VOL. 9. NO. 1 AUGUST 2023
P-ISSN: 2685-8223 | E-ISSN: 2527-4864
DOI: 10.33480 /jitk.v9i1.4070

JITK (JURNAL ILMU PENGETAHUAN DAN TEKNOLOGI KOMPUTER)

MEASURING UX USING USABILITY AND HEURISTIC METHODS IN JKN MOBILE APPLICATION

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Abstract— *The JKN Mobile Application is an application to provide services for BPJS Health participants that can access anywhere and anytime. Systems that many people use need to be evaluated. User satisfaction is one factor that can determine a system's success. This study measures the usability level of the JKN Mobile Application using the usability evaluation and Heuristic Evaluation methods. Usability can be identified based on four parameters: learning ability, efficiency, memory, and satisfaction. The Heuristic Evaluation method by Nielsen has ten principles: Visibility of system status, Match between the system and the real world, User control and freedom, Consistency and standards, Error prevention, Recognition than recall, Flexibility and Efficiency of Use, Aesthetic and Minimalist Design, Help user Recognize, Diagnose and Recover from Errors, Help, and Documentation. This study aims to evaluate the application design and determine which parts need improvement. The results of the usability test obtained a percentage of 62.25%, which means that this application is still feasible to use. However, in the heuristic testing, it was found that there were several inefficient tasks, and there needed to be more help & documentation.*

Keywords: *Usability, Heuristic, USE Questionnaire, User Experience*

Intisari—*Aplikasi Mobile JKN adalah aplikasi untuk memberikan layanan bagi peserta BPJS Kesehatan yang dapat diakses dimana saja dan kapan saja. Sistem yang digunakan oleh banyak orang perlu dievaluasi. Kepuasan pengguna merupakan salah satu faktor yang dapat menentukan keberhasilan suatu sistem. Penelitian ini mengukur tingkat usability Aplikasi Mobile JKN dengan menggunakan metode usability evaluation dan Heuristic Evaluation. Usability* dapat diidentifikasi berdasarkan 4 aspek yaitu *learnability, efficiency, memorability, dan satisfaction*. *Metode Evaluasi Heuristik oleh Nielsen memiliki sepuluh prinsip: Visibility of system status, Match between system and the real world, User control and freedom, Consistency and standars, Error prevention, Recognition rather than recall, Flexibility and efficiency of use, Aesthetic and minimalist design, Help users recognize, diagnose, and recover from errors, Help and documentation. Hal ini membantu pengguna Mengenali, Mendiagnosis, dan Memulihkan dari Kesalahan, Bantuan, dan Dokumentasi. Penelitian ini bertujuan untuk mengevaluasi desain aplikasi dan mengetahui bagian mana yang perlu diperbaiki. Hasil uji kegunaan diperoleh persentase sebesar 62,25% yang berarti aplikasi ini masih layak untuk digunakan. Namun dalam pengujian heuristik, ditemukan beberapa tugas yang tidak efisien, dan tidak ada bantuan & dokumentasi.*

Kata Kunci: *Usability, Heuristik Evaluation, USE Questionnaire, User Experience*

INTRODUCTION

Information and telecommunication technology development is increasing rapidly, including smartphone devices currently owned by some people. Indonesia's smartphone users are estimated at over 100 million[1]. As information technology develops, this opportunity is used by BPJS Kesehatan to build the JKN Mobile Application. This application aims to help BPJS Kesehatan participants get services at the BPJS Health office without queueing and jostling to perform various services[2].

Utilization of JKN Mobile is still relatively low, including the system's quality, which is the benchmark for the primary system performance of an application shown when users use the application both in terms of hardware and software. Information quality can deliver the quality of information expected by users in the application. Service quality can describe the services that users expect when using the application[3].

One factor determining a system's success in the JKN Mobile Application is Usability Evaluation and Heuristic Evaluation—the quality level of a system that is easy to learn and use and encourages

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P-ISSN: 2685-8223 | E-ISSN: 2527-4864
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the user experience. Measurement of system usability needs to be done to determine the high or low level of usability[4]. This research determined whether the JKN Mobile application can meet user needs[5]. Based on reviews from the Google Play store, JKN mobile gets an average rating score of 4.1 out of 5 stars, many users still need to improve application features, and the interface needs clarification.

A complicated user interface makes users need clarity in using the application. An application that is difficult to use means an error in the software being run[6]. This research measured the JKN application using the Usability and Heuristic Evaluation method.

Literature Review

A. User Interface

The user interface is one crucial component of computer software. If an interface has error issues, it can cause the user to leave the application [7].

B. Usability

Usability assesses the extent of the user's experience using the application[8]. If there is a failure in its use, it can be minimized and maximized the level of its usefulness[9]. Usability can be identified based on learning, efficiency, memorability, and satisfaction[10]. This aspect is helpful for testing techniques or measuring software applications.

C. Heuristic Evaluation

Heuristic evaluation is an evaluation system for user-based computer software[11]. This evaluation determines whether the system functions correctly based on user comfort and satisfaction with the entire application system[12]. This evaluation involves the evaluator providing input which is then categorized into heuristic principles[9]. This aims to improve the design effectively from the evaluation results and usability errors in an application[13].

Evaluation of this heuristic in finding interface design problems with only 4-5 evaluators is sufficient to find the overall usability problem found[14].

MATERIALS AND METHODS

The method used in this study is using the usability evaluation method and the Heuristic Evaluation. The evaluation method procedure is used as a reference in implementing user interface design assessment and evaluation.

This study has several stages in the usability evaluation and testing process for the Mobile JKN application. The very first step is to plan and study the literature. After planning carefully, proceed with data collection. The data was collected by distributing questionnaires to respondents to determine the user interface design assessment.

Data collection in this study uses quantitative and qualitative data types. Both types of data are the results obtained through the distribution of questionnaires.

The USE questionnaire will collect data on the usability method, producing quantitative data. This questionnaire has four aspects of usability measurement: learnability, efficiency, memorability, and satisfaction.

The aspects contained in the Heuristics Evaluation method will be made in points - questionnaire question points with a score of 1-5 and in a severity rating level worth 0-4[7].

Table 1. Heuristic Evaluation

No.	Code	Indicator	Description
1	H1	*Visibility of system status*	The interface on the system provides information to the user about the condition of a process within a certain period.
2	H2	*Match between system and the real world*	The compatibility of the JKN mobile system with real life.
3	H3	*User control and freedom*	User control and freedom to use the JKN mobile application.
4	H4	*Consistency and standars*	Consistency and operational standards for using the JKN mobile application.
5	H5	*Error prevention*	Prevention in maintaining errors in the use of the JKN mobile application.
6	H6	*Recognition rather than recall*	User understanding and memory in using the JKN mobile application.
7	H7	*Flexibility and efficiency of use*	Efficiency and Flexibility in using the JKN mobile application.
8	H8	*Aesthetic and minimalist design*	Minimalist and easy to understand design.
9	H9	*Help users recognize, diagnose, and recover from errors*	User assistance in recognizing errors and countermeasures.
10	H10	*Help and documentation*	Application usage guide and documentation.

For the number of evaluators required, Nielsen found a high usability problem-finding rate when using 1 to 5 evaluators, and when using 5 to 10 evaluators, the problem-finding rate decreased drastically. Thus, to achieve optimal results, the number of evaluators involved in the evaluation process is four people[15]. The survey results from these five evaluators will produce qualitative data.

After knowing the results of the answers from the collected respondents, they are calculated to determine conclusions and evaluate the Mobile JKN application. The research flow can be seen in Figure 1.

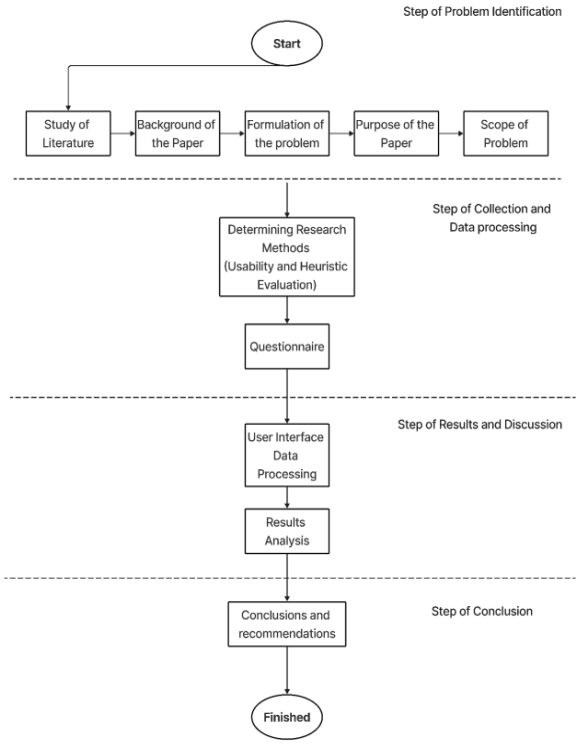

Figure 1. Research Flow

RESULT AND DISCUSSION

A. Usability Evaluation Results

1. Description of Respondents/Frequency Analysis of Respondent Demographics

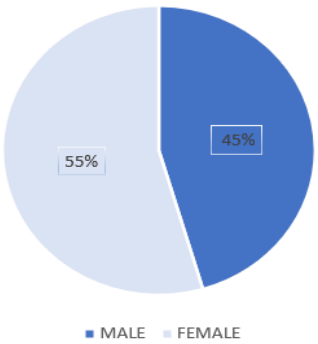

Figure 2. Gender Identity

The number of respondents to the research was 45 people. The identity of the respondents based on the diagram in Figure 2 shows 45% male and 55% female. The age range was 19-52 years, and the most who filled out the questionnaire was 22.

2. Validity Test and Reliability Test

a. Validity Test

The validity test used is to correlate bivariate Pearson by linking each score with item scores so that the questions answered by respondents are valid or invalid.

The number of respondents, as many as 45 people at a significance r-table of 5%, can be seen at 0.294. Suppose the significance value is greater than the r-table value. In that case, the questionnaire is declared valid, whereas if the significance value is less than the r-table value, then the questionnaire is declared invalid.

Table. 2 Validity Test Results

Usabillity	Variable	rtable	r-count	Result
System	U1	0,294	0.621	*Valid*
	U2	0,294	0.721	*Valid*
	U3	0,294	0.806	*Valid*
	U4	0,294	0.652	*Valid*
user	U5	0,294	0.760	*Valid*
	U6	0,294	0.756	*Valid*
	U7	0,294	0.653	*Valid*
	U8	0,294	0.522	*Valid*
	U9	0,294	0.683	*Valid*
Interaksi	U10	0,294	0.687	*Valid*
	U11	0,294	0.677	*Valid*
	U12	0,294	0.736	*Valid*

Based on the results of the validity test of all variable instruments in Table 2, it can conclude that they are valid.

b. Reliability Test

This reliability test was conducted to determine whether the measuring instrument for respondents' answers during repeated measurements remained consistent. The questionnaire is reliable if Cronbach's Alpha value is > 0.60. Moreover, the questionnaire is unreliable if Cronbach's Alpha value is <0.60.

Table 3. Reliability Test Results

Cronbach's Alpha	N Of Items
0.84133	45

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P-ISSN: 2685-8223 | E-ISSN: 2527-4864
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Based on Table 3, Cronbach's Alpha reliability test for all variables is worth more than 0.60, which means the questionnaire can be concluded as reliable.

c. Research result

Table 4. Results Score Score Questions

Usability	Indicator	1	2	3	4	5
System	U1	1	1	14	18	11
	U2	2	3	18	17	5
	U3	1	2	15	21	6
	U4	1	3	18	17	6
	U5	0	4	14	18	9
*U*ser	U6	0	1	10	23	11
	U7	1	3	16	1	11
	U8	1	4	9	20	11
	U9	1	0	14	20	10
Interaksi	U10	0	5	12	17	11
	U11	1	2	12	18	12
	U12	0	7	8	19	11
Total Skor		9	35	160	222	114

Based on the recap value of the score in Table 4, usability can be analyzed in Table 5 as follows.

Table 5. Score Value For Each Usability

Learnbility	Efficiency	Memoribility	Satisfaction
3.7	3.7	4.0	3.7

After recording the results of the questionnaire scores, the data is processed using the T x Pn formula (Respondent's total score x Likert score).

Table 6. Likert Score Results

Description	Total score of respondents	*Likert Score	Answer
Strongly Agree (SA)	114	*5	570
Agree (A)	222	*4	888
Neutral (N)	160	*3	480
Disagree (D	35	*2	70
Strongly Disagree (SD)	9	*1	9
Total			2017

The number obtained from the total score is 2017. The calculation results will be compared with the standards in Table 7.

Table 7. The Feasibility Category Table

Score (%)	Categories
Score < 19%	Very Unworthy
20% < 39%	Not Worthy
40% < 59%	Enough
60% < 79%	Worthy
80% < 100%	Very Worthy

To get the formula obtains the percentage score results:

$$T = \frac{Total\ answer\ score}{Highest\ score(y) + Lowest\ score(x) * 100\%} \quad \text{.....(1)}$$

y = highest likert score * number of respondents
y = (5x12)x45 = 2700
x = lowest Likert score* number of respondents
x = (1x12)x45 = 540

$$T = \frac{2700}{3240\ x\ 100\%} = 62.25$$

The data processing results produce a percentage score of 62.25%, with this value included in the "Worthy" category.

B. Heuristic Evaluation Results Evaluation

This heuristic evaluation was carried out by five evaluators who were appropriate in their fields. The percentage of gender is known to be 33.3% male and 66.6% female. This study uses a Likert scale from 0 to 4 to assess the severity rating. If the number gets smaller, there is a problem, and the respondent is concerned. However, on the contrary, if the number is getting bigger, the respondent agrees and does not mind it.

Table 8. Classification Of Severity Rating.

Severity Rating	Code	Description
0	NP	No problem
1	P	Problems don't really matter
2	P1	There are potential issues that can be difficult for users
3	P2	There is a problem that makes it difficult for users
4	P3	The system/feature needs to be overhauled

Problem evaluation results from data are grouped and identified with a heuristic code. To find the results of the heuristic evaluation analysis can be calculated by the formula :

$S = (\ \Sigma\ A\ ) / n$ ..... (2)

Description:
S = severity rating results in one aspect
$\Sigma\ A$ = the total rating score of the heuristic evaluation sub-aspects
n = the number of heuristic evaluation sub-aspects in each aspect

Table 9. Severity Rating Result

Heuristic Parameter	Severity Rating Score	Result
H1	1.8	N
H2	1.8	N
H3	1.4	S

Heuristic Parameter	Severity Rating Score	Result
H4	2.2	N
H5	1.8	N
H6	2.2	S
H7	2.6	KS
H8	1.8	N
H9	1.6	S
H10	2.6	KS

The results of the evaluation show problems that often occur with an average score of 1.98, which means there are potential problems that make it difficult for users. The system's visibility and status need to be fixed, and some service features need to be fixed. In the Match between and the real-world section, using the system is inappropriate and does not display logical information. The profile section should provide user account information to make logging in easier or for other activities. When the user wants to enter the OTP code via email, the code does not enter the email. Users often complain that they must use credit when using other methods via SMS.

Regarding consistency and standards, the application has clashing colors and layouts between parts, with a severity rating 2.2. The Error prevention aspect, when the user makes a system error, is quite good at giving a warning. However, some users still experience error/bug problems when logging in and using some commands. Aesthetic and minimalist design in this aspect gets a severity rating of 1.8. The application's appearance is quite good and easy to understand, but the sections in the article have two parts. They should be one part not to burden the application with the animation.

Aspects with a severity rating below 2.0 mean that the user agrees that there are no problems and is comfortable to use. In the part of User control and freedom, the user can use the application as desired in selecting system functions. In the recognition aspect, instead, that recall the components in the mobile JKN application is easy to understand. The help users recognize, diagnose, and recover from errors and can describe the problem/error and suggest a solution.

Problems that can make it difficult for users with a severity score of 2.6 are the flexibility and efficiency of use aspects. Users still complain about the steps that must be obtained, one of which is when a user wants to change the user's email address, a user has to contact in another way, not through the application. The profile section should be added with information from the user so that it is easy when the user wants to change or update the profile. In the help and documentation aspect, users need help getting help information when they make mistakes because the solutions provided are not generated in the application.

CONCLUSION

From the results of the analysis and testing of the Mobile JKN application using the usability and heuristic evaluation methods can draw the following conclusion are the results of the Usability Evaluation using the USE Questionnaire on the aspects of System, User, and Interaction which include the values of Usability Learnability, Efficiency, Memorability, and Satisfaction, can be seen to produce a percentage score of 62.25%, which is included in the "Decent" category. The results of qualitative testing using the Heuristic Evaluation method are seen from 10 heuristic principles/aspects by Nielsen, namely Visibility of system status, Match between system and the real world, User control and freedom, Consistency and standards, Error prevention, Recognition rather than recall, Flexibility and efficiency of use, Aesthetic and minimalist design, Help users recognize, diagnose, and recover from errors, Help, and documentation. From this aspect, it produces an average score of 1.98 in the Neutral category, which means that potential problems can make it difficult for users in the five heuristics, namely H1, H2, H4, H5, and H8. This problem needs improvement but needs the low priority. In the disagree category, some issues make it difficult for users on H7, and H10 means they need improvement with high priority. From the two tests, it is feasible, but there is potential that can make it difficult for users, so the application needs to be repaired and improved again. Advice for further research is to explore more applications to be evaluated to obtain more accurate and diverse data. The method used for testing is expected to be different so that different and more accurate results can be seen and compared.

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