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UI/UX Redesign of the 'GOBIS' Public Transportation Application in Surabaya using the Design Thinking Method

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ABSTRACT

GOBIS is one of the public transportation applications launched by the Surabaya City Government in 2018. However, in the use of GOBIS there are still various problems, A pre-evaluation using the System Usability Scale (SUS) with 20 respondents yielded a score of 45.15—well below the average of 68 and classified as 'very poor. This study uses the design thinking method with 5 stages, namely empathize, define, ideate, prototype, and testing. Testing on the prototype results involved 5 respondents using the System Usability Scale (SUS) method and maze.co tools to get task results automatically. As a result, this new UI/UX design has gone through usability testing using maze and produced a score of 93/100 and an increase in the SUS score from 45.152 to 82, which is a good category. These results demonstrate that the redesigned interface better aligns with user needs and is more user-friendly, achieving a 36.85-point increase in SUS.

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1. INTRODUCTION

Rapid technological developments encourage the use of information systems to meet human needs, especially in facilitating access to various things [1]. In the field of public transportation, the implementation of a digital system based on mobile applications makes it easy for users to access information related to routes, schedules, stops, and payments. This system also supports the efficiency of business processes between service providers and passengers[2]. Public transportation plays an important role in big cities around the world, including Indonesia [3]. With this public transportation, it is very easy for people to travel and can reduce traffic congestion. However, over time, various problems are still encountered, such as delayed schedules, weak integration between modes of transportation, and minimal information that can be accessed by users so that it can hinder the use of public transportation [4]. From the study entitled "The Impact of UI/UX On Customer Satisfaction In Use Public Transportation Applications" it was found that it is important to increase the use of public transportation through a visually attractive and interactive UI/UX design approach that can have a significant influence on the use of public transportation applications. Therefore, it is necessary to design a design that focuses on users and pays attention to various design elements so that users are satisfied and the application can be better accepted by the public. The use of applications not only emphasizes function, but also comfort and convenience for users. Therefore, the design of the interface (UI) needs to be improved [5]. However, building an effective user interface (UI) also requires attention to the user experience (UX), which is influenced by the quality of information and the level of usability of the system [6]. Tri Risma Harini, when she was the Mayor of Surabaya, launched the GOBIS application in 2018 to support the Suroboyo Bus service [7]. GOBIS is a mobile application from the Surabaya City Government that provides public transportation information such as Suroboyo Bus, Wira-Wiri, and Trans Semanggi, with an internet connection. However, there were still user complaints regarding the appearance of the features, so a pre-evaluation was carried out using the System Usability Scale (SUS) and a score of 45.152 was obtained, which is included in the very bad category [8].

The preliminary evaluation of the GOBIS application yielded a System Usability Scale (SUS) score of 45.152, which is classified as very poor, indicating inadequate levels of user comfort and ease of use. In the context of digital public services, suboptimal user interface (UI) and user experience (UX) design can significantly hinder technology adoption among citizens [9]. Design thinking has been recognized as an effective methodology in the public sector for identifying and addressing user needs in a user-centered manner [10]. However, its implementation in local government-owned digital transportation applications in Indonesia remains

limited. This study seeks to address this gap by redesigning the UI/UX of the GOBIS application to enhance usability and overall user experience.

This study aims to redesign the UI/UX of the Surabaya City GOBIS public transportation application using the design thinking method with 5 stages to improve usability. And the hypothesis is generated that the new UI/UX will achieve a SUS score exceeding the average value of ≥ 68 and even reach the good category and reduce the user error rate by ≥ 30% compared to the initial design. The design thinking method was chosen because, according to Bradley Pallister, it is able to encourage innovative ideas [11], and focus on user needs and problems to produce relevant solutions [12]. The stages include understanding the problem, collecting and analyzing data, creating ideas, making prototypes, and evaluating through user feedback. The results of the study were in the form of prototypes that were retested to respondents to assess the success of the redesign [13]. The gap in this research in the lack of studies that redesign the UI/UX of local government public transportation applications using the design thinking method. In fact, many applications such as GOBIS still have low usability levels. The novelty of this study lies in the application of the design thinking method and the combination of two usability evaluations, namely the System Usability Scale and Maze.co, so that the usability results can be more convincing not only through the SUS questionnaire but also examples of direct task execution using maze.co. in the context of digital public services in Surabaya.

This research aims to redesign the user interface (UI) and user experience (UX) of the GOBIS application by applying the design thinking method, with the goal of enhancing user comfort and usability, following previous usability evaluation results that showed a significantly low score. The novelty of this study is the application of the design thinking method to the public service application owned by the Surabaya City government, namely GOBIS, and there has been no in-depth redesign of the UI/UX of the application from the UI/UX aspect in Indonesia. This study also combines 2 usability testing methods, namely the system usability scale (SUS) and usability testing using the maze.co tool for automatic calculation of usability values. This redesign is recommended for the public transportation Management UPTD as an effort to improve the comfort and ease of use of the GOBIS application, as well as attract the interest of the Surabaya community in using public transportation.

2. RESEARCH METHODS

2.1 Research Flow

This research follows the flow as shown in Figure 1, focusing on redesigning the UI/UX of the GOBIS application using the design thinking method. This method includes five main stages, namely empathize, define, ideate, prototype, and testing.

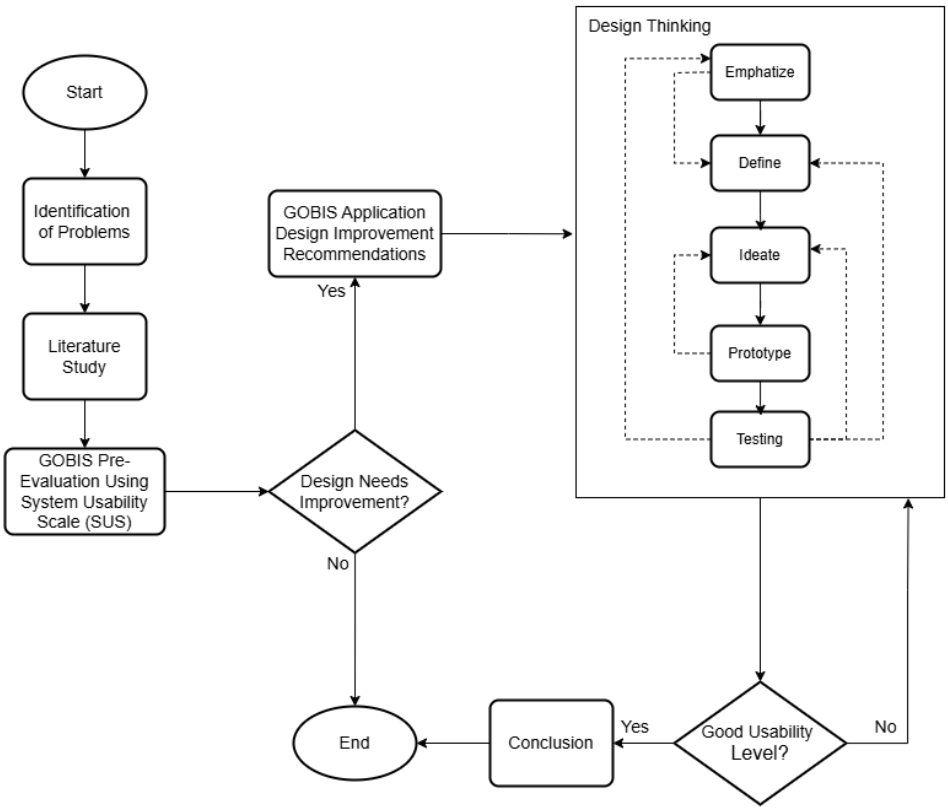

Figure 1. Research flow

The research begins with problem identification and a literature review, followed by an initial evaluation of the GOBIS application using the System Usability Scale (SUS). Since the SUS score was classified as very poor, indicating the need for design improvements, the study proceeds with the design thinking methodology. The empathize stage involves interviewing users who have used the GOBIS application at least 3–5 times to understand their experiences. In the define stage, user problems are clearly articulated. The ideate stage generates potential solutions through brainstorming based on identified issues. Then, in the prototype stage, a redesigned version of the application is developed based on the proposed solutions. Finally, the design is tested in the testing stage. If the revised design achieves a good usability level, conclusions are drawn. Otherwise, the process iterates until optimal results are achieved.

2.2 Literature Study

The literature study in this study serves as a theoretical basis by collecting various information from reliable sources such as scientific articles, journals, books, and other relevant references. The aim is to enrich the understanding of the UI/UX redesign process of the GOBIS application with a design thinking approach. In addition, this study also supports the selection of evaluation methods used in the study, namely the System Usability Scale (SUS) to measure the level of usability with the Google Form platform (accessed in May 2025), usability testing via the Maze.co platform (website version, free account, accessed in May 2025).

2.3 Pre-Evaluation

The next stage in this study is pre-evaluation, which aims to assess whether the current GOBIS application design has met the level of user satisfaction or still needs improvement. This initial evaluation was carried out by distributing a questionnaire containing 10 simple statements using a Likert scale of 1–5 [14], as shown in Table 1. A score of 1 indicates "strongly disagree" and a score of 5 indicates "strongly agree". Odd-numbered statements are positive, while even-numbered statements are negative [15]. After the data was collected and calculated, the SUS score for the GOBIS application was obtained at 45.152, far below the average threshold of 68. This value is in the very poor category [16], so it is necessary to redesign the GOBIS application interface to improve the quality and user satisfaction.

Table 1. System Usability Scale (SUS) statement

Code	System Usability Scale Question
P1	I think I will use this system again
P2	I found the system complicated to use
P3	I found the system easy to use
P4	I needed help from another person or technician to use the system
P5	I felt the features of the system worked as they should
P6	I felt there were many inconsistencies in the system
P7	I felt other people would figure out how to use the system quickly
P8	I found the system confusing
P9	I felt there were no barriers to using the system
P10	I need to get used to it first before using the system

2.4 Design Thinking

The design thinking method is an innovative approach that aims to create positive change by producing the right solutions to problems found. This method is used to understand the needs and challenges faced by users. The stages of this method include exploration, understanding, and creating solutions that adapt to user needs and technological developments, as well as existing business strategies [17].

2.4.1 Empathize

The first stage of Design Thinking—empathize—begins by observing the application to uncover user needs This includes interviews with five GOBIS users. The goal is to explore user personas, emotions, and needs by asking what users says, thinks, does, and feels. Insights from these interviews are used to create an empathy map, which guides the design process. Key features of the GOBIS app include route information, top-up, integrated maps, bottle exchange points, FAQ, and trip history. All feature designs are based on the empathy map findings. Here are the criteria for the user persona of the GOBIS application:

a. Target: Students, College Students, and Employees
b. Age: 12 - 40 years
c. Gender: Male and Female
d. Location: Resident or domicile of Surabaya
e. User experience: Have used the GOBIS application 3-5 times
f. Pain point: Users who have experienced difficulties when using the GOBIS application
g. Goals: More effective and efficient travel
h. Motivation: Save time, energy, and costs

Designing a system needs to be in line with user needs, to find out this, an interview stage is needed to find the persona, user feelings and user needs. Questions asked in the interview include what the application user says, thinks, does, feels. The list of interview questions for GOBIS application users is described in Table 2 as follows.

Table 2. Empathy map questions from GOBIS application users

	Questions
Says	Have you used this application 3-5 times?
	Do you often complain about incomplete or inaccurate information displayed on the application?
	Why is it necessary to redesign the UI/UX of the GOBIS application?
	What is your perspective on the current appearance of the GOBIS application?
Thinks	Does this application make your daily travel easier?
	Do you think this application needs a new appearance change? If yes, in what part?
	Are there any feature displays that confuse you? If yes, what?
Does	How is your process using the GOBIS application from opening the application to completing the trip?
	How do you usually make public transportation payments through the application?
	What is the first step you usually take when facing problems or obstacles with the GOBIS application?
Feels	Do you often see routes, stops and others on the application?
	Do you feel more comfortable with this application?
	Do you feel safe and comfortable using GOBIS to find routes and transportation?
	How would you feel if the application did not provide the right information?
Pain	Do users experience technical and visual difficulties when using the GOBIS application? (e.g. slow application, errors, or confusing navigation)
	Do they feel that the application's interface is not user-friendly or too complicated to use?
Gain	What do you want to achieve by using the GOBIS application?
	What features would you hope to have?

2.4.2 Define

The define stage is to study and define in detail the results obtained in the previous stage, namely empathizing with the pain points in the GOBIS application by compiling a problem statement using the 4W's technique and compiling a user persona.

A. Problem Statement

The preparation of problem statements using the 4W's technique includes the following questions, as in Table 3.

Table 3. The 4W's technique

Who	Who is experiencing problems with the GOBIS application?
What	What problems do users face when using the GOBIS application?
Where	Where are the problems that occur in the GOBIS application?
Why	Why is it necessary to redesign the UI/UX of the GOBIS application?

B. User Persona

User persona is obtained based on the results of interviews that have been conducted, the interview will produce information needed when compiling user persona such as user background, goals, needs, behavior, and user problems then a user persona is formed that represents several sources, namely GOBIS application users. The formation of this user persona is useful for understanding user needs in depth so that the creation of UI/UX of an application can adjust the things needed by users.

2.4.3 Ideate

The ideate stage is a stage for developing ideas and solutions using the How Might We method so that it produces questions that trigger the emergence of solutions and the creation of information architecture related to features according to solutions to existing problems. The results of this stage will be applied as an application design for reference in the next stage, namely the prototype. The How Might We method can generate various questions to find out how the system works optimally in dealing with problems experienced by users, so that brainstorming of ideas and solutions to the problems that have been mentioned occurs. The How Might We method can raise various questions to find out how the system works optimally in overcoming problems experienced by users, so that brainstorming of ideas and solutions to the problems mentioned in Table 4 occurs.

Table 4. How might we

How can we design a user-friendly UI/UX so that users feel comfortable and easy, and there is no confusion when using the application?
How can we find out the departure and arrival schedules of buses at stops to calculate the estimated trip to be taken?
How can we search for routes and stops according to the starting location and destination location?
How can we provide feedback or reviews regarding the trip so that an evaluation can be carried out on the driver?
How can we report problems experienced without leaving the application?
How can we provide information or frequently asked questions about the application?

2.4.4 Prototype

At the prototype stage, a system design is carried out according to the idea or solution obtained, so that a prototype is created and a trial is carried out on the system prototype. The results at this stage are low fidelity wireframe and high fidelity prototype. Low fidelity wireframe is a system design plan that is not yet perfect because there are no details in the design, for example in colors that are still black and white. For high fidelity prototype is a system design plan that is close to perfect because it already has complete details related to images, colors, and icons. One of the tools that can be used in making a prototype is Figma (accessed online website in April 2025).

2.4.5 Testing

The testing stage is a stage for conducting tests related to the application design that has been designed as a prototype after redesigning the UI/UX to determine the level of ease of design and suitability to user needs. This test uses a usability pre-evaluation, namely the System Usability Scale (SUS) questionnaire involving 20 respondents. In addition, the post-evaluation in this study uses usability testing.

Usability testing will use the Maze.co tool as an online testing medium and measure the accuracy of the tested design with the usability tester feature it has and the maze usability score will be calculated automatically [18]. This test involves 5 respondents who are the same as in the interview in the empathize stage. Respondents will work on scenarios in the GOBIS application. Table 5 contains scenarios that will be worked on by respondents in the usability testing.

Table 5. Usability testing scenarios

Code	Scenario
T01	Sign up
T02	Login
T03	Route search
T04	Search for nearest stops
T05	Top up
T06	Problem reporting
T07	Driver review

3. RESULTS AND DISCUSSION

3.1 Research Results

3.1.1 Pre-evaluation

Pre-evaluation was carried out using the System Usability Scale (SUS) questionnaire. This questionnaire involved 20 respondents who included GOBIS application users. Respondents were asked to answer 10 easy questions in the questionnaire according to their experience and usefulness when using the GOBIS application. The following are the results of the pre-evaluation using the System Usability Scale (SUS) questionnaire and obtained the average System Usability Scale (SUS) questionnaire score of 45.152, which indicates that the score is below the average SUS score of 68 and is included in the very poor category, so it is necessary to redesign the UI/UX of the GOBIS application.

3.1.2 Design Thinking

A. Empathize

The initial stage of the design thinking method begins with observation to understand user needs. The main activities include interviews with five GOBIS app users. The interview results are then used to create an empathy map consisting of four aspects: Says, Thinks, Does, and Feels. Figure 2 presents the empathy map developed based on user responses aligned with these four aspects.

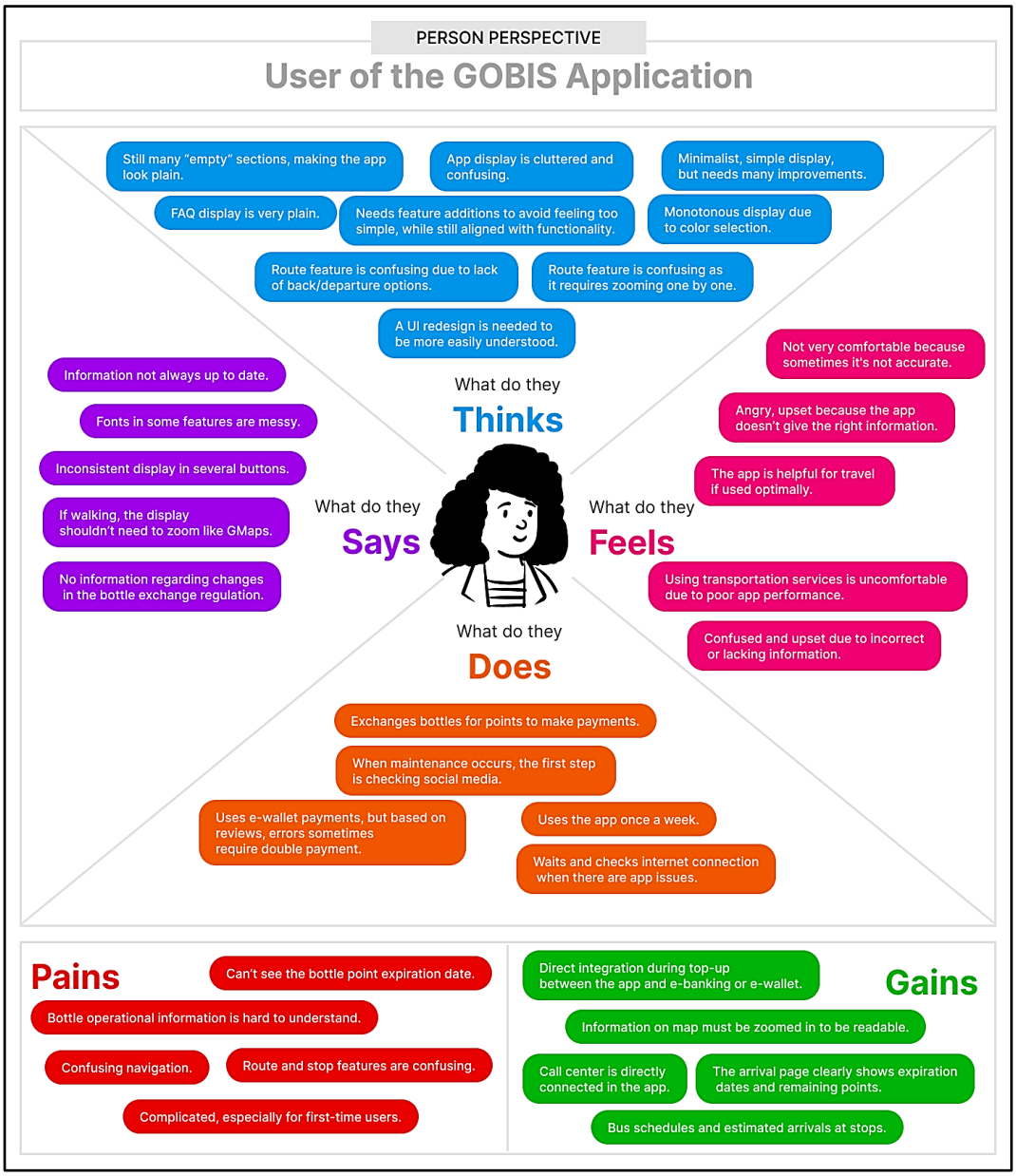

Figure 2. Empathy map GOBIS user

B. Define

In the define stage, a problem statement was formulated using the 4W's technique (Who, What, Where, Why) to systematically identify the core issue. A user persona was also created to represent user characteristics and needs. Table 6 outlines the main problem: users experience confusion regarding bus stops and routes when using the GOBIS app. The app does not fully support public transport users, as they still rely on social media or Google Maps for route information, and must exit the app to report issues due to the absence of an integrated call center.

Table 6. The 4W's technique

Who is experiencing problems with the GOBIS application?	The users facing issues with the GOBIS app are public transport users of services.
What problems do users face when using the GOBIS application?	GOBIS users struggle with bus stop and route info, must use social media or Google Maps, lack an in-app call center for reports, and can't track point expiration.
Where are the problems that occur in the GOBIS application?	GOBIS app issues include confusing routes and stops, difficult navigation, and ineffective problem reporting.
Why is it necessary to redesign the UI/UX of the GOBIS application?	The GOBIS UI/UX redesign improves ease of access to transport info, payments, and reporting for users.

Figure 3 shows two user personas: a final-year student needing clearer routes, bus schedules, and a simpler interface, and a Surabaya transport staff aiming to improve route display and add features like search, driver reviews, and direct reporting.

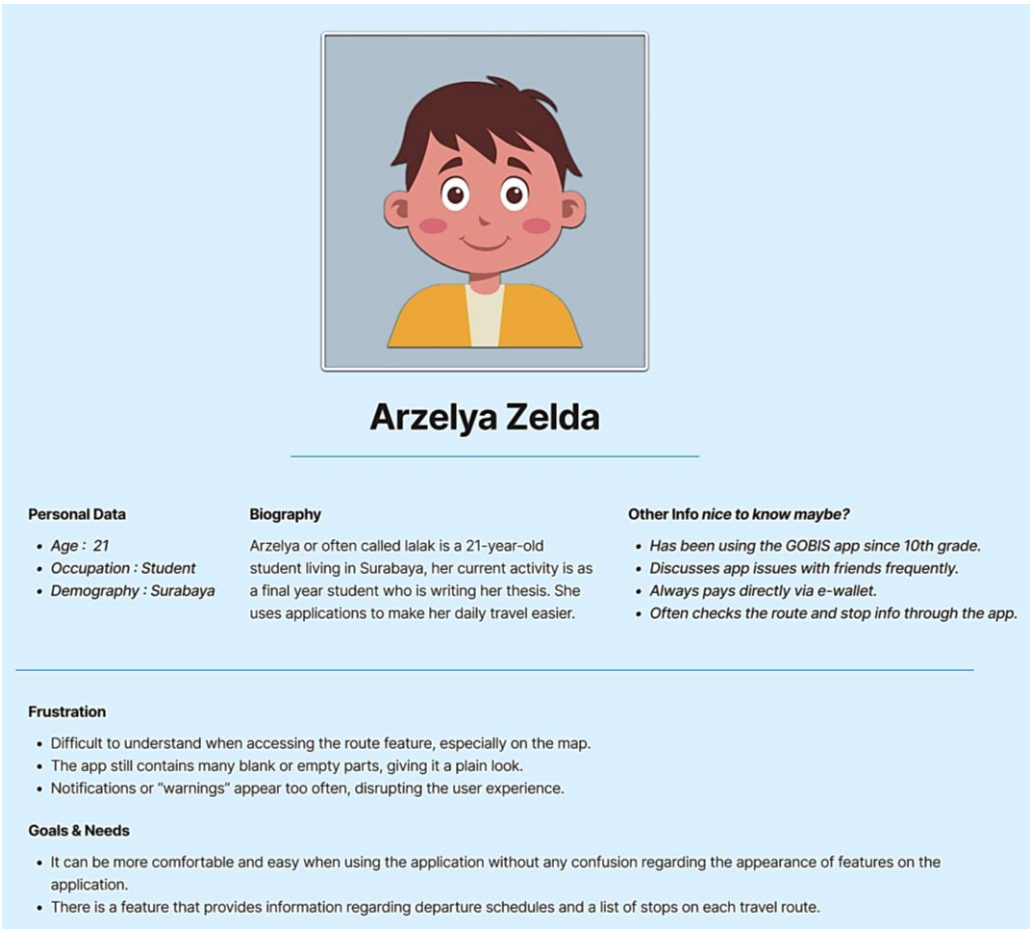

Figure 3. User persona

C. Ideate

The ideate stage generates solutions based on user needs and problems defined earlier. Using the How Might We method, questions guide the creation of ideas, resulting in an information architecture blueprint and system functions that shape feature layout. This method helps understand how to optimize the system to address user issues, sparking brainstorming as shown in Table 7.

Table 7. Solutions

Design a simple, consistent interface with intuitive and familiar icons for easy navigation.
Provide detailed bus departure and arrival schedules at each stop.
Add a route search feature where users enter start and destination points to view routes and nearby stops.
Include a driver review feature for users to rate performance after trips.
Enable live chat and call features for direct issue reporting.
Offer an FAQ section with common questions and key app information.

D. Prototype

The prototype stage involves designing the app interface based on the ideation results. In this phase, the GOBIS app design was created using Figma. Figures 4 display the sign up and login mockups. Before accessing these screens, users see a welcome page with the GOBIS logo, app name, and two buttons: "daftar (sign up)" and "masuk (login)". The sign up screen includes a form for "nama (name)", "alamat email (email)", "nomor HP (phone number)", and password, followed by a confirmation popup. After account creation, users are directed to the login screen, where they can toggle between "nomor HP (phone number)" for login use phone number or "alamat email (email)" for login use email. Once logged in, they are taken to the homepage.

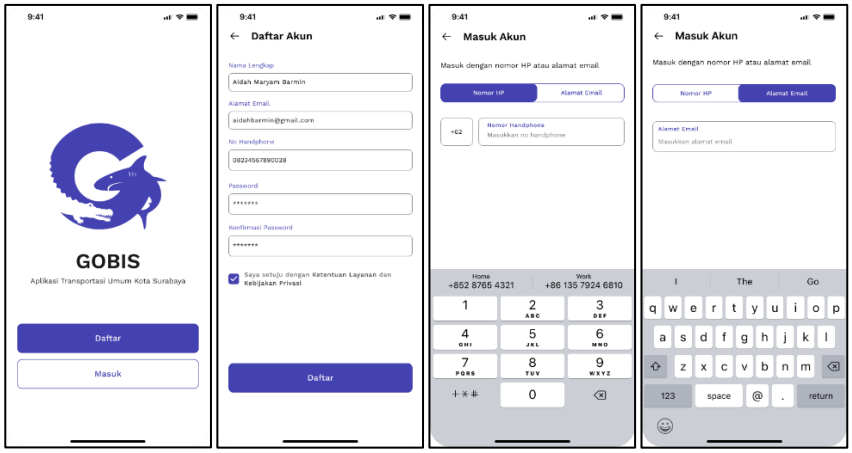

Figure 4. Mockup of account sign up and login

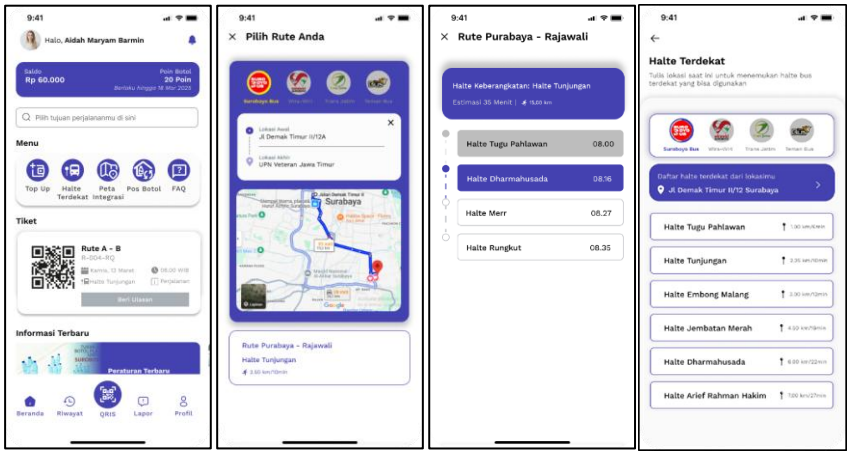

Figure 5. Mockup of homepage, route, schedule and nearest bus stops

After logging in, the user will be directed to the homepage as shown in Figure 5 which displays "saldo" representing the nominal balance, "poin (points)" representing the number of points along with the points' expiration date, a trip search bar, and five main features: top up, "halte terdekat (nearest bus stop)" which functions to find the nearest bus stop, "peta integrasi" which is an integrated map of all transportation modes, "pos botol (bottle collection)" which is the bottle collection point available for exchanging bottles for points, and FAQ. The user can view ticket details such as "tanggal (date)" which is the date, "waktu (time)" which is the trip start time, and "halte tujuan (destination bus stop)" which is the user's destination bus stop. By using the search bar, the user can enter "titik awal (starting point)" which is the starting point and "tujuan (destination)" which is the destination to find a suitable route along with estimated schedules displayed in cards at the bottom. The "halte terdekat (nearest bus stop)" feature shows available transportation modes and lists the nearest stops based on the user's location, including the bus stop name, distance, and estimated travel time.

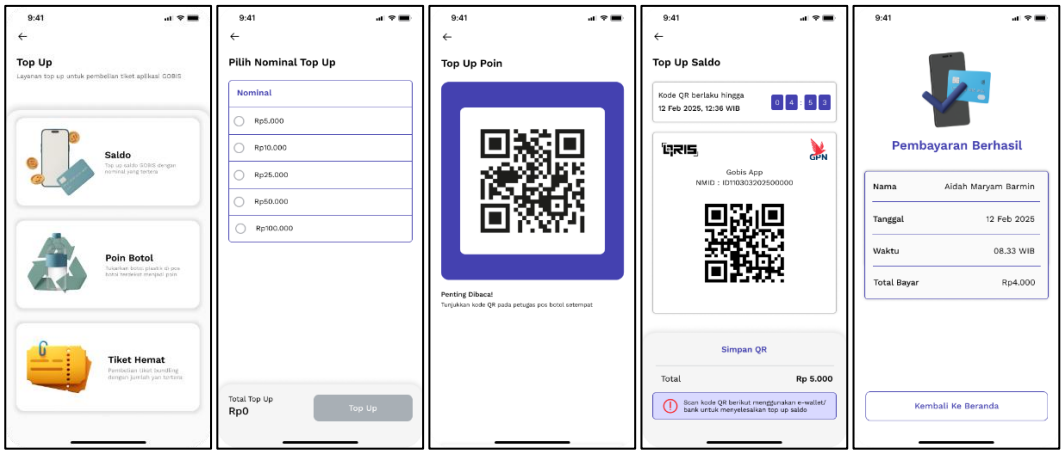

Figure 6. Mockup of top up

Figure 6 shows the Top Up feature. After tapping the Top Up icon, the user is directed to a page with three options: "saldo (balance)", "poin (point)" for users to top up by exchanging bottles, and top up "tiket (ticket)" which is ticket bundling top up. Selecting the "saldo (balance)" card will open a page with nominal options in rupiah; after the amount is selected and the Top Up button is pressed, a QRIS code will appear for payment. After the payment is successful, the confirmation page will display details such as "nama (name)" which is the user name, "waktu (time)" which is the top up time, "tanggal (date)" which is the payment date, and "total (amount)" which is the total amount paid. The bundling ticket card follows the same flow. For the "poin (point)" card, a QR code will appear to be scanned by the bottle filling officer, followed by a success page that has a button "kembali ke beranda (back to homepage)" which navigates back to the homepage.

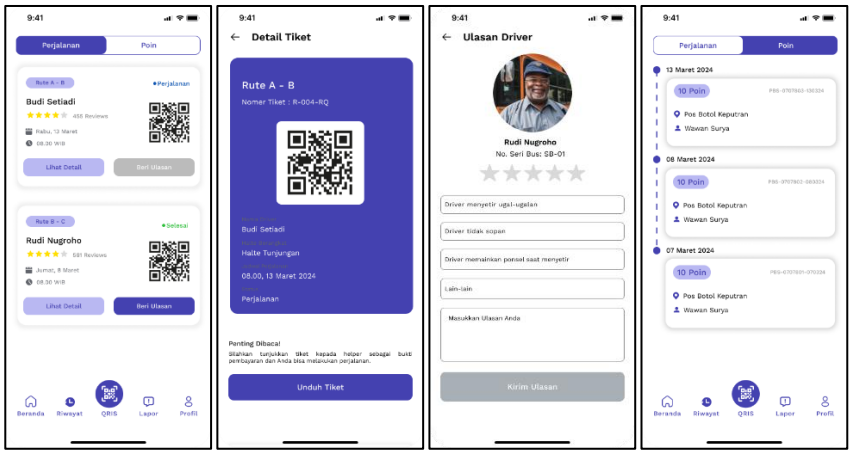

Figure 7. Mockup of travel history, ticket details, points history, and driver review

When users tap the “riwayat (history)” tab in the navigation bar, they access a page with buttons for “perjalanan (trip history)” and “poin (points history)” as shown in Figure 7. The “perjalanan (trip history)” button displays the ticket card with details, the “lihat detail (detail ticket)” button for ticket info, and the “beri ulasan (leave a review)” button for leaving a review for the driver. Clicking on “lihat detail (see details)” opens the page with ticket info and the “unduh tiket (download ticket)” button for downloading the ticket. The “beri ulasan (leave a review)” button for reviews directs users to the driver review page where they can rate the driver, select issues, or write additional feedback. After submitting, a confirmation popup appears with a check mark and a close button. The “poin (points history)” button displays the points redemption history with a detailed card.

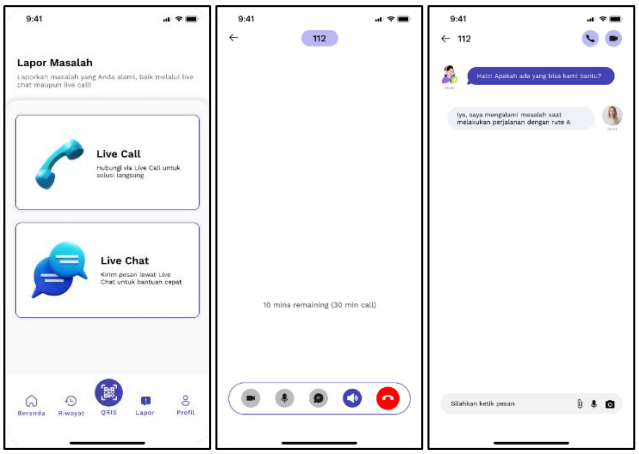

Figure 8. Mockup of problem report

Figure 8 shows the issue reporting feature accessed by clicking the icon on the navigation bar labeled “lapor (report)” with two options: live call and live chat. The live call connects users directly without leaving the app for urgent cases. The live chat allows users to send messages and request voice calls for immediate customer service feedback.

E. Testing

After completing the wireframe and prototype, testing was conducted to determine whether the design achieved a high level of usability. Table 8 presents the average scenario performance, including completion time in seconds, error rate in percent (%), number of respondents in each status category direct for successful, indirect for successful but not immediate, and unfinished for unsuccessful task completion and the usability score per scenario. The results showed a score of 93 out of 100, indicating a high level of usability.

Table 8. Average scenario performance of post-evaluation usability testing

Code	Average Time	Error Rate	Direct	Indirect	Unfinished	Usability Score
T01	9.3s	8,3%	4	2	0	89
T02	8.9s	10%	6	0	0	97
T03	45.1s	34,4%	6	0	0	87
T04	6.4s	0%	6	0	0	100
T05	69.5s	7,7%	6	0	0	100
T06	44.9s	0%	6	0	0	95
T07	17.5s	58,5%	5	1	0	80
Average Score						93

Table 9 shows the results of calculating respondents' answers after redesigning the design. Then the results were calculated and obtained a SUS score for the GOBIS application of 82, this value exceeds the average of 68. This value is included in the good category, so that the redesign of the GOBIS application interface has improved the quality and user satisfaction as well as acceptance of the GOBIS application interface.

Table 9. Results of calculating respondents' answers post-evaluation SUS

Respondent	R1	R2	R3	R4	R5	P06	P07	P08	P09	P10	Amount x 2,5
R01	4	5	5	1	4	1	4	1	5	1	72,5
R02	5	2	5	2	5	2	5	2	5	2	87,5
R03	4	2	2	1	5	2	5	2	4	4	77,5
R04	4	2	4	1	3	3	4	2	4	1	75
R05	5	1	5	1	5	1	5	1	5	1	97,5
Average											82

3.2 Comparison with Other Research Results

The following is a research gap detailed based on differences with other research.

A. Revolutionizing Sustainable Public Transportation: the Go-Bus Mobile App Journey with Design Thinking [19]
This research uses the Design Thinking method as in the research to be conducted. However, the research was conducted in Banyumas Regency, not Surabaya. Apart from that, the evaluation used was the Single Ease Question (SEQ), while this research used the System Usability Scale (SUS) as the pre-evaluation method.

B. Implementation of Re-design of the Jakarta MRT Mobile Application Using the User Centered Design Method [20]
This research focuses on redesigning the Jakarta MRT application using the User Centered Design (UCD) method and using A/B Testing for evaluation. The difference lies in the approach method used and the research location, because this research used Design Thinking and was conducted in Surabaya, not Jakarta.

C. UI/UX Design in Public Transportation Mobile Applications Using the Design Sprint Method [21]
This research uses Design Sprint as an approach method, different from this research which uses Design Thinking. Even though they both use the System Usability Scale (SUS) as an evaluation method, the research location was carried out in Jakarta, while this research focuses on Surabaya.

D. UI/UX Design of Mobile-Based Public Transportation Applications Using the User Centered Design Method [22]
This research uses the User Centered Design (UCD) method and evaluation with the System Usability Scale (SUS). The main difference lies in the design approach used and the research area, because this research applies Design Thinking and was conducted in Surabaya.

E. Trans Metro Bandung Bus Application Media Design [23]
This research was conducted in Bandung and used the Human Centered Design method, with a focus on conveying transportation information. The approach method and geographical scope are different from this research, which used Design Thinking and was conducted in Surabaya. The evaluation in this study is also more structured through SUS measurements, whereas in previous studies there was no mention of the specific evaluation method used.

Previous research entitled "The Impact of UI/UX on Customer Satisfaction in Use of Public Transportation Applications" showed that visually appealing and interactive UI/UX design has a significant influence on satisfaction and adoption of public transportation applications [5]. Initial evaluation of the GOBIS application also strengthened these findings, with a System Usability Scale (SUS) score of 45.152, which is classified as very poor, reflecting low comfort and ease of use for users. This study extends these findings by applying a comprehensive Design Thinking approach to redesign the UI/UX of the GOBIS application. Through the stages of Empathize, Define, Ideate, Prototype, and Test, this study not only identifies user needs in depth

but also tests the effectiveness of the solutions designed iteratively. The results of the redesign showed a significant increase in the usability score of 82, indicating that the user-based approach is able to significantly improve the user experience. Thus, this study is not only in line with previous literature but also fills the gap in practice related to the lack of application of user-centered design methods in digital transportation services owned by local governments.

4. CONCLUSION

The redesign of the GOBIS UI/UX increased the System Usability Scale (SUS) score from 45.152 to 82, which is categorized as "good" and testing with Maze.co resulted in a score of 93 out of 100. These results indicate a significant improvement in usability and indicate that the redesign of the GOBIS application UI/UX—using the Design Thinking approach—successfully addressed user needs and constraints in line with the findings [19], which showed a research result of 15 points on the Go-Bus application in Banyumas. This study contributes to strengthening user-centered design practices in the development of public digital services, especially in government-owned transportation applications in Surabaya so that the Surabaya City Government can adopt this new design to increase the number of people using public transportation to support their daily trips and speed up customer service. However, this study presents several limitations. The use of SUS as an evaluation method, although useful for generating general usability scores, lacks the depth needed to fully capture the nuances of the user experience. In addition, limitations were observed in the application of the Design Thinking approach. This method takes a long time to carry out each stage thoroughly, from appreciation to testing. Due to time constraints, some stages—especially iterative testing and prototyping—were not explored in sufficient depth. Furthermore, the effectiveness of Design Thinking relies heavily on active user participation throughout the process. In this study, limited user engagement due to scheduling conflicts and availability affected the quality of user insights. Future research is encouraged to explore alternative approaches such as User-Centered Design and adopt complementary evaluation methods, including the User Experience Questionnaire (UEQ) or the Single Ease of Use Questionnaire (SEQ), to gain more detailed and diverse insights. Further development of the GOBIS application could also include the integration of additional transportation-related features, enhanced accessibility options (e.g., offline mode, language preferences, and dark/light theme buttons), a user loyalty system, and extensions to other platforms such as mobile web, smartwatches, and digital displays at bus stops to provide real-time route and arrival information.

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