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Application of the Design Thinking Method in UI/UX Design Model for the Daur Minyak Application

Muhamad Roihan Alazhari*, Ricky Indrawan, Didit Widiatmoko Soewardikoen*, Dandi Yunidar***
* Magister Design, Telkom University

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ABSTRACT

The Daur Minyak application is designed as a used cooking oil pick-up service, allowing customers to sell their oil, while the service buys and collects it. The app aims to tackle environmental issues caused by improper disposal of used oil. It provides a sustainable solution by enabling users to sell oil that is no longer safe for cooking, in partnership with PT. MBIO. This study focuses on proposing a UI/UX model for the Daur Minyak application using the design thinking method, which includes five stages: Empathize, Define, Ideate, Prototype, and Testing. The prototype was built using Figma and was tested on 12 respondents. Usability was measured with the System Usability Scale (SUS), where the app received a high score of 90, indicating a positive user experience. This design approach aims to create an intuitive and functional app to support efficient used oil management.

Corresponding Author:

Third Author,
Magister Design,
Telkom University,
Telekomunikasi street. 1, Terusan Buahbatu - Bojongsoang, Telkom University.
Email: diditwidiatmoko@telkomuniversity.ac.id

1. INTRODUCTION

Cooking is a common activity in households, restaurants, and eateries, often generating used cooking oil that is unhealthy and environmentally harmful. Many people either reuse this oil or dispose of it improperly, leading to waste accumulation (1) . A survey shows that households are the biggest contributors to used cooking oil, resulting in significant environmental concerns. Improper disposal can cause health issues like atherosclerosis and damage ecosystems due to oil buildup in drains, which contains pollutants (2).

In Indonesia, fried food remains highly popular, contributing to the large amount of used cooking oil. Despite the potential waste, only 18.5% of the oil is recycled, with the remaining oil often discarded irresponsibly, leading to pollution. In Pekanbaru, while some oil collectors exist, many people still do not recycle or sell their used oil, contributing to environmental harm, particularly in rivers (3) .

To address these issues, the researcher proposes a solution through an application called “Daur Minyak.” This app would provide a platform for pricing used oil, home pickup services, and digital payment options via e-money. The app uses location-based services for oil pickup and allows users to receive payments through various digital methods, such as phone credits, electricity tokens, game vouchers, or bank transfers. By making the process more convenient, the app aims to reduce environmental damage, encourage oil recycling, and create a long-term business model. The proposal, titled “Penerapan Metode Design Thinking Pada Model Perancangan UI/UX Aplikasi Daur Minyak,” seeks to optimize the management of used oil and enhance user comfort with the app's design.

The proposal, titled “Penerapan Metode Design Thinking Pada Model Perancangan UI/UX Aplikasi Daur Minyak,” seeks to optimize the management of used oil and enhance user comfort with the app's design. Furthermore, integrating principles of environmentally-friendly applications and their UI/UX design principles is crucial to ensure user engagement and sustainability. Studies on waste management applications emphasize

that a user-centric approach in UI/UX design significantly improves adoption rates and effectiveness, as demonstrated by research on waste collection systems (4) and environmentally-conscious application designs (5).

2. RESEARCH METHOD

Research methods are procedures used to understand a subject. The scientific method forms the foundation of knowledge, requiring certain criteria to be accurate and accountable (6) . This study uses a design research approach, which effectively addresses issues and offers design solutions. Design Thinking by Stanford d.school is the framework applied in designing the *Daur Minyak* application.

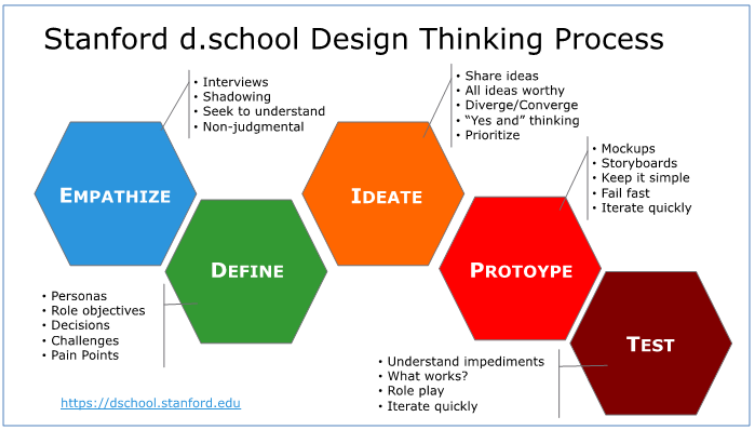


Figure 1. Stanford d.school Design Thinking Process

2.1. Emphatize

In this phase, observations were conducted with collectors, small business owners, and housewives. Researchers interviewed three core respondents and created a questionnaire with questions tailored to the research topic. By empathizing, the design becomes more relevant and better understands the users' emotions (7) . Data collection involved interviews, observations, and questionnaire distribution to gather information on used oil recycling.

2.2. Define

This phase aims to capture users' insights as a foundation for the application. Researchers identified key issues from the interviews and observations, using Pain Points, Affinity Mapping, and *How Might We* techniques to outline the problems without suggesting specific solutions, fostering innovative thinking (8).

2.3. Ideate

Here, researchers developed solutions based on Affinity Mapping and Prioritization. They brainstormed ideas to address the identified issues, aiming to create an app that meets users' needs. The final step in ideation is the User Journey Map, which helps users understand the business and application flow (9).

2.4. Prototype

In this phase, the solution is designed into a mockup based on the User Journey. The prototype focuses on UI and UX to meet client expectations. Figma was used to create the *Daur Minyak* application's UI (10).

2.5. Testing

This phase refines the product, ensuring it meets usability requirements using the System Usability Scale (SUS) framework, chosen to evaluate the application comprehensively (11).

3. RESULTS AND ANALYSIS

3.1. Old Business Process Flow Analysis

PT. MBIO has a market for collecting used oil, primarily from established oil collectors, as there are few individual sellers who return used oil. The process for selling used oil to PT MBIO involves several key steps. First, sellers must transfer the used oil into safe and sterilized bottles, which are then delivered to PT

MBIO's collection center located at Jl. Air Hitam, Golden City Warehouse No. B-10, Pekanbaru. To ensure safety, sellers are required to adhere to PT MBIO's health protocols when selling their oil. Once the oil is collected, it is weighed and assessed for quality. If it meets the required standards, sellers receive Rp.5,000 per liter. After the weighing process, both the seller and PT MBIO agree on the final price based on the net weight, as determined by the collection team.

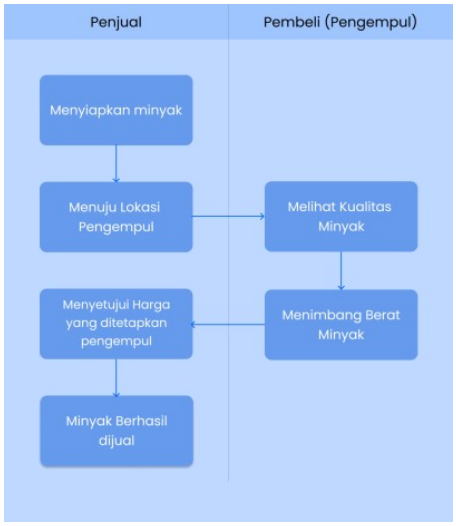


Figure 2. Old Business Process Analysis Map

3.2. New Business Process Flow Analysis

In the Daur Minyak app, sellers can order a pickup service by entering their address and preferred pickup schedule. Once a pickup is scheduled, the picker receives the order, adding it to the day's pickup list on the app. At the scheduled time, the picker arrives at the seller's address, weighs the used oil to confirm it matches the order details, and, upon agreement on the price, completes the transaction by paying the seller. Afterward, sellers earn points for each sale and can rate the picker's service quality. When the picker's collected oil reaches the capacity limit, they can sell it directly to a designated partner or oil collector.

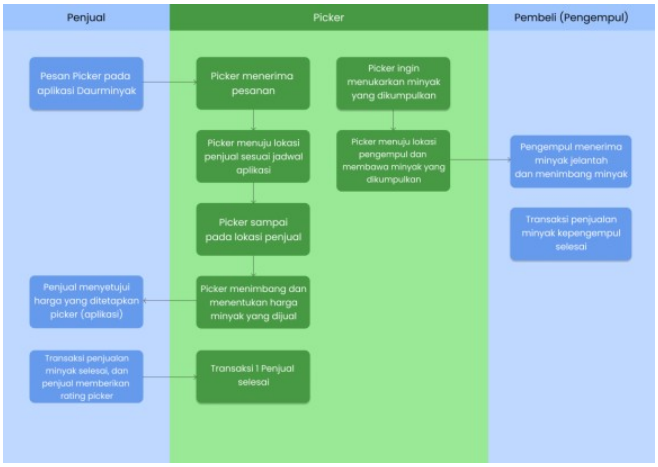


Figure 3. New Business Process Flow Analysis Map

3.3. Observation

Field Observation is a strategy conducted face-to-face or directly in the field. This approach aims to understand the issues perceived by the local community (12). During this observation phase, challenges faced by the community (customers) and oil collectors at PT MBIO from a business perspective were identified, highlighting the obstacles they have been dealing with. These issues will be presented in the following table.

Table 1. Table of Field Observation Results

No	Masyarakat	Pengempul
1	Kebanyakan Masyarakat tidak mengetahui bahwa minyak bekas bisa dijual Kembali	Masyarakat banyak meng- c*laim* bahwa pengempul mengumpulkan minyak untuk diolah Kembali, padahal pengempul hanya wadah untuk mengumpulkan minyak bekas dan diolah diluar negeri untuk dijadikan bahan bakar biodiesel
2	Masyarakat tidak tahu cara mengolah minyak bekas Kembali, sehingga minyak bekas banyak dibuang ke wastafel dan tanah, sehingga menyebabkan dampak buruk bagi lingkungan.	Volume minyak bekas yang hanya bergantung pada mitra yang sudah sering menjual minyak bekasnya saja, sehingga pengempul membutuhkan jaringan customer yang lebih luas lagi
3	Harga minyak yang mahal, menjadi factor meningkatnya minyak bekas di goreng berulang-ulang kali.	Pengempul hanya bisa menjadwalkan penjemputan berdasarkan banyaknya mitra yang memesan. Jika tidak sesuai, maka penjemputan akan ditunda
4	Lokasi pengempul minyak yang jauh, dan membuat penjualan minyak bekas Kembali menjadi tidak efektif dan efesien.	

3.4. Interview

The three interviews reveal various perspectives on used cooking oil. Rahmi Fariza, a student, expressed concerns about the improper disposal of used oil but acknowledged the difficulty of finding alternative uses for it. Although she knows that used oil can be recycled, she isn't aware of the process and finds it inconvenient. She would appreciate an application-based service to facilitate selling her used oil, making it easier to avoid environmental harm and earn some money in the process.

Zubaidah, a housewife, shared that the rising cost of cooking oil forces her to reuse oil multiple times, but she didn't know that used oil could be processed or sold. She typically disposes of it by throwing it away, unaware of its potential to be reused or sold. Despite this, she would be open to using an app-based service for used oil collection, provided it is easy to use.

Jakfar , forestry service employees, acknowledged the negative environmental impact of improperly disposed of used oil, which can clog drains and pollute the environment. He knows that used oil can be recycled into products like candles or fuel, but he doesn't process it himself. He would be willing to sell his used oil if given the option, and he sees the potential benefits of a service that helps reduce environmental pollution, especially with the added convenience of digital payments and the opportunity to save from recycling the oil.

3.5. Questionnaire

After conducting interviews with 3 sources regarding complaints and issues related to used oil recycling, the researcher distributed a questionnaire to gather additional qualitative data and obtain various opinions from the community with different behaviors toward used oil.

Figure 4. Questionnaire Respondent Data

3.6. Problem Solving

In the Define phase, the issues identified will be characterized based on the perceptions, encounters, and opinions gathered in the previous stage. This phase involves organizing and refining the problems to gain a clear understanding of the key challenges. The problems will be categorized using tools such as Pain Points, Affinity Mapping, and How-Might We questions to explore potential solutions.

The first step is to identify the Pain Points, which are derived from the data collection phase (Empathize). These Pain Points highlight the specific difficulties or frustrations experienced by users. Once the Pain Points are identified, they serve as the foundation for the next phase, which is the creation of an Affinity Map.

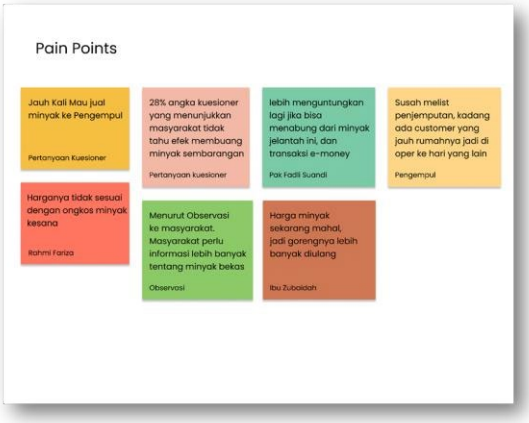


Figure 5. Map of user Pain Points

After identifying the Pain Points, the next task is to organize them into themes through Affinity Mapping. This process involves grouping related issues under specific topics, allowing for a clearer understanding of the problem areas.

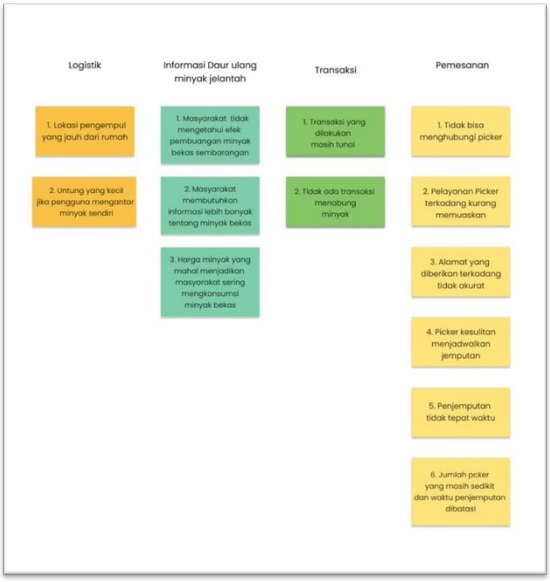


Figure 6 . Affinity Map Analysis

Once the Affinity Map is complete, the next step is to develop the How-Might We questions, which are formulated based on the insights from the Affinity Map. These questions help define the direction for generating potential solutions for oil recycling challenges.

Figure 7 . How Might We Map

3.7. Ideate

After identifying the issues, the next step is to collect ideas and plan the features during the idea generation phase. This phase is crucial for translating the insights gained from the previous stages into actionable concepts. It is done progressively, beginning with the creation of an Application Idea Affinity Map. This map is based on the Affinity Map developed in the Define phase, allowing the team to organize and group related ideas and concepts. By doing so, it becomes easier to prioritize features, align them with user needs, and ensure that the application will address the identified problems effectively. This structured approach helps in building a solid foundation for the development of the application, ensuring that each feature is thoughtfully planned and strategically placed.

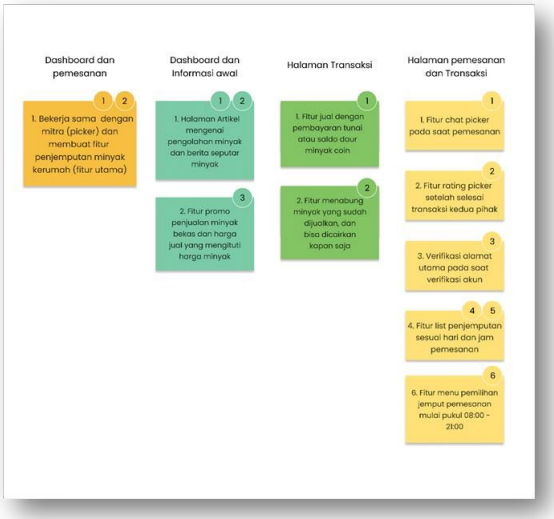


Figure 8. Affinity Map Ideas Analysis

After creating the Application Idea Affinity Map, the next step is to separate the issues based on the needs of both the clients and the application. The problems are isolated and categorized using a Prioritization Map. This map helps in identifying which issues are most urgent or critical for the clients, as well as which ones align with the functionality and goals of the application. By mapping these issues, it becomes clearer which features should be prioritized and developed first, ensuring that both user needs and client expectations are met. This process is essential for setting clear priorities and making informed decisions on which problems to tackle in the next phases of the development.

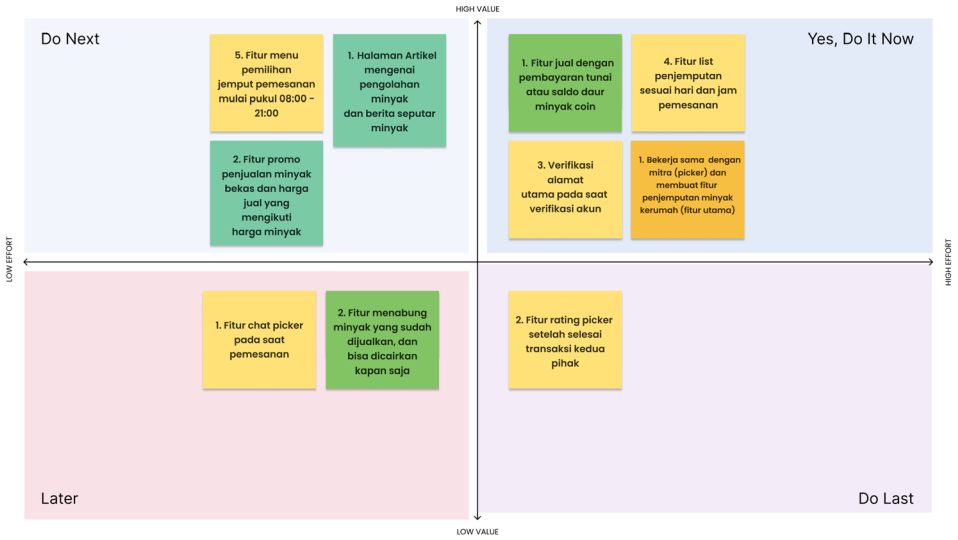
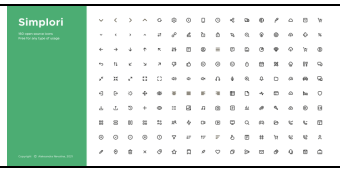


Figure 9. Prioritization Map

3.8. Prototype

After planning the ideation and finding the expected solutions to address the current problems, the next step is to execute them into a High-Fidelity Prototype. A prototype is an exploration phase, and its main goal is to identify the best solutions for each issue distinguished during the first three phases (13). Before the prototype stage is carried out, the design concept must be developed based on the theme/big idea from the previous stages, so that the design provides the right solution.

Table 2. visual aspects of design

Visual aspect	Selected	Description
Color	#4CAD73 greenish-blue main color #F7BF41 Golden Yellow support color	The greenish-blue color was chosen to reflect sustainability and a natural feel, while golden yellow provides energy, optimism, and an appealing visual contrast. The combination of both supports the eco-friendly and social benefits theme of the app, while creating a harmonious and user-friendly appearance.
Font	Poppins	The Poppins font was chosen for its high readability on digital screens, modern and clean appearance, and flexibility in visual hierarchy. Its geometric and simple style supports the campus mobility app's interface, which is neat and user-friendly, while also aligning with the identity of the oil recycling app that provides benefits to many people.
Asset		The assets are tailored to the app's simple visual character, selecting icons that are not too thick. The type of assets used is Solid to make them more prominent and easy to see. The minimum icon size follows a standard of 20x20px and a maximum of 36x26px. Some icons are sourced from Figma plugins and community resources, so the licenses are free.
Navigation		The navigation is designed to be intuitive with a menu at the bottom of the screen, featuring clear icons and call-to-action (CTA) buttons for key features such as "Home," "Orders," "Start Selling," "Inbox," and "Account." This allows users to switch between features quickly and efficiently.

layout		The grid layout employs columns and rows to arrange elements. Consistent use of the grid ensures proportional content organization, making key information easily accessible. Padding guidelines and spacing between components are based on multiples of 4 and 8.

The prototype design is created using the Figma application Below is an example of the product generated from the design of the Daurminyak application. The splash screen displayed at the beginning shows the product name and the logo of the application that has been created.

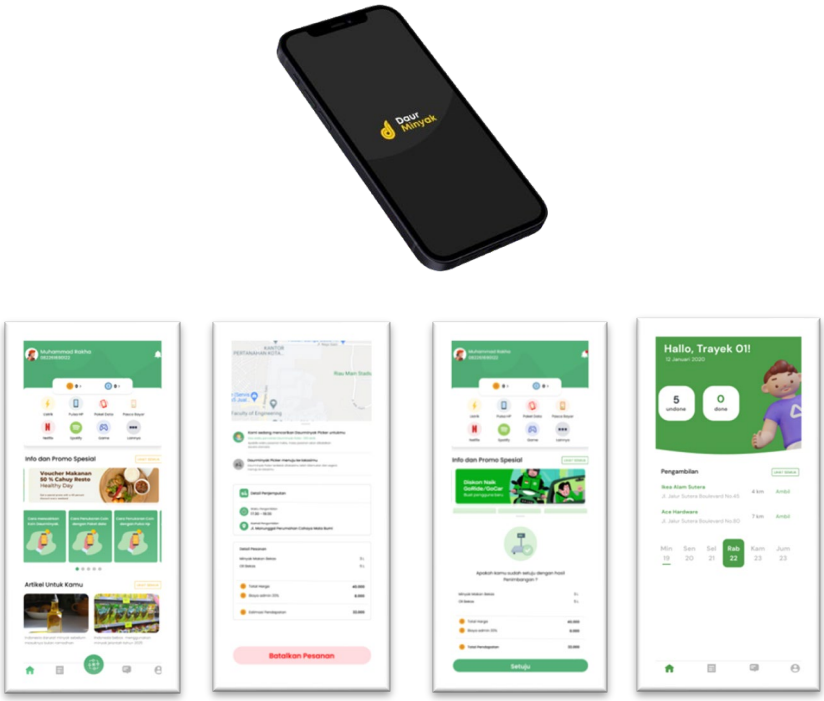


Figure 4. Daur Minyak application design display

Following that, the main page in the image below displays the features provided by Daurminyak. These include Ordering, Exchange features, Information and Promotions, Articles, and the instructions for using the application.

3.9. Testing

After assigning tasks and distributing the questionnaire to the respondents, the next step is to calculate the results from the completed questionnaires. Below is the personal data of the respondents, including their age and profession.

Table 3. Testing response data

TimeStamp	Nama Lengkap	Umur	Jenis Kelamin	Profesi
09/04/2022 13:32:02	Zubaidah	51	Female	Housewife

09/04/2022 14:57:22	Weni Ratnasari	30	Female	Housewife
09/04/2022 08:15:26	Sukmawati	55	Female	Housewife
07/04/2022 22:03:37	Selphi Af.	22	Female	Student
09/04/2022 10:09:19	Rahmah	33	Female	Housewife
06/04/2022 21:29:44	Maulana Ikhsan	22	Male	Student
09/04/2022 15:20:11	Ira Maryuni R	48	Female	Housewife
11/04/2022 14:47:49	M.Rizky Ramadhan	27	Male	Founder PT.MBIO
06/04/2022 13:30:55	Miftahur Rizki	25	Male	Collector Promotion Staff
10/04/2022 19:45:26	Pak Kifli	42	Male	Fried food seller
03/04/2022 15:54:29	Andrian Wahyu	22	Male	Developer Daur Minyak
07/04/2022 16:07:09	Jakfar	26	Male	forestry service employees

Based on the SUS weight, which is divided into 5 levels (from strongly disagree to strongly agree), below are the weight values from the respondents' answers.

Table 4. Respondent testing results

No	Nama	Profesi	Skor Asli Data									
			Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10
1.	Zubaidah	Housewife	4	1	5	1	5	1	4	1	5	3
2.	Weni Ratnasari	Housewife	5	1	4	2	5	1	5	2	5	5
3.	Sukmawati	Housewife	5	2	5	5	5	1	5	1	4	4
4.	Selphi Af.	Student	5	1	5	1	4	1	5	1	5	2
5.	Rahmah	Housewife	5	1	5	4	5	1	4	1	5	3
6.	Maulana Ikhsan	Student	5	2	5	1	5	1	5	1	5	1
7.	Ira Maryuni R	Housewife	5	1	4	1	5	1	4	2	5	1
8.	M.Rizky Ramadhan	Founder PT.MBIO	5	1	5	1	5	2	5	1	5	1
9.	Miftahur Rizki	Collector Promotion Staff	5	1	5	1	5	2	5	2	5	1
10.	Pak Kifli	Fried food seller	4	1	5	5	5	1	3	1	4	5
11.	Andrian Wahyu	Developer Daur Minyak	5	1	5	1	5	1	5	1	5	1
12.	Jakfar	Forestry service employees	5	1	5	1	5	2	5	2	4	2

The SUS score must be above 70, which is considered within the Acceptable category. The SUS score from the empathize phase with 12 respondents is 90, which falls into the Acceptable category. A SUS score is considered Good if it is above 90. The SUS score from the testing phase with 12 respondents is also 90, which falls into the Best Imaginable category.

Additionally, qualitative feedback from respondents during the System Usability Scale (SUS) testing phase highlights the app's strengths and areas for improvement. Respondents particularly appreciated the simplicity and intuitiveness of the user interface, which made navigation seamless even for those with limited technical proficiency. The clear layout and functionality of features like oil pickup scheduling and digital payment options were frequently cited as positive aspects. However, some feedback suggested enhancing the onboarding process to familiarize new users more effectively with the app's capabilities. This qualitative insight reinforces the high SUS score of 90, categorizing the app within the Best Imaginable range and reflecting its potential to meet user needs effectively.

4. CONCLUSION

The research conducted on the Daur Minyak application, which aims to address the issue of used cooking oil disposal and recycling, highlights several important findings. Through a design thinking approach, the study successfully developed a user-centered solution that provides a practical and accessible service for used oil collection, recycling, and payment. The empathize phase revealed significant issues with the lack of awareness regarding oil recycling and the inefficient business processes currently in place. By implementing location-based pickup services and integrating e-money as a payment system, the Daur Minyak application offers a convenient and efficient solution for both sellers and collectors. dssasa

The testing phase, which included 12 respondents, demonstrated that the application meets usability expectations, with a System Usability Scale (SUS) score of 90, placing it in the "Best Imaginable" category. This suggests that the application is highly user-friendly and effective in addressing the needs of its target users. Overall, the Daur Minyak application not only provides an innovative solution to a pressing environmental issue but also encourages more efficient and responsible management of used cooking oil, contributing to a cleaner and more sustainable environment.

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