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Designing the UI/UX for a Shoe Repair Application Using the Design Thinking Method

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Abstract

The process of designing a mobile application requires a user-centered approach that addresses real-world problems through innovation and creativity. This study focuses on applying the Design Thinking method to develop the UI/UX for a shoe repair service application, aimed at enhancing the user experience for both customers and service providers. The Design Thinking process consists of five stages: empathize, define, ideate, prototype, and test. Through these stages, the study identifies key pain points, such as customers' difficulties in locating service providers and estimating repair times, and service providers' challenges in managing customer flow and payment methods. Solutions generated include real-time updates on vendor locations, transparent wait times, and multiple payment options. Prototypes were developed and tested to assess usability, with the research highlighting the need for continuous iteration to improve user experience. The usability testing revealed mostly positive results, with an average usability score of 88.8 across scenarios. However, certain areas, particularly screens in scenario 5, showed higher error rates and required further refinement. This study demonstrates the effectiveness of the Design Thinking method in solving complex design challenges, offering innovative solutions tailored to user needs. The Shoe Repair application's design not only enhances functionality but also addresses specific challenges faced by users, emphasizing the importance of an iterative, user-focused approach in UI/UX design.

Keywords: *UI/UX, Repair, Design Thinking Method, Usability, Key.*

1. Introduction

In the ongoing digital era, technology has undergone significant transformation in various aspects of human life, such as in the economic and business sectors [1]. In this context, Shoe Repair, an application providing shoe repair services, emerges as a solution for customers who want to easily find shoe repair services. In this digital age, technology encourages people to engage in various activities and transactions online, as it is considered more efficient in terms of time, cost, and location. Additionally, it is easier to obtain the necessary information [2]. The importance of designing an effective user interface and user experience in an application plays a crucial role in presenting and becoming a critical factor in determining the success of an application and maximizing the user experience [3].

One approach that has proven effective in designing superior user experiences is by applying the Design Thinking method. Design Thinking is an approach that allows for the creation of new ideas in product development that align with user needs, ensuring the suitability of innovative solutions to the problems at hand [4-6]. Stanford University details five stages in Design Thinking, involving empathize, define, ideate, prototype, and test. This concept refers to a human-centered method, where the process involves empathetic observation, idea visualization, collaboration, business analysis, and prototyping [7].

Referring to this framework, this research aims to design the UI/UX for the Shoe Repair application in a mobile app format specifically designed to provide a loyalty program service to users and customers. This case study aims to provide UI/UX design recommendations for the mobile application by identifying the problems faced by shoe repair professionals, focusing on efforts to retain and increase customers. This application model is developed by considering the needs of the target users in providing a loyalty program service and functioning as an intermediary to deliver rewards through the application. The Design Thinking approach emphasizes the user as the main focus, encouraging creativity, and promoting innovative solutions that align with the users' needs and expectations. With the application of Design Thinking in the UI/UX design for the Shoe Repair application, it is expected that the results will not only have aesthetic value but also provide solutions that meet the users' needs and expectations.

2. Literature Review

M In recent years, UI/UX design has become a crucial aspect of enhancing the effectiveness of service-based applications in Indonesia, including laundry services and restaurants. Research [8] highlights that the User-Centered Design (UCD) method is particularly effective for applications like laundry services. This approach focuses on understanding user needs and preferences to create interfaces that are easy to navigate, practical, and provide convenience for users, such as locating nearby laundry providers and managing orders through a seamless mobile interface. The goal is to improve both customer experience and the growth of home-based laundry businesses by providing a functional and user-friendly design that meets industry demands

Similarly, for service industries like restaurants, UI/UX design is critical in ensuring that customers can efficiently explore menus, place orders, and make payments. Prillya et al [9] conducted a study on laundry service apps, demonstrating that well-structured interfaces can significantly improve user satisfaction by addressing pain points like unclear service options and payment processes. These designs not only enhance customer experience but also help service providers manage operations more effectively, resulting in increased customer retention and sales. There's also several other researches that utilize design thinking method such as [10], [11] and [12].

3. Research Method

Design Thinking is an iterative cycle where we attempt to understand the user, test hypotheses, and redefine the problem to create alternative strategies and solutions that might not have been apparent in the initial stages of understanding. [13]. To solve the issues previously discussed, this research uses a Design Thinking approach to create a solution that will be developed in the form of a mobile application. There are five stages, which can be found in Figure 1, along with a detailed explanation of each stage, they are:

1. The Empathize stage is the initial step aimed at enhancing our understanding of the user's needs, which includes aspects such as habits, motivations, and other psychological factors. To gain this understanding, potential users are interviewed through a series of questions. Creative design can connect with principles and humanity through understanding and empathy. As a result, the solutions generated will automatically meet human needs. This creates a special touch through the interaction between decision-makers and users [14].
2. The Define stage aims to identify and resolve the actual problems experienced by the users. The outcome of this stage will become the main focus in the application design development. In this stage, the process of analyzing and understanding the various insights gained through empathy is intended to identify the problem statement as the point of view or the main focus in the research [15].
3. The Ideate stage is the step of generating ideas or solutions based on the analysis of user needs and understanding of the problems identified in the previous stage. Designers can generate solutions to the problems by conducting brainstorming sessions with the team and related parties. The ideas that emerge from this process will transform into solutions to address the challenges faced by the users [16].
4. The Prototype stage focuses on the implementation of solutions or ideas gathered in the previous stage into a prototype or product that can be tested. The Prototype stage is the process of creating the desired design appearance by implementing ideas to create a prototype or product that can be tested [17].
5. The Test stage involves users in trying out the completed application. From the user experience, feedback will be obtained that can be used to improve the product and make enhancements to the existing product [18].

Design Thinking is recognized for its flexibility and iterative nature, making it highly effective in addressing complex, user-centered problems. The iterative approach enables designers to revisit earlier stages, refine their understanding, and continuously improve solutions based on real-time feedback from users. According to [19], Design Thinking is not just about generating creative ideas but also about engaging with users through empathy and collaboration to uncover insights that might be hidden in traditional development processes. Moreover, recent studies emphasize the importance of sustainable innovation through Design Thinking, as it enables the creation of solutions that are not only user-centered but also environmentally and socially responsible. In their study [20] highlight how Design Thinking fosters sustainable practices by encouraging businesses to integrate user needs with environmental considerations. This combination of user-focused innovation and sustainability makes Design Thinking an essential framework in modern mobile application development [19-20].

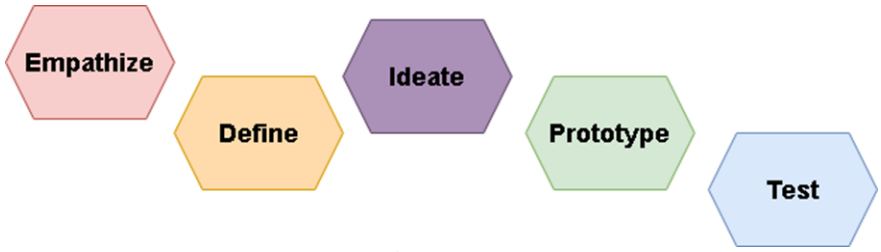

Fig 1. Stages of Design Thinking Method

4. Result and Discussion

4.1. Empathize

In this stage, the researcher conducted an interview with Mr. Hengky, a shoe repair vendor. Based on the interview results, it can be concluded that the vendors do not understand the patterns of busy and quiet hours around the market to determine a more effective marketing strategy. The vendors want to attract potential customers through promotions and offer special discounts. They wish to interact with customers more efficiently through an application or communication device. Vendors also want to approach customers to get

feedback on their services and offerings to evaluate the possibility of using an application or other tools that can help in sales or building relationships with customers.

On the customer side, based on the interview results, it can be concluded that customers face challenges because they do not know where the vendors are located or the operational hours of the shoe repair services. Orders are still being made offline. Buyers try to find a solution by looking for ways to order services online, but Shoe Repair does not yet have an online platform for booking shoe repair services. Although buyers attempt to pay using digital payment applications, this option is not yet available.

4.2. Define

After gathering the necessary data during the Empathize stage, the next step is the Define stage. The primary objective here is to analyze the data and the problems identified earlier. All results and analyses in this stage are derived from the interviews. The analysis of the customer's issues is detailed in Table 1.

Tabel 1. Analysis of the customer's issues

No	Problem	Reason
1	Not knowing the location where the vendors are stationed.	No information on where the vendors are stationed.
2	Not being sure whether the order can be completed or not.	The shoe repair vendor needs to inspect the shoes first to determine if they can fix them.
3	Not knowing the exact waiting time for the order.	The waiting time could be longer depending on the condition of the shoes or the request, as well as if there are many orders to be processed.

After identifying the problems that have arisen, the next step is to analyze the data on customer needs to serve as a foundation for designing the application to be developed. Table 2 contains a list recording the identified user needs.

Tabel 2. List of customer needs

No	Customer Needs
1	Want to know exactly where the shoe repair vendor is stationed.
2	Want to know for sure whether the shoe repair vendor is at their usual market location or not.
3	Want to know exactly how long the wait time is to receive services from the shoe repair vendor.
4	Want to know exactly how long it will take to repair one shoe.
5	Want to know for sure whether QRIS payment methods can be used or not.
6	Want to know exactly if the vendor has change available or not.

Now we are going to list the service provider's issues:

Tabel 3. Analysis of the service provider's issues

No	Problem	Reason
1	Want to know if there were any customers on that day.	To ensure the service provider is prepared for the number of customers and manage resources and time effectively.
2	Want to know what time the market at the trading location closes.	To plan the repair work within the available time and avoid any inconvenience due to market hours.
3	Want to know whether customers will use cash or non-cash payment methods.	To be prepared with the appropriate payment facilities and avoid potential payment issues.
4	Want to know if the customers were satisfied with the results provided.	To improve service quality and address any issues or feedback from customers.

After identifying the emerging problems, the next step is to analyze the service provider's needs data to serve as the foundation for designing the application to be developed. Table 4 contains a list that records the identified service provider needs.

Tabel 4. List of service provider's needs

No	Service Provider's Needs
1	I want to know if there were any customers on that day.
2	I want to know if there will be customers on that day even if the weather is unfavorable.
3	I want to know what time the market at the trading location closes.
4	I want to know whether customers will use cash or non-cash payment methods.
5	I want to know if there is enough change available if customers pay in cash.
6	I want to know if the customers were satisfied with the results provided.

4.3. Ideate

Based on the pain points defined in the previous stage, the Ideate phase is the process of designing solutions consisting of various ideas that can be used to address the defined problems.

Tabel 5. Analysis of service provider's solutions

No	Problem	Solution
1	Not knowing for sure if there will be any customers or not	Providers can receive immediate notifications when an order comes in. This allows them to respond quickly and work on the

		order.
2	Not knowing for sure how much money will be earned	Providers can receive payment notifications to know the amount of money earned.
3	Not knowing exactly when it will be their turn to be served	A system that provides notifications or alerts to vendors about their estimated service time based on the existing queue. This allows them to prepare before their turn arrives.
4	Uncertainty about the waiting time	Provide customers with a transparent waiting time estimate, either through pop-ups, the app, or an information board at the business location.
5	No payment options available	Offer various payment options, such as credit/debit cards, bank transfers, e-wallets, or cash payments.

Table 6. Analysis of customer's solutions

No	Problem	Solution
1	How do we provide information on where the vendors are stationed?	Messaging feature to directly order shoe repair services and to find out the vendor's address
2	How do we provide an estimated completion time to the customer?	Confirmation feature to check the estimated completion time
3	How do we provide transaction information to the customer?	Transaction feature to facilitate payment

4.4. Prototype

The Prototype stage is the step in implementing the ideas obtained from analyzing user needs and resolving cause-and-effect problems that were evaluated in the previous stage.

4.4.1. Low-Fidelity Wireframe

Wireframe is a way to visualize the application system. At this stage, the researcher uses low-fidelity wireframes to illustrate the application that will be built without images or colors. The low-fidelity wireframe of the Shoe Repair application can be seen in the following image.

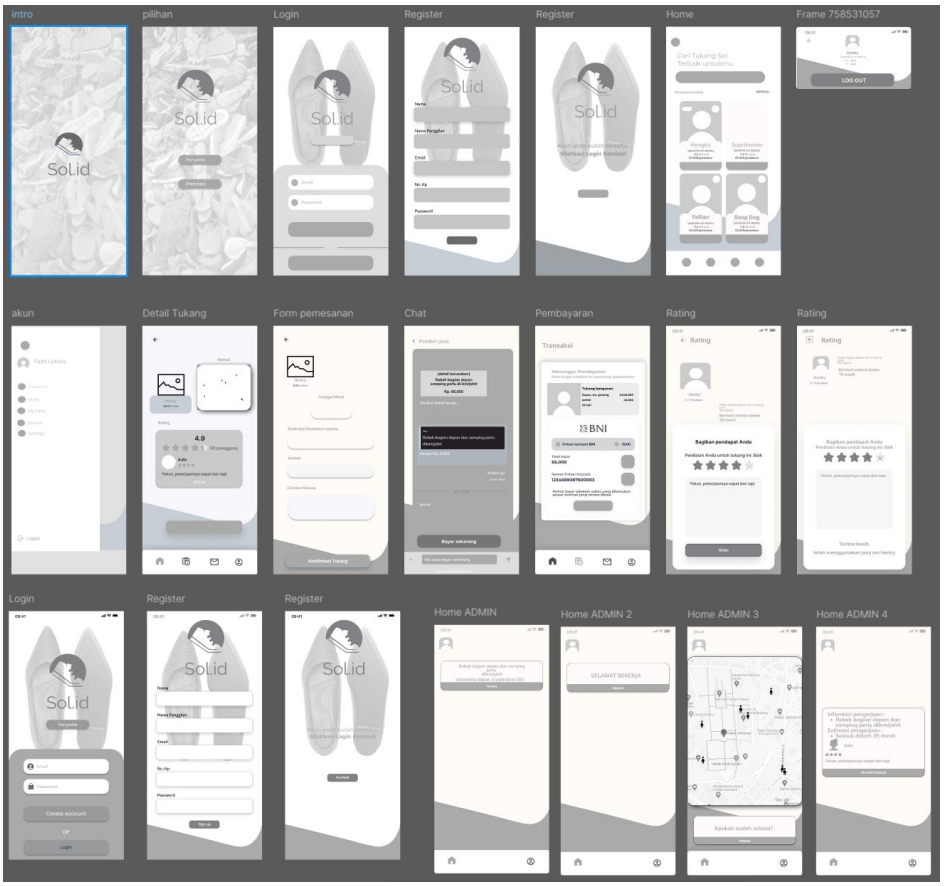

Fig 2. Low-Fidelity Wireframe Aplikasi Shoe Repair

4.4.2. High-Fidelity Wireframe

After defining the basic components, such as determining the information infrastructure, creating sketches of the application using low-fidelity wireframes, and establishing the typography and colors to be used, the next step is to design the user interface using high-fidelity wireframes based on the low-fidelity wireframe design. The following image shows the UI/UX of the Shoe Repair application

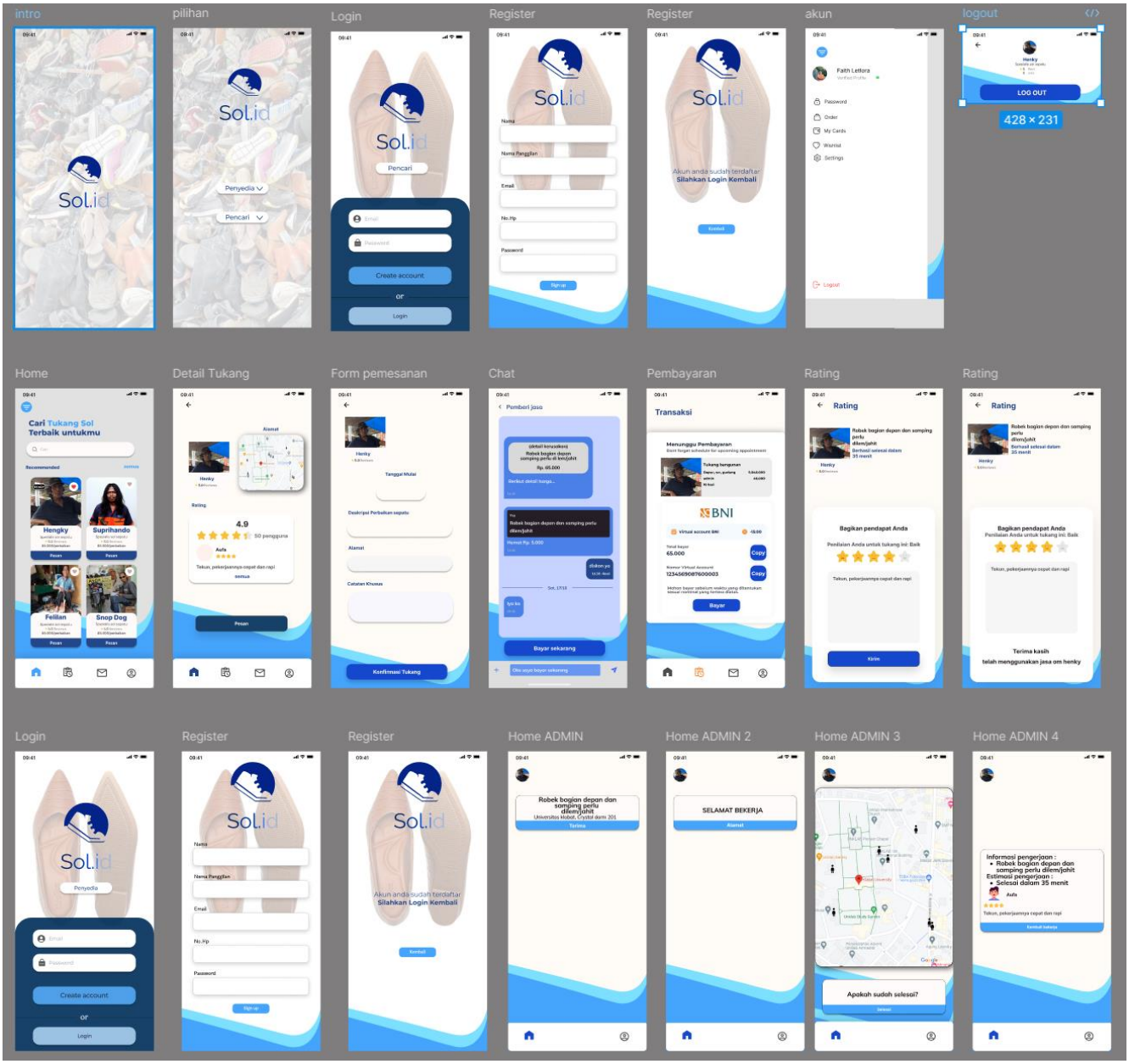

Fig 3. High-Fidelity Wireframe Aplikasi Shoe Repair

4.4.3. Task Scenario

Creating task scenarios is a necessary step before conducting usability testing on the application design. The purpose of creating task scenarios is to provide guidance for conducting usability tests involving participants by creating or writing a scenario. This scenario aims to encourage participants to perform specific actions to achieve the goals described in the scenario. By creating task scenarios that reflect real-world situations, we can collect qualitative data on the obstacles users face with the interface being tested and also develop ways to improve the interface design. The following are the task scenarios created and the prototype of the Shoe Repair

1. Customer
    1. Scenario 1 : Login Process
       User Goal : Enter the email and password to log in to the Shoe Repair account to make a reservation.
       Task :
       1)The user selects the login option after entering their email and password.
       2)The user successfully logs in and can place a service order.
       3)The user selects the registration option because they don't have an account.
       4)The user selects the forgot password option and enters their phone number for the OTP process and verification.

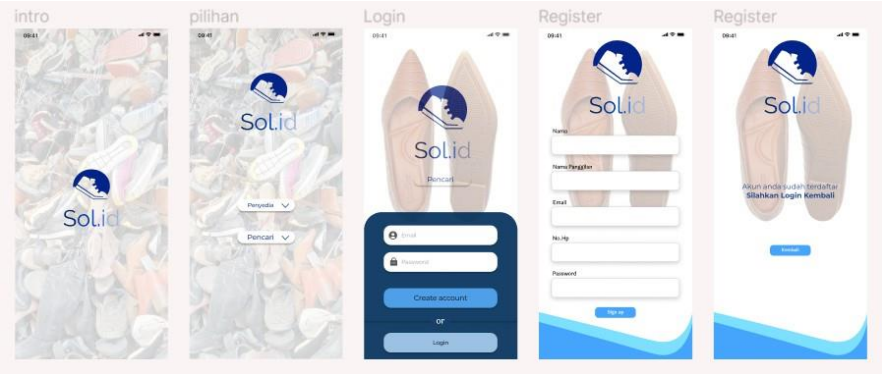

Fig 4. Login UI on Figma

2. Scenario 2 : Home
   User Goal : Exploring and using the available features.
   Task :
   1)After the login process, the user is directed to the home page.
   2)The user can select the home button.
   3)The user receives notifications about vendor availability (open/closed) and offered promotions.

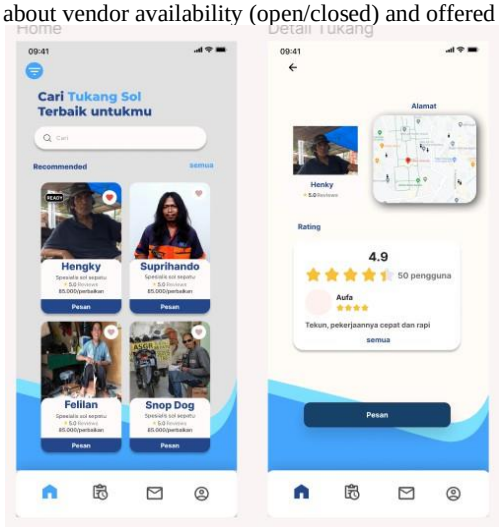

Fig 5. Tampilan

3. Scenario 3 : Menu
   User Goal : Selecting an available shoe repair vendor.
   Task :
   1)After the user presses the home button, they are immediately directed to the shoe repair vendor selection page.
   2)The user can choose the desired shoe repair vendor to fix their shoes.
   3)Next, the user presses the order button.
   4)After pressing the order button, the user will fill out the order form, including the order date, shoe repair description, address, and special notes.
   5)Once the user has filled out the order form, they will press the admin confirmation button, and the admin will provide details on the damage and the total repair cost through the chat feature.
   6)Then the user will press the "Pay Now" button.
   7)After the payment is successful and the user presses the "Done" button, they will be taken to the "Status" page to see how long it will take for the order to be ready.

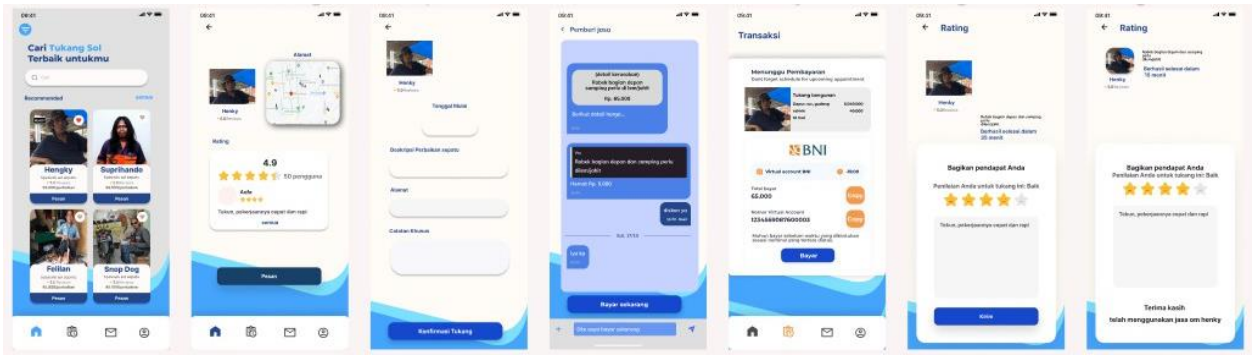

Fig 6. Scenario 3

2. Service Provider
    1. Scenario 4 : Home
       User Goal : Activating the sales status, work address, and operating hours (open and close times).
       Task :
       1)The user activates the sales status.
       2)The user checks the calendar to see if students have a holiday or not.
       3)The user sets the operating hours for when to open and close.

Fig 7. Scenario 4

3. Scenario 5 : Profile
   User Goal : Creating Profile
   Task :
   1) User can see profile page
   2) User Logout

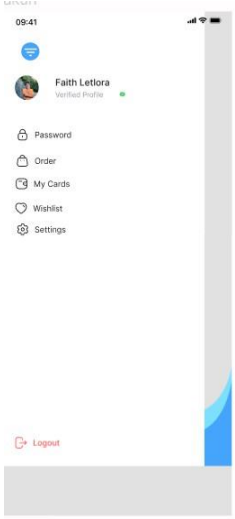

Fig 8. Scenario 5

4.5. Test

The developed application. At this stage, the researcher will evaluate the qualitative data obtained from the scenario testing conducted by potential users through the MAZE.co website platform. This test involved a total of 12 testers who tested 5 different scenarios.

4.5.1 Test

This stage is carried out by testing scenarios on the UI design prototype of the Shoe Repair application using the MAZE website platform. The process involves observing the behavior of potential users as they complete the predefined scenarios, as shown in the following image:

1. Scenario 1 (Login Process)
   The usability results of each application interface used in scenario 1.

Fig 9. Usability Breakdown scenario 1

The following are the results of behavioral observations represented using a heatmap that shows the parts that are pressed when creating a task in scenario 1.

Fig 10. Heatmap interface scenario 1

Figure 9 and 10 shows the results of a usability test for each interface of the Shoe Repair application during scenario 1. It includes six screens with metrics such as average time spent, the percentage of users who miss clicked, and the usability score. The usability scores range from 79 to 100, indicating how user-friendly each screen is. Most screens performed well, with low miss click percentages and high usability scores, except for the second screen, which had a lower usability score of 79 and a higher miss click rate of 8%. The data suggests that while most of the interface is intuitive, the second screen might require improvements to enhance user experience.

2. Scenario 2 (Ordering Process)

The usability results of each application interface used in scenario 2.

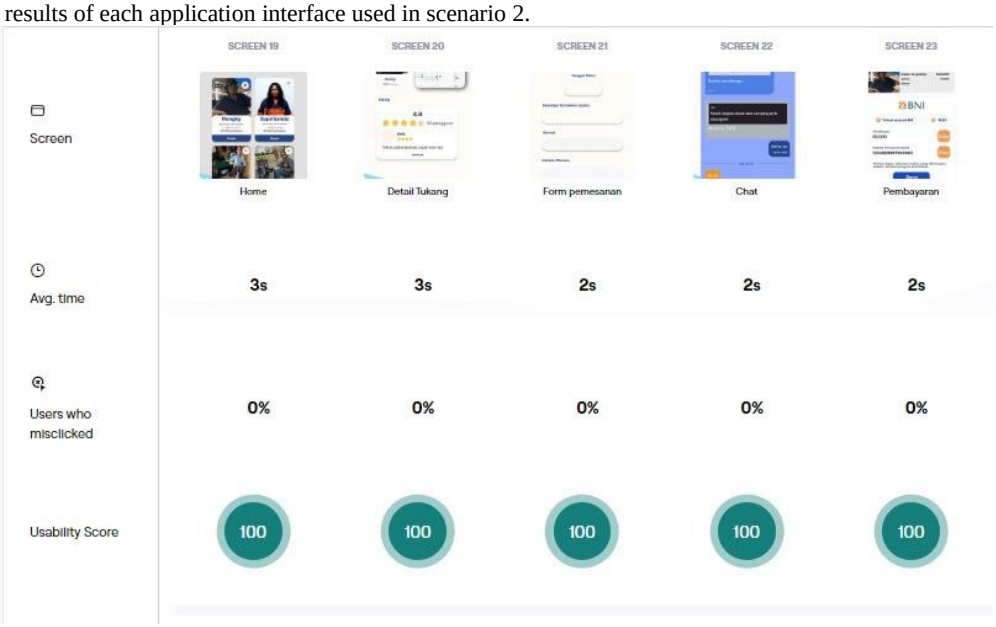

Fig 11. Usability Breakdown Scenario 2

Here are the observation results of the behavior, represented using a heatmap that shows the areas that were clicked on while completing tasks in scenario 2.

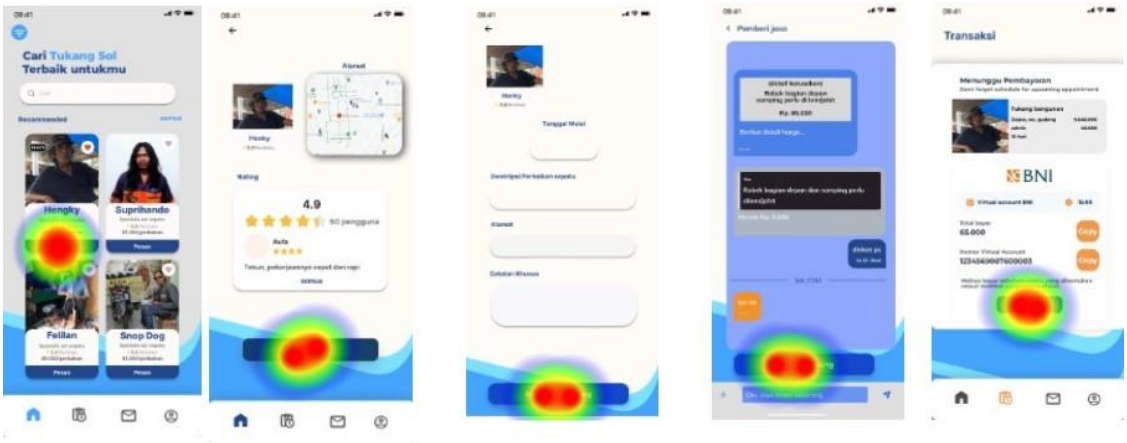

Fig 12. Heatmap Interface Scenario 2

Figure 11 an 12 displays the usability test results for scenario 2 of the application, covering five screens: Home, Detail Vendor, Order Form, Chat, and Payment. The average time users spent on each screen ranged from 2 to 3 seconds, indicating quick and efficient navigation. There were no miss clicks reported across all screens, suggesting a highly intuitive interface. Each screen received a perfect usability score of 100, reflecting an excellent user experience with no significant issues encountered during interaction. Overall, the results highlight the application's strong usability and user-friendliness in scenario 2.

3. Scenario 3 (Payment)
   The usability results of each application interface used in scenario 3.

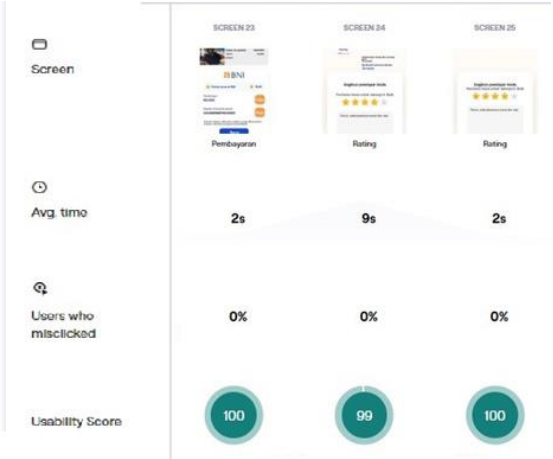

Fig 13. Usability Breakdown Scenario 3

Here are the observation results of the behavior, represented using a heatmap that shows the areas that were clicked on while completing tasks in scenario 3

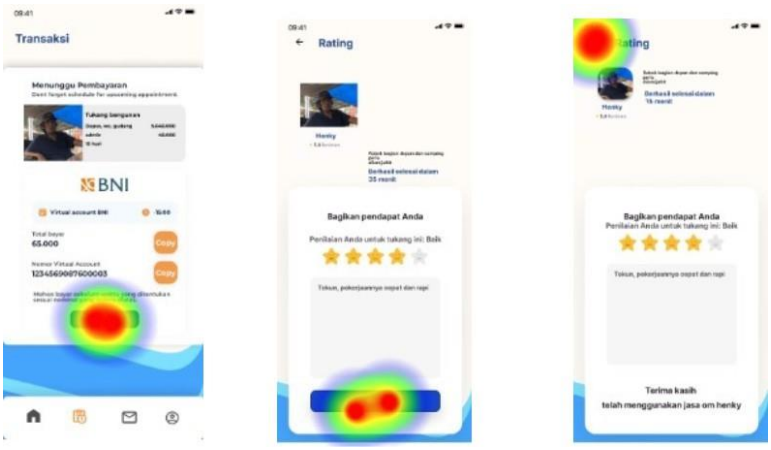

Fig 14. Heatmap Interface Scenario 3

As shown on figure 13 and 14, the usability testing results for scenario 3 of the application, which focused on the Payment and two

Rating screens, reveal a highly user-friendly interface. The average time spent on the screens varied, with users taking 2 seconds on the Payment and second Rating screens, and 9 seconds on the first Rating screen, possibly reflecting more time spent evaluating the content. There were no miss clickss on any of the screens, indicating clarity and ease of use. The usability scores were near perfect, with the Payment and second Rating screens scoring 100 and the first Rating screen scoring 99, suggesting that the application is generally very easy to navigate, with only minor room for improvement on the first Rating screen.

4. Scenario 4 (Login)
   The usability results of each application interface used in scenario 4

Fig 15. Usability Breakdown Scenario 4

Here are the observation results of the behavior, represented using a heatmap that shows the areas that were clicked on while completing tasks in scenario 4

Fig 16. Heatmap Interface Scenario 4

Figure 15 and 16, showes The image presents usability test results for three screens (Login, Register, and another Register screen) in scenario 4. Users spent 4 seconds on the Login screen and 2 seconds on each Register screen, indicating quick navigation. However, the Login screen had a 10% miss clicks rate, and the first Register screen had an 11% miss clicks rate, pointing to potential usability issues, while the second Register screen had no miss clickss. The usability scores were 85 for the Login screen, 95 for the first Register screen, and a perfect 100 for the second Register screen, suggesting that while the Register screens performed well, the Login screen may need design improvements to enhance user experience.

5. Scenario 5 (Accept Orders)
   The usability results of each application interface used in scenario 5.

Fig 17. Usability Breakdown Scenario 5

Here are the observation results of the behavior, represented using a heatmap that shows the areas that were clicked on while completing tasks in scenario 5

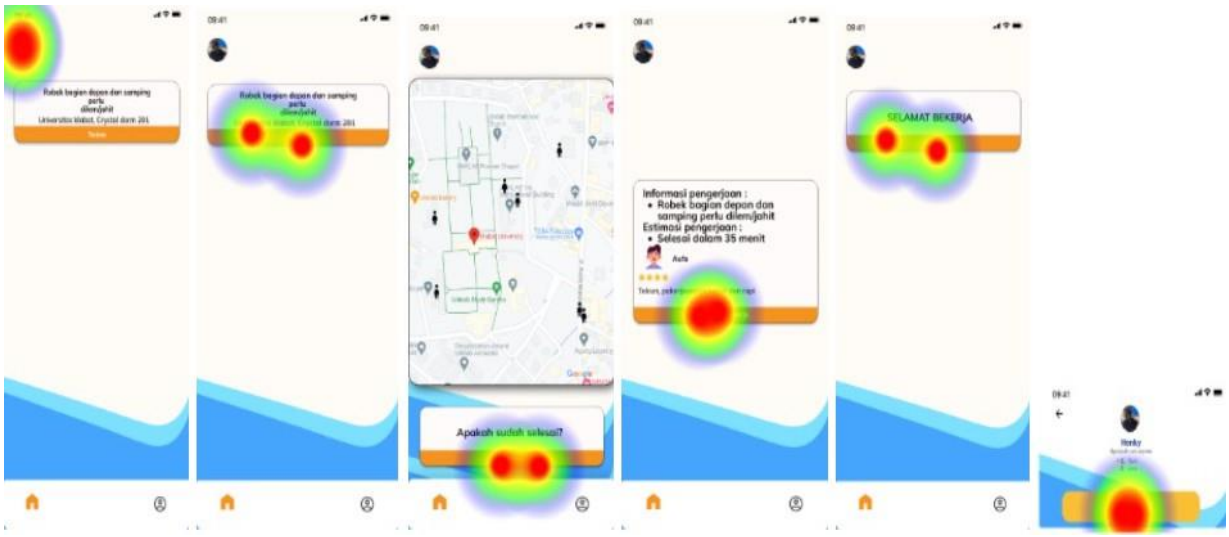

Fig 18. Heatmap Interface Scenario 5

Lastly figure 17 and 18 Show usability test results for scenario 5, covering six screens. Users navigated quickly through the screens, spending 1 to 3 seconds on each. While Screens 8, 9, and 12 had no miss clickss and scored perfect usability scores of 100, Screens 7, 10, and 11 showed higher miss clicks rates (13%, 25%, and 14% respectively) and lower usability scores, particularly Screen 10 with a score of 75 and Screen 11 with a notably low score of 36. These results suggest that while most screens are user-friendly, Screens 10 and 11 require significant improvements to reduce errors and enhance the overall user experience.

4.5.2. Usability Testing

The usability testing across various scenarios for the application interfaces reveals a mixed performance. On average, users spent approximately 2.1 seconds per screen, indicating efficient navigation. The average miss clicks rate across all screens was about 8.4%, with certain screens, particularly Screens 10 and 11 in scenario 5, showing higher error rates. The overall average usability score was 88.8, with most screens performing well, though some, especially in scenario 5, scored significantly lower, highlighting areas that need design improvements to enhance user experience and reduce miss clickss.

5. Conclusion

The purpose of this research was to develop the Shoe Repair mobile application, focusing on enhancing the user experience (UI/UX) for both shoe sole service providers and customers by applying the Design Thinking methodology. This approach, which encompasses empathizing, defining, ideating, prototyping, and testing, allowed the research team to create a user-centered and innovative solution that addresses the specific needs and challenges faced by the target users. The UX analysis was particularly crucial in identifying pain points for both customers and service providers. Customers faced difficulties such as locating service providers and uncertainty about service availability, while service providers struggled with managing customer flow and payment methods. The solutions generated through the UX analysis included features like real-time service updates, transparent wait time estimates, and efficient payment processing, all of which were designed to directly address these identified challenges.

The final usability testing yielded varied results across different scenarios. On average, users navigated through the application efficiently, with an average usability score of 88.8 and quick screen transition times. However, the testing also revealed certain areas requiring improvement, particularly in scenario 5, where screens 10 and 11 exhibited higher miss clicks rates of 25% and 14%, respectively, and lower usability scores, with screen 11 scoring as low as 36. These findings underscore the importance of continuous iteration and testing to ensure the application fully meets user expectations and provides a seamless experience. Overall, the research successfully applied the Design Thinking method to develop a functional and user-friendly application, while the UX analysis played a pivotal role in transforming user pain points into practical design solutions, ultimately enhancing the overall user experience

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