MEASUREMENT OF VALIDITY AND RELIABILITY OF CUSTOMER SATISFACTION QUESTIONER in E-BOARDING APPICATIONS

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Abstract— PT. Kereta Api Indonesia (Persero) is the largest company in Indonesia which is engaged in railroad transportation. One of the technological innovations carried out by PT KAI (Persero) is to make the KAI Access application with the latest feature is e-boarding. Through the e-boarding feature provided by PT KAI, KAI seeks to provide excellent service to customers. Not many customers use the e-boarding application as a gap between PT KAI's vision and train customers. The gap that exists between the vision and customer acceptance of information technology needs to be measured to determine the extent to which the implementation of the information technology is accepted by the customer. One method used to measure customer satisfaction is to use the use questionnaire. Before measuring customer satisfaction using the Use questionnaire, each item of questions must be tested for validity and reliability. The purpose of measuring the validity and reliability of this research is to ensure the accuracy and reliability of each question on the questionnaire as a test tool. The validity test results used by using the construct validity technique are valid. The reliability test results using the split-half reliability technique have a value of 0.9896 or equivalent to the very high-reliability criteria.

Keywords: E-Boarding, Customer Satisfaction, Validity, Reliability

Intisari—*PT. Kereta Api Indonesia (Persero) merupakan sebuah perusahaan terbesar di Indonesia yang bergerak di bidang transportasi kereta api. Salah satu inovasi teknologi yang dilakukan oleh PT KAI (Persero) adalah membuat aplikasi KAI Access dengan fitur terbaru adalah e-boarding. Melalui fitur e-boarding yang disediakan oleh PT KAI, KAI berupaya memberikan pelayanan prima kepada customer. Belum banyak pelanggan yang menggunakan aplikasi e-boarding menjadi gap antara visi PT KAI dan pelanggan kereta api. Gap yang ada antara visi dan penerimaan pelanggan terhadap sebuah teknologi informasi perlu diukur untuk mengetahui sejauh mana implementasi teknologi informasi tersebut diterima oleh pelanggan. Salah satu metode yang digunakan untuk mengukur kepuasan pelanggan adalah dengan menggunakan use questionnaire. Sebelum dilakukan pengukuran kepuasan pelanggan dengan menggunakan Use questionnaire, maka setiap item pertanyaan harus dilakukan uji validitas dan reliabilitas. Tujuan pengukuran validitas dan reliabilitas pada penilitian ini adalah memastikan ketepatan dan kehandalan setiap pertanyaan pada kuesioner sebagai alat uji. Hasil uji validitas yang digunakan dengan menggunakan teknik validitas konstruk adalah bernilai valid. Hasil uji reliabilitas dengan menggunakan teknik split-half reliability memiliki nilai 0,9896 atau setara dengan kriteria reliabilitas sangat tinggi.*

Kata Kunci*: E-Boarding, Validitas, Kepuasan Pelanggan, Reliabilitas.*

INTRODUCTION

In 2009 the directors of PT Kereta Api Indonesia (Persero) issued a notice containing a new vision for PT. Kereta Api Indonesia (KAI) Persero namely "Being the best railway service provider that focuses on customer service and meets the expectations of stakeholders". Through this vision, there are 5 organizational cultures promoted by PT KAI (Persero), namely Integrity, Professional, Safety, Innovation and Excellent Service (PT. Kereta Api Indonesia, 2019). PT Kereta Api Indonesia (Persero) as a provider of land transportation services continues to strive to provide excellent service to customers to achieve the company's competitive advantage. One of the efforts made by utilizing information technology to make easier for customers. One of the information technologies developed is a mobile-based application.

The selection of mobile-based application development conducted by PT KAI is something that is appropriate and in accordance with the current condition of Indonesian society where as many as 93.9% use smartphones to connect to the internet. Figure 1 is the result of a survey conducted by the Indonesian Internet Service Users Association showing the percentage of the number of devices used by Indonesian internet users to connect to the internet
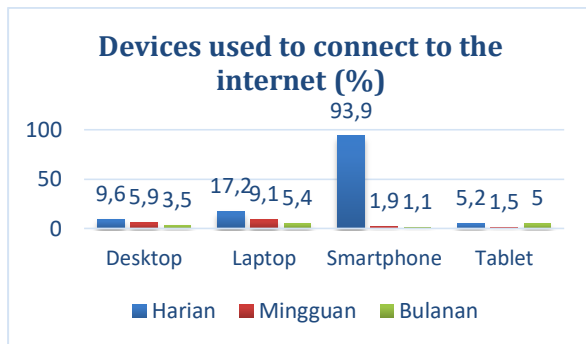
Source: (APJII, 2019)

Figure 1 Percentage of the number of devices used to connect to the internet

The KAI Access application as a mobile application was developed on July 15, 2014 by PT Kereta Api Indonesia (Persero). As a time goes by, PT KAI continues to be updated and added features to the KAI Access application. The features provided are ticket booking, ticket cancellation, ticket schedule changes, local train ticket purchase, train ticket purchase 1 hour before departure (or go show) and e-boarding pass. The e-boarding feature is a feature that can be used / will appear 2 hours before the Train's departure.

The advantage provided by the e-boarding feature for train passengers is that train passengers leaving will not need to queue to print boarding passes on the Check in counter machine. The check-in process can be carried out by showing e-boarding on the passenger cellphone. Specifically, the research to be carried out is on the e-boarding feature in the KAI Access application. Research focuses on the e-boarding feature based on observations that have been made there are still many passengers who do not use the e-boarding feature during the check-in process.

In accordance with the vision of PT KAI, the innovations provided by PT KAI are expected to meet customer needs. The e-boarding feature was created to reduce the queue of potential passengers at the Check in counter machine. But in reality, there are only a few passengers who use e-boarding when checking in. The gap between the company's vision and customer response becomes a basis that needs to be explored to what extent applications developed by PT KAI (Persero) can meet stakeholder expectations. Rail passengers are the main stakeholders owned by PT KAI (Persero). Customer satisfaction is one method that can be used to measure customer satisfaction with a service.

Customer Satisfaction needs to be done to improve the performance of company management. Customer Satisfaction or in Indonesian known as customer satisfaction is something that is often associated with customer ratings of a product or service they use (Biesok & Wyród-Wróbel, 2011) .

The method that can be used to measure customer satisfaction is to use the USE Questionnaire using a Likert rating scale. As a test material to measure customer satisfaction, the components of questions that have been compiled by questionnaire need to be tested for validity and reliability. Validity and reliability testing is a test conducted to the extent that the questionnaire as a measuring tool to be used can be trusted and the results are accountable (Deniz & Alsaffar, 2013)

The measurement of the validity and reliability of the questionnaire was carried out with the aim that each question item on the questionnaire as a measure of customer satisfaction in the Indonesian Railroad e-boarding application is an appropriate and consistent measure if used repeatedly.

MATERIAL AND METHOD

The list of questions on the questionnaire to measure customer satisfaction refers to the use questionnaire method. After the questionnaire has been prepared, the validity and reliability test is carried out using a probability sampling - multistage random sampling technique. Multistage random sampling techniques can be used for populations with large areas (Sedgwick, 2015) . In this study, the population is divided into each of PT KAI's Operational Areas (DAOP) spread across Java. Samples were taken to do a trial "trial" in the field. This "trial" trial was carried out through an electronic questionnaire with a filling time span of September 1 - September 30 2019.

The validity value of a questionnaire will indicate precisely the measuring instrument used to measure. The questionnaire used as a data collection tool must be able to describe the research topic to be examined. One measure of the validity of a questionnaire is to use construct validity. Test criteria are performed by calculating the product moment correlation (r). The calculation formula r can be seen in equation (1). After calculating the moment product correlation value, the test continues with the t-test. Criteria to determine the results of calculations can be done

by comparing the value of t-count with the value of t on the t-table. If t-count> t-table, it can be concluded that the item is valid (Widi, 2011). The calculation formula to get the t-value can be seen in equation (2).

$$r_{xy} = \frac{n \sum X_i Y_i - (\sum X_i)(\sum Y_i)}{\sqrt{(n \sum X_i^2 - (\sum X_i)^2)(n \sum Y_i^2 - (\sum Y_i)^2)}} \quad \dots \dots (1)$$

Note :
r_{xy} = Correlation coefficient
n = Number of respondents
X = Score of each item
Y = Scores of all respondent items

$$t_{hitung} = \frac{r_{xy}\sqrt{(n-2)}}{\sqrt{(1 - r_{xy}^2)}} \quad \dots \dots (2)$$

Reliability testing needs to be done on the questionnaire instrument with the aim of being able to know the consistency of the questions used on the questionnaire instrument so that the questionnaire can be trusted (Triana & Oktavianto, 2013). There are four methods to measure the reliability of a questionnaire, namely retest-reliability, parallel-forms reliability , inter-rater reliability and split-half reliability (Mohajan, 2017). Reliability calculation techniques in this study are using split-half reliability techniques because the questions raised are even. The split-half reliability technique has a way of dividing the test into two equal parts, so that each test has two scores, namely the first score (initial / odd questions) and the second score (final / even questions). Each half of the questions is calculated the reliability coefficient with the formula:

$$rij = \frac{n \sum ij - (\sum i)(\sum j)}{\sqrt{(n \sum i^2 - (\sum i)^2)(n \sum j^2 - (\sum j)^2)}} \quad \dots \dots (3)$$

Note:
r_{ij} = reliability coefficient
n = number of respondents
i = calculation for odd questions
j = calculation for even questions

After calculating the reliability coefficient for each group of odd and even questions, the next step is to calculate the reliability using the *Spearman Brown* formula.

$$rij = \frac{2 * r_{ij}}{1 + r_{ij}} \quad \dots \dots (4)$$

After calculating the reliability value, then do the matching value in the reliability interpretation table.

RESULTS AND DISCUSSIONS

Based on the distribution of questionnaires that have been done, the respondents who filled out the questionnaire were 89 respondents. After conducting data checking, valid data that can be done the next processing stage is 80 respondent data. The distribution of respondents is as follows:

Table 1 Distribution of Respondent's Occupation

Occupation	Number
Teaching Staff (Teacher / Lecturer / Mentor)	6
Student / Student	68
Private employees	4
Government employees	1
Businessman	1

Source: (Safitri, 2019)

Table 2 Distribution of railroad usage within 1 month

Railroad usage within 1 month	Number
≤1 times	40
2 - 5 times	32
6 - 10 times	6
11 - 15 times	1
>15 times	1

Source:(Safitri, 2019)

Questionnaire questions given refer to the question template using the questionnaire method. Use Questionnaire consists of four aspects of questions, namely usefulness, ease of use, ease of learning and satisfaction.
Detailed questions for each aspect of the questions on the customer satisfaction questionnaire used are as follows:

1. Usefulness
V1 = e-boarding can increase effectiveness at check-in
V2 = e-boarding helps me be more productive in checking in
V3 = e-boarding is easy to use
V4 = e-boarding is able to remind me of the time of departure
V5 = e-boarding is easier to use than paper boarding passes
V6 = e-boarding can save time when I leave
V7 = e-boarding according to my needs
V8 = e-boarding according to my expectations for

use

2. Ease of Use

V9 = e-boarding is easy to use

V10 = e-boarding is practical to use

V11 = e-boarding display is easy to understand

V12 = e-boarding only requires a few steps to be able to check-in

V13 = e-boarding is very flexible

V14 = e-boarding does not require a lot of power

V15 = I can use e-boarding without written instructions

V16 = I found no inconsistencies in using e-boarding

V17 = non-permanent customers and regular customers like the e-boarding application

V18 = Errors in using e-boarding can be easily resolved

V19 = I always succeed in using e-boarding all the time

3. Ease of learning

V20 = e-boarding can be learned quickly

V21 = how to use e-boarding is easy to remember

V22 = e-boarding is very easy to learn

V23 = I am fast at using e-boarding

4. Satisfaction

V24 = I am satisfied with the e-boarding feature in the KASI Access application

V25 = I will recommend the e-boarding application to my friends

V26 = I feel happy using e-boarding

V27 = e-boarding works according to function

V28 = e-boarding has a good display

V29 = I must use e-boarding again for the boarding process before leaving

V30 = e-boarding is comfortable to use

Source:(Safitri, 2019)

Table 3 The results of filling out the questionnaire by 80 respondents

	Q1	Q2	Q3	Q4	...	Q30	Number (y)
R1	5	5	5	3		4	134
R2	5	5	5	5		5	146
R3	4	4	5	3		3	117
R4	5	5	5	5		5	148
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
R80	4	4	4	4		5	142
Total	344	339	344	312		338	9892

Source:(Safitri, 2019)

In accordance with the results presented in table 3, the next step is to determine the validity value for each question item. Based on the calculation formula (1), the validity calculation for item 1 is as follows:

$r_{xy(1)}$ = coefficient of validity of questions 1

N = 80

$\sum_{xy1} = 44361$

$\sum_{x1} = 344$

$\sum_{y} = 9892$

$\sum_{x^2} = 1558$

$\sum_{y^2} = 1274670$

$r_{xy(1)} = 0{,}884$

The validation calculations for item 2 are as follows:

$r_{xy(2)}$ = coefficient of validity of questions 2

N = 80

$\sum_{xy2} = 43659$

$\sum_{x1} = 339$

$\sum_{y} = 9892$

$\sum_{x^2} = 1511$

$\sum_{y^2} = 1274670$

$r_{xy(2)} = 0{,}889$

Furthermore, this calculation is carried out until the last item. The validity calculation for the 30th question is as follows:

$r_{xy(30)}$ = coefficient of validity of questions 30

N = 80

$\sum_{xy2} = 43569$

$\sum_{x1} = 338$

$\sum_{y} = 9892$

$\sum_{x^2} = 1504$

$\sum_{y^2} = 1274670$

$r_{xy(30)} = 0{,}897$

After all r values on each item have been calculated, do the calculations to find the t value. The implementation to find the value of t arithmetic for each problem is as follows:

$t_{(1)}$ = 16,72

$t_{(2)}$ = 17,17

The next step is to calculate the t value for all questionnaire questions. The results of the calculation of the value of t in the 30th problem as the last question are as follows:

$t_{(30)}$ = 17,94

After calculating t for each question, a comparison is performed with the values in table t. The values taken in table t are at the 95% confidence level and the degree of freedom (df) = N-2. The number of respondents (N) who filled in the data validly was 80, so the degree of freedom obtained was 78

Based on the t table, with df = 78 and 95% confidence level, the value of t is 1.66462.

After calculating the value of t for all items, the next step is to compare the results of the calculation of the value of t with the value in table t. Table 4 is the result of validity for each questionnaire question conducted. If the value of t in each question is greater than the value of t table, then it can be said that the question is valid.

Table 4 Results of questionnaire validity

Items	Value t	Value t tabel	Result
1	16,72	1,66462	Valid
2	17,17	1,66462	Valid
3	18,56	1,66462	Valid
4	8,16	1,66462	Valid
5	12,64	1,66462	Valid
6	15,75	1,66462	Valid
7	14,57	1,66462	Valid
8	17,12	1,66462	Valid
9	17,10	1,66462	Valid
10	14,66	1,66462	Valid
11	15,94	1,66462	Valid
12	11,89	1,66462	Valid
13	16,84	1,66462	Valid
14	14,61	1,66462	Valid
15	10,99	1,66462	Valid
16	11,41	1,66462	Valid
17	11,13	1,66462	Valid
18	7,45	1,66462	Valid
19	13,88	1,66462	Valid
20	17,91	1,66462	Valid
21	15,53	1,66462	Valid
22	18,27	1,66462	Valid
23	15,04	1,66462	Valid
24	18,86	1,66462	Valid
25	15,78	1,66462	Valid
26	17,72	1,66462	Valid
27	17,42	1,66462	Valid
28	10,05	1,66462	Valid
29	11,08	1,66462	Valid
30	17,94	1,66462	Valid

Source:(Safitri, 2019)

After calculating the validity, each question needs to be measured reliability value on each question. In this study the method used to measure the reliability of the questionnaire is to use the Spearman Brown split half technique. The reliability testing steps for *split half spearman brown* are as follows:

1. Compile even and odd question questionnaire data

Table 5 List the value of odd questions

	Q1	Q3	Q5	Q7	...	Q29	Total (i)
R1	5	5	4	5		5	68
R2	5	5	5	5		5	74
R3	4	5	4	4		1	58
R4	5	5	5	5		5	74
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
R80	4	4	4	4		5	71

Source:(Safitri, 2019)

Table 5 List the value of even questions

	Q2	Q4	Q6	Q8	...	Q30	Total (j)
R1	5	3	5	4		4	66
R2	5	5	5	5		5	72
R3	4	3	4	3		3	59
R4	5	5	5	5		5	74
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
R80	4	4	4	4		5	71

Source:(Safitri, 2019)

2. Calculate the total score of each odd and even questions

Table 7 Total scores for each odd and even questions

	$\sum i$	$\sum j$	$\sum i^2$	$\sum j^2$	i*j
R1	68	66	4624	4356	4488
R2	74	72	5476	5184	5328
R3	58	59	3364	3481	3422
R4	74	74	5476	5476	5476
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
R80	71	71	5041	5041	5041
Total	4977	4915	322963	314665	318521

Source:(Safitri, 2019)

3. Calculate the correlation between scores of odd and even question questions (according to formula number 3)
   r_{ij} = 0,9796

4. Calculate reliability using the *Spearman Brown* formula (according to formula 4)
   r = 0,9896

Based on table 8 interpretation of reliability, the final value of reliability to measure the level of customer satisfaction in the e-boarding application of PT. KAI is very high.

Table 8 Interpretation of reliability

Correlation Coefficient	Reliability criteria
0,81 < r ≤ 1,00	Very High
0,61 < r ≤ 0,80	High
0,41 < r ≤ 0,60	Enough
0,21 < r ≤ 0,40	Low
0,00 < r ≤ 0,21	Very Low

Source :(Arikunto, 2010)

CONCLUSION

Questionnaire arrangement using the use questionnaire was carried out to measure customer satisfaction with e-boarding in the KAI-Access application. Validity measurement needs to be done on a measurement instrument that has the objective to measure the accuracy of the questionnaire as a measurement tool. The reliability of the questionnaire instrument was carried out to monitor the consistency of the questions raised on the questionnaire instrument. Using probability sampling - multistage random sampling technique, the number of questionnaire filler data to measure the validity and reliability values is 80 respondents from all DAOP PT KAI. Calculation of the validity value by using construct validity for the PT Kereta Api (Persero) e-boarding customer satisfaction questionnaire is valid. In the reliability calculation, the technique used is split-half reliability with a reliability value of 0.9896 or has very high reliability criteria. Based on the results of the calculation of validity and reliability that have been done, the questionnaire as a measurement tool for assessing customer satisfaction on e-boarding PT Kereta Api Indonesia (Persero) has a valid value and has a very high reliability so that it can be used as a tool to measure customer satisfaction on the e- boarding on KAI Access at PT Kereta Api Indonesia (Persero). Suggestions that can be done for further research is to calculate the reliability of each aspect contained in the use questionnaire.

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