	Do not know the ongoing process	12 (80%)	6 (40%)

After evaluating the two criteria, then the assessment is based on satisfaction or satisfaction to meet the three criteria based on ISO 9241-11. Measurement of satisfaction is done by using a QUIS questionnaire consisting of several sub-characteristics of the assessment that is a comprehensive response to software, screens, system terminology and information, learning, and system capabilities. This questionnaire was processed by calculating the mean and standard deviation of participants' responses for each sub-characteristic. Then the results of the statistical test calculation Paired T Test are then used to compare two groups of related data. The results of the statistical test can be seen in Table 5. for the novice participant group and Table 6. for the non-novice participant group, that there are sub-characteristics that are of significance below the significance value (<0.05) which means that the sub-characteristics need to be improved.

Table 5. QUIS Questionnaire Question Items for Initiator Participant Groups with Significance <0.05

Subcharacteristics	Question Item Code	Significance	Conclusion
Whole response	TM4	0.018	Significantly different
Learning	PB6	0.011	Significantly different
System capability	KS3	0.008	Significantly different

Table 6. Question Items for QUIS Questionnaire in Non-Initiator Participant Groups with Significance <0.05

Subcharacteristics	Question Item Code	Significance	Conclusion
Whole response	TM3	0.018	Significantly different
System terminology and information	TI5	0.011	Significantly different
Learning	PB5	0.008	Significantly different

The next process is to take measurements of user acceptance by using the e-commerce acceptance questionnaire. The calculation carried out by this questionnaire has similarities to the QUIS questionnaire, ie the results of the calculation are carried out by calculating the average value for each question item in each sub-characteristic. In this questionnaire there are several sub-characteristics measured, including transactions, the desire to transact, trust, risk perception, usefulness perception, perceived ease of use, reputation, satisfaction with past transactions, and frequency of shopping. Then the results of the statistical test calculation Paired T Test are then used to compare two groups of related data. The results of the statistical test can be seen in Table 7. for

the novice participant group and Table 8. for the non-novice participant group, that there are sub-characteristics that are worth under a significance value (<0.05) which means that the sub-characteristics need to be improved.

Table 7. E-Commerce Acceptance Questionnaire Question Items for Initiator Partisan Groups with Significance <0.05

Subcharacteristics	Question Item Code	Significance	Conclusion
Inclination to transaction	KTR2	0.002	Significantly different
	KTR3	0.001	Significantly different
Usefulness perception	PKG4	0.020	Significantly different

Table 8. E-Commerce Acceptance Questionnaire Question Items for Non-Initiator Participant Groups with Significance <0.05

Subcharacteristics	Question Item Code	Significance	Conclusion
Trust	PCY1	0.028	Significantly different
Perception of easy use	PKP2	0.016	Significantly different
	PKP4	0.006	Significantly different
Mobile Application reputation	RPT3	0.004	Significantly different

Through an analysis of the level of effectiveness, efficiency, and satisfaction found that the level of effectiveness and efficiency of the novice participant group is lower than the non-beginner participant group. However, the level of effectiveness is still in accordance with the limits set by previous studies that is 70% and the level of efficiency is still in accordance with the completion time under 229 seconds in accordance with previous studies. As for the level of satisfaction or satisfaction and the level of user acceptance still has the opportunity to improve sub-characteristics that are considered insignificant. Thus the DOOgether mobile application can be said to have not worked optimally in meeting the level of satisfaction and the level of user acceptance.

Improvement. In this study, four proposed improvements to the results that have been made, including:

Improvements of the search feature or search box can be seen in Table 9.

Table 9. Improvements of 'Search Box Features'

No.	Improvement	Basic of Improvement	Explanation
1	Add captions to the 'search' feature	a) Error K2 (did not find a designated place because the search was done manually)	The search feature is displayed on the initial appearance of this mobile application. But in the initial view, the system has directly suggested or displayed a suggestion for the closest location to the user's location. This is usually a confusion by the user, that many participants use manual search (choosing from the options that have been presented) even though the desired place is not displayed due to improper location. The process will be easier if the information on the search feature should be added, to direct users to use the search feature. (Resolving problem point a).
	Provide a suggestion or correction feature for writing place names	b) Error K3 (wrong place name input)	Writing in the search feature or search box also has constraints on the process, i.e. if the writing does not match the place name will not come out. This can be overcome by adding a suggestion or suggestion to write the correct place name to make it easier for users to find the desired place. (Resolving problem point b).

Improvement of 'schedule option' Feature can be seen in Figure 1

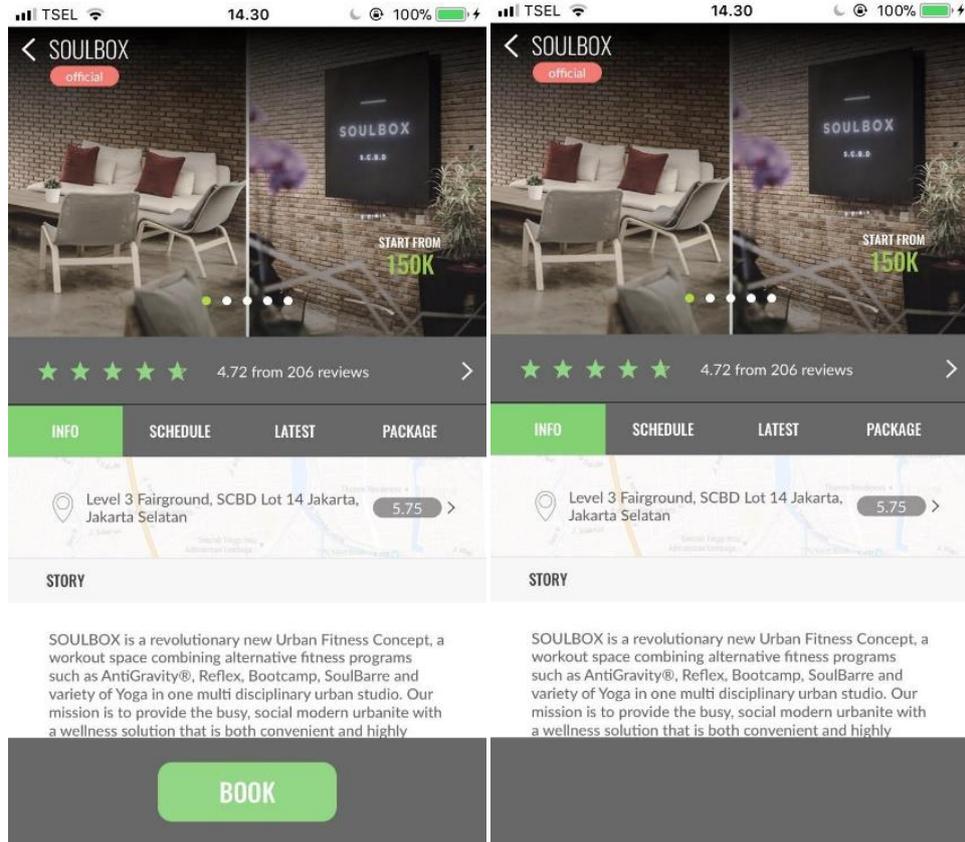


Figure 1. Product List Display with 'book' options (left) and apusan book 'Option Removal Proposals to Optimize' schedule 'Option' (right)

Improvement of 'Option Improvement View' can be seen in Table 10.

Table 10. Improvement of 'Option Improvement View'

No.	Improvement	Basic of Improvement	Explanation
1	Remove 'book' option	<p>a) Consumer Acceptance Questionnaire Results: PKG4 about the ease of finding information</p> <p>b) Consumer Acceptance Questionnaire Results: PKP2 (amount of mental effort in operating a mobile application).</p>	<p>Option booking sport venue: participants are expected to follow a predetermined task scenario. In carrying out the ordering process, there is confusion and ineffectiveness with the 'book' and 'schedule' options. Both of these options have the same purpose, namely choosing the schedule available to make the order process. However, in reality the 'book' option has not worked optimally and its existence only adds to the participant's time in the ordering process because participants will do the process repetition or return to the previous menu. Therefore, the use of the 'book' option should be removed to maximize the use of the 'schedule' option itself. (Resolving problems a and b).</p>

Improvement of Payment Process, Complete Payment option can be seen in Table 11.

Table 11. Improvement of Display Option 'Complete Payment'

No.	Improvement	Basic of Improvement	Explanation
1	Added payment process information to the 'complete payment' option	a) Error K7 (Participants do not choose the complete payment menu option)	The improvement is based on the presence of participants who made mistakes related to the continuation of the payment process, that participants did not know the function of the 'complete payment' option because participants assumed that they had not completed the payment, while the meaning of complete payment itself was completing payment. So there is confusion and miss perception that results in participants not continuing the payment process that they should, but instead doing the process again or choosing to return to the previous process. Therefore it is necessary to provide words that indicate information related to the complete payment option or the replacement of the words complete payment with the next word or the next meaning. So that it will be easier to receive and understand the information related to continuing the next payment process. (Resolving problem point a).

Improvement of Navigation Display can be seen in Table 12.

Table 12. Improvements in Navigation Display

No.	Improvement	Basic of Improvement	Explanation
1	Add Navigation View	a) Error K6 (return to the previous menu to repeat the process) b) Error K8 (did not know the ongoing progress)	The majority of participants will choose the "Back" button many times to go to the desired page and do not get the navigation feature, while this feature can be used to determine the position of the current page, the next, and the past. Therefore an additional navigation display is added to better indicate that navigation can be selected to move to another page. The addition of the navigation display feature is also done to accentuate the navigation function so that it can reduce user confusion resulting in moving from page to other pages (resolving problems points a and b).

Conclusion

Evaluation of DOOgether mobile application is carried out using the usability and user acceptance approach. Evaluation using the usability approach is done by measuring the effectiveness, efficiency, and user satisfaction using the QUIS Questionnaire. Whereas user acceptance is measured using the Consumer Acceptance of Electronic Commerce Questionnaire.

- 1) Based on performance measurement, the value of effectiveness and efficiency of the novice participant group is lower than that of the non-novice participant group. The value obtained for effectiveness for both groups of participants is above 70% which means the system can be said to be effective and the

value of efficiency for both groups of participants is worth no more than 226 seconds which means the system can be said to be efficient.

- 2) The number of errors found is eight and there are sub-characteristics that provide opportunities for improvement based on the results of data processing with the QUIS Questionnaire and the Consumer Acceptance of Electronic Commerce Questionnaire.
- 3) There are four proposed improvements that can be proposed, namely regarding proposed improvements to the search feature, display schedule options, display complete payment options, and display navigation features.

References

- [1] S. Ha, L. Stoel, L. “Consumer e-shopping acceptance: Antecedents in a technology acceptance model”, *Journal of Business Research* (2009), 565 – 571.
- [2] F. Li, Y. Li, “Usability evaluation of e-commerce on B2C websites in Dhina”. *Procedia Engineering*, 2011, 15 (2011), 5299-5304.
- [3] J. Chin, V. Diehl, K. Norman, “Development of a Tool Measuring User Satisfaction of the Human-Computer Interface”, *Proceedings of SIGCHI '88* (1988), p. 213-218.
- [4] F.D. Davis, *Percieved Usefulness, Percieved Ease of Use, and User Acceptance of Information Technology*, *MIS Quarterly*, 319-340 (1989).
- [5] T. Tullis, B. Albert, *Measuring The User Experience: Collecting, Analyzing, and Presenting Usability Metrics*, Massachusetts: Morgan Kauffman (2008).
- [6] P. Pavlou, “Consumer Acceptance of Electronic Commerce: Integrating Trust and Rizk with the Technology Acceptance Model”, *International journal of Electronic Commerce* (2003), 69-103.
- [7] P. Chau, G. Au, K. Tam, “Impact of information presentation modes on online shopping: an empirical evaluation of a broadband interactive shopping services”, *Journal of Organizational Computing Electronic Commerce*, vol. 10,1 (2000), p. 1-22.
- [8] J. Garrett, *The Elements of User Experience: User-centered Design for the Web*, Indiana: New Riders Publications (2003).
- [9] I. Etikan, S. A. Musa, R. S. Alkassim, “Comparison of Convenience Sampling and Purposive Sampling”, *American Journal of Theoretical and Applied Statistics*, 5, 1-4, (2016)