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Measuring User Experience Using Cognitive Walkthrough in the JKN Mobile Application

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Abstract

The JKN mobile application is an application owned by BPJS Kesehatan, through this application participants can get primary and tertiary health services. Based on a preliminary study of 30 BPJS Kesehatan participants in Makassar City, it is known that 37% of users do not know about the JKN mobile application, 33% of users prefer to come directly to the nearest BPJS Kesehatan service office and 30% of users have difficulty using the JKN mobile application. The lack of participants using the JKN mobile application has an impact on the tight queues for services at the BPJS Kesehatan office and at health facilities. Thus, this study aims to test the reusability of the JKN mobile application by using a cognitive walkthrough and an analysis of the level of user experience using the User Experience Questionnaire (UEQ). Measurement of usability with cognitive walkthrough showed that the average respondent completed all tasks in 312.4 seconds. The success rate of completing the task was achieved 100% by 40% of respondents and the task that was completed correctly by the respondent was 29%. The measurement of user experience with UEQ is 1.26 based on the positive impression given by the JKN mobile application after being used by respondents. The different test results were obtained from the non-parametric statistical t test, which showed that there was no difference in the usability assessment and the JKN mobile user experience. The overall user experience is above average, so there is still a need to improve the JKN mobile interface.

Keywords: JKN mobile application, usability, cognitive walkthrough, User Experience Questionnaire

INTRODUCTION

The era of the industrial revolution 4.0, innovation is not only in the manufacturing sector but also in the health service sector (Adian and Budiarto, 2020; Puspitasari *et al.*, 2020). In order to improve services for participants in the National Health Insurance for the Healthy Indonesia Card (JKN-KIS), BPJS Kesehatan launched the Mobile JKN application (Nadya, 2019). Registration of BPJS participants is an early stage that is beneficial for the sustainability of the program. BPJS currently has two registration options, namely by registering manually through the nearest branch office and online (Ichsani and Hartono, 2020). According to Handayani *et al.* (2018) the benefits of having an e-health application can speed up registration time because it can be done at any time, can reduce the risk of multiple claims and participant data only for the online system in the entire BPJS Kesehatan system. Through the JKN mobile application, participants can get primary and tertiary health services, thus allowing direct, detailed access if the person is in care (Kao *et al.*, 2018; Wulandari and Sudarman, 2019; Pinem *et al.*, 2020; Haryanti *et al.*, 2020; Hermansyah *et al.*, 2020). Based on a preliminary study of 30 BPJS Kesehatan participants in Makassar City, it is known that 37% of users do not know about

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the JKN mobile application, 33% of users prefer to come directly to the nearest BPJS Kesehatan service office and 30% of users have difficulty using the JKN mobile application. The lack of participants using the JKN mobile application has an impact on the tight queues for services at the BPJS Kesehatan office and at health facilities. Services needed by participants, such as moving health facilities (health facilities), registering new participants, and other services can be accessed through the JKN mobile application.

Several previous studies on the reusability test of the JKN mobile application were conducted by Annisa and Suharso using *Usability Measurement Inventory Software (SUMI).* From the research results, five variables, three of which have low values, namely efficiency, control and learnability, so that the level of usability in this application is still low and does not meet the satisfaction of the application user (2020). Research by Lubis *et al.* (2020) using the USE questionnaire obtained usability testing results on the system aspect with a very good category, user aspects in good categories and interaction aspects with very good categories. Research the usability tested of the e-health application in Indonesia using the System Usability Scale (SUS). The results of the study found that the design was good, but the aspects of information quality needed to be changed in use. Some of the studies above only test the level of reusability and are not yet at the stage of providing recommendations for improvement and no one has yet measured the reusability and user experience of the JKN mobile application. This study aims to test the usability of the JKN mobile application using cognitive walkthroughs and to analyze the level of user experience using the UEQ (User Experience Questionnaire) questionnaire.

METHOD

The population in this study were the participants of the Makassar City BPJS Health, totaling 159,142 people. Samples who meet the inclusion criteria are aged 20-30 years, age who are actively using digital applications, are registered as active participants of BPJS Kesehatan, do not have cognitive impairments, can operate android / iOS and are already using the JKN mobile application. According to formula (1), experimental research can be formulated:

$$(t-1)\,(r-1) > 15 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Information:
t = number of treatment groups
The number of treatments in this study were eight treatments.
(7-1) (r-1)> 15
(r-1)> 15/6
r> 3

The sample required is more than three people. To avoid invalid data used 30% of the total sample of 10 people.

The research instruments used were:

1. Mobile Android / IOS to use the Mobile JKN application
2. Checklist a preliminary study on respondents' knowledge of the JKN mobile application
3. JKN Mobile Application
4. Task scenario guide
5. User Experience Questionnaire adapted from the Handbook of UEQ by Schrepp (2015).

The preparatory stages carried out in this research are:

1. Conducted a preliminary study in the form of a questionnaire about respondents' knowledge of the JKN mobile application.

2. Explain the research objectives to respondents, namely measuring the level of reusability by performing several tasks and user perceptions, in this case UX, through several stages of tasks in the JKN mobile application.
3. Respondents were given guidance regarding the tasks (T) that had to be done in the JKN mobile application. Respondents who carry out their duties have met the requirements, namely having used the JKN mobile application. The task to be carried out by the respondent is a total of seven tasks with each number of stages can be seen in Table 1.

Table 1
Respondents Task

T	Destination	Number of Stages
T 1	*Log In* As a JKN Participant	7
T 2	Sending E-ID Card to e-mail	4
T 3	Check Premium	2
T 4	Looking for Covered Medicine	5
T 5	Finding Availability of Hospital Beds	5
T 6	Seeking First Level Health Facilities	7
T 7	Seeking Advanced Health Facilities	3

Data Collection Stage including :

1. Cognitive Walkthrough (CW) The CW stages carried out in this research are:
   1) Walkthrough done go through a sequence of stages for each task. The sequence of stages for each task can be seen in the guidelines given to respondents, so that they can assist in carrying out each given task.
   2) Respondents recorded tasks carried out by respondents using a screen recording application on Android / IOS so that the completion time could be known.
2. User Experience Questionnaires (UEQ). The UEQ stage carried out in this study is respondents filled out the UEQ questionnaire which consisted of 26 questions on a scale of 1 for the low rating to 7 for the highest and filled in by the respondent according to their experience after using the JKN mobile application.
3. The data processing stages carried out in this study are:
   1) Make a recapitulation of the completion time and the success of the task carried out by the respondent
   2) Make the percentage of the respondent's success in completing each task. Percentages are graphed.
   3) Make the percentage of task completion by the respondent. In this case what is meant is a task that the respondent has successfully completed correctly. Percentages are graphed.
   4) Process the results of the UEQ questionnaire based on the guidelines in the UEQ handbook (Schrepp, 2015).
4. Focus Group Discussion (FGD). The FGD was conducted to find obstacles or problems when carrying out the seven tasks using the JKN mobile application. The FGD was conducted on 1-4 January 2021. The stages of the FGD carried out were:
   1) After the seven tasks were completed by all respondents using the JKN mobile application, a discussion was held regarding the obstacles experienced by the respondents during the task completion process.
   2) Noting the obstacles experienced by the respondent during the process of completing the task along with recommendations for the improvements desired by the respondent.

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5. Data Analysis Stages. The data analysis stage carried out in this study were:
   1) Determine the obstacles experienced by the user when performing tasks. The obstacles that were included in the FGD results table were the ones most respondents complained about.
   2) The analysis of the results of usability measurement using the CW method was carried out by analyzing the level of success and time in completing each task by the respondent.
   3) User experience analysis is carried out based on UEQ by interpreting the level of user experience with an average impression value between -0.8 and 0.8 being a normal evaluation value, a value> 0.8 being a positive evaluation and values <-0.8 being a negative evaluation (Scrhepp, 2015).

RESULTS AND DISCUSSION

The results of measuring usability obtained by cognitive walk through is the level of success of the respondent in completing the task, shown in graphical form in Image 1. The measurement results for completing tasks that were done correctly by the respondent are shown in Image 2.

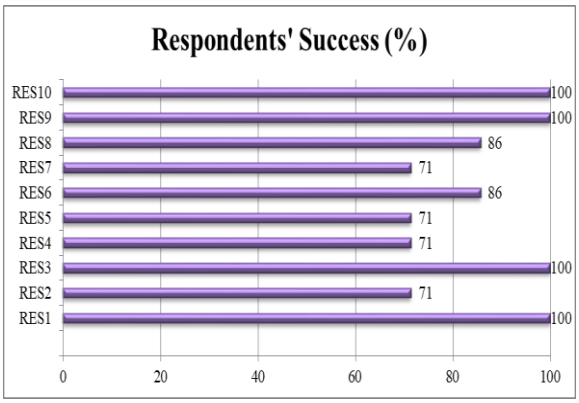

Image 1. Percentage of respondent success

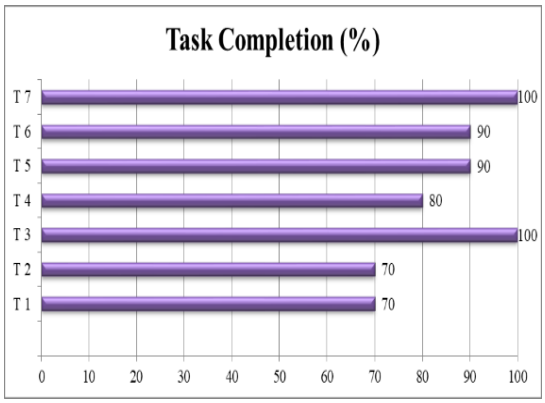

Image 2. Percentage of task completion

The CW method was chosen in measuring the usability of the JKN mobile application because of the direct cognitive involvement of respondents in completing task scenarios, in line with the research of Dewi *et al.* (2020) the CW method is used in measuring the effectiveness and efficiency of e-evaluation applications. Respondent success is a measure of the number of successful completions completed by respondents for each task. The level of task completion is measured based on the percentage of tasks completed correctly by the respondent.

Based on Image 1, it is obtained the results of the respondents who have succeeded in completing the task correctly by 40% and the rest have not succeeded in completing all the tasks given correctly. In Image 2 it is known that 29% of the task scenarios were successfully completed by respondents, namely checking premiums and looking for advanced health facilities. Not all task scenarios can be completed by respondents as in the research of Weninger *et al*. (2020) found 4 out of 10 task scenarios that can be completed by respondents.

The lack of respondents who are successful in completing the task is influenced by the level of respondent's knowledge of the application and is influenced by the interface that the respondent does not understand, as the results of the measurement of the JKN mobile user pasa usability aspects carried out by Lubis. The completion of each task by the respondent is summarized in Table 2.

Table 2
Recapitulation of task completion time

Respondents	T1	T2	T3	T4	T5	T6	T7	Total (seconds)	Average (seconds)
RES1	102	25	10	30	36	40	43	286	40.86
RES2	114	29	11	45	38	43	46	326	46.57
RES3	100	24	10	35	37	41	44	291	41.57
RES4	108	28	12	46	38	52	46	330	47.14
RES5	104	27	13	32	56	47	49	328	46.86
RES6	110	35	11	30	40	46	43	315	45.00
RES7	112	33	14	31	45	49	41	325	46.43
RES8	106	36	13	36	41	45	42	319	45.57
RES9	110	26	11	34	38	48	41	308	44.00
RES10	103	28	10	35	40	40	40	296	42.29
Average	106.9	29.1	11.5	35.4	40.9	45.1	43.5		312.4
Minimum	100.0	24.0	10.0	30.0	36.0	40.0	40.0		
Maximum	114.0	36.0	14.0	46.0	56.0	52.0	49.0		

Task scenario completion time is the amount of time the respondent takes to complete the task. Completion of tasks in this study was recorded through a screen recorder. The amount of time is calculated based on the number of seconds required by the respondent in completing the task. The waiting process for the application is not taken into account as Ardyani (2020) did in measuring the usability of travel websites using the CW method.

Based on table 2 it is obtained recapitulation of task completion time with the fastest amount of time used by respondents in completing the task is 286 seconds with the task successfully completed by 100%. The success of respondents is influenced by the level of understanding and experience in using these applications as explained in Seta study regarding the reusability of the Dota 2 game that the success of completing goals in cognitive tests is influenced by habits and experiences (2020).

The longest amount of time used by the respondent is 328 seconds with tasks that can be completed by 71%. The average amount of time that the respondents spent in completing the entire task was 312.4 seconds. In completing task 1 it takes the longest time by the respondent with an average completion time of 106.9 seconds, while the shortest completion of task is task 3 with an average time required of 11.5 seconds by the respondent.

The duration of task completion is influenced by the number of stages of a given task as research conducted by Lee *et al.* (2020), namely the more the number of stages in the puzzle walk application, the longer it will take the respondent to complete the given task.

FGDs that were conducted on 1-4 January 2021 involved all respondents, namely users of the JKN mobile application in Makassar City. The results of the FGD included obstacles experienced in the process of completing tasks using mobile JKN as well as recommendations for improvements to overcome the obstacles that occurred. These results are summarized in Table 3.

Table 3
FGD Results

Duty	Problem	Improvement Recommendations
1. Log In as a JKN Participant	1.1. Double data	1.1. Designing a login menu for new users.
	1.2. Difficulty logging in when the address on the KTP is different from the JKN system	1.2. Integrated data with disdukcapil
2. Sending E-ID Card to e-mail	2.1. Email is only sent to registered email	2.1. Provision of an "email input" box for sending to alternative e-mails.
3. Check Premium	3.1. The amount of the fine is not shown.	3.1. The premium feature provided displays the amount of the fine
		3.2. Provides a special "fine" feature
4. Looking for Covered Medicine	4.1. There was no prescription drug found	4.1. Update type of drug every 1 x 24 hours
	4.2. Drug names are not sorted alphabetically	4.2. Drug names are sorted alphabetically
	4.3. The drug is not classified	4.3. Provision of drug menus based on disease categories
5. Finding Availability of Hospital Beds	1.1. Application data is out of sync with hospital data	1.1. Information update every 1 hour
6. Seeking First Level Health Facilities	1.1. Difficulty finding the "first level health facility" menu	6.1. Provision of a menu on the application start page
	1.2. Difficulty finding the address of health facilities	6.2. Displays all health facilities (clinics) according to the health facility name entered by the User
	1.3. Does not match the current location of the User	6.3. The application is connected to the default android / ios location feature of the User
7. Seeking Advanced Health Facilities	7.1. Difficulty finding the "health facilities tk. Continue" menu	7.1. Provision of a menu on the application start page
	7.2. Difficulty finding the address of health facilities	7.2. Displays all advanced health facilities (Hospital) according to the name of the health facility inputted by the User
	7.3. Does not match the current location of the User	7.3. The application is connected to the default android / ios location feature of the User

Result FGD can be used as a recommendation to improve the interface of the JKN mobile application, in line with research conducted by Visvalingam and Dhillon, namely the results of focus group discussions are used as input in designing self-care applications (2020). FGD was also conducted in the process of designing a letter recognition application for children with disabilities (Deforte *et al.*, 2020). In line with the research of Zakaria *et al.* (2020) conducted an FGD to provide recommendations for improvement of the Riyadh Mother and Baby Multicenter application. FGD in the research of Smith *et al.* (2020) was carried out as an evaluation for the improvement of the iConquerFear application.

Measurement of user experience or user experience using UEQ which is distributed to 10 respondents involved in cognitive walkthrough task completion. The results of calculating the average variable in UEQ can be seen in Table 4, as explained by Heshmati *et al.* (2020) that the calculation of the average UEQ variable is used for interpretation purposes.

Table 4
The results of the calculation of the average value of the UEQ mobile JKN variable

UEQ Variable Measurement (Average)	
Attractiveness	1.333
Clarity	1.278
Efficiency	1.375
Accuracy	1.262
Stimulation	1.194
Novelty	1.133

All variables in the UEQ measurement are above 0.8. So that it shows a positive user experience in using mobile JKN with an overall average of 1.26. In line with the research of Hinderks *et al.* (2020), namely the UEQ variable is said to be positive if the variable value is above 0. The measurement data of the six variables has different interpretations based on the average value of the variable. In a study conducted by Kristanto *et al*. (2020), namely the classification of variables with the variable means in the teacher room application so that it is easy at the interface redesign stage (2020).

Based on Image 4, information is obtained that all variables, namely attractiveness, clarity, efficiency, accuracy, stimulation and novelty of the JKN mobile are in the above average category. A positive assessment was given by respondents after the use of the JKN mobile application was proven by all variables being above average, as stated in the Boletsis study that the UX assessment indicator on VR locomotion, one of which is the average value of the variable scale is above average (2020). Similar results are shown in the study of Biduski *et al.* (2020) in designing a mobile health application.

The statistical tests performed were the Shapiro Wilk normality test and the one sample t test. Test normality is conducted to determine the level of normality of the data prior to inferential analysis using parametric statistical tests. The probability value is the significance of the normality test results *Shapiro-wilk* is 0.960. This value is greater than 0.05, so the data is normally distributed. The normality test with Shapiro-Wilk was also carried out by Murtiningrum because amount data below 30 (2020).

The data is normally distributed so that the parametric statistical test performed is the t-test. Statistical test for 1 sample, was conducted to compare two unpaired groups. As in Anam's (1976) study, a one sample t test was used for unpaired data in one population. The hypothesis in this test is H_0: there is no difference in the reusability assessment and user experience of mobile JKN. The t test results show a probability of a significance value of 0.002 which is smaller than 0.05. Based on this value, it is known that there is no difference in the usability assessment and the user experience of the JKN mobile. This is due to reusability which still requires improvement in terms of interface as described in Mirza and Irawan states that the low reusability is influenced by the interface so that a redesign is needed (2020). User experience levels that are above the average with a value of 1.26 are given by users for the positive impression given by the JKN mobile application after use, in line with the research of

Umar *et al.* (2020) that the UX assessment on the LSP UAD website is above average but still needs improvement.

CONCLUSION

Measurement of usability with cognitive walkthrough showed that the average respondent completed all tasks in 312.4 seconds. The success rate of completing the task was achieved 100% by 40% of respondents and the task that was completed correctly by the respondent was 29%. The measurement of user experience with UEQ is 1.26 based on the positive impression given by the JKN mobile application after being used by respondents. The results of the different test with the t test show that there is no difference in the usability assessment and the JKN mobile user experience. The overall user experience is above average, so there is still a need to improve the JKN mobile interface. The recommendation to improve the JKN mobile application interface is based on the results of the FGD, which is to display guidelines or instructions on how to use the JKN mobile application that are easy to learn and easy to understand by the user.

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