E-boarding KAI access summative usability analysis with adoption of USE questionnaire

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Abstract. PT Kereta Api Indonesia (KAI) is a State-Owned Enterprise that regulates and manages railroad transportation services in Indonesia. PT KAI focused on becoming the best railroad service provider by meeting stakeholder's expectations. In its development, PT KAI launched the KAI Access Application in 2014. KAI Access is an Official Mobile Application to help prospective passengers obtain information and make train ticket reservations online. E-Boarding Pass is one of the features in the KAI Access application that can be operated two hours before the train departure schedule. Summative usability analysis is applied to measure the level of compatibility between the functional system and its focus. This study uses the USE Questionnaire Method as a parameter in usability measurement. The assessment criteria used are usefulness, ease of use, ease of learning, and satisfaction. The results showed that usability was in the "high" standards with a value of 79.6%. The study conducted in 9 Indonesian Railroad Operation Areas (DAOP) of PT KAI with the results of the usefulness criterion 80.9%, the ease of use criterion 77.7%, the ease of learning criterion 80.4%, and the satisfaction criterion 79.4%.

1. Introduction

Kereta Api Indonesia (KAI) is a state-owned enterprise in land transportation in the form of rail transportation. KAI has a long history ranging from a Djawatan Kereta Api (DKA), Perusahaan Negara Kereta Api (PNKA), Perusahaan Jawatan Kereta Api (PJKA), Perusahaan Umum Kereta Api (Perumka) to become a limited liability company of PT Kereta Api (Persero). The name change occurred again in 2011 to become PT Kereta Api Indonesia Persero or commonly called PT KAI. PT KAI performs several activities other than passenger transport, namely tourism services, catering, and logistics related to the train. Passenger trains owned by PT KAI serve commercial, non-commercial, and local railways on Java and Sumatera. PT KAI also has several trains, among other executive trains, business, mix, economy, regional, and commuter lines [1].

PT KAI must be the best railway service provider with a focus on customer service and meeting stakeholder's expectations. This can be achieved by conducting business practices and organizational models based on four main pillars: safety, timeliness, service, and convenience [1]. In addition to the 4 main posts, PT KAI has a corporate culture based on 5 key values: integrity, professionalism, safety, innovation, and excellent service [2]. When viewed from its development side, PT KAI performs various designs by always developing new ideas, performing sustainable corrective actions, and creating an environment to create value for stakeholders.

According to President Director of PT KAI, Edi Sukmoro, PT KAI provides innovations that are not separated from people's needs in 5 years. This innovation is a source of inspiration for improvement in
various aspects. PT KAI explores a variety of potential services with expectations that can meet the needs of the passengers. Innovation in technology that has been built since 2014 is launching the KAI Access application. KAI Access is an Official Mobile Application to make it easy for customers to obtain information and make train ticket reservations online [3].

The latest innovation in the ticketing system of PT KAI is one of the strategies in dealing with public service paradigm shifts. The paradigm shift in question is a change from "Old public Administration" to "New Public Service". According to Dwiyanto, "New Public Service" is a public service that can fulfill the community's importance and added value [4].

To implement "New Public Service", PT KAI in all DAOP get instruction by official letter to improve service and boarding. The order is contained in the instruction of Board of Directors Number 15/LL. 006/KA-2012 about service improvement and boarding at the station. Based on these instructions, all DAOP is obliged to implement them. In this case, a problem arises after the implementation of the boarding pass innovation. The problem arises in the event of a decline of passengers after such innovation in some DAOP [5]. It is the interest to study KAI Access's usability to know the satisfaction and input of KAI Access users.

KAI Access has a wide range of features, such as online cancellation, online schedule change, local train ticket purchase, train ticket purchase 1 hour before departure, E-Boarding Pass, and E-wallet [6]. Based on a variety of features, the study focuses on one feature: the E-Boarding Pass. E-Boarding Pass is one of the KAI Access applications features that can be operated 2 hours before the scheduled train departure [7]. This feature makes it easier for potential passengers not to queue and only print boarding passes on the CIC machine (check-in counter). Prospective passengers simply show the e-boarding pass on the mobile phone to the boarding officer. This feature can only be used for KAI ACCESS app users.

Based on the results of the questionnaire, it is known that most people do not understand the features in KAI access. Another issue that occurs in the E-boarding pass is if the internet network is interrupted, e-boarding is inaccessible. Error boarding pass machine and or smartphone can also cause ticket or e-boarding pass is not detected so it cannot be able to check-in via e-boarding pass. This causes passengers to print manually and passengers reluctant to use the boarding pass at a later time. Some of these issues indicate that it is necessary to measure usability e-boarding passes to better train passengers' needs.

The measurement of e-boarding pass usability needs to be done because usability has an important role in a system. The system is considered good if the system matches the prospective passenger and usability has a close relationship with the user experience [8]. The definition of usability according to ISO 9241 shows the success of the system in achieving goals that are effective, efficient, and satisfying prospective passengers. According to Tom and Bill, usability has two types: formative usability and summative usability [9]. Usability is used to measure quality when prospective passengers as users face a user interface system. Based on the explanation, usability is also a major determining factor in measuring the success of a system [10]. The usability of the system itself can also determine the age of a system. The higher the level of usability of a system, the longer the system life. It is inversely proportional if the system usability level is low. Low usability can make the system neglected or not reused [11]. When discussing usability, it is important to distinguish between summative usability goals and practices [12].

Usability measurement can be done using several methods using the USE Questionnaire [8]. Usability measurement of a product software has become an important purpose within the development of a product. It seeks to avoid the redesign that is translated in more difficult learning and lost effectiveness for the realization of the tasks [13][14].

Research on measuring usability is done by testing aspects of learnability, flexibility, effectiveness, and attitude. Results of usability values achieved by 98.54%. This study has a percentage of usability values that the community can receive well [15]. Study on usability testing on Android applications has also been carried out and resulted in usability values above 3. The results indicate that the application is acceptable to the user. Increased levels of usability influence application acceptance because the application is easy to remember, so it has the effect of receiving such applications [16]. Use questionnaire can be used for voluntarily, picked up quickly with as little training. This method provides
a lot of information about which aspects of the system are upgraded can make for a better version of the application [17]. Furthermore, this study shows that a design approach can improve product usage satisfaction to improve communication with social consumer [18].

Based on some of these studies, this study was conducted using the USE questionnaire method to analyze the summative usability of KAI Access e-boarding. The use of summative usability is appropriate to be used in this study because summative usability is assessed from user satisfaction with existing applications [19].

2. Methods
This study identifies the problem of measuring usability from KAI Access e-Boarding pass based on the USE Questionnaire. Furthermore, analysis of data needs by determining criteria for measuring the e-boarding pass usability of KAI Access. This study's criteria consist of 4 criteria: usefulness, Ease of Use, Ease of Learning, and Satisfaction. This research population is the prospective passengers who use the KAI Access e-boarding pass from DAOP I to DAOP IX. The population measured from this study is employment, travel destination, age, and time frame for using the system. The samples used are incidental: sampling techniques by chance, in a sense, that this study used 2 data dissemination techniques, namely online and directly at the railway station for DAOP I to DAOP IX.

Based on Isaac and Michael the exact number of sample members in the study is based on sampling error. If the greater the error rate, then the smaller the number of samples required and the smaller the error rate, the larger the number of sample members required as the data sources [20]. This research uses a 5% error rate. The formula of Isaac and Michael is:

$$S = \frac{\lambda^2 N P Q}{d^2 (N-1) + \lambda^2 P Q}$$

Where,
S = sample number
$\lambda^2$ = Chi squared (3.841)
N = total population
P = correct odds (0.5)
Q = wrong odds (0.5)
D = difference between average samples with an average population

Calculation of sample count on DAOP I:

$$S = \frac{(3.841)(85)(0.5)(0.5)}{(0.05)^2 (85 - 1) + (3.841)(0.5)(0.5)} = \frac{81.62}{1.17} = 69.75 \approx 70$$

Calculate the number of samples with the same formula in each DAOP until the sample value appears, as shown in Table 1.

| Description | Number of population | Number of samples |
|-------------|----------------------|-------------------|
| DAOP I      | 85                   | 70                |
| DAOP II     | 50                   | 44                |
| DAOP III    | 40                   | 36                |
| DAOP IV     | 50                   | 44                |
| DAOP V      | 120                  | 92                |
| DAOP VI     | 80                   | 66                |
| DAOP VII    | 25                   | 24                |
| DAOP VIII   | 50                   | 44                |
| DAOP IX     | 20                   | 19                |

Table 1 indicates the number of sample research data for each DAOP. Samples taken from each DAOP are representations or representatives of data processed in the study. After determining the
criteria, population and samples for this study, the reliability test's subsequent stages were carried out using Cronbach Alpha \([21]\). The formula of Cronbach Alpha is given by equation 2.

\[
 r = \frac{k}{(k-1)} \times \left[ 1 - \frac{\sum \sigma_{b}^2}{\sigma_{t}^2} \right]
\]  

(2)

Where

- \(r\) = instrument reusability coefficient of Cronbach Alpha
- \(k\) = number of question points
- \(\sum \sigma_{b}^2\) = total variance of grains
- \(\sigma_{t}^2\) = total variance

Reliability calculations in DAOP I:

\[
r = \left[ \frac{30}{(30-1)} \right] \times \left[ 1 - \frac{31.227}{659.554} \right] = 0.986
\]

Perform reliability calculations with the same formula on each DAOP until the sample value appears as shown in Table 2.

**Table 2. Table Testing with Cronbach Alpha**

| Description | Cronbach Alpha Test | Reliability level >0.60 |
|-------------|---------------------|------------------------|
| DAOP I      | 0.986               | Valid                  |
| DAOP II     | 0.983               | Valid                  |
| DAOP III    | 0.982               | Valid                  |
| DAOP IV     | 0.984               | Valid                  |
| DAOP V      | 0.981               | Valid                  |
| DAOP VI     | 0.981               | Valid                  |
| DAOP VII    | 0.984               | Valid                  |
| DAOP VIII   | 0.971               | Valid                  |
| DAOP IX     | 0.984               | Valid                  |

Table 2 shows testing with the Cronbach Alpha method, this test is done so that the instrument can be trusted as a data collection tool and able to disclose the actual information field. An instrument is said to be reliable if the answer to the statement is always consistent over time. The test results showed a high degree of reliability due to the value of the criteria coefficient \(\geq 0.60\) so it can be said every DAOP in this research is reliable.

**Table 3. Comparison results with R table**

| Description | Number of Sample | Cronbach Alpha Test | R Table |
|-------------|------------------|---------------------|---------|
| DAOP I      | 70               | 0.986               | 0.232   |
| DAOP II     | 44               | 0.983               | 0.291   |
| DAOP III    | 36               | 0.982               | 0.320   |
| DAOP IV     | 44               | 0.984               | 0.291   |
| DAOP V      | 92               | 0.981               | 0.203   |
| DAOP VI     | 66               | 0.981               | 0.239   |
| DAOP VII    | 24               | 0.984               | 0.388   |
| DAOP VIII   | 44               | 0.971               | 0.291   |
| DAOP IX     | 19               | 0.984               | 0.433   |

Table 3 shows the R table value based on the number of samples per DAOP with a significant level of \(\alpha = 0.05\). From the Cronbach Alpha test results above the \(R\) count > \(R\) table for each DAOP. This comparison shows significant results so that the reliability of the instrument is good and trustworthy. Next, the respondent data collected for each DAOP is processed and analysed the result. After the data is processed, it generates an analysis of the KAI Access e-boarding system.
3. Result and discussion
This study uses data collection method with the questionnaire based on the USE questionnaire for all DAOP in Indonesia. Data is collected in stages both online and directly visiting each DAOP KAI. The result is the USE Questionnaire and Summative Usability Analysis Results.

3.1 The Result of the USE Questionnaire Analysis
This study used a questionnaire to measure the usability of the KAI Access e-boarding pass system. The USE questionnaire method can provide information about the usability of the system and illustrates the suitability of the system with the needs. The USE Questionnaire has 4 criteria namely usefulness, ease of use, ease of learning, and satisfaction. Measurements were made by distributing questionnaires to respondents. After the questionnaire is distributed, mapping data is carried out by distributing respondents based on DAOP. Next, specify the Maximum Value, Total Value, and the Average for the USE questionnaire criteria.

The initial step in usability testing is to provide several tasks that have been prepared before the distribution of questionnaires to respondents. This task is given online or directly to the respondents. The tasks given to the respondent are:

a) Have you ever used the e-boarding feature on the KAI Access app?
b) If you have, please access your e-boarding pass;
c) Perform a barcode scan for scheduled departures.

Respondents were certain to have used the KAI Access application and needed boarding passes through the application, the next step was to distribute questionnaires to respondents online or directly for each DAOP KAI. Respondents fill out the questionnaire based on their experience of using, seeing, and feeling the given tasks. Each question in the questionnaire is based on the USE questionnaire consisting of 4 criteria: usefulness, Ease of Use, Ease of Learning, and Satisfaction [22]. The questionnaire question's preparation question is as follows: Arrange questionnaire questions concerning the use questionnaire method with 30 questions. Next, perform a reliability test with the Cronbach Alpha method, shown in Table 2, and generating a reliability value of 0.982. Based on the reliability testing results, the questionnaire presented can be used as a measuring instrument to analyse the usability of boarding pass system's usability on KAI Access.

3.2 The Results of Summative Usability Analysis
After distributing the questionnaire to the respondent, the calculation of the questionnaire results is then performed. The calculation of the usability value of each variable has the following stages:

a. The first stage is finding the max value of each DAOP for each criterion, this max value indicates the value expected by the developer for the satisfaction of a system. Max value is obtained from the number of samples x expected value x number of questions.

b. The second stage is calculating the total value of each criterion. The Total value indicates the value obtained after the distribution of the questionnaire to the respondent. Total value is obtained from sum up the whole value of each question.

c. The third stage is to assess each criterion at each DAOP. The criteria assessment shows the value generated after knowing the Max and the total value of the respondent. The criteria assessment obtained from: Total value divided by Max value multiplied by 100%. The criteria assessment of each DAOP can be seen in Table 4.

Table 4. The criteria assessment of each DAOP

| Criteria                  | DAOP 1 | DAOP 2 | DAOP 3 | DAOP 4 | DAOP 5 | DAOP 6 | DAOP 7 | DAOP 8 | DAOP 9 |
|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| E-boarding Usefulness     | 0.831  | 0.824  | 0.863  | 0.811  | 0.814  | 0.805  | 0.774  | 0.783  | 0.776  |
| (USE)                     |        |        |        |        |        |        |        |        |        |
| E-boarding Ease of Use    | 0.794  | 0.798  | 0.839  | 0.781  | 0.778  | 0.768  | 0.736  | 0.761  | 0.744  |
| (EOU)                     |        |        |        |        |        |        |        |        |        |
d. The fourth stage is to calculate the average for all variables in each DAOP. The average calculation result of all variables in each DAOP can be seen in Table 5.

Table 5. The results of the average calculation of all variables for each DAOP

| Criteria                  | DAOP 1 | DAOP 2 | DAOP 3 | DAOP 4 | DAOP 5 | DAOP 6 | DAOP 7 | DAOP 8 | DAOP 9 |
|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| E-boarding Ease of Learning (EOL) | 0.827  | 0.807  | 0.861  | 0.810  | 0.801  | 0.798  | 0.769  | 0.790  | 0.773  |
| E-boarding Satisfaction (SAT)     | 0.809  | 0.802  | 0.854  | 0.799  | 0.794  | 0.775  | 0.764  | 0.776  | 0.776  |

e. The fifth stage is to calculate the average for all criteria in each DAOP. Table 6 shows the average calculation results for all criteria for each DAOP.

Table 6. The Results of the average calculation of all criteria for each DAOP

| Criteria  | DAOP 1 | DAOP 2 | DAOP 3 | DAOP 4 | DAOP 5 | DAOP 6 | DAOP 7 | DAOP 8 | DAOP 9 |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| USE       | 0.815  |        |        |        |        |        |        |        |        |
| EOU       | 0.808  |        |        |        |        |        |        |        |        |
| EOL       | 0.800  |        |        |        |        |        |        |        |        |
| SAT       | 0.797  |        |        |        |        |        |        |        |        |
|           | 0.786  |        |        |        |        |        |        |        |        |
|           | 0.761  |        |        |        |        |        |        |        |        |
|           | 0.777  |        |        |        |        |        |        |        |        |
|           | 0.767  |        |        |        |        |        |        |        |        |

f. The last step is calculating the level of usability. This level of usability shows the value generated after obtaining the entire questionnaire, the max value, and the total value. The level of usability can be shown in Table 7.

Table 7. The level of usability

| Correlation coefficient | Reliability criteria |
|-------------------------|----------------------|
| 0.81 < r ≤ 1.00         | Very high            |
| 0.61 < r ≤ 0.80         | High                 |
| 0.41 < r ≤ 0.60         | Neutral              |
| 0.21 < r ≤ 0.40         | Low                  |
| 0.00 < r ≤ 0.21         | Very low             |

4. Conclusion

Form of reliability testing deduce reliability of 0.982 which means the reliability of the instrument is good and trustworthy. The usability measurements performed in this study used 4 criteria. The four criteria are obtained from 9 DAOP KAI Indonesian. As a result of the usefulness criteria with a percentage of 80.9%, the criteria of ease of use with a percentage of 77.7%, the criteria of ease of learning with percentages of 80.4%, and variable satisfaction criteria with a percentage of 79.4%. Besides, usability levels indicate a value of 79.6% or the equivalent of "high" value. This illustrates that the KAI Access e-boarding pass feature is eligible and suitable for user needs.

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