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Usability Evaluation of the Railfood Feature in the Access by KAI Application Using System Usability Scale Method and Factor Analysis

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Abstract: This study assesses the Railfood feature in the Access by KAI application through System Usability Scale (SUS) methodology and factor analysis. Railfood allows train passengers to order meals online during travel, representing PT Kereta Api Indonesia's move toward digital service integration. Quantitative data from 400 users who accessed the feature within three years revealed a SUS score of 73.5 (Grade C), indicating moderate performance. Satisfaction ranked highest among measured factors, suggesting users found the interface approachable, while efficiency scored lowest due to the initial learning requirements. The gap between these factors points to specific improvement areas: simplifying navigation paths, adding visual cues, and implementing brief tutorials. Such adjustments would likely reduce user adaptation time while maintaining the satisfaction already achieved. The research offers practical value for mobile service development in transportation settings where users operate under time constraints and varying connectivity conditions. Results demonstrate how targeted usability evaluation can identify actionable refinements in transit-based digital services.

Keywords: Usability; Railfood; Access by KAI; Indonesian Railways; Feature Application.

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1. Introduction

PT Kereta Api Indonesia (Persero) (hereafter "KAI") operates as the sole State-Owned Enterprise managing railway services in Indonesia [1]. To meet passenger and freight transportation needs, KAI provides various services including Passenger Trains (Inter-City, Local, Commuter Line) and Freight Trains. KAI has implemented digital technology through the Access by KAI application as part of its service enhancement strategy [2]. The application was designed to simplify and enhance convenience for KAI customers through its available features. Among these services is Railfood, which allows customers to order food and beverages either before departure or during their journey [3]. The Railfood service merits examination to measure how effectively it benefits train users ordering food online, with aims to enhance satisfaction, save time and energy, and gather user feedback. Research by Muhammad (2023) emphasizes the value of usability testing in digital public transportation services for improving user experience [4]. Additionally, Fari *et al*. (2025) found that positive user experiences increase customer retention in transportation applications [5].

System Usability Scale (SUS) offers an evaluative approach to assess how well Railfood serves train users. This method functions as a measurement instrument designed to evaluate system usability in relation to meeting user expectations and needs. According to Kaban, Komang, and Adam (2020), SUS incorporates three main dimensions: efficiency, effectiveness, and user satisfaction [6]. ISO (1994) notes this method can assess user perceptions of the Railfood feature to identify gaps in meeting customer needs [7]. Research by Saputra *et al*. (2024) shows a positive relationship between high usability scores and users' willingness to recommend an application [8]. Similarly, factor analysis by Maulana *et al*. (2023) indicates that reliability and accessibility are key aspects in digital feature development [9].

This study also analyzes key factors for improving Railfood service that can inform development plans. The SUS method has been widely applied, including research by Alam & Puji Rahayu Kurniasih (2024) evaluating the Correspondence Management Information System at Fatmawati Sukarno State Islamic University Bengkulu [10]. According to Putri and Fitriani (2025), design consistency and access speed represent two critical elements in digital application usability [11]. Their research produced an average score of 70.03 (Good category), with a percentile rank in the Good category, average Grade C, "OK" Adjectives, while Acceptability fell in the marginal category, and NPS classification was passive. These results indicated SIMAMURAT could be declared viable based on usability through the SUS method. Musyafa *et al*. (2024) found that train users with positive application experiences tend to use additional features like Railfood more frequently [12]. Another study using SUS was conducted by Edi Kurniawan, Nofriadi, and Andri Nata (2022) to measure website usability for study programs at STMIK Royal [13]. This method yielded average final SUS scores for both websites, with the Computer System program website scoring 69.93 and the Information System program website scoring 70.19. Based on these results, both websites showed development potential. Additionally, Putri and Zulvia (2025) demonstrated the effectiveness of digital applications in reducing wait times and increasing efficiency [14].

Research using ISO 9241-11-based usability testing was also conducted to evaluate a sales website created in 2019, using effectiveness and efficiency attributes. This study involved ten participants completing task scenarios to test PT X's website usability. Based on evaluation results, the website achieved 69% effectiveness and 61% efficiency. These percentages indicate moderate site performance, neither optimal nor poor. These findings formed the basis for strategic recommendations to improve system effectiveness and efficiency, which PT X could apply in further digital platform development [15]. Another study using the usability method tested PLN Mobile's usability level with end users. The usability testing result was 22.77%, considered suboptimal, meaning PLN Mobile users were dissatisfied with the application's usability. Improvement steps to enhance usability were conducted through discovery prototyping by gathering user improvement suggestions, which were then retested. The improvement suggestions from this research increased PLN mobile usability to 85.26%, an improvement of 62.49% [6]. Setiawan and Mulyani (2024) state that good usability evaluation forms the foundation for increasing digital services competitiveness [16].

Based on previous research, using the SUS method to determine Railfood service adequacy in meeting customer needs regarding effectiveness, efficiency, and satisfaction represents a viable evaluation approach that can enhance Railfood feature reliability. While research has addressed the Access by KAI application, none has specifically examined the Railfood feature/service. The limited specific research related to Railfood presents an opportunity to specifically investigate whether the Railfood feature itself has good usability and helps Access by KAI improve customer satisfaction. Beyond using the SUS method for usability evaluation, the author also considered previous research related to Access by KAI and its features. Previous research has evaluated the Access by KAI application generally, while specific research on Railfood within Access by KAI remains minimal. Several studies on Access by KAI show that the application significantly influences service effectiveness [2] and has fairly good service quality acceptable to customers [1], though service improvements are needed. Research specifically assessing Railfood's influence on customer satisfaction through a cross-sectional survey of 200 train passengers measured five dimensions: tangibles, reliability, responsiveness,

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assurance, and empathy. Results showed Railfood has a significant positive effect on customer satisfaction and loyalty, with tangibles and assurances dimensions having the strongest effect on customer satisfaction [3]. Meanwhile, there exists a need and urgency to specifically evaluate Railfood's usability using the SUS method to identify its reliability in meeting train customers' needs for food and/or beverage ordering in terms of efficiency, effectiveness, and satisfaction. Beyond researching Railfood usability, this study will conduct factor analysis to identify key factors based on customer perceptions to optimize service in the Railfood feature. The purpose of evaluating effectiveness, efficiency, and satisfaction and identifying key factors is to enhance the Railfood experience and provide important information for KAI in planning future feature development for optimal results. Academically, this research will enrich literature related to transportation application usability in Indonesia. Practically, the results can support KAI in improving Railfood feature quality to provide a better user experience.

2. Related Work

Technological advancements have transformed how users interact with public transportation services, including Indonesia's railway sector. PT Kereta Api Indonesia (Persero) (KAI) has leveraged digital technology through the Access by KAI application offering various features, including Railfood. This feature allows users to order food and beverages online during their journey [3]. However, ensuring Railfood maintains good usability remains essential for customer satisfaction and user experience. Usability is a critical aspect of application development focused on user experience (UX). According to ISO 9241-11 (1994), usability comprises three main dimensions: effectiveness, efficiency, and user satisfaction. The System Usability Scale (SUS) developed by Brooke (1995) is widely used to measure usability [10]. This method is considered practical and capable of providing an overview of user perceptions toward a system.

Several previous studies support SUS methodology's relevance in evaluating public service application usability. Kaban *et al*. (2020) used SUS to evaluate the PLN Mobile application, showing initially low usability scores that significantly improved after discovery prototyping adjustments [6]. Research by Alam and Kurniasih (2024) demonstrated SUS effectiveness in evaluating university management information systems, producing "Good" category usability scores. Edi Kurniawan *et al*. (2022) confirmed in their STMIK Royal website study that usability scores ranging from 69-70.19 indicate applications still requiring development for optimization [13]. Studies have assessed that digital features in Access by KAI positively contribute to service quality [2][1]. However, specific research on the Railfood feature remains limited. Lestari & Pradana (2024) study represents an early assessment showing Railfood positively influences customer satisfaction and loyalty, particularly through tangibles and assurance dimensions. Nevertheless, no thorough evaluation has focused on Railfood usability using SUS methodology.

The Railfood feature in Access by KAI allows users to order food and beverages before or during journeys, offering train culinary specialties and regional foods. This service aims to enhance passenger comfort during rail travel. Evaluations of this feature show that responsive interface design and easily accessible information are key factors in improving user satisfaction with food ordering services on trains. Azzadin (2023) study evaluated user experience in online food ordering applications using usability methods [17]. Results showed that effectiveness, efficiency, and user satisfaction significantly influence perceptions of application service quality. These findings are relevant for developing the Railfood feature to be more responsive to user needs and improve food ordering experiences during train journeys.

Beyond measuring general usability scores, factor analysis provides deeper information regarding dimensions most affecting user experience. According to Sugiyono (2010), descriptive factor analysis can map dominant usability components and form the basis for improvement recommendations [18]. Previous research by Suhendra *et al*. (2021) on e-commerce websites found effectiveness and efficiency as critical points needing enhancement [15]. For Railfood feature evaluation, factor analysis helps identify specific usability gaps in effectiveness, efficiency, and satisfaction dimensions, providing strategic input for further development. This research attempts to fill this gap by evaluating Railfood feature usability using SUS methodology and analyzing factors influencing usability based on customer perceptions. This approach ensures the Railfood feature meets user expectations and supports improved journey experiences. Additionally, these research findings aim to provide KAI with a foundation for digital service development and improvement strategies while contributing to scientific literature on public transportation application usability evaluation in Indonesia.

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3. Research Method

The study employs quantitative research methodology following the research flow shown in figure 2.

Figure 1. Research Flow

3.1 Literature Review

During this phase, researchers examined literature related to the research topic. The literature review aimed to understand theories about application usability evaluation, particularly those concerning the System Usability Scale (SUS). Researchers also studied previous research on application usability evaluation, specifically focusing on SUS methodology for evaluating applications or systems.

3.2 Data Collection

This research uses quantitative methods through questionnaires representing subjective assessment. The Slovin formula determines the sample size representing the population, as shown in equation 1:

$$N = \frac{N}{N+N(e)^2} \quad (1)$$

Where:
n = sample size
N = Population total
e = margin of error

The established population consists of passengers transported by KAI in 2024. The research instrument uses SUS-related questionnaires that can improve Railfood feature services. Data collected from questionnaire results will be processed to generate information forming the basis for conclusions and improvement recommendations, allowing the feature to deliver optimal user experiences. Questions regarding criteria for appropriate respondents in this research are presented in table 1:

Table 1. List of Questions According to Criteria

No	Question
1	Are you willing to participate as a respondent in this research?
2	Have you used the Railfood feature in the Access by KAI application within the last 3 months?

The research instrument uses a questionnaire accessible at: https://forms.gle/PZEDgQfgWJxRkZ5JA. The following are 10 (ten) statement items from the SUS questionnaire referring to John Brooke (1995), based on ISO 9241-11. Each statement is grouped into 3 (three) factors: effectiveness, efficiency, and satisfaction for factor analysis affecting usability, as shown in Table 2:

Table 2. List of Questionnaire Statements

No	Statement	Factor
	10 SUS Statements by John Brooke	
1	I think I would use this system again	Satisfaction
2	I found the system unnecessarily complex	Satisfaction
3	I thought the system was easy to use	Satisfaction
4	I need the support of a technical person to use this system	Satisfaction
5	I found the various functions in this system were well integrated	Effectiveness
6	I thought there was too much inconsistency in this system	Effectiveness
7	I would imagine that most people would learn to use this system very quickly	Efficiency
8	I found the system very cumbersome to use	Efficiency
9	I felt very confident using the system	Effectiveness
10	I needed to learn a lot of things before I could get going with this system	Efficiency

The questionnaire results use a 5-point Likert scale that will become the score for each statement answered by respondents. This scale represents psychometrics used to measure others' feelings toward a respondent

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through agreement levels from responses given to a statement. Source: Brooke, J., 1995. [19] Presented in Table 3:

Table 3. Likert Scale

Answer	Value
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

Due to SUS limitations regarding difficulty knowing specifically which usability factors have the greatest or least influence, this research also conducts factor analysis to identify factors affecting usability from effectiveness, efficiency, and satisfaction perspectives to enhance user experience, which can inform feature improvement planning.

3.3 Data Analysis

Data collection results will be processed through usability analysis and factor analysis for interpretation according to research objectives.

1) Usability Analysis

Usability Analysis uses the mechanism performed by John Brooke (1995) as follows:

a) Calculation of each statement value. Can be observed in table 4:

Table 4. Statement Scoring Guidelines

Questionnaire Statement	Scoring Guidelines
Odd Numbers	Respondent value minus 1
Even Numbers	5 minus respondent value

b) Calculation of respondent scores

After evaluating all 10 (ten) statements, the total value for each respondent is summed and multiplied by 2.5 to get a value of 0-100. Next, the average Score R is calculated across all respondent scores to obtain an average usability assessment value. Percentile rank and letter grades describe SUS values according to Jeff Sauro, where the scale ranges from class A to E, with class A being the best and class E the worst. Table 5 shows percentile ranks and letter grades:

Table 5. SUS Score Interpretation

Grade	SUS
A	>=80.3
B	<=74< value <80.3
C	<=68< value <74
D	<=51< value <68
E	<51

Source: Jeff Sauro, 2018 [20]

2) Factor Analysis

According to Sugiyono (2010) [18], descriptive analysis approach aims to provide a systematic picture of research data results, without making generalizations or inferences beyond the data context. This method helps identify and describe factors receiving highest or lowest scores based on System Usability Scale (SUS) values. To support this analysis, equation 2 below calculates the average value of each factor studied:

$$Average = \frac{\sum Score}{n} \quad (2)$$

Coefficients ensure each factor's score has a maximum value of 100, calculated using equation 3:

$$Coefficient = \frac{100}{Maximun\ Factor\ Score} \quad (3)$$

The final score for each factor is calculated by summing scores for questions falling within a particular category.

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3.4 Results Interpretation

The evaluation results form a basis for identifying gaps and suggesting improvements needed to optimize the Railfood feature. The research findings can guide not only the company but also benefit stakeholders affected by the evaluation and future Railfood development.

4. Result and Discussion

4.1 Results

According to official information from KAI, the number of long-distance and local train passengers in 2024 reached 51,839,503. Based on Slovin's formula equation 4, the number of respondents in the study was:

$$Number\ of\ Respondents = \frac{51.839.503}{1+51.839.503\ (5\%)2} = 399{,}9\ or\ rounded\ up\ to\ 400\ respondents \quad (4)$$

The research questionnaire was distributed to 421 respondents. Of these, 420 people responded, with 419 agreeing to participate and 1 declining. Among the 419 willing participants, 400 (95.2%) had used the Railfood feature in the Access by KAI app within the past 3 months, while 20 (4.8%) had not, as shown in Table 6.

Table 6. Summary of Respondents Meeting Criteria

No	Question	Total Respondents	Yes	No
1	I am willing to participate in this research	421	420	1
2	Have you used the Railfood feature in the Access by KAI app in the last 3 months?	420	400	20

Responses collected through Google Forms were compiled and converted to Microsoft Excel format for data processing. Before analysis, researchers cleaned the data to optimize processing by removing unusable questionnaire data, such as responses from individuals who did not meet the participant criteria. The process for obtaining the SUS score involved: (a) Converting respondent answers into values according to a 1-5 Likert scale, then evaluating them as specified in Table 4's assessment provisions; (b) After all respondents had values for each statement, researchers calculated the sum and average score for each statement and evaluated them as described in point 3.1 letter f. The SUS score calculation yielded the results shown in Table 7:

Table 7. SUS Score Results

Question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total Score	SUS Score
Total Score	1,182	1,144	1,229	1,184	1,143	1,118	1,174	1,249	1,094	1,094	11,756	29,390
Average	3.0	2.9	3.1	3.0	2.9	2.8	3.1	2.9	3.1	2.7	29.4	73.5

Based on the calculations using the SUS method, the average score was 73.5, which was evaluated according to the score interpretation in Table 5. The interpretation of the usability score for the Railfood feature on Access by KAI showed a Grade C, indicating average performance. The Railfood feature on Access by KAI can still be improved to enhance usability and provide greater value for Access by KAI. The study also measured the highest and lowest usability factors, with results shown in Table 8:

Table 8. Scores by Factor

	Satisfaction				Effectiveness			Efficiency		
Question	Q1	Q2	Q3	Q4	Q5	Q6	Q9	Q7	Q8	Q10
Average Score	3.0	2.9	3.1	3.0	2.9	2.8	3.1	3.1	2.9	2.7
Coefficient	6.25				8.33			8.33		
By Factor										
SUS Score	18.47	17.88	19.20	18.50	23.81	23.29	26.02	25.81	24.46	22.79
SUS Score by Factor	74.05				73.13			73.06		

Table 8 reveals that satisfaction scored highest, particularly regarding how easily respondents could use the Railfood feature. The lowest score was efficiency, relating to the need for users to familiarize themselves with the feature and the time required to understand how to use it. Users found the Railfood feature easy to use, despite needing time to learn it initially. The low efficiency score largely stemmed from insufficient visual

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guidance and intuitive user interface. Respondents indicated that several Railfood functions needed clearer instructions for quick understanding. Without interactive tutorials or adequate visual guides, users had to learn independently, increasing the time needed to understand functions. This feedback suggests that adjustments to the User Interface design and additional visual guides could improve perceptions of the Railfood feature's efficiency.

4.2 Discussion

The research examined the Railfood feature's usability on the Access by KAI application through the System Usability Scale (SUS) methodology. Using Slovin's formula based on the 51,839,503 long-distance and local train passengers in 2024, the study required 400 respondents with a 5% error margin. The questionnaire reached 421 potential participants, achieving an excellent response rate of 99.8% (420 respondents). Among these, 419 agreed to participate, with 400 (95.2%) having used the Railfood feature within the previous three months. The high percentage of Railfood users suggests the feature enjoys considerable popularity among Access by KAI app users. The SUS calculation yielded an average score of 73.5, placing the Railfood feature in Grade C category, indicating average performance. While functional, the feature still has room for improvement to enhance user experience and add greater value to the Access by KAI application. The study analyzed three key usability factors: satisfaction, effectiveness, and efficiency. Satisfaction received the highest score at 74.05, showing users generally found the Railfood feature easy to use and providing a pleasant ordering experience. Effectiveness scored 73.13, demonstrating that the feature adequately serves its purpose of facilitating food orders during train travel, though enhancements remain possible. Efficiency scored lowest at 73.06, primarily due to users needing time to familiarize themselves with the feature. The research revealed that several Railfood functions lacked clear instructions for quick understanding. The absence of interactive tutorials or adequate visual guidance forced users to learn independently, increasing the learning curve. Users reported that while the feature proved easy to use after learning, the initial experience required more time than expected due to insufficient visual cues and a less intuitive interface. These findings suggest that adjustments to the user interface design and additional visual guides could significantly improve the perceived efficiency of the Railfood feature and enhance overall user satisfaction with the Access by KAI application.

5. Conclusion

The research revealed that the Railfood feature on Access by KAI has an average usability score of 73.5, placing it in Grade C category with average performance. This indicates room for feature development to improve usability scores. Factor-by-factor assessment showed that the Railfood feature scored highest in satisfaction, positively affecting feature reuse rates. However, users needed extra effort to understand how to use the Railfood feature properly. KAI could enhance usability by adjusting the User Interface to be more user-friendly and implementing feature usage guides or assistance services. This research provides valuable insights for companies that own or develop food and beverage ordering applications to evaluate their application usability.

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