Journal of Informatics, Information System, Software Engineering and Applications (INISTA)

Evaluation of the "Jeknyong" Application Usability Level Using the Computer System Usability Questionnaire (CSUQ) Method

Yohanna Sitorus [*1], Sarah Astiti [2], Resad Setyadi [3]

[*1, 2, 3] *Information Systems Department, Faculty of Informatics, Telkom Purwokerto Institute of Technology*
Jl. D. I. Panjaitan No. 128 Purwokerto, Postal Code: 53147, Central Java, Indonesia.
[*1] 19103052@ittelkom-pwt.ac.id
[2] sarah@ittelkom-pwt.ac.id
[3] resad@ittelkom-pwt.ac.id

Abstract

The Jeknyong application (Ojeke Inyong) is a household garbage collection service application with a transaction value. However, the use of the Jeknyong application has not been maximized because there are obstacles, such as several features still in development. This study discusses the Evaluation of the Level of Usability of the "Jeknyong" Application using the Computer System Usability Questionnaire (CSUQ) method, where Usability is a technique to find out how easily users can use the system, how efficiently and effectively the system can help users achieve goals. Data collection used a questionnaire with Banyumas community subjects who knew the Jeknyong application. The results are in the form of an indexed percentage of 85% in the Agree Interval category. The first variable System Usability (SYSUSE) evaluation results were 5135 or in the agreed interval. The second variable Information Quality (INFOQUAL) was 4588 or in the Fairly Disagree category. The third variable, Interface Quality (INTERQUAL), was 2039 or in the Agree category; the third variable, Overall Usability (OVERALL), gets a result of 709 or is in the Strongly Agree interval.

Keywords: CSUQ, Usability Testing, Mobile Application, Evaluation
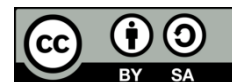
Corresponding Author:
*Yohanna Sitorus
Information Systems Department, Faculty of Informatics, Telkom Purwokerto Institute of Technology
Jl. D. I. Panjaitan No. 128 Purwokerto, Postal Code: 53147, Central Java, Indonesia
Email: 19103052@ittelkom-pwt.ac.id

I. INTRODUCTION

TECHNOLOGICAL developments continue to grow rapidly from time to time. In accordance with consumer demand, the development of the Internet is getting faster from time to time [1]. Information Technology (IT) is a fundamental requirement to support the performance of an institution or organization. With information technology, the efficiency and effectiveness of business and work processes will increase. One example of IT development is a mobile application with a high mobility level. Users can easily make a transaction or obtain information [2].

Mobile applications can be used to overcome several obstacles that are felt in everyday life. For example, the waste management problem. The waste management problem in Banyumas Regency, Central Java, according to Law no. 18 of 2008 Article 4 regarding waste management, aims to advance public health and environmental quality. However, garbage reduces environmental quality, aesthetics, and waste disposal in waterways invites flooding and environmental pollution [3]. For this reason, the Government is presenting a new technological tool as a waste application created because of the problems experienced, called the recycling system, and waste sorting between organic and inorganic waste is still manual. By making this application, it is hoped that it can reduce some of the problems, especially regarding waste.

The Jeknyong application (Ojeke Inyong) is a household garbage pick-up service and has a transaction value. The Jeknyong application was released on December 27th, 2021. The Jeknyong application,

managed by a Regional-Owned Enterprise (BUMD), can already buy waste sorted at home through an application. Each type of waste has its value. So that people do not need to litter. With the Jeknyong application program's launch, waste sorted based on organic and inorganic categories can be sold to PT Banyumas Investama Jaya (BIJ). The officer will then pick up and start the direct transaction. According to one of the Jeknyong application Managers of the Banyumas Regency Communication and Information Service, this application is currently used by 1570 users. The Jeknyong application was created to assist the community in processing waste and assist waste workers in recycling waste so that it runs quickly and efficiently. The Jekyong application has several other features, namely "Ojeke Nyong", "E-olehe Nyong", "Food Nyong", and "Touriste Nyong".

Even though it has reached a large number of users, some users still complain about the level of Usability of the Jeknyong application. From the results of the Pre-Questionnaire, several users complained about applications experiencing server downtime during registration and users who wanted additional digital payment features. In addition, some users complain about the features of the Jeknyong application that are still not accessible [4].

These problems are part of the level of Usability found in the Jeknyong application. The level of Usability refers to how users can find out whether users can easily use the system, how efficiently and effectively a system can help users achieve their goals and how satisfied they are with their use. Therefore, it is necessary to have further problem identification to find out what problems may be found in the Jeknyong application and to know the respondents' impressions of the system both in terms of convenience and experience, knowing the level of convenience, the level of speed of users when searching for the desired service, to what extent mistakes made by users.

The expected goal of conducting this research is to be able to find out what level of usability problems are contained in the Jeknyong application and evaluate the level of Usability in the Jeknyong application, including measuring how easy it is for users to carry out tasks, how fast users can get the information needed. According to completing tasks, the level of errors that occur when users use the Jeknyong application, as well as the level of user satisfaction with the Jeknyong application. Evaluation of the usability level of the Jeknyong application will be carried out using the analysis of the Usability Computer System Questionnare (CSUQ) method. CSUQ is a questionnaire developed by Jim Lewis at IBM in 1980, and this questionnaire has 19 questions using a 7-point Likert scale (1 point strongly disagrees and 7 strongly agrees) [5].

II.   LITERATURE REVIEWS

A.   Usability Testing

Usability testing is a quality attribute describing or measuring how easy an interface is to use. The word "usability" also refers to a method to improve ease of use during the design process [6]. Usability testing is a technique to understand whether users can easily implement the system, how efficiently and effectively a system can support users to achieve their goals [4]. Data collection is one of the usability evaluation strategies. Task scenarios that guide users through app usage are necessary for data collection and tools for measuring app effectiveness and efficiency. While using the program, respondents must complete several task scenarios. From Usability Testing, will obtained qualitative data pertains to difficulties experienced by the user, this data will Support in making recommendations improving the interface design of an application. Before working on usability testing and look at the user, a task is needed which will be executed by the user. In Setting up a task, first of all need to know a main goal that must be achieved in the application to be tested [7].

B.   Computer System Usability Questionnaire (CSUQ)

The Computer System Usability Questionnaire (CSUQ) is a satisfaction questionnaire with the Test-Level Satisfaction type. This questionnaire is given to respondents after completing usability testing to know the respondent's impression of the system in terms of convenience or experience [8]. CSUQ is an instrument for measuring perceived usefulness, developed by IBM, which consists of 19 questions validated using a 7-point Likert scale [8]. This 19-item questionnaire has a Likert rating scale with 7 points ranging from 1 (strongly agree) to 7 (strongly disagree) and yields an overall score that represents overall

satisfaction with the program and scores of three scales for System Usability, Information Quality (quality of instruction in the program), error message utilities, and Interface Quality.
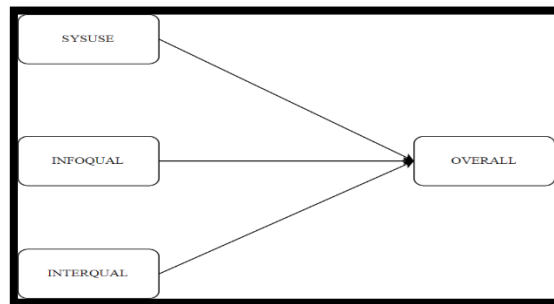

Fig 1. CSUQ Research Model

Based on Figure 1. there is an explanation of the statements in CSUQ covering several sections [5], namely:

1. System Usefulness is the meaning of the system for users to cope with tasks;

2. Information Quality is the quality of information that functions as software that can share messages with users when using software or when an error occurs;

3. Interface Quality is the quality of the interface for questions to estimate the appearance and ease of applying functions in an application;

4. Overall Usability is the overall use of the system.

III.   RESEARCH METHOD

The research methodology to be carried out in this study will be discussed systematically with multiple Meanings of the steps contained in this research. These steps will be used later to answer research problems. The steps in this study are shown in Figure 2.
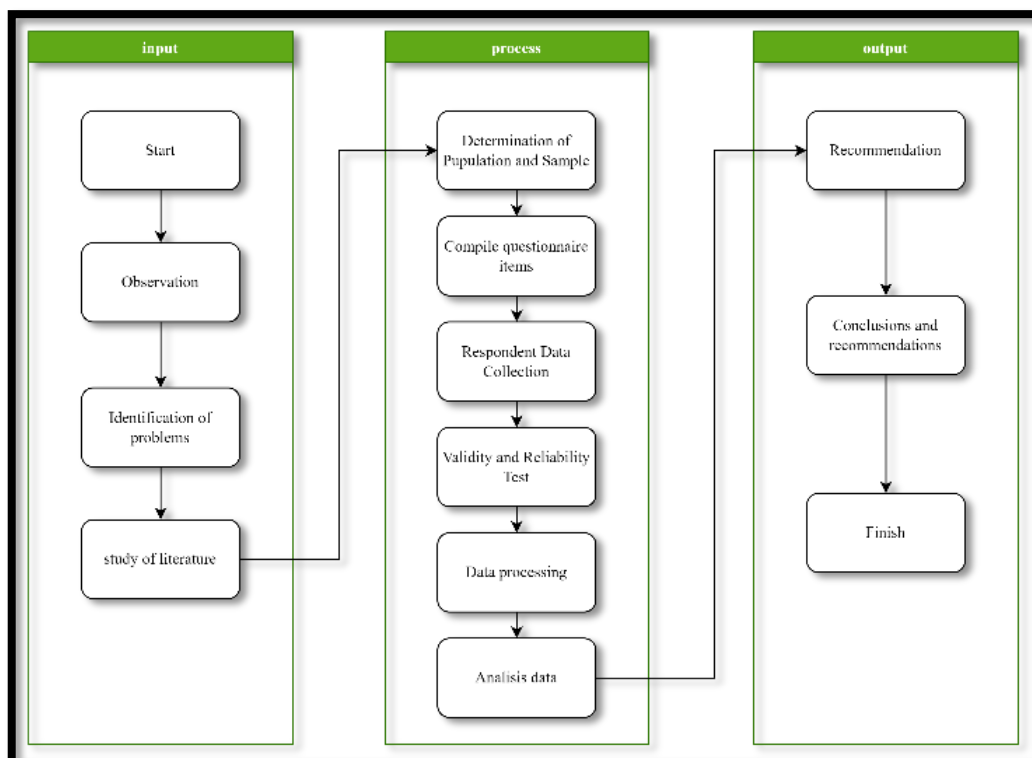

Fig 2. Example of a Figure

A. *Observation*

Initial research began by observing the object under study. The object in question is people who know the application and have used the Jeknyong application. Observations were made by conducting interviews with one of the developers of the Jeknyong application at the Banyumas Kominfo Service to obtain valid information regarding the Jeknyong application. This stage is a way to understand problems related to the background and description of the Jeknyong Application and discover the problems when making applications.

B. *Identification of problem*

Problem identification is carried out to understand the main problems experienced by users when using the Jeknyong application by distributing pre-research questionnaires to the public to capture the constraints felt by users after using the Jeknyong application, as well as knowing the speed of access and the integrity of the features in the application. Jeknyong as a guide in conducting research related to evaluating the level of application usability and measuring user ratings of application usability following user experience when accessing the Jeknyong application.

C. *study of literature*

The next stage is a literature study that aims to conduct theoretical studies as research support materials using the CSUQ method. Literature study is obtained from searching and collecting literature or studies related to CSUQ issues, which can be journals, articles, books, and other types connected with research methods.

D. *Determination of Population and Sample*

The population is a broadly defined group of objects or subjects with certain traits and features. People who have taken advantage of the Jeknyong app form the study population. The sample is part of the number and characteristics possessed by the population [9]. The sample was collected using a purposive sampling approach to understand the total sample called by the Slovin formula. The Slovin method was used in this study because sampling requires a representative sample size to generalize the findings. Calculating sample size does not require sample size tables; instead, it can be done using direct formulas and calculations [10].

Determination of the Number of samples using an error tolerance limit of 10% in the following way.

$$n = \frac{N}{1 + Ne^2} \tag{1}$$

$$n = \frac{1570}{1 + (1570 \times 0{,}1)^2}$$

$$n = \frac{1570}{1 + (1570 \times 0{,}01)}$$

Information :
n   = Amount
N   = Total Population
e   = Error tolerance limit (Margin Of error = 10%)

Based on the calculation of the Slovin formula, the sampling technique uses the same random sampling technique using the Slovin equation to determine the sample formulation using an error rate of 10% or 0.1 [11]. The reason for using a 10% error (90% confidence level) is that it refers to the maximum error rate that can be tolerated in social science research, so it is known that the total sample in this study is as many as 94 respondents.

E. Compile questionnaire items

The questionnaire in this study is useful for identifying the factors of the Computer System Usability Questionnaire (CSUQ) method that impact the level of Usability of the Jeknyong application. This questionnaire was distributed via the Google form link. The questionnaire given to participants consisted of 19 question indicator items with 4 characteristics from System Usefulness (SYSUSE) with question items 1st-8th, Information Quality (INFOQUAL) variables with question item numbers 9th-15th, and Interface Quality (INTERQUAL) variables with question item numbers 16th-18th. Lastly, the Overall Usability variable (OVERALL) is in question 19th. The following is a list of questions and dimensional variables from the CSUQ method used in the questionnaire [12]. The descriptions of all question in every category can be seen in Table I until Table IV.

TABLE I.   VARIABLE SYSTEM USEFULNESS (SYSUSE)

No	Category	Frequency
1		Overall, I am satisfied with how easy it is to use the system
2		It's very easy to use this system
3		I can effectively get my work done quickly using this system
4	System Usefulness (SYSUSE)	I can effectively get my work done quickly using this system
5		I can get my work done efficiently using this system
6		I feel comfortable using this system
7		It is very easy to learn to use this system
8		I believe I can become productive quickly using this system

TABLE II.   VARIABLE INFORMATION QUALITY (INFOQUAL)

No	Category	Frequency
1		The system gives an error message clearly telling me how to fix the problem
2		Whenever I make a mistake using the system, I can recover easily and quickly
3	*Information Quality*(INFOQUALS)	Information (such as online help, on-screen messages, and other documentation) provided with these systems is self-explanatory
4		It's easy to find the information I need
5		The information provided for the system is easy to understand
6		The information was effective in helping me complete tasks and scenarios
7		The organization of information on the system screen is clear

TABLE III.   VARIABLE INTERFACE QUALITY (INTERQUAL)

No	Category	Frequency
1		The system interface is pleasant
2	*Interface Quality*(INTERQUALS)	I like using this system interface
3		This system has all the functions and capabilities I expect

TABLE IV. VALIDITY TEST RESULTS

No	Category	Frequency
1	*Overall Usability* (OVERALLS)	Overall, I am satisfied with this system.

In the Computer System Usability Questionnaire (CSUQ) method, 7 Likert scales are used, which serve as material for assessing the use of the Jeknyong application. 7 levels of measurement scale in filling out the questionnaire as shown in Table V.

TABLE V. 7 CATEGORY LIKERT SCALE CSUQ METHOD

No	Category
1	Strongly Disagree
2	Don't agree
3	Disagree
4	Doubtful
5	Simply Agree
6	Agree
7	Strongly agree

F. Respondent Data Collection

In the following stages, the questionnaire created in the previous stage and used as a validity and reliability test is distributed as a type of survey in the context of data collection. For this study, 94 respondents were required as data samples. Jeknyong application users are the main criteria for respondents.

G. Validity and Reliability Test

Validity is a measure that shows how far an instrument can measure what will be measured [13]. Validity stems from the word validity which implies the extent to which the accuracy of a measuring instrument (test) in carrying out its measuring function. A test is said to have high validity if the tool performs the measuring function correctly or gives measurement results that follow the purpose of carrying out the measurement. The variable r_{xy} is to calculating the internal validity coefficient for polytomous item scores of product-moment correlation [12].

$$r_{xy} = \frac{N \sum xy - (\sum x . \sum y)}{\sqrt{\{N \sum x^2 - (\sum x^2)\}\{N \sum Y^2 - (\sum Y)^2\}}} \tag{2}$$

r_{xy} = Correlation coefficient

N = Number of samples

Σxy = The Number of times the variables x and y

Σx = Total value of variable x

Σy = Total value of variable y

$\sum x^2$ = Sum to the power of the value of the variable x

$\sum y^2$ = Sum to the power of the value of the variable y

This validity test was carried out using the SPSS program with the following criteria:

    a. If $r_{Count} > r_{table}$ then the statement is declared valid.
    b. If $r_{Count} < r_{table}$ then the statement is declared invalid.
    c. The calculated r value can be seen in the corrected item total correlation column.

After knowing the validity test, calculations will be carried out to find out the r_{table} Value of the total respondents obtained, which is equal to 112 respondents, the formula to find out the r_{table} is given:

$$Df = n - 2$$
$$= 111 - 2$$
$$= 109$$
\tag{3}

Df = Degree Of Freedom

n = Number of samples

2 = Number of Variables

Based on the calculation results in determining the df table, which consists of 111 respondents, it is found that the final result of the df table is 109, which means the significant level is 0.05 with a known number of r_{table}, namely 0.1569. Then it will be continued with the reliability test.

Reliability comes from the word reliability which means the extent to which the results of a measurement can be relied upon. Reliability is a test to measure the extent to which the instrument provides stable and consistent results. A measuring instrument is reliable if it produces the same results even though measurements are taken many times [14]. This test is important because it refers to the consistency of all instruments [15]. This reliability test was carried out using questions that turned out to be valid in the validity test for a total of 111 respondents who used the Jeknyong application in the Banyumas Regency area. The following is the Cronbach Alpha reliability formula [12].

$$\alpha = \frac{(k)}{(k-1)} \frac{(s_r^2 - \sum s_i^2)}{(s_x^2)} \tag{4}$$

α = reliability coefficient Alpha Cronbach

k   = Number of question items tested

$\sum s_i^2$ = Number of score item variances

s_x^2 = variance of test scores (all k items)

H.   Data processing

After the validity and reliability tests were used to find out the findings of the questionnaire responses, the data processing was completed. The CSUQ variable is then calculated using the Mean, Median, Mode, and Standard Deviation formulas.

I.   Analisis data

Data analysis is now being carried out based on the results of the CSUQ questionnaire recapitulation. The resulting scores for each CSUQ question number were then checked against the correlation between the score and the related elements of the usability criteria. All the results can be seen in Table VI.

TABLE VI. THE RESULTS OF CALCULATING THE CORRELATION OF EACH VARIABLE

Nomor	Variable	Skor Total
1	*System Usefulness* (SYSUSE)	5135
2	*Information Quality* (INFOQUAL)	4588
3	*Interface Quality* (INTERQUAL)	2039
4	*Overall Usability* (OVERALL)	709

J.   Recommendation

The next step is to collect suggestions when the calculations have been completed and have shown the value of the Jeknyong application. Then, based on the test findings, it will be discussed what the application is lacking and what can be changed to ensure that the Jeknyong application serves the community as much as possible. This discussion can also explain the importance or rating of each survey question.

K.   Conclusions and recommendations

The conclusions and suggestions that will be made are taken from the results of the analysis that has been carried out and provide suggestions for better future research. This conclusion represents the discussion of the results of the research that has been carried out and how the Jeknyong application users respond to the application's usefulness.

IV.   RESULTS AND DISCUSSION

Respondents in this study were reached by distributing questionnaires in the form of a Google form given to community users who already knew and had used the Jeknyong application. This questionnaire

has 115 unfiltered respondents, divided into two parts: respondents who have used the application and respondents who have never used the application. Many 111 respondents' answers have been filtered with the criteria of knowing and using the Jeknyong application. Furthermore, testing will be carried out on each item, namely testing the validity and reliability tests, determining how far a measurement result can be trusted. The characteristics of the respondents include the user's Age and occupation. Table VII describes the category of respondents by Age.

TABLE VII. CATEGORY OF RESPONDENTS BY AGE

Number	Category	Frequency	Percentage
1	15 – 24 Years	43	37.4%
2	25 – 34 Years	52	45.2%
3	35 – 44 years	18	15.7%
4	45 – 54 Years	2	1.7%
	Total	**115**	

Table VIII is the result of an analysis based on the work of the questionnaires that have been distributed.

TABLE VIII. CATEGORIES OF RESPONDENTS BY OCCUPATION

Number	Category	Frequency	Percentage
1	Student / Student	37	32.2%
2	Employee	32	27.8%
3	Government employees	7	6.1%
4	Businessman	37	32.2%
5	Self-employed	1	0.9%
6	*Freelance*	1	0.9%
	Total	**115**	

A. Validity test

The validity test in this study utilized the SPSS Version 26 application to determine the value of the r_{count} has a total of 111 respondents. With a significance level of 5% is 0.1555. The results of the validity test can be observed in Table IX.

TABLE IX. VALIDITY TEST RESULTS

Number	r_{Count}	r_{Table}	Results
1	0,728	0,1569	Valid
2	0,728	0,1569	Valid
3	0,668	0,1569	Valid
4	0,658	0,1569	Valid
5	0,708	0,1569	Valid
6	0,681	0,1569	Valid
7	0,654	0,1569	Valid
8	0,617	0,1569	Valid
9	0,674	0,1569	Valid
10	0,685	0,1569	Valid
11	0,746	0,1569	Valid
12	0,703	0,1569	Valid
13	0,528	0,1569	Valid
14	0,600	0,1569	Valid
15	0,669	0,1569	Valid
16	0,721	0,1569	Valid
17	0,681	0,1569	Valid
18	0,629	0,1569	Valid
19	0,717	0,1569	Valid

Based on Table IX shows that the validity test for r.Table research with a total of 111 respondents from 19 indicator items is said to be valid because, based on the formula if $r_{Count} > r_{table}$ it will produce test results with valid conclusions. Other results that can result if the components of the statement are valid are in the table.

B. Reliability test

The reliability test was conducted using the SPSS version 26 application through the Cronbach Alpha formula. The following is a table of reliability test results in Table X.

TABLE X. RELIABILITY TEST RESULTS

Cronbach's Alpha	N of Items
.932	19

Based on the results of the reliability test on the CSUQ method, it can be seen that the test results are reliable because the results obtained using the Cronbach's Alpha formula are 0.932 out of 19 question indicator items that exceed 0.7, which means that the results obtained are reliable or accurate. Each statement in the questionnaire has a different Cronbach's Alpha value.

C. Data Processing

Data processing using CSUQ can be done after the data from the questionnaire results have been obtained. Table XI is the results of data processing from the questionnaire answers based on the CSUQ method.

TABLE XI. AVERAGE VALUE AND STANDARD DEVIATION RESULTS

Mean	Median	Modus	Standard Deviation
6,12	6	6	0,86
6,12	6	6	0,86
6,08	6	6	0,87
5,72	6	6	0,95
5,63	6	6	1,06
5,60	6	6	0,97
5,75	6	6	0,97
5,81	6	6	0,96
5,81	6	6	1,12
5,90	6	6	0,99
5,63	6	6	1,06
5,60	6	6	0,97
5,75	6	6	0,97
5,81	6	6	0,96
5,81	6	6	1,12
5,90	6	6	0,99
5,82	6	6	0,88
6,89	6	6	0,96
6,89	6	6	0,96
5,98	6	6	0,84
6,00	6	6	0,82
5,99	6	6	0,89
6,10	6	6	0,97
5,98	6	6	0,84
6,00	6	6	0,82
5,99	6	6	0,89
6,10	6	6	0,97
6,18	6	6	0,88
6,08	6	6	0,79
6,38	7	7	0,82

D. Calculating Usability

The usability value for the entire contents of the respondent's answers can be calculated by finding the minimum, maximum, and range of assessment categories. Table XII shows the Number of respondents and scores obtained from the questionnaire.

TABLE XII.   TOTAL SCORE OF RESPONDENTS

Score	Filling Amount	Total
7	644	4508
6	913	5478
5	393	1965
4	121	484
3	35	105
2	3	6
1	0	0
	Amount	**12546**

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The table above shows the Number of respondents' questionnaires for each interpretation score from a Likert scale of one to seven. Next is to calculate the total by calculating the multiplication of the score and the Number of entries in the respondent. Finally, to calculate the total score, it is calculated from the total weight and total value.

The highest score = number of questions x highest score x number of respondents = 19 x 7 x 111 = 14763

Lowest value = number of questions x lowest score x number of respondents = 19 x 1 x 111 = 2 109

data range = Highest score – lowest score = 14 896 – 2 109 = 12 654

class length = Data range/number of assessment categories = 12 654 / 7 = 1 807

The assessment categories are obtained from the calculation of the minimum value, maximum value, and class length, as shown in Table 4.

From Table XII obtained that the total score is 12546. If compared with the table, then the usability quality factor of the application made is in the "Agree" category. The quantitative eligibility value is calculated by percentage: (12645/14763) x 100% = 85%. Also, the Value Intervals can be seen in Table XIII

TABLE XIII. VALUE INTERVALS

Value Intervals	Category
2109 – 3916	Strongly Disagree
3917 – 5724	Don't agree
5725 – 7532	Simply Disagree
75331 – 9340	Neutral
9341 – 11148	Simply Agree
11149 – 12956	Agree
12957–14764	Strongly agree

Next, to calculate the usability results for each variable, use the same method so that the results are obtained:

1. The analysis results for each, namely the first variable System Usefulness (SYSUSE), get the final result of 5135 or are in the agreed interval category.
2. The results of the analysis on each, namely the second variable Information Quality (INFOQUAL), get the final result of 4588 or are in the interval category Simply Disagree
3. The results of the analysis on each, namely the third variable Interface Quality (INTERQUAL), get the final result of 2039 or are in the interval category Agree
4. The analysis results on each, namely the third variable, Overall Usability (OVERALL), get the final result of 709 or are in the interval category Strongly Agree.

V.   RECOMMENDATION

Based on the results of usability calculations on the Jeknyong application, which have been carried out using the Computer System Usability Questionnaire (CSUQ) method, the results are in the form of an indexed percentage of 85% in the Agree interval category. However, even though the usability results are already in that category, the application also requires several recommendations for future improvements for developers (system developers). Table XIV describes how the results and recommendations for improvements.

TABLE XIV. RESULTS AND RECOMMENDATIONS FOR IMPROVEMENT

Number	Variable	Scores	Interval	Recommendation
1	System Usefulness (SYSUSE)	5135	Agree	Error recovery and making improvements to some existing bugs in the application by observing from a security perspective and servers that often don't respond
2	Information Quality (INFOQUAL)	4588	Simply Disagree	Improvements in several application features that do not function properly and cannot be applied or accessed, as well as additional features such as payment for goods

				via digital wallets or other means that can make it easier for users to use the Jeknyong application.
3	Interface Quality (INTERQUAL)	2039	Agree	Improvements include making improvements to the display section because the application's appearance is less attractive and less in line with user expectations, such as selecting colors or more attractive menu display variations.
4	Overall Usability (OVERALL)	709	Strongly agree	Recommendations for improvements to improvements in the speed of using the Jeknyong application.

VI. CONCLUSION

Based on research evaluating the usability level of the Jeknyong application using the Computer System Usability Questionnaire (CSUQ) method with measurement criteria including the SYSUSE, INFOQUAL, INTERQUAL, and OVERALL variables that have been carried out, the following conclusions are obtained: validity and reliability tests on the CSUQ questionnaire show the results in the form of each indicator question item get valid and reliable results. Furthermore, the results of the Jeknyong application questionnaire calculation with the CSUQ method are in the Agree Category with a percentage value is 85%. It means that application users agree if it is good to use and accessible from the convenience or experience for variables. The suggestions for subsequent research. For subsequent research, we can use other methods or techniques. So that the main problems that occur in the Jeknyong application can be resolved, and more and more enthusiasts use the Jeknyong application.

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