Usability Analysis on ISO 9241-11 Based Bibit and Bareksa Mutual Software Application Using Partial Least Square (PLS)

Yora Fithria Nova[1], Dr. Tristyanti Yunitasari[2]

[1, 2]Master of Information Systems Management Department, Business Information System, Gunadarma University, Depok, West Java, Indonesia-16424
Email Address: [1]yorafithrianova 07@ gmail.com, [2]tristyanti 07@ gmail.com

Abstract— *Making a mobile application must be done by paying attention to the usability factor. Usability of a mobile application is important to pay attention to so that users who use it find it easy to use it and obtain the necessary information and services so that it is possible to continue using the application. Bibit and Bareksa applications are two mutual fund applications that have been supervised by OJK from abroad that have successfully reached the market in Indonesia. This research was conducted to compare the application of Bibit and Bareksa based on ISO 9241-11. The research was conducted using a questionnaire as a research instrument. The research questionnaire distributed consists of 20 questions which are grouped into four variables based on ISO 9241-11, namely effectiveness, efficiency, satisfaction, and usability. After the questionnaire is distributed, the results of the data are obtained and will be analyzed using the PLS (Partial Least Square) technique with the SmartPLS tool and later there will be results of usability comparison analysis of both bibit and bareksa applications.*

Keywords— *Usability Analysis, Mobile Application, Bibit, Bareksa, ISO 9241-11, PLS.*

I. INTRODUCTION

An information system is a set of organizational procedures that exist when implemented will provide information to make decisions or control information (Syarif, 2009). . Mutual fund marketplace is an information system that provides mutual fund products published by the Investment Manager. One type of application in the mutual fund capital market industry is the Bibit and Bareksa application. Useful software has three important points, namely the effectiveness of the software process, a product that is able to deliver content and functions and is able to provide added value to software users. The importance of software quality is emphasized by Crosbi in (Sommervillle, 2003: 174).

II. LITERATURE REVIEW

A. Mobile Application

The mobile application is an application that allows for mobility using equipment such as PDAs, cell phones or cell phones. By using a mobile application, users can easily carry out various kinds of activities ranging from entertainment, selling, shopping, doing office work, browsing, and so on.

B. ISO 9241-11

ISO 9241 is a multipart standard from the International Organization for Standardization (ISO) that sheds light on the ergonomics of human-computer interaction. This standard is regulated by the ISO 159 Technical Committee. This standard was originally named Ergonomic requirements for office work with visual display terminals (VDTs). Since 2006, the name of this standard has been changed to Ergonomics of Human System Interaction.

C. Usability

Derived from the word usable which means good use. Usability in general can be defined as the ability of a system to be easy to use and simple to operate. In this final project, the researcher uses ISO 9241-11 as the basis for measuring usability. ISO 9241 defines usability as follows: software is usable when it allows the user to execute his task effectively, efficiently and with satisfaction in the specified context of use (Alain Abran, 2003). ISO 9241 Part 11 explains that usability refers to the level of a product that can be used by certain users to achieve specific goals effectively, efficiently and satisfactorily in a context of use (Anonymous, 1998). Usage context consists of users, tasks, equipment (hardware, software, and materials), and physical and social environments affect the reusability of the product in the work system. The effects of changing components in the work system can be measured by user performance and satisfaction.

D. PLS (Partial Least Square)

Partial Least Square (PLS) was first developed by Herman Wold (1982). PLS is a powerful analytical method because it does not assume that the data must be in a certain measurement scale and that the sample size is relatively small (minimum recommended ranges from 30 to 500). The PLS approach is distribution free, which means that data cannot have a certain distribution, it can be in the form of nominal, category, ordinal, interval and ratio. During its development, the basic PLS model was completed by Herman Wold in 1977 which was later developed further by Lohmoller in 1984 and 1989, and then developed by Chin in 1996 (Imam Ghozali, 2011).

III. RESEARCH METHOD

A. Research Steps

Usability testing is done to evaluate whether an application is in accordance with user needs or not. Sampling in the study used random sampling, namely the technique of taking

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samples from members of the population which was carried out randomly without paying attention to the strata in the population, based on ISO 9241-11 using partial least squares (PLS to determine the extent to which the application is usable for its users because of the two applications. these have similarities in terms of providing services and also to determine the effectiveness, efficiency and satisfaction of the user. The steps of this study are as follows:
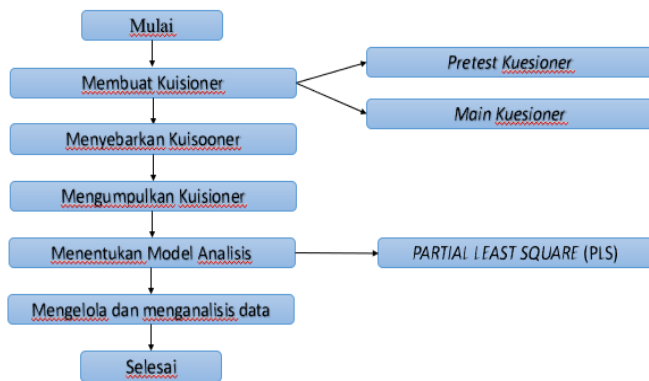

Fig. 3.1 Research Framework

Based on Figure 3.1, the activities carried out in this study are as follows:
• Stage 1: The points discussed in the questionnaire are the development of the usability variable construct. The measurement procedure is that respondents are asked to state their agreement based on the perceptions of each respondent.
• Stage 2: Questionnaires are distributed to several Bibit and Bareksa application users who are deemed capable of providing answers regarding usability and can represent the answers of all Bibit and Bareksa application users.
• Stage 3: Before being processed, the data is collected and stored in the cvs (comma delimited) file format because smartPLS can only read files inputted in that format.
• Stage 4: The analysis model that is deemed suitable and accurate for this research is Partial Least Square (PLS) using a usability approach based on ISO 9241-11, because the main objective of this study is to test the variable hypothesis Effectiveness, Efficiency, and Satisfaction on Usability applications. Bibit and Bareksa.
• Stage 5: The data obtained from the respondents will then be processed using the Partial Least Square (PLS) method with the SmartPLS 3 tool. Analysis will be carried out based on hypothesis testing based on the measured variables.
• Stage 6: At this stage, a result of the effect of effectiveness, efficiency and satisfaction with usability will be obtained as well as an explanation of the design recommendations that can be used as a reference for the development of this application.

B. Questionnaire Analysis Techniques

Validity Test

Validity is a measure that shows the level of validity or validity of an instrument. The principle of validity is a measurement or observation which means the principle of the reliability of the instrument in collecting data. The instrument must be able to measure what it is supposed to measure. So validity emphasizes more on measurement or observation tools (Singgih Santoso, 2010).

The validity test used was the corrected item-total correlation coefficient. Where a question item is said to be valid and can measure the research variable in question if the value of the validity coefficient is more than or equal to the r-table (Imam Ghozali, 2002).

Where to take the decision, it is used:
• If r is positive and r count $\geq$ r table then the question item is valid.
• If r is negative and r counts $<$r table then the question item is invalid. And for testing the validity.

Reliability Test

For the main questionnaire reliability test, it was carried out based on the Partial Least Style (PLS) analysis model and using the SmartPLS 3 tool. The reliability criteria of the reflexive indicators were determined from the composite reliability and Cronbach's alpha values for each first order indicator block in the reflective construct. The rule of thumb for alpha or composite reliability values must be greater than 0.7, although a value of 0.6 is still acceptable. Meanwhile, the value of Croanbach's alpha received is greater than or equal to 0.6 (Imam Ghozali, 2011).

Test of the coefficient of determination

The multiple correlation value (R-Squares) is the correlation value between the independent variables and the dependent variable, namely optimizing the benefits of the system for users on the application of the system. The R-square value ranges from 1 to 0, if it approaches 1, the relationship is getting stronger. Conversely, if it is close to 0, the relationship is getting weaker. The R-square value shows the coefficient of determination which is used to determine how much the percentage of independent variables contributes together to the dependent variable.

Significance Test F (Test F)

The F test is used to test the effect of the independent variables together (simultaneously) on the dependent variable. In this study using decision making based on significance and testing was carried out using levels significance of 0.05 provided that:
Significance $\geq$ 0.05 then H0 is accepted
Significance $<$0.05, then H0 is rejected

Significance test t (t test)

The t test basically aims to determine individually the effect of one independent variable on the dependent variable. If the significance value generated by the t-test P $<$0.05, it can be concluded that partially the independent variable has a significant effect on the dependent variable.

Hypothesis

H0: The variables Efficiency, Effectiveness, Satisfaction on Bibit and Bareksa mobile applications have a direct and significant positive effect on usability.

H1: The variables Efficiency, Effectiveness, Satisfaction on Bibit and Bareksa mobile applications have a direct and insignificant positive effect on usability.

IV. RESEARCH RESULT AND DISCUSSION

A. Characteristics of Respondents

The number of respondents used in this study were 100 respondents, all of whom were users of the Bibit and Bareksa application services. The following are the characteristics of all respondents based on gender and age of the respondent:

User Respondents Bibit and Bareksa Applications

The following are the characteristics of the 100 respondents who use the Bibit and bareksa application who are respondents who use the bibit or bareksa application, ranging from men and women of various ages:

TABLE 4.1 Characteristics of Respondents Using Bibit and Bareksa Applications

Karakteristik	Jumlah(n)	Persentase(%)
Jenis Kelamin		
Laki-laki	25	25 %
Wanita	75	75 %
Umur		
< 20	3	3 %
21 – 25	8	8 %
26 – 30	13	13 %
> 30	76	76 %

Based on the table above, it can be seen that most of the respondents were male, namely 75%, while the remaining 25% of respondents were female. Furthermore, in terms of age, most of the respondents were people aged> 30 years.

B. Questionnaire

The pretest questionnaire consisted of 20 statements and was carried out to 30 respondents. Then the data is processed and recapitulated to test the validity and reliability of each statement. If the questionnaire questions are declared valid and reliable, then each questionnaire can be distributed to 100 respondents.

TABLE 4.2 Questionnaire Pretest Reliability Test Results

Sesi	Jumlah Pertanyaan	Pertanyaan Tidak Valid	Cronbach Alpha	Keterangan
Efficiency	5	0	0,889	Reliabilitas Tinggi
Effectiveness	5	0	0,912	Reliabilitas Tinggi
Satisfaction	5	0	0,883	Reliabilitas Tinggi
Usability	5	0	0,934	Reliabilitas Sangat Tinggi

Thus it can be concluded that the usability questionnaire pretest has been Valid and Reliable by including all the 20 questionnaire questions in the distribution of the main questionnaire for each of the next 100 respondents.

C. Questionnaire

Testing the Goodness of Fit (suitability) Data

This study uses the Partial Least Square (PLS) method with the smartPLS 3.0 standard procedure to analyze data. Partial Least Square (PLS) is a powerful analytical method because it is not based on many assumptions. PLS can be applied to all data scales and the sample size in PLS does not have to be large. Besides that PLS can be used to confirm the theory, PLS can also be used to explain whether there is a relationship between latent variables (Gede Nyoman, 2008).

Structural Model Testing (Inner Model)

This model is a specification of the relationship between latent variables, also known as inner relations. In this test, it is a test of the type and magnitude of the effect of the independent latent variable on the dependent latent variable. This test consists of 2 stages, namely the Determinant Coefficient R Square (R^2) test, which is a test that calculates how much the independent latent variable explains the variance of the dependent latent variable and hypothesis testing which is a test of the research model hypothesis and can be obtained from both bibit applications and large contributions. effectiveness variable, efficiency and satisfaction with usability.

D. Hypothesis Test Results

From the structural model that has been formed, it is obtained the coefficient of the relationship between the independent variable and the dependent variable. The coefficient is the coefficient of the relationship between the latent variables and the contribution value of the manifest variables that make up the latent variables. The relationship that occurs in this structural mode is the basis for evaluating the research hypothesis.

Bibit Hypothesis Test Results

From the structural model that has been formed, it is obtained the coefficient of the relationship between the independent variable and the dependent variable. The coefficient is the coefficient of the relationship between the latent variables and the contribution value of the manifest variables that make up the latent variables. The relationship that occurs in this structural mode is the basis for evaluating the research hypothesis. The significance level of each relationship between latent variables is seen from the T-Statistic value which must be greater than the t-table (1.98) for a significant effect and less than the table for an insignificant effect ($\alpha = 0.05$). Significant influence is a convincing or significant influence, in research it means that the hypothesis that has been proven in the sample can be applied to the population (Imam Ghozali, 2011).

TABLE 4.3 Path Coefficients (Mean, STDEV, T-Values) of the Research Model for Bibit Application usability using SmartPLS 3.0

Variabel	Original Sample	Standart Deviation (STDEV)	T Statistic (|O/STDEV)	Tingkat Signifikansi (1.98)
Efficiency -> Usability	0,336	0,075	4.467	Signifikan
Effectiveness -> Usability	0,359	0,110	3.250	Signifikan
Satisfaction -> Usability	0,252	0.109	2.329	Signifikan

From the test results above, it is known that all hypotheses are accepted because they have a T-statistic above 1.98. This shows that the aspects of Efficiency, Effectiveness, Satisfaction have a significant effect on Usability in the bibit application.

Bareksa Hypothesis Test Results

From the structural model that has been formed, it is obtained the coefficient of the relationship between the independent variable and the dependent variable. The coefficient is the coefficient of the relationship between the latent variables and the contribution value of the manifest variables that make up the latent variables. The relationship that occurs in this structural mode is the basis for evaluating the research hypothesis.

TABLE 4.4 Path Coefficients (Mean, STDEV, T-Values) of the Bareksa Application usability Research Model using SmartPLS 3.0

Variabel	Original Sample	Standart Deviation (STDEV)	T Statistic (|O/STDEV)	Tingkat Signifikansi (1.98)
Efficiency -> Usability	0.228	0.072	3.143	Signifikan
Effectiveness -> Usability	0.464	0.068	6.856	Signifikan
Satisfaction -> Usability	0.309	0.070	4.439	Signifikan

From the test results above, it is known that all hypotheses are accepted because they have a T-statistic above 1.98. This shows that the aspects of Efficiency, Effectiveness and Satisfaction have a significant effect on Usability in the Bareksa application.

Comparison of Analysis Results

Based on the analysis described above, in this study a comparison of the extent to which the effect of Effectiveness, Efficiency and Satisfaction of bibit and Bareksa application users has an effect on usability. So based on the results of the analysis, it can be seen whether the 3 independent variables have a significant effect on the dependent variable. The results of the comparison of usability analysis on Bibit and Bareksa can be seen in the following table:

TABLE 4.5 Comparison of Usability Analysis Results for Bibit and Breksa Applications

Variabel	Aplikasi Bibit	Aplikasi Bareksa
Efficiency -> Usability	Berpengaruh positif langsung dan signifikan	Berpengaruh positif langsung dan signifikan
Effectiveness -> Usability	Berpengaruh positif langsung dan signifikan	Berpengaruh positif langsung dan signifikan
Satisfaction -> Usability	Berpengaruh positif langsung dan signifikan	Berpengaruh positif langsung dan signifikan

V. CONCLUSION

A. Hypothesis Test Results

Based on the analysis of the tests that have been carried out in this study, it can be concluded that:

1. This study shows that Efficiency in the application of bibit and bareksa both have a significant effect on Usability.
2. This study shows that the Effectiveness (Effectiveness) in the application of bibit and Bareksa both have a significant effect on Usability.
3. This research shows that Satisfaction (Satisfaction) in the application of bibit and Bareksa has a significant effect on Usability.

B. Suggestion

The suggestion needed in this research for system development or further analysis is to use expert theory in addition to ISO 9241-11 standards in the next measurement of system usability and compare the results with the existing standards in HCI. Using usability analysis calculation tools to measure the level of usability in different contexts.

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