ISSN 2085-4579

Usability Evaluation of Ticket Purchasing Applications, Case Study Public Railways in Indonesia

Lisana Lisana*[1], Dea Almira Bena[2], Jessica Levina Sutanto[3], Evan Novandyanta[4], Kevin [5]
[1,2,3,4,5] Department of Informatics Engineering, University of Surabaya, Surabaya, Indonesia
*Email: lisana@staff.ubaya.ac.id

Accepted on April 04th, 2024
Approved on May 16th, 2024

***Abstract*— This study is an experimental research aimed at evaluating the usability of a mobile-based application used to facilitate passengers in purchasing train tickets. Currently, the ratings and comments on the Play Store indicate that users are experiencing a poor user experience with the ticket purchasing application. As an application widely used by the public, the usability evaluation is essential. The evaluation was conducted in a laboratory setting by measuring usability in three aspects: effectiveness, efficiency, and user satisfaction. The level of effectiveness and efficiency was measured using task analysis, analyzing the final results of each respondent after performing five predetermined tasks. The system usability scale method was used to determine the user satisfaction level. The measurement involved 10 respondents who actively use the application. The results show that the effectiveness and efficiency of the application are good. However, the measurement of user satisfaction aspect indicates less favorable results. This obviously results in poor user experience (UX) for users. Therefore, the practical implication of this study is the need for improvements to the application, both in the user interface (UI) and existing business processes, to enhance the user experience.**

***Index Terms*—ticket; system usability scale; testing; usability**

I. INTRODUCTION

Transportation is an essential means in daily life, facilitating people to travel anywhere. One of the public transportation options is the train. According to [1], transportation is an effort to move goods and/or passengers from one origin location to a destination location. One of the transportation modes in Indonesia is the train. The government provides train transportation services managed by Badan Usaha Milik Negara (BUMN), namely PT Kereta Api Indonesia (Persero). The Badan Pusat Statistik (BPS) reported that in September 2023, there were approximately 31.5 million train passengers in Indonesia [2]. Meanwhile, if calculated from January to September 2023, the number had reached 270 million train passengers. Compared to the data for the same period in 2022, this figure represents a 40% increase [2].

Currently, train tickets can be purchased at various locations such as train station counters, Alfamart, and Indomaret. Additionally, there are several applications available for purchasing train tickets online, including Traveloka, Shopee, and several other similar applications. Therefore, to facilitate passengers in purchasing train tickets, PT Kereta Api Indonesia officially released a mobile-based application. This application was first launched on September 10, 2023. Data from kai.id website shows that the number of users using the ticket purchasing application is approximately 12.4 million registered users [3]. Among these application users, there are approximately 6.1 million active users, including premium members. The data indicates that during the period from January to June 2023, there were 9.2 million (62%) train ticket bookings made through the application.

Furthermore, data from the Play Store indicates that more than ten million users have downloaded the ticket purchasing application. The application is expected to be a modern solution for train users to facilitate train travel with innovative features. Additionally, this application is a digital-based innovation from KAI equipped with reliable technology, a fun and youthful user interface, as well as various feature enhancements and seamless services. All of these are expected to enhance the user experience.

The success of an application depends not only on its advanced features but also on how easy it is to use [4][5]. Users should be able to interact with the application quickly and effectively. A usable application can reduce user frustration, increase efficiency, and reduce the time required to learn how to use it [6]. Usability heavily relies on easy-to-understand design, clear navigation, and consistent layout and icons [7]. An application must have good usability to attract users, increase retention, and provide a positive user experience (UX) [8].

However, data from the Play Store indicates that the ticket purchasing application has received a rating of 2.3 out of 5. Several user reviews suggest that the app's UI and UX are problematic. Specific issues reported by

users include a complicated payment system, the absence of an option to view seat orientation (front or back), and the lack of a feature to display travel history. These reviews suggest that users currently have poor user experience with the application.

Therefore, this research proposes the following research question: R1 Does the ticket purchasing application offer users an effective and efficient process?; R2. How satisfied are users with their experience using the ticket purchasing application? The results obtained will indicate whether users have a good user experience (UX) when using the application. Usability testing is crucial because the ticket purchasing application is widely used by train users for public transportation in Indonesia. In addition to testing the effectiveness and efficiency of the application, this research will also measure user satisfaction levels using the system usability scale method. The method has been widely used by researchers to measure usability scales in various applications, including Microsoft Teams [9], mobile-based learning applications [10], and augmented reality-based learning applications [11].

II. LITERATURE REVIEW

Usability is an important characteristic of any application, as it directly affects the application's overall quality. Consequently, numerous studies have focused on usability, though they remain relatively limited. An experiment conducted by [12] assessed the usability of a web-based application by examining three key aspects: effectiveness, efficiency, and satisfaction. Similarly, a study by [13] tested the usability of a mobile-based learning application using both undergraduate and postgraduate students as the respondents. Moreover, usability testing has been shown to enhance the quality of electronic health (eHealth) applications, making them more easily adopted by users [14][15].

More specific usability research has explored user satisfaction by utilizing a system usability scale. Researchers [16] compared scores of system usability scale among various mobile-based social media applications. Additionally, a systematic review summarized the use of system usability scale to measure usability in different educational applications [5]. The system usability scale method has also been adopted to evaluate the usability of mobile-based health applications [17][19]. During the Covid-19 pandemic, system usability scale was also employed to measure the usability of the Microsoft Teams application [9].

III. METHODOLOGY

This study is an experimental research aimed at examining user experience through usability testing carried out in a laboratory setting. The measurement will be based on three aspects including Effectiveness, Efficiency, and User Satisfaction [12][18]. Testing of all these aspects is carried out using the task analysis method, which involves inviting respondents who are the target users of the ticket purchasing application to perform a series of tasks. The respondents involved are users of train transportation services who are accustomed to purchasing train tickets directly at the counter or through other applications but have never used the ticket purchasing application before.

Next, in conducting task analysis, a task list is created to serve as a tool for measuring the Effectiveness and Efficiency aspects of the ticket purchasing application. There are five tasks that each respondent must complete. These five tasks involve using the main features of the application that users will utilize when purchasing train tickets. The details of these five tasks are as follows:

A. Task 1

Viewing train schedules is a crucial step before purchasing tickets. Viewing schedules on the ticket purchasing application is used to check availability, select suitable times, and make better travel plans. In Task 1, respondents are expected to view the train schedule from Gubeng Surabaya Station to Jember Station, with the date set to one day after the task is performed. The expected steps for each respondent to complete Task 1 are shown in Figure 1.

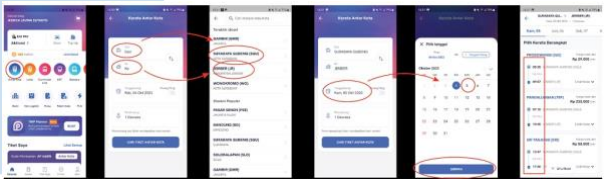

Fig. 1. Steps of Task 1

B. Task 2

Booking train tickets is a primary feature of this application. This feature provides information about ticket availability, various class options, as well as seat and meal selection. In Task 2, respondents have to book train tickets. Task 2 is a continuation of Task 1. Respondents are required to view the train schedule, choose one of the schedules, and proceed to the payment stage. Respondents do not need to pay for the ticket but only to complete the ticket booking. The steps for Task 2 can be seen in Figure 2.

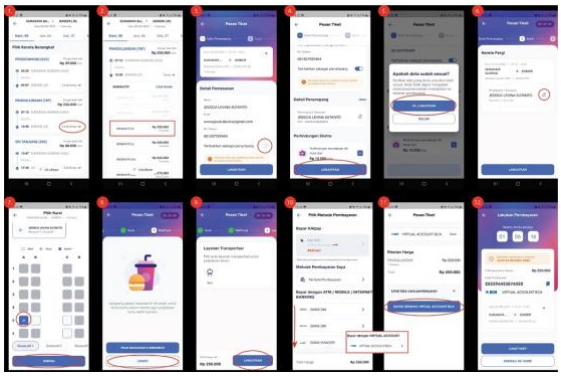

Fig. 2. Steps of Task 2

C. Task 3

The feature to view booked tickets is included as one of the most important features of this application. Users are required to show proof of booking in the form of an e-boarding pass to the inspector when boarding. Therefore, in Task 3, respondents are asked to view the tickets that have been booked in the previous Task 2. The steps for Task 3 can be seen in Figure 3.

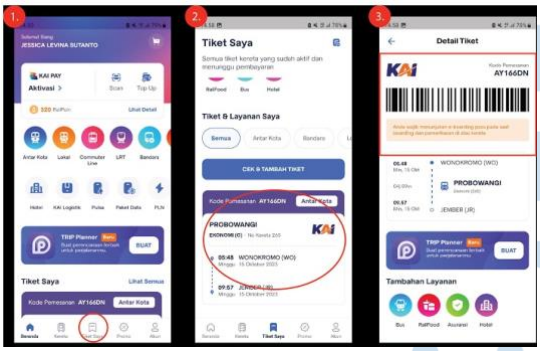

Fig. 3. Steps of Task 3

D. Task 4

For users, viewing booking history is a useful tool for future reference, serves as confirmation and evidence of previous travel details, and tracks expenses and personal preferences. In Task 4, respondents are expected to view the booking history of tickets that have been previously purchased. There are 2 ways to complete this task. The first scenario for completing Task 4 can be seen in Figure 4. Meanwhile, the second scenario can be observed in Figure 5.

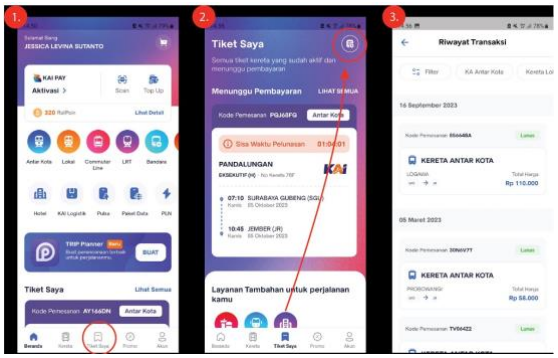

Fig. 4. Steps of Task 4 (1st scenario)

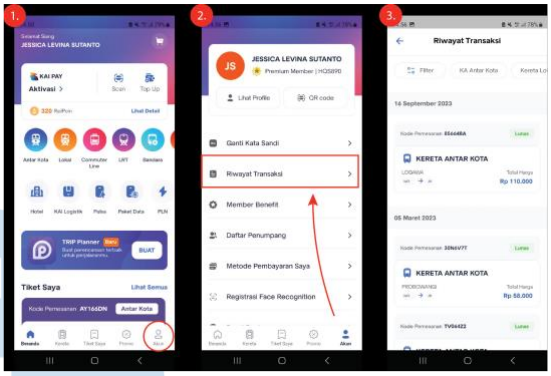

Fig. 5. Steps of Task 4 (2nd scenario)

E. Task 5

The profile feature allows users to access and manage their personal information easily, enabling users to validate their identity. In Task 5, respondents need to view their profile on the application. Respondents are advised to log in or create an account before starting Task 5. The steps for Task 5 can be seen in Figure 6.

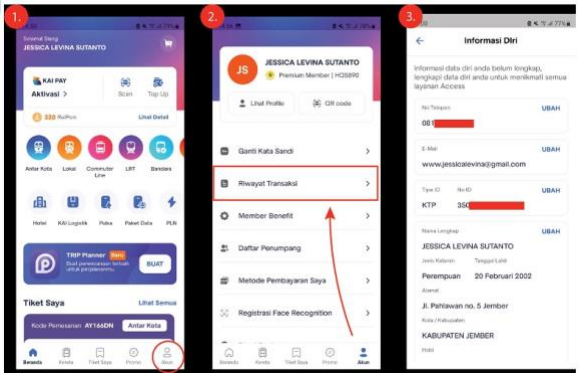

Fig. 6. Steps of Task 5

Furthermore, to measure the level of user satisfaction, the system usability scale measurement instrument is used. Respondents have to indicate whether they agree or disagree with 10 provided statements [19]. The system usability scale score results will determine the level of user satisfaction with the application.

IV. RESULT AND DISCUSSION

A. Respondent Profile

This study involves 10 respondents following the guidelines from [20]. The characteristics of these 10 respondents are that there are six (60%) females and four (40%) males. Figure 7 shows the profile of respondents based on gender.

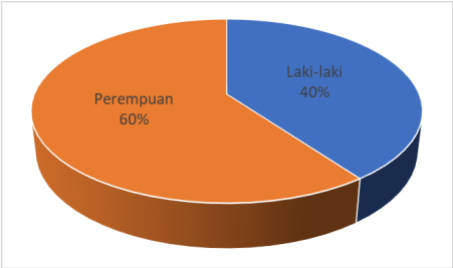

Fig. 7. Respondent profile based on gender

Based on age, there are 7 respondents aged between 21 to 30 years old (70%), while 3 respondents are over thirty years old (30%). The percentage breakdown of both age groups can be seen in Figure 8.

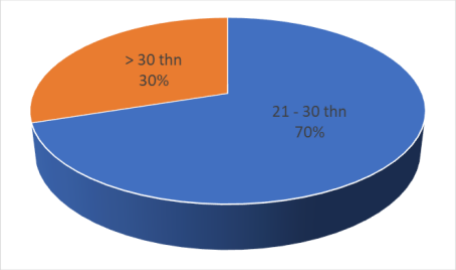

Fig. 8. Respondent profile based on age

B. Task Analysis Results

This section provides a detailed explanation of the results obtained after all respondents completed all the specified tasks. The final score is obtained from the calculation of the average completion time of tasks by all respondents. Each task has a maximum completion limit depending on the difficulty of the given task. The completion results of each task by the 10 respondents will be explained as follows:

1. Task 1: The completion time limit for this task is 60 seconds. The final score indicates that the average time taken by respondents to complete Task 1 is 28.82 seconds. One respondent failed to complete this task.

2. Task 2: The completion time limit for the task given to respondents is 90 seconds. The final score indicates that the average time taken by respondents to complete Task 2 is 55.91 seconds. One respondent failed to complete this task.

3. Task 3: Respondents were given a maximum of 10 seconds to complete this task. The final score indicates that the average time taken by respondents to complete Task 3 is 6 seconds. Three respondents failed to complete this task.

4. Task 4: The time limit given to respondents to complete this task is 30 seconds. The final score indicates that the average time taken by respondents to complete Task 4 is 20.45 seconds. Four respondents failed to complete this task.

5. Task 5: The completion time limit for this task is 10 seconds. The final score indicates that the average time taken by respondents to complete Task 5 is 5 seconds. One respondent failed to complete this task.

C. Effectiveness Measurement

Effectiveness is the accuracy of users in achieving the specified goals. To calculate the effectiveness, this study uses the formula proposed by [21] as follows:

$$Effectiveness = \frac{\text{Number of tasks completed successfully}}{\text{Total number of tasks undertaken}} \times 100\% \quad (1)$$

Based on the task completion results and the formula above, the effectiveness results for each task are quite good, as shown in Table I. All tasks have effectiveness values above 60%, with an average value of 80%. This indicates that the effectiveness of the ticket purchasing application is high [22].

TABLE I. EFFECTIVENESS RESULTS

No Task	Percentage
Task 1	9/10 * 100% = 90%
Task 2	9/10 * 100% = 90%
Task 3	7/10 * 100% = 70%
Task 4	6/10 * 100% = 60%
Task 5	9/10 * 100% = 90%

D. Time Based Efficiency Measurement

Time Based Efficiency measures the time used in an activity or process that can be optimally utilized to achieve the desired results. Time Based Efficiency is obtained using the following formula:

$$Time\ Based\ Efficiency = \frac{\sum_{j=1}^{R}\sum_{i=1}^{N}\frac{n_{ij}}{t_{ij}}}{NR} \quad (2)$$

N (total tasks) = 5
R (total respondents) = 10
Nij: The result of task i by user j; Nij = 1 if the user completes the task, otherwise Nij = 0

Tij: The time needed by user j to complete task i. If the respondent can not complete the task, then Tij = time the respondent quits the task

By using the formula above, we obtained a quite good result with a value of 1.320 goals/sec. This result shows that the ticket purchasing application is efficient.

E. User Satisfaction Measurement

User satisfaction level is measured using the system usability scale. The measurement consists of 10 questions that respondents must answer by ranking from 1 to 5 based on how much they agree with the given questions [23]. The details of the system usability scale questions are listed in Table II.

TABLE II. SYSTEM USABILITY SCALE QUESTION

No.	Question
1.	I will frequently use this application
2.	I feel this application is unnecessarily complex
3.	I find this application easy to use
4.	I need technical assistance to use this application
5.	I find a variety of features integrated well in this application
6.	I find many inconsistencies in this application
7.	I believe many users would be able to learn this application quickly
8.	I find this application very impractical to use
9.	I am very confident in using this application
10.	I need to learn a lot of things first to be able to use this application

Based on the provided guidelines, here is the calculation of the system usability scale score for the ticket purchasing application:

- For each of the odd-numbered questions, subtract 1 from the score.
- For each of the even-numbered questions, subtract their value from 5.
- All scores are then summed up, and the result is multiplied by 2.5 to obtain the system usability scale score.

After calculation, the value indicates that the system usability scale score for the ticket purchasing application is 65. Based on the guidelines from [24] as seen in Table III, a score of 65 can be interpreted as the user satisfaction level for the application is still low, as the application falls within the "poor" category. This will undoubtedly result in a subpar user experience. Therefore, improvements to the user interface of the application are necessary to enhance the user experience.

TABLE III. SYSTEM USABILITY SCALE INTERPRETATION

Score	Grade	Interpretation
> 80.3	A	Very Good
68 – 80.3	B	Good
68	C	Average
51 – 68	D	Poor
< 51	E	Very Poor

V. CONCLUSION

The objective of this study is to assess the usability of the ticket purchasing application, a mobile-based platform designed to assist passengers in purchasing train tickets. The assessment was conducted in three aspects: effectiveness, efficiency, and user satisfaction. The measurement results indicate that the effectiveness of the application is good with an average score of 80%. Additionally, the efficiency of the application is also quite good, as evidenced by the Time Based Efficiency score of 1.320 goals/sec and the Overall Relative Efficiency score of 72.18%. However, based on the system usability scale score obtained, user satisfaction with the ticket purchasing application is still low at 65. This can potentially lead to a subpar user experience for users.

Furthermore, this research provides practical guidance for government decision-makers on improving ticket purchasing applications. This can be achieved by optimizing the user interface (UI) and refining business processes to enhance the user experience. However, there are some limitations to this study. The evaluation of usability in Indonesian ticket purchasing applications might produce different results if replicated in other countries. Moreover, the sample size in this study was relatively small, suggesting the need for further research with a larger group of respondents.

REFERENCES

[1] L. Ge, S. Voß, and L. Xie, “Robustness and disturbances in public transport,” *Public Transport*, vol. 14, no. 1, pp. 191–261, Mar. 2022, doi: 10.1007/s12469-022-00301-8.

[2] B. P. S. Indonesia, “Jumlah Penumpang Kereta Api Pada September 2023 naik 0,62 persen,” Badan Pusat Statistik Indonesia, https://www.bps.go.id/id/pressrelease/2023/11/01/2044/jumlah-penumpang-kereta-api-pada-september-2023-naik-0-62-persen.html (accessed Dec. 25, 2023).

[3] Upgrade Aplikasi, KAI Lakukan Grand Launching Access. (2023, September 10). Diambil dari https://www.kai.id/information/full_news/5688-upgradeaplikasi-kai-lakukan-grand-launching-access.

[4] L. Lisana and M. F. Suciadi, “The Acceptance of Mobile Learning: A case study of 3D Simulation Android App for learning Physics,” *International Journal of Interactive Mobile Technologies*, vol. 15, no. 17, p. 205, Sep. 2021, doi: 10.3991/ijim.v15i17.23731.

[5] P. Vlachogianni and N. Tselios, “Perceived usability evaluation of educational technology using the System Usability Scale (SUS): A systematic review,” Journal of Research on Technology in Education, pp. 1–18, Feb. 2021, doi: https://doi.org/10.1080/15391523.2020.1867938.

[6] S. Yeni, K. Çağıltay, and N. Karasu, "Usability investigation of an educational mobile application for individuals with intellectual disabilities," *Universal Access in the Information Society*, vol. 19, no. 3, pp. 619–632, Jun. 2019, doi: 10.1007/s10209-019-00655-0.

[7] K. Majrashi, "Performance of mobile users with text-only and text-and-icon menus in seated and walking situations," Behaviour & Information Technology, pp. 1–19, Jul. 2020, doi: https://doi.org/10.1080/0144929x.2020.1795257.

[8] H. A. Sasono, E. Pramana, and L. Zaman P. C. S. W, "Continuance intention on gamifikasi in e-learning using extended expectation-confirmation model," EDUTEC : Journal of Education And Technology, vol. 6, no. 4, pp. 704–724, 2023. doi:10.29062/edu.v6i4.684

[9] D. Pal and V. Vanijja, "Perceived usability evaluation of Microsoft Teams as an online learning platform during COVID-19 using system usability scale and Technology Acceptance Model in India," Children and Youth Services Review, vol. 119, p. 105535, 2020. doi:10.1016/j.childyouth.2020.105535.

[10] G. E. Saputra, Rakhmi Khalida, and Ratu Nurmalika, "EVALUATION OF USER EXPERIENCE TLX TRAINING GATE FOR COMPETITIVE PROGRAMMING LEARNING USING USER EXPERIENCE QUESTIONNAIRE AND SYSTEM USABILITY SCALE," International Journal Science and Technology, vol. 1, no. 2, pp. 30–37, Jul. 2022, doi: https://doi.org/10.56127/ijst.v1i2.142.

[11] H. Huang and G. Liu, "Evaluating students' behavioral intention and system usability of augmented reality-aided distance design learning during the COVID-19 pandemic," Universal Access in the Information Society, Sep. 2022, doi: https://doi.org/10.1007/s10209-022-00920-9.

[12] J. M. Ferreira et al., "Impact of usability mechanisms: An experiment on efficiency, effectiveness and user satisfaction," Information and Software Technology, vol. 117, p. 106195, 2020. doi:10.1016/j.infsof.2019.106195

[13] N. N. N. Ahmad and M. M. Hussaini, "A usability testing of a higher education mobile application among postgraduate and undergraduate students," International Journal of Interactive Mobile Technologies, vol. 15, no. 09, p. 88, May 2021, doi: 10.3991/ijim.v15i09.19943.

[14] O. L. Aiyegbusi, "Key methodological considerations for usability testing of electronic patient-reported outcome (ePRO) systems," Quality of Life Research, vol. 29, no. 2, pp. 325–333, Oct. 2019, doi: 10.1007/s11136-019-02329-z.

[15] M. Broekhuis, L. Van Velsen, and H. Hermens, "Assessing usability of eHealth technology: A comparison of usability benchmarking instruments," International Journal of Medical Informatics, vol. 128, pp. 24–31, Aug. 2019, doi: 10.1016/j.ijmedinf.2019.05.001.

[16] A. Kaya, R. Ozturk, and Ç. A. Gümüşsoy, "Usability Measurement of Mobile Applications with System Usability Scale (SUS)," in Lecture notes in management and industrial engineering, 2019, pp. 389–400. doi: 10.1007/978-3-030-03317-0_32.

[17] W.-H. Cheah, N. M. Jusoh, M. M. T. Aung, A. A. Ghani, and H. M. A. Rebuan, "Mobile Technology in Medicine: Development and validation of an Adapted System Usability Scale (SUS) questionnaire and Modified Technology Acceptance Model (TAM) to evaluate user experience and acceptability of a mobile application in MRI safety screening," Indian Journal of Radiology and Imaging - New Series/Indian Journal of Radiology and Imaging/Indian Journal of Radiology & Imaging, vol. 33, no. 01, pp. 036–045, Dec. 2022, doi: 10.1055/s-0042-1758198.

[18] N. N. N. Ahmad, N. I. M. Hamid, and A. M. Lokman, "Performing usability evaluation on Multi-Platform based application for efficiency, effectiveness, and satisfaction enhancement," *International Journal of Interactive Mobile Technologies*, vol. 15, no. 10, p. 103, May 2021, doi: 10.3991/ijim.v15i10.20429.

[19] M. N. Islam, S. R. Khan, N. N. Islam, Md. Rezwan-A-Rownok, S. R. Zaman, and S. R. Zaman, "A Mobile Application for Mental Health Care During COVID-19 Pandemic: Development and Usability Evaluation with System Usability Scale," in *Advances in intelligent systems and computing*, 2021, pp. 33–42. doi: 10.1007/978-3-030-68133-3_4.

[20] J. R. Lewis and J. Sauro, "Usability and user experience: Design and evaluation," Handbook of human factors and ergonomics, pp. 972-1015, 2021, doi: 10.1002/9781119636113.ch38.

[21] J. Sauer, A. Sonderegger, and S. Schmutz, "Usability, user experience and accessibility: towards an integrative model," *Ergonomics*, vol. 63, no. 10, pp. 1207–1220, Jun. 2020, doi: 10.1080/00140139.2020.1774080.

[22] E. B. Prihastari and R. Widyaningrum, "The Effect of Microsoft Whiteboard-Assisted Environmental Mathematics towards Environmental Care Attitudes of Pre-Service Elementary School Teachers," Jurnal Pendidikan MIPA, vol. 23, no. 2, pp. 486–495, 2022, doi: https://doi.org/10.23960/jpmipa/v23i2.pp486-495.

[23] N. J. Clark, M. Dabkowski, P. J. Driscoll, D. Kennedy, I. Kloo, and H. Shi, "Empirical decision rules for improving the uncertainty reporting of small sample system usability scale scores," *International Journal of Human-computer Interaction*, vol. 37, no. 13, pp. 1191–1206, Jan. 2021, doi: 10.1080/10447318.2020.1870831.

[24] O. Alhadreti, "Assessing Academics' Perceptions of Blackboard Usability Using SUS and CSUQ: A Case Study during the COVID-19 Pandemic," *International Journal of Human–Computer Interaction*, vol. 37, no. 11, pp. 1003–1015, Dec. 2020, doi: https://doi.org/10.1080/10447318.2020.1861766.

UMN
ULTIMA InfoSys
Jurnal Sistem Informasi
e-ISSN : 2549-4015
p-ISSN : 2085-4579

Ultima InfoSys : Jurnal Ilmu Sistem Informasi is a Journal of Information Systems which presents scientific research articles in the field of Information Systems, as well as the latest theoretical and practical issues, including database systems, management information systems, system analysis and development, system project management information, programming, mobile information system, and other topics related to Information Systems. ULTIMA InfoSys Journal is published regularly twice a year (June and December) by Faculty of Engineering and Informatics in cooperation with UMN Press.

Online ISSN: 2549-4015
Print ISSN: 2085-4579

Author Guidelines
Focus and Scope
Submissions Guideline
Editorial Board
Peer Reviewer
Publication Ethics Policy
Contact Us

ULTIMA InfoSys
Jurnal Sistem Informasi
e-ISSN : 2549-4015
p-ISSN : 2085-4579

Editorial Board

Author Guidelines
Focus and Scope
Submissions Guideline
Editorial Board
Peer Reviewer
Publication Ethics Policy
Contact Us
AI Ethnics and Procedures
Reviewers
Open Access Policy
Copyright Notice & Lincensing

Perceived Usability Evaluation of Ticket Purchasing Apps

by Infosys 3566

Submission date: 05-Apr-2024 08:29AM (UTC+0700)
Submission ID: 2340316379
File name: 3566-Article_Text-14842-1-2-20240404.doc (1.66M)
Word count: 2939
Character count: 16091

Perceived Usability Evaluation of Ticket Purchasing Apps: A Case Study

Accepted on mmmmm dd, yyyy
Approved on mmmmm dd, yyyy

***Abstract*— This study aims to evaluate the usability of a mobile-based application used to facilitate passengers in purchasing train tickets, the Access by KAI application. As an application widely used by the public, the usability evaluation is essential. The evaluation was conducted by measuring usability in three aspects: effectiveness, efficiency, and user satisfaction. The measurement involved 10 respondents who actively use the application. They performed the experiment at the usability laboratory. The level of effectiveness and efficiency was measured using task analysis, analyzing the final results of each respondent after performing the predetermined tasks. The results show that the effectiveness and efficiency of the application are good. However, the measurement of user satisfaction aspect using the SUS (System Usability Scale) method indicates less favorable results. This obviously results in poor user experience (UX) for users. Therefore, the practical implication of this study is the need for improvements to the application, both in the user interface (UI) and existing business processes, to enhance the user experience.**

***Index Terms*—Access by KAI; SUS; system usability scale; testing; usability**

I. INTRODUCTION

Transportation is an essential means in daily life, facilitating people to travel anywhere. One of the public transportation options is the train. According to [1], transportation is an effort to move goods and/or passengers from one origin location to a destination location. One of the transportation modes in Indonesia is the train. The government provides train transportation services managed by Badan Usaha Milik Negara (BUMN), namely PT Kereta Api Indonesia (Persero). The Badan Pusat Statistik (BPS) reported that in September 2023, there were approximately 31.5 million train passengers in Indonesia [2]. Meanwhile, if calculated from January to September 2023, the number had reached 270 million train passengers. Compared to the data for the same period in 2022, this figure represents a 40% increase [2].

Currently, train tickets can be purchased at various locations such as train station counters, Alfamart, and Indomaret. Additionally, there are several applications available for purchasing train tickets online, including Traveloka, Shopee, and several other similar applications. Therefore, to facilitate passengers in purchasing train tickets, PT Kereta Api Indonesia officially released an application called Access by KAI. This application was first launched on September 10, 2023. Data from kai.id website shows that the number of users using the KAI Access application is approximately 12.4 million registered users [3]. Among these application users, there are approximately 6.1 million active users, including premium members. Furthermore, the data indicates that during the period from January to June 2023, there were 9.2 million (62%) train ticket bookings made through the KAI Access application.

Data from the Play Store indicates that more than ten million users have downloaded the Access by KAI application. The Access application is expected to be a modern solution for train users to facilitate train travel with innovative features. Additionally, this application is a digital-based innovation from KAI equipped with reliable technology, a fun and youthful user interface, as well as various feature enhancements and seamless services. All of these are expected to enhance the user experience.

However, the success of an application depends not only on its advanced features but also on how easy it is to use [4][5]. Users should be able to interact with the application quickly and effectively. A usable application can reduce user frustration, increase efficiency, and reduce the time required to learn how to use it [6]. Usability heavily relies on easy-to-understand design, clear navigation, and consistent layout and icons [7]. An application must have good usability to attract users, increase retention, and provide a positive user experience (UX) [8].

Therefore, this research aims to conduct usability testing of the Access by KAI application. The results obtained will indicate whether users have a good user experience (UX) when using the application. Usability testing is crucial because the Access by KAI application is widely used by train users for public transportation in Indonesia. In addition to testing the effectiveness and efficiency of the application, this research will also measure user satisfaction levels using the System Usability Scale (SUS) method. The SUS method has been widely used by researchers to measure usability scales in various applications, including Microsoft Teams [9], mobile-based learning applications [10], and augmented reality-based learning applications [11].

II. METHODOLOGY

This study is an experimental research aimed at examining user experience through usability testing carried 22 in a laboratory setting. The measurement will be based on three aspects including Effectiveness, Efficiency, and User Satisfaction [12][13]. Testing of all these aspects is carried out using the task analysis method, which involves inviting respondents who are the target users of the Access by KAI application to perform a series of tasks. The respondents involved are users of train transportation services who are accustomed to purchasing train tickets directly at the counter or through other applications but have never used the Access by KAI application before.

Next, in conducting task analysis, a task list 8 created to serve as a tool for measuring the Effectiveness and Efficiency aspects of the Access by KAI application. There are five tasks that each respondent must complete. These five tasks involve using the main features of the application that users will utilize when purchasing train tickets. The details of these five tasks are as follows:

A. *Task 1*

Viewing train schedules is a crucial step before purchasing tickets. Viewing schedules on Access by KAI is used to check availability, select suitable times, and make better travel plans. In Task 1, respondents are expected to view the train schedule from Gubeng Surabaya Station to Jember Station, with the date set to one day after the task is performed. The expected steps for each respondent to complete Task 1 are as shown in Figure 1.

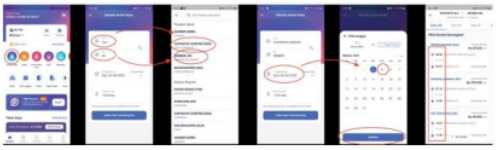

Fig. 1. Steps of Task 1

B. *Task 2*

Booking train tickets is a primary feature of this application. This feature provides information about ticket availability, various class options, as well as seat and meal selection. In Task 2, respondents have to book train tickets. Task 2 is a continuation of Task 1. Respondents are required to view the train schedule, choose one of the schedules, and proceed to the payment stage. Respondents do not need to pay for the ticket but only to complete the ticket booking. The steps for Task 2 can be seen in Figure 2.

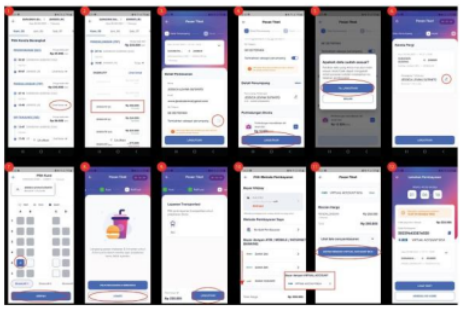

Fig. 2. Steps of Task 2

C. *Task 3*

The feature to view booked tickets is included as one of the most important features in this application. Users are required to show proof of booking in the form of an e-boarding pass to the inspector when boarding. Therefore, in Task 3, respondents are asked to view the tickets that have been 20ked in the previous Task 2. The steps for Task 3 can be seen in Figure 3.

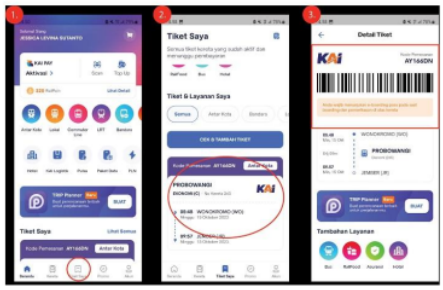

Fig. 3. Steps of Task 3

D. *Task 4*

For users, viewing booking history is a useful tool for future reference, serves as confirmation and evidence of previous travel details, and tracks expenses and personal preferences. In Task 4, respondents are expected to view the booking history of tickets that have been previously purchased. There are 2 ways to complete this task. The first scenario for completing Task 4 can be seen in Figure 4. Meanwhile, the second scenario can be observed in Figure 5.

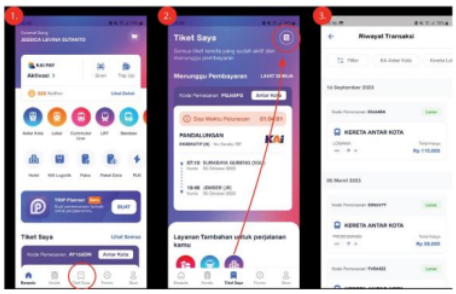

Fig. 4. Steps of Task 4 (1st scenario)

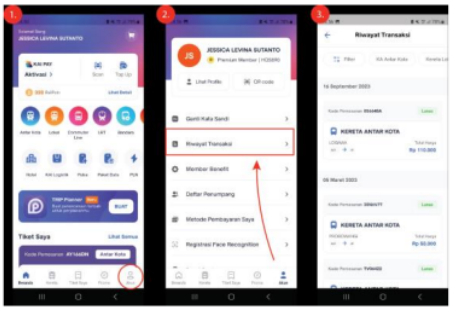

Fig. 5. Steps of Task 4 (2nd scenario)

E. *Task 5*

The profile feature allows users to access and manage their personal information easily, enabling users to validate their identity. In Task 5, respondents need to view their profile on the KAI Access application. Respondents are advised to log in or create an account before starting Task 5. The steps for Task 5 can be seen in Figure 6.

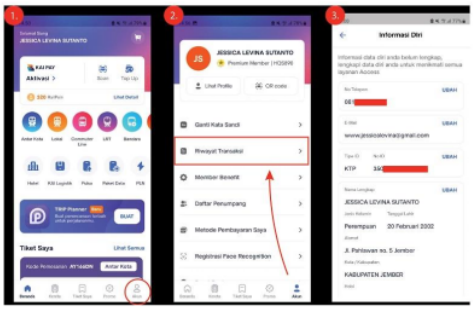

Fig. 6. Steps of Task 5

Furthermore, to measure the level of user satisfaction, the System Usability Scale (SUS) measurement instrument is used. Respondents have to indicate whether they agree or disagree with 10 provided statements [14]. The SUS score results will determine the level of user satisfaction with the application.

III. Result and Discussion

A. *Respondent Profile*

This study involves 10 respondents. The characteristics of these 10 respondents are that there are six (60%) females and four (40%) males. Figure 7 shows the profile of respondents based on gender.

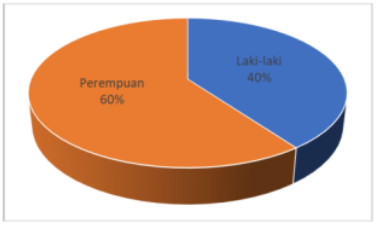

Fig. 7. Respondent profile based on gender

Based on age, there are 7 respondents aged between 21 to 30 years old (70%), while 3 respondents are over thirty years old (30%). The percentage breakdown of both age groups can be seen in Figure 8.

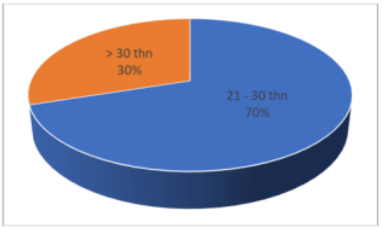

Fig. 8. Respondent profile based on age

B. *Task Analysis Results*

This section provides detailed explanation of the results obtained after all respondents completed all the specified tasks. The final score is obtained from the calculation of the average completion time of tasks by all respondents. Each task has a maximum completion limit depending on the difficulty of the given task. The completion results of each task by the 10 respondents will be explained as follows:

1. Task 1: The completion time limit for this task is 60 seconds. The final score indicates that the average time taken by respondents to complete Task 1 is 28.82 seconds. There was one respondent failed to complete this task.

2. Task 2: The completion time limit for the task given to respondents is 90 seconds. The final score indicates that the average time taken by respondents to complete Task 2 is 55.91 seconds.

There was 1 respondent failed to complete this task.

3. Task 3: Respondents were given a maximum of 10 seconds to complete this task. The final score indicates that the average time taken by respondents to complete Task 3 is 6 seconds. There were three respondents failed to complete this task.

4. Task 4: The time limit given to respondents to complete this task is 30 seconds. The final score indicates that the average time taken by respondents to complete Task 4 is 20.45 seconds. There were four respondents failed to complete this task.

5. Task 5: The completion time limit for this task is 10 seconds. The final score indicates that the average time taken by respondents to complete Task 5 is 5 seconds. There was one respondent failed to complete this task.

C. *Effectiveness Measurement*

Effectiveness is the accuracy of users in achieving the specified goals. To calculate the effectiveness, this study use the formula proposed by [15] as follow:

$$Effectiveness = \frac{\text{Number of tasks completed successfully}}{\text{Total number of tasks undertaken}} \times 100\% \quad (1)$$

Based on the task completion results and the formula above, the effectiveness results for each task are quite good, as shown in Table I. All tasks have effectiveness values above 60%, with an average value of 80%. This indicates that the effectiveness of the Access by KAI application is high [16].

TABLE I. EFFECTIVENESS RESULTS

No Task	Percentage
Task 1	9/10 * 100% = 90%
Task 2	9/10 * 100% = 90%
Task 3	7/10 * 100% = 70%
Task 4	6/10 * 100% = 60%
Task 5	9/10 * 100% = 90%

D. *Time Based Efficiency Measurement*

Time Based Efficiency measures the time used in an activity or process that can be optimally utilized to achieve the desired results. Time Based Efficiency is obtained using the following formula:

$$Time\ Based\ Efficiency = \frac{\sum_{j=1}^{R}\sum_{i=1}^{N}\frac{n_{ij}}{t_{ij}}}{NR} \quad (2)$$

N (total tasks) = 5
R (total respondents) = 10
Nij: The result of task i by user j; Nij = 1 if the user successfully completes the task, otherwise Nij = 0
Tij: The time needed by user j to complete task i. If the respondent can not complete the task, then Tij = time respondent quit the task

By using the formula above, we obtained a quite good result with a value of 1.320 goals/sec. This result shows that the KAI application is efficient.

E. *User Satisfaction Measurement*

User satisfaction level is measured using the System Usability Scale (SUS). SUS consists of 10 questions that respondents must answer by ranking from 1 to 5 based on how much they agree with the given questions. The details of the SUS questions are listed in Table II.

TABLE II. SUS QUESTION

No.	Question
1.	I will frequently use this application
2.	I feel this application unnecessarily complex
3.	I find this application easy to use
4.	I need technical assistance to use this application
5.	I find a variety of features integrated well in this application
6.	I find many inconsistencies in this application
7.	I believe many users would be able to learn this application quickly
8.	I find this application very impractical to use
9.	I am very confident in using this application
10.	I need to learn a lot of things first to be able to use this application

Based on the provided guidelines, here is the calculation of the SUS score for the Access by KAI application:

- For each of the odd-numbered questions, subtract 1 from the score.
- For each of the even-numbered questions, subtract their value from 5.
- All scores are then summed up, and the result is multiplied by 2.5 to obtain the SUS score.

After calculation, the value indicates that the SUS score for the Access by KAI application is 65. Based on the guidelines from [17] as seen in Table III, a score of 65 can be interpreted as the user satisfaction level for the Access by KAI application is still low, as

the application falls within the "poor" category. This will undoubtedly result in a subpar user experience. Therefore, improvements to the user interface of the application are necessary to enhance the user experience.

TABLE III. SUS INTERPRETATION

Score	Grade	Interpretation
> 80.3	A	Very Good
68 – 80.3	B	Good
68	C	Average
51 – 68	D	Poor
< 51	E	Very Poor

IV. CONCLUSION

The objective of this study is to assess the usability of the Access by KAI application, a mobile-based platform designed to assist passengers in purchasing train tickets. The assessment was conducted in three aspects: effectiveness, efficiency, and user satisfaction. The measurement results indicate that the effectiveness of the application is good with an average score of 80%. Additionally, the efficiency of the application is also quite good, as evidenced by the Time Based Efficiency score of 1.320 goals/sec and the Overall Relative Efficiency score of 72.18%. However, based on the SUS score obtained, user satisfaction with the Access by KAI application is still low at 65. This can potentially lead to a subpar user experience for users.

REFERENCES

[1] K. Biomantara and H. Herdiansyah, "Peran Kereta Api Indonesia (KAI) sebagai Infrastruktur Transportasi Wilayah Perkotaan," Cakrawala - Jurnal Humaniora, vol. 19, no. 1, pp. 1–8, Mar. 2019, doi: https://doi.org/10.31294/jc.v19i1.4356

[2] B. P. S. Indonesia, "Jumlah Penumpang Kereta Api Pada September 2023 naik 0,62 persen," Badan Pusat Statistik Indonesia, https://www.bps.go.id/id/pressrelease/2023/11/01/2044/jumlah-penumpang-kereta-api-pada-september-2023-naik-0-62-persen.html (accessed Dec. 25, 2023).

[3] Upgrade Aplikasi, KAI Lakukan Grand Launching Access. (2023, September 10). Diambil dari https://www.kai.id/information/full_news/5688-upgradeaplikasi-kai-lakukan-grand-launching-access.

[4] E. Pramana, "Determinants of the adoption of Mobile Learning Systems among university students in Indonesia," Journal of Information Technology Education: Research, vol. 17, pp. 365–398, 2018. doi:10.28945/4119

[5] P. Vlachogianni and N. Tselios, "Perceived usability evaluation of educational technology using the System Usability Scale (SUS): A systematic review," Journal of Research on Technology in Education, pp. 1–18, Feb. 2021, doi: https://doi.org/10.1080/15391523.2020.1867938.

[6] J. Baumgartner, A. Sonderegger, and J. Sauer, "No need to read: Developing a pictorial single-item scale for measuring perceived usability," International Journal of Human-Computer Studies, vol. 122, pp. 78–89, Feb. 2019, doi: https://doi.org/10.1016/j.ijhcs.2018.08.008.

[7] K. Majrashi, "Performance of mobile users with text-only and text-and-icon menus in seated and walking situations," Behaviour & Information Technology, pp. 1–19, Jul. 2020, doi: https://doi.org/10.1080/0144929x.2020.1795257.

[8] H. A. Sasono, E. Pramana, and L. Zaman P. C. S. W, "Continuance intention on gamifikasi in e-learning using extended expectation-confirmation model," EDUTEC : Journal of Education And Technology, vol. 6, no. 4, pp. 704–724, 2023. doi:10.29062/edu.v6i4.684

[9] D. Pal and V. Vanijja, "Perceived usability evaluation of Microsoft Teams as an online learning platform during COVID-19 using system usability scale and Technology Acceptance Model in India," Children and Youth Services Review, vol. 119, p. 105535, 2020. doi:10.1016/j.childyouth.2020.105535.

[10] G. E. Saputra, Rakhmi Khalida, and Ratu Nurmalika, "EVALUATION OF USER EXPERIENCE TLX TRAINING GATE FOR COMPETITIVE PROGRAMMING LEARNING USING USER EXPERIENCE QUESTIONNAIRE AND SYSTEM USABILITY SCALE," International Journal Science and Technology, vol. 1, no. 2, pp. 30–37, Jul. 2022, doi: https://doi.org/10.56127/ijst.v1i2.142.

[11] H. Huang and G. Liu, "Evaluating students' behavioral intention and system usability of augmented reality-aided distance design learning during the COVID-19 pandemic," Universal Access in the Information Society, Sep. 2022, doi: https://doi.org/10.1007/s10209-022-00920-9.

[12] J. M. Ferreira et al., "Impact of usability mechanisms: An experiment on efficiency, effectiveness and user satisfaction," Information and Software Technology, vol. 117, p. 106195, 2020. doi:10.1016/j.infsof.2019.106195

[13] I. K. R. Arthana, I. M. A. Pradnyana, and G. R. Dantes, "Usability testing on website wadaya based on ISO 9241-11," Journal of Physics: Conference Series, vol. 1165, p. 012012, Feb. 2019, doi: https://doi.org/10.1088/1742-6596/1165/1/012012.

[14] J. R. Lewis, "The System Usability Scale: Past, Present, and Future," International Journal of Human–Computer Interaction, vol. 34, no. 7, pp. 577–590, Mar. 2018, doi: https://doi.org/10.1080/10447318.2018.1455307.

[15] Alqahtani, A. (2019) 'Usability testing of Google Cloud Applications: Students' perspective', Journal of Technology and Science Education, 9(3), p. 326. doi:10.3926/jotse.585.

[16] E. B. Prihastari and R. Widyaningrum, "The Effect of Microsoft Whiteboard-Assisted Environmental Mathematics towards Environmental Care Attitudes of Pre-Service Elementary School Teachers," Jurnal Pendidikan MIPA, vol. 23, no. 2, pp. 486–495, 2022, doi: https://doi.org/10.23960/jpmipa/v23i2.pp486-495.

[17] W. T, "Measuring and Interpreting System Usability Scale (SUS) - UIUX Trend," UIUX Trend, May 31, 2017. https://uiuxtrend.com/measuring-system-usability-scale-sus/

Perceived Usability Evaluation of Ticket Purchasing Apps

ORIGINALITY REPORT

13%	7%	12%	7%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to RMIT University Student Paper	1%
2	Submitted to University of Wolverhampton Student Paper	1%
3	Submitted to Aston University Student Paper	1%
4	www.scielo.br Internet Source	1%
5	Sisca Ayu Febrianti, Satriyo Adhy. "Usability Evaluation of iPekalonganKota with Different End-user Groups Using Usability Testing and USE Questionnaire Methods", 2021 5th International Conference on Informatics and Computational Sciences (ICICoS), 2021 Publication	1%
6	Frederik Allotodang, Herman Tolle, Nataniel Dengen. "Design and Evaluation of Bible Learning Application using Elements of User Experience", International Journal of	1%

	Advanced Computer Science and Applications, 2021 Publication	
7	Indah Purwandani, Nurfia Oktaviani Syamsiah, Siti Nurwahyuni. "Perceived Usability Evaluation of TikTok Shop Platform Using the System Usability Scale", Sinkron, 2023 Publication	1 %
8	www.growingscience.com Internet Source	1 %
9	Submitted to Glasgow Caledonian University Student Paper	1 %
10	www.coursehero.com Internet Source	1 %
11	Submitted to Sekolah Tinggi Sandi Negara Student Paper	1 %
12	Hala Abushamleh, Shaidah Jusoh. "Usability Evaluation of Distance Education Tools Used in Jordanian Universities", 2021 Innovation and New Trends in Engineering, Science and Technology Education Conference (IETSEC), 2021 Publication	<1 %
13	jakarta.bisnis.com Internet Source	<1 %

14	journal.unipdu.ac.id Internet Source	<1%
15	"Human-Computer Interaction – INTERACT 2021", Springer Science and Business Media LLC, 2021 Publication	<1%
16	Ismayana Teguh Pratama, Rahmatika Putri, Rian Fernanda, Sunardi. "The Usability Analysis of Human Resource Information System (HRIS) Using Usability Scale System and Concurrent Think Aloud", 2022 International Conference on Informatics, Multimedia, Cyber and Information System (ICIMCIS), 2022 Publication	<1%
17	Arief Hidayat, Ma'As Shobirin, Akhmad Pandhu Wijaya. "Usability Measurement of Aswaja Chatbot with System Usability Scale (SUS)", 2023 Eighth International Conference on Informatics and Computing (ICIC), 2023 Publication	<1%
18	Muhammad Basyir, Widdha Mellyssa, Suryati, Munawar. "Evaluating the Quality of Emergency Reporting Mobile Application on Usage Service Decision", IOP Conference Series: Materials Science and Engineering, 2019 Publication	<1%

19	Rudy Ariyanto, Erfan Rohadi, Imam Fahrur Rozi, Vipkas Al Hadid Firdaus et al. "IoT Board Education Design and Analysis for Elementary School Students", KnE Social Sciences, 2024 Publication	<1 %
20	Tita Alisya, Muhammad Luthfi Hamzah, Eki Saputra, Tengku Khairil Ahsyar, Syaifullah. "Evaluation of User Experience on ShopeePay Digital Wallet Using System Usability Scale (SUS) and User Experience Questionnaire (UEQ) Methods", 2023 3rd International Conference on Emerging Smart Technologies and Applications (eSmarTA), 2023 Publication	<1 %
21	Hafedh Ben Hassen, Nadia Ayari, Ahmed Maalel, Belgacem Hamdi. "An Electric Wheelchair Monitoring System based on the Internet of Things and Fog computing", 2021 IEEE 2nd International Conference on Signal, Control and Communication (SCC), 2021 Publication	<1 %
22	I Gusti Agung Ayu Made Bidari Bening Buana, Raymond Oetama. "Refining Web-Based Job Search through Goal-Directed Design Improvement", Indonesian Journal of Computer Science, 2023 Publication	<1 %

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	On		