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# Design and Development of UI/UX for Viclerent Mobile Application in Online Vehicle Rental Services

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***Abstract*— The advancement of digital technology has encouraged the emergence of mobile-based innovations, including vehicle rental services. However, many existing applications still fail to prioritize user convenience, resulting in unintuitive interfaces, unclear information, and inefficient navigation flows. This study aims to design and develop the user interface (UI) and user experience (UX) of the Viclerent mobile application, an online vehicle rental platform that emphasizes usability, accessibility, and user comfort. The design process adopts the Design Thinking approach, which consists of five stages: Empathize, Define, Ideate, Prototype, and Test. Data collection was conducted through questionnaires distributed to potential users to identify their needs, problems, and preferences in using digital vehicle rental services. The findings were analyzed to produce design artifacts such as User Personas, Empathy Maps, Affinity Diagrams, pain points, and solution ideas. These artifacts guided the creation of Wireframes and Prototypes using design tools, ensuring that the application design was structured, intuitive, and responsive. The Prototype was then tested with users to evaluate usability, satisfaction, and effectiveness in supporting the rental process. Results indicate that the proposed design improves transparency of rental costs, simplifies booking procedures, and enhances trust through features such as real-time vehicle availability, flexible payment methods, and reliable review systems. Overall, the Viclerent UI/UX design demonstrates the potential to deliver a user-friendly, efficient, and innovative digital solution, thereby improving accessibility, convenience, and satisfaction in mobile-based vehicle rental services.***

***Keywords*— User interface (UI); User experience (UX); Mobile Application; Online Vehicle Rental;**

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## I. INTRODUCTION

The rapid development of digital technology has brought significant changes to various aspects of human life, including the transportation service sector. The emergence of various mobile-based applications has made it easier for people to meet their daily needs quickly and efficiently. One form of application of this technology is online car rental services, which allow users to book and manage vehicle rentals through mobile applications without having to come directly to the service provider's location [1].

However, not all vehicle rental applications are able to provide an optimal user experience. Many of them still present problems such as unintuitive interfaces, confusing navigation flows, and unclear information. This can reduce user satisfaction and trust in these digital services. Therefore, an interface and user experience design is needed that can provide ease, clarity, and comfort in interacting with the system.

The Viclerent application was developed as a mobile-based vehicle rental platform that focuses on ease of use and user comfort. To achieve this goal, this study used the Design Thinking approach, which involves five main stages, namely Empathize, Define, Ideate, Prototype, and test. This approach was chosen because it places the user at the center of the design process, so that the resulting design is more in line with user needs and expectations. search for references [2].

With this research, it is hoped that the resulting user interface (UI) and user experience (UX) designs can become effective and user-friendly digital solutions, thereby improving the quality of interaction and user satisfaction in the online vehicle rental process [3].

## II. LITERATURE REVIEW

### A. User Interface (UI)

UI is a display that is designed in such a way into a visual display, based on user experience or what users feel when using an application or information system that is created [4]. In this study, the user interface (UI) design of the Viclerent application was developed to ensure an intuitive and

comfortable user experience (UX). The UI serves as a visual and interactive medium that makes it easier for users to browse, select, and complete online vehicle rental transactions. This is in line with the view that UI is an important aspect of mobile applications designed to enhance the user experience through effective visual and interactive elements [5].

### *B. User Experience (UX)*

User experience (UX) is the overall perception, emotions, and responses that a person has when interacting with a product, system, or service influenced by usability, aesthetics, functionality, and user expectations [6].

User experience (UX) plays an important role in determining the level of satisfaction and comfort of users when using the Viclerent application. UX not only focuses on visual appearance, but also includes how users feel, understand, and assess the ease of interaction during the vehicle rental process.

In developing the Viclerent application, UX was implemented through the Design Thinking process, in which stages such as Empathize and test were used to understand user needs and evaluate satisfaction with the resulting design. Thus, UX became a major factor in creating an online vehicle rental system that is user-friendly, responsive, and capable of providing a positive and sustainable experience for users.

### *C. Prototype*

A Prototype is an early form or model of a system created to illustrate the flow and appearance of the design before the system is fully developed [7].

The Prototype development stage is carried out after going through the Ideate process in the Design Thinking method, where ideas resulting from observation and analysis of user needs are converted into interactive visual forms. With the Prototype, users can see a real simulation of the Viclerent application, such as the main page display, vehicle booking features, payment methods, and rental confirmation.

Thus, Prototypes in Viclerent's research are not merely representations of design, but also tools for evaluating usability and user satisfaction, ensuring that the interface design and user experience developed are truly effective, efficient, and tailored to the needs of the target users.

### *D. Wireframe*

Wireframe is the basic interface layout design used as a guide in creating a website design. It illustrates the arrangement of main elements such as menus, buttons, and content without displaying visual details like colors or images. The purpose is to simplify the design process so that the final appearance becomes more structured, appealing, and aligned with user needs [8].

The Wireframe concept plays an important role in the research entitled “User interface (UI) and User experience (UX) Design in the Viclerent Mobile-Based Application for Online Vehicle Rental Services.” In the context of this research, Wireframes serve as preliminary designs for the Viclerent application’s display structure, helping to illustrate the layout of elements such as the main menu, vehicle list, booking button, and rental confirmation page before the visual design stage is carried out. With Wireframes, the UI and UX design process becomes more focused because developers can visualize the navigation flow and user interactions systematically. This ensures that the Viclerent application has a structured appearance, is easy to use, and provides an optimal user experience when renting vehicles online via mobile devices.

### *E. Mobile Application*

Mobile application is Software that runs on mobile devices such as smartphones or tablet PCs, designed to make it easier for users to perform tasks or activities quickly and efficiently anywhere and anytime [9].

With reference to this definition, the Viclerent application was developed to make it easier for users to rent vehicles online via mobile devices, thereby optimizing the user experience (UX) and enabling the user interface (UI) to be designed intuitively, responsively, and easily accessible whenever needed.

In addition, the implementation of the Viclerent Mobile application also plays an important role in improving the accessibility and efficiency of online vehicle rental services. Through the mobile platform, users can easily search, select, and book vehicles according to their needs with just a few taps on their smartphone screen. This is in line with the main characteristics of mobile applications, which emphasize portability, ease of use, and real-time interactivity, thereby supporting the creation of a satisfying user experience (UX). The responsive and attractive user interface (UI) design also helps users interact with the app's features intuitively. Thus, the development of the Viclerent mobile-based application not only functions as a transaction tool but also as a means to build user comfort, speed, and trust in digital-based vehicle rental services.

### *F. User Flow*

User Flow is used to design the flow of a website from start to finish in order to achieve a goal or complete a task. The result of User Flow illustrates the steps taken by users when performing a certain process to achieve the desired result [10].

User Flow is used to design the flow of a website from start to finish so that users can easily achieve their goals or complete specific tasks. With reference to this concept, the User Flow design in the Viclerent app helps illustrate the steps users take from opening the app, selecting a vehicle, making a reservation, to the transaction confirmation process. These stages ensure that every interaction in the application is logical and focused, so that users can achieve their goals without confusion. The implementation of a good User Flow also supports the improvement of the overall user experience (UX) and is an important basis for developing an intuitive, responsive interface (UI) structure that meets the needs of online vehicle rental service users.

## III. Research Methods

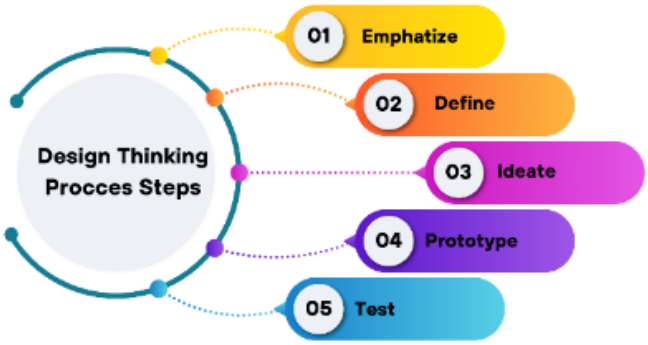


Fig. 1Design Thinking

Design Thinking is a user-centered approach that involves five main stages: Empathize, Define, Ideate, Prototype, and Test. These stages help designers deeply understand user needs, clearly Define problems, generate creative ideas, create interface Prototypes, and test them directly with users to obtain feedback.

The Design Thinking method used in this study consists of five main stages, namely Empathize, Define, Ideate, Prototype, and Test. In the Empathize stage, researchers sought to understand the needs and problems of Viclerent app users, such as difficulty finding vehicles, inefficient rental processes, or unattractive displays of similar apps [11]. The Define stage was used to formulate the core problems based on the results of these observations, such as how to create an informative, responsive, and easy-to-use interface on mobile devices. Next, in the Ideate stage, researchers generated various creative ideas to improve the user experience, including navigation design, vehicle search systems, and transaction confirmation features. The Prototype stage was then carried out by creating Wireframes and mockups using design tools such as Figma to illustrate the display structure and user interaction flow. Finally, the Test stage is carried out by testing the Prototype with users to obtain feedback on comfort, ease of use, and the appeal of the interface design [12]. Through the application of these five stages, the Viclerent application design process can produce a more efficient, attractive UI/UX design that suits the needs of online vehicle rental service users.

## IV. Result

The rapid development of digital technology has had a major impact on the advancement of online-based service systems, including in the transportation and vehicle rental industries. Today's society demands mobile applications that not only have good functionality, but also provide an engaging, easy, and efficient user experience. However, many existing vehicle rental applications still face problems such as complicated navigation, unattractive interfaces, and designs that do not focus on user needs. This can reduce user satisfaction and trust in the digital services offered. To address these issues, the Viclerent Mobile application was designed as a solution to provide an efficient, easy-to-use online vehicle rental platform with an attractive interface.

In Mobile application development, the role of User interface (UI) and User experience (UX) is a major factor that determines user satisfaction and comfort. The Design Thinking approach is an effective method for understanding user needs in depth and designing solutions that meet their expectations. This method consists of five main stages, namely Empathize, Define, Ideate, Prototype, and Test, which enable developers to produce iterative and user-oriented designs.

The application of the Design Thinking method in Mobile application UI/UX design can improve usability and design effectiveness [13]. This shows that the Design Thinking approach can produce intuitive and efficient interfaces that help users achieve their goals. These findings form the basis for this study in developing the UI/UX design of the Viclerent app, which is also oriented towards user comfort and ease of use in mobile-based vehicle rental services. The Design Thinking method was chosen because it has a systematic and iterative approach, with an emphasis on empathy for users. Each stage Empathize, Define, Ideate, Prototype, and Test is designed to ensure that the design not only fulfills functional aspects but also provides an intuitive and satisfying user experience. With the application of this method, it is hoped that the Viclerent application interface design can improve accessibility, convenience, and efficiency in the online vehicle rental process [14].

### *A. Empathize*

In the Empathize stage, researchers understand the needs and problems of Viclerent app users by distributing questionnaires to potential users of online vehicle rental services. The data from these questionnaires is used to compile an Empathy Map and User Persona as representations of user characteristics. The Empathy Map illustrates what users think, feel, say, and do, while the User Persona displays a fictional profile that represents real users based on the questionnaire results. From this analysis, information was obtained regarding pain points such as the complicated rental process and the need for a simple and easy-to-use application display. The results of this stage became the basis for formulating the main problems and the direction of the Viclerent application's UI/UX design in the next stage.

*1) Empathy Map*

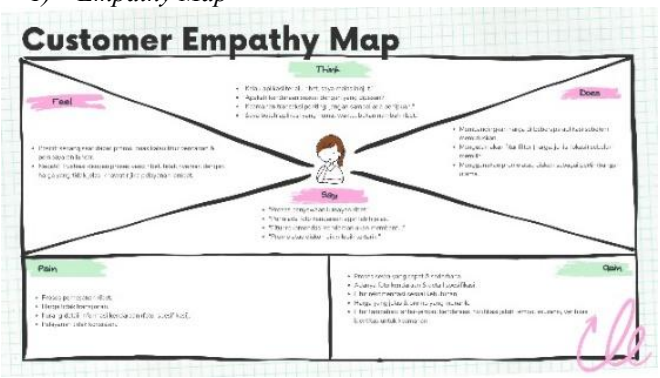


Fig. 2 Empathy Map

Researchers analyze user needs and behavior to understand the main problems experienced in the online vehicle rental process. This approach is carried out by compiling a Customer Empathy Map to identify what users feel, think, say, and do

when using vehicle rental services. Based on the mapping results, it was found that users tend to feel frustrated with the complicated booking process, uncomfortable with non-transparent prices, and concerned about transaction security. However, users also feel happy when they get promos, satisfied when the search and payment processes run smoothly, and interested in informative features such as vehicle photos and price recommendations. These findings indicate that users need an application that is simple, fast, secure, and transparent, with supporting features such as vehicle filters, due date notifications, and an identity verification system to ensure trust in transactions. This Empathy Mapping serves as a crucial foundation for formulating the problem statement in the next phase (Define), enabling the User interface (UI) and User experience (UX) design of the Viclerent app to be fully tailored to the needs and expectations of online vehicle rental service users.

*2) User Persona*

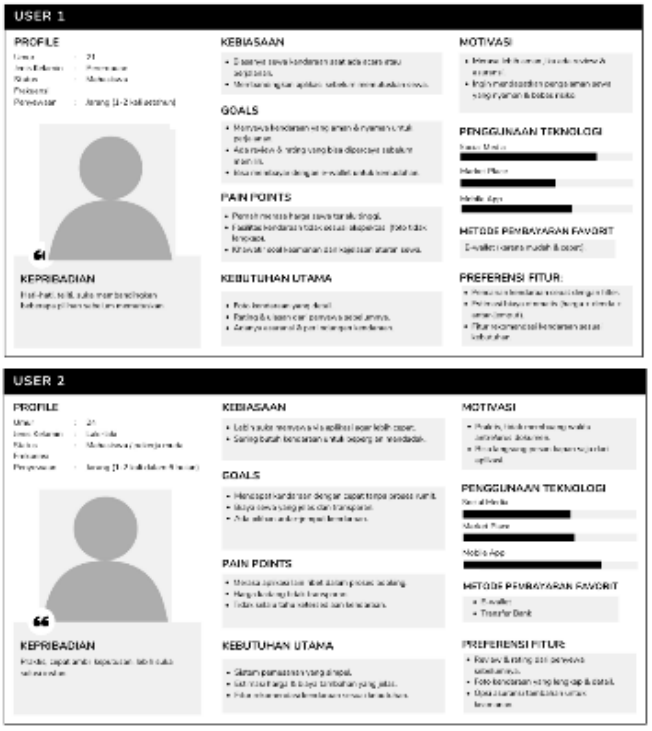


Fig. 3 User Persona

One of the tools used in this stage is User Persona, which is a fictional representation of potential users based on observations, interviews, or surveys of actual target users. Through this approach, researchers can identify the goals, motivations, habits, and obstacles experienced by users in using online vehicle rental services.

User 1 describes a young female user who is active in using technology and wants a fast, secure vehicle rental process that can be accessed directly through a mobile device. Meanwhile, User 2 represents a male user who is accustomed to using digital applications and wants a simple, efficient application display with an easy-to-understand booking system. From these two personas, a number of pain points were identified, such as a lengthy vehicle search process, a lack of detailed vehicle information, and an impractical payment system.

The results of this User Persona analysis provide a clear picture of users' expectations and needs regarding the Viclerent application. These findings are then used as a basis in the next stage, Define, to formulate the main problems to be solved through the design of a more effective, interactive User interface (UI) and User experience (UX) that is in line with the preferences of online vehicle rental service users.

*B. Define*

In the Define stage, researchers process and analyze all data obtained from the Empathize stage, such as questionnaire results, Empathy Maps, and User Personas, to formulate the main problem statement that will be solved through the Viclerent application design. The purpose of this stage is to clearly identify the core of the user's problems so that the designed solution is truly relevant to their needs.

*1) Pain Points*

TABEL I
PAIN POINTS

| ***Pain Points*** | **Problem Statement** |
|---|---|
| The vehicle rental process is still complicated (lengthy verification, manual confirmation). | Users find the rental process too complicated and impractical, which reduces the efficiency of the application. |
| The rental cost is unclear, and there are additional costs (gasoline, fines, pick-up and drop-off) without prior information. | Users do not trust rental apps because the rental cost is not transparent from the start of the booking process. |
| Service and order confirmation are often slow. | Users are disappointed because the response time of the *application* or vehicle owner is too long, making it difficult when they need a vehicle quickly. |
| Vehicle photos are not detailed or differ from the actual condition. | Users feel cheated because vehicle information is incomplete or does not match reality. |
| Vehicle availability status is not updated in real time. | Users miss out on rental opportunities because the app does not accurately display vehicle availability status. |
| There are no due date reminders or vehicle availability notifications. | Users risk returning vehicles late or missing out on their favorite units because the app does not provide timely notifications. |
| Review and rating information is still limited or invalid. | Users find it difficult to make choices due to the lack of a reliable review and rating system. |
| The security and protection aspects of the vehicle are unclear. | Users do not feel secure because the app does not offer transparent insurance or vehicle protection. |
| Limited payment method options (e.g., bank transfer only). | Users have difficulty making transactions because the *application* does not support flexible payment methods such as e-wallets or credit cards. |
| There are no additional features (vehicle recommendations, detailed | Users consider the rental app to be lacking in innovation because it does not provide |

| | |
|---|---|
| photos, maximum rental time alerts) | additional features that simplify the rental experience. |

*2) How Might Be*

TABLE II
HOW MIGHT BE

| How Might We | Description |
|---|---|
| HMW simplify the vehicle rental process | How can we simplify the vehicle rental process so that users don't feel overwhelmed and the process becomes more efficient? |
| HMW make rental costs more transparent | How can we display rental costs clearly and transparently from the outset, including additional costs such as gasoline or fines? |
| HMW improve response and confirmation speed | How can we speed up order confirmation and service response so that users can use the vehicle immediately? |
| HMW ensure vehicle information and photos match reality | How can we ensure that photos and vehicle descriptions match the actual condition to increase user trust? |
| HMW display real-time vehicle availability | How can we display vehicle availability status in real time so that users don't miss out on rental opportunities? |
| HMW remind users about due dates and availability | How can we provide reminders about due dates and vehicle availability so that users don't return vehicles late or miss out on their favorite units? |
| HMW build a reliable review and rating system | How can we build a valid and reliable review and rating system so that users can make informed decisions? |
| HMW clarify vehicle protection and insurance options | How can we provide clear information about insurance and vehicle protection to increase user safety? |
| HMW offer more flexible payment methods | How can we provide flexible payment methods such as e-wallets, QRIS, and credit cards to facilitate transactions? |
| HMW add innovative features to improve *user experience* | How can we add innovative features such as vehicle recommendations, detailed photos, and maximum rental time reminders to improve the *user experience*? |

## C. Ideate

The Ideate stage is a process of developing creative ideas and solutions based on the results of the Define stage analysis [15]. At this stage, researchers strive to produce innovative Viclerent application UI/UX designs that meet user needs. Several activities are carried out to support this process, namely Affinity Diagram to group findings and ideas, Crazy 8's to generate visual ideas quickly, Solution Ideas to develop relevant concepts, Idea Prioritization to select the best solutions, and User Flow to describe the flow of user interactions in the application. Through this stage, a more focused, efficient, and user experience-oriented interface design for the online vehicle rental service is obtained.

*1) Solution Idea*

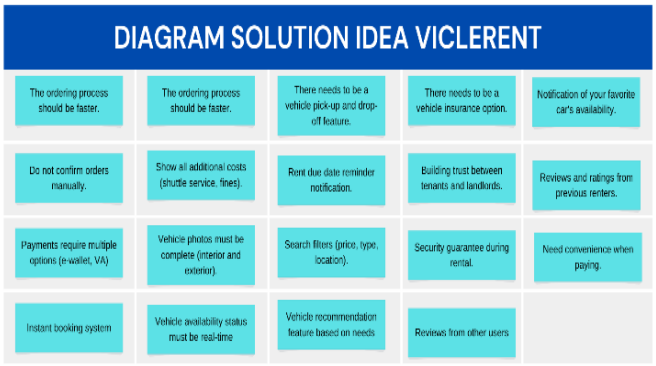


Fig. 4 Solution Idea

The ideas generated focus on several key aspects, namely simplifying the booking process, transparency of information and costs, improving security and user trust, and ease of transactions. Examples include an instant booking system, transparent rental cost display, accurate vehicle photos, and the provision of various payment methods such as e-wallets and QRIS. Additionally, there are ideas for developing additional features such as notifications about the availability of favorite vehicles, vehicle recommendations, and a review and rating system from other users to enhance user trust and satisfaction. Overall, the Viclerent Solution Idea Diagram serves as the foundation for the UI/UX design of the application, with the goal of delivering a fast, transparent, and user-centric vehicle rental experience.

*2) Affinity Diagram*

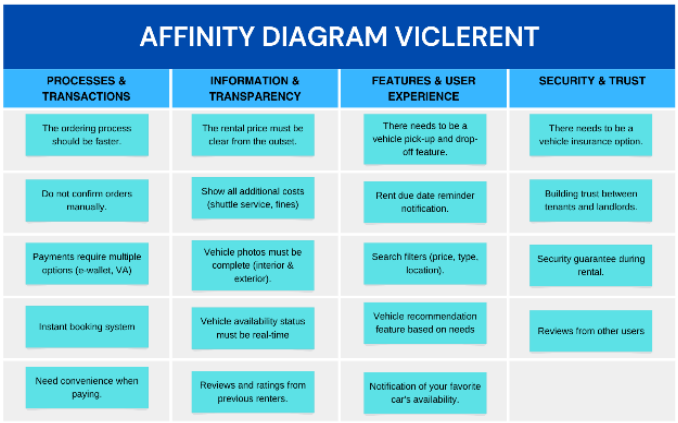


Fig. 5 Affinity Diagram

This Diagram is divided into four main categories, namely Processes & Transactions, Information & Transparency, Features & User experience, and Security & Trust. From the analysis results, users need a faster and more practical ordering process, clear transparency of rental costs from the outset, and additional features such as due date reminders and vehicle recommendations to improve the convenience of using the application. In addition, security and trust are also important considerations through the provision of insurance options, a valid review system, and transaction protection. With

this grouping, the design of Viclerent's UI and UX is aimed at providing an efficient, informative, and reliable vehicle rental experience, in line with the principles of user-centered design.

*3) Idea Priorities*

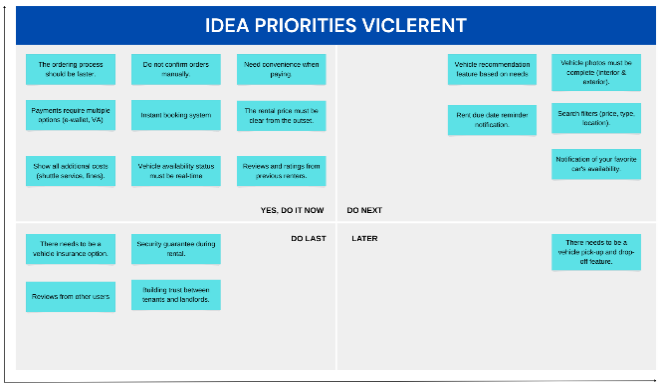


Fig. 6 Idea Priorities

The Viclerent Idea Priority Diagram identifies feature development based on urgency and effort required. Features that have a big impact and are easy to implement such as quick booking, automatic confirmation, price transparency, and real time vehicle status are prioritized in the "Do Now" category. Improvements such as vehicle recommendations, reminders, and search filters fall into the "Do Next" category, while security features such as insurance and transaction guarantees are categorized as "Do Last". Additional services such as pick-up and drop-off are placed in the "Later" category. These priorities ensure that Viclerent's user interface (UI/UX) focuses on providing a fast, efficient, and user-friendly vehicle rental experience.

*4) Crazy '8s*

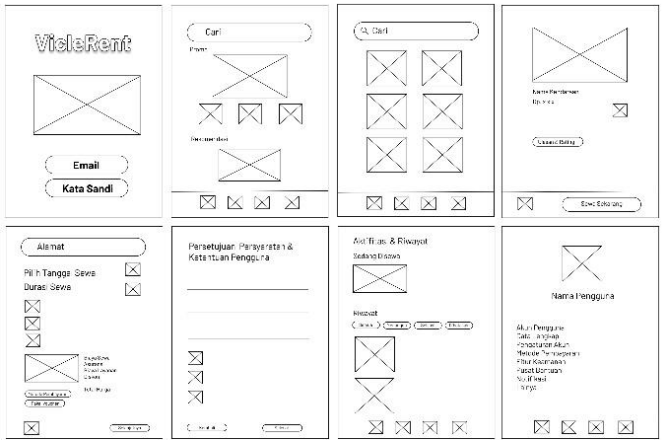


Fig. 7 Crazy '8s

The image shows the results of the Crazy 8's method, which is a quick brainstorming technique to generate eight interface design ideas in eight minutes. This method was used to explore various alternatives for the Viclerent app's main display and flow, such as login, vehicle search, rental details, payment, and user profiles. The Crazy 8's results help the design team determine the best UI/UX concepts that best suit user needs and comfort before developing them into a final Prototype.

*5) User Flow*

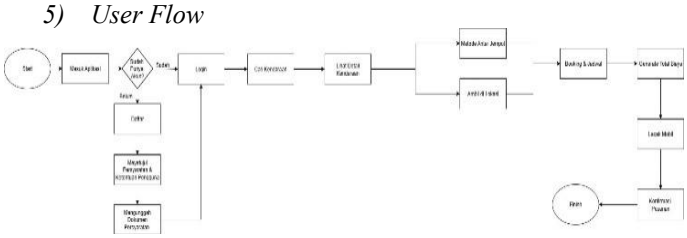

Fig. 8User Flow

This flow maps out the logical journey of users step by step, starting from the onboarding process (register/login), moving on to the core features (searching for vehicles, choosing pick-up/drop-off methods), entering the transaction phase (booking and viewing costs), to order confirmation and tracking. Each box in this Diagram directly Defines the screen or User interface (UI) display that must be designed, ensuring that the overall navigation of the application feels intuitive, efficient, and meets the user's objectives.

## *D. Prototype*

The Prototype stage uses Figma to create Wireframes and mockups that illustrate the display structure and user interaction flow [16]. Wireframes are used to determine the layout of elements such as the main menu, order buttons, and vehicle listings, while mockups display a more realistic design with the application of colors, icons, and typography [17]. The Prototype produced in Figma then became a reference for the next stage, namely Testing, to assess the ease of use and user satisfaction with the Viclerent application's UI/UX design [18].

*1) Wireframe*

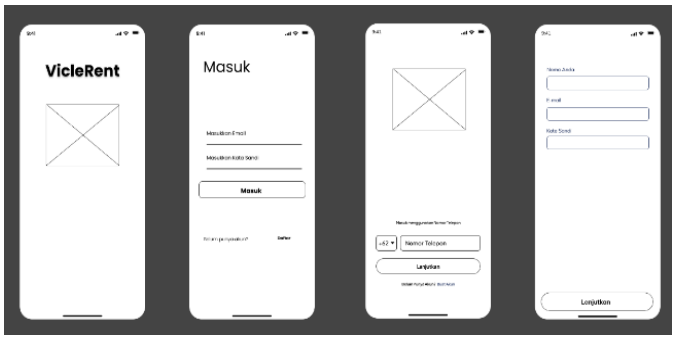


Fig. 9 Wireframe

A Wireframe is a preliminary interface design used to illustrate the structure, layout, and user interaction flow in an application before moving on to the visual design and system implementation stages. This stage is important to ensure that the application design is orderly, easy to use, and efficient for end users. By creating Wireframes, developers and designers can visualize the functional requirements of the application in a structured manner, making the design process more effective and focused [19].

The viclerent application Wireframe displays four main pages that form the beginning of the user experience, namely the splash screen, login page, phone number verification, and new account registration page. The splash screen displays the viclerent logo as the application's identity. Users who already have an account can log in directly through the login page by entering their email and password, while new users can register by verifying their phone number and filling in personal data such as their full name, email, and password. The Wireframe design is simple and systematic so that users can easily understand the initial flow of using the vehicle rental application.

*2) Mockup*

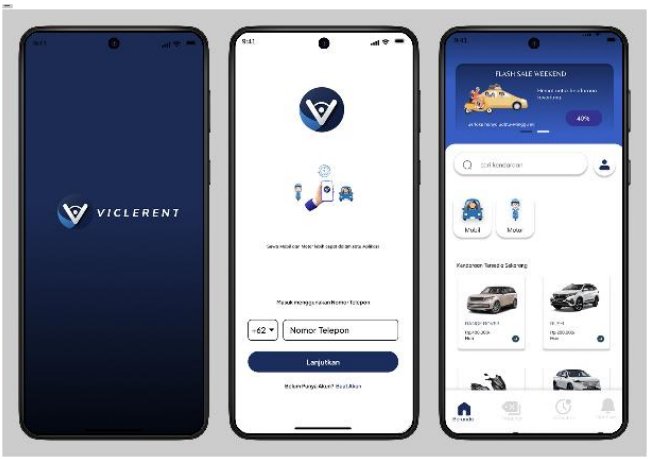


Fig. 10 Mockup

The viclerent application interface shown in the image above displays three main pages that describe the initial process of using the application. The first page is the splash screen, which displays the viclerent logo with a dark blue background as the main visual identity of the application. This display serves as a brand introduction as well as an initial transition before users enter the next page. The second page is the login page, where users are asked to enter their phone number as an initial verification step to access their account. The design is simple and professional, with illustrative icons to help users understand the page's functions quickly and intuitively.

Next, the third page displays the app's main homepage, which contains various key features such as a vehicle search bar, car category options, and current promotions. Users can easily browse the list of available vehicles, view car details, and select vehicles that suit their needs. The homepage design is modern and clean, using a combination of blue and white colors to create an elegant and comfortable look. The well-organized layout makes it easy for users to navigate the app and find the information they need quickly.

## *E. Test*

User-Centered Design (UCD) is a design method that focuses on user needs and experiences to produce systems that are easy to use, efficient, and in line with user objectives. In developing the viclerent application, this approach helps create an intuitive interface that is responsive to the needs of digital vehicle rental [20].

The Test phase aims to determine the level of satisfaction and usability of the Viclerent application interface design. Testing is conducted using user questionnaires to obtain quantitative and qualitative data on the user experience when using the application. The method used was a user evaluation questionnaire, which was distributed to a number of respondents after they tried the application Prototype. The questionnaire used a 1–5 Likert scale, with 1 indicating "strongly disagree" and 5 indicating "strongly agree."

The questions in the questionnaire cover several aspects, including:

- I think that I would like to use this system frequently.
- I found the system unnecessarily complex.
- I thought the system was easy to use.
- I think that I would need the support of a technical person to use this system.
- I found the various functions in this system were well integrated.
- I thought there was too much inconsistency in this system.
- I would imagine that most people would learn to use this system very quickly.
- I found the system very cumbersome to use.
- I felt very confident using the system.
- I needed to learn a lot of things before I could get going with this system.

TABLE III
TESTING

| Responden | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Jumlah | Jumlah x 2,5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Responden 1 | 3 | 4 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 35 | 87,5 |
| Responden 2 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 36 | 90 |
| Responden 3 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 34 | 85 |
| Responden 4 | 4 | 5 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 3 | 37 | 92,5 |
| Responden 5 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 5 | 3 | 3 | 35 | 87,5 |
| | | | | | | | | | | | | 88,5 |

The results of the System Usability Scale (SUS) test conducted on five respondents to assess the ease of use of the application. Each respondent answered ten questions, Q1 to Q10, on a scale of 1 to 5. The value of each answer was calculated using the SUS formula, where odd-numbered questions such as Q1, Q3, Q5, Q7, and Q9 were converted using the formula of the answer minus one, while even-numbered questions such as Q2, Q4, Q6, Q8, and Q10 were calculated using the formula of five minus the answer. The results of the ten questions were added up and then multiplied by 2.5 to obtain the final score for each respondent. Based on the calculation results, each respondent's SUS score ranged from 85 to 92.5, with an overall average of 88.5. This score indicates that the application falls into the excellent category, meaning that users find the application easy to use, have a

clear interface, and provide a positive and efficient user experience.

## V. Conclusion

Based on the results of the User interface (UI) and User experience (UX) design for the Viclerent Mobile application for vehicle rental services, it can be concluded that the design process has successfully produced a user-friendly, informative, and efficient interface design that supports user needs.

Through the application of the Design Thinking method, each stage, from identifying user problems, creating How Might We Statements, to designing Wireframes and mockups, was able to produce solutions that focused on ease, convenience, and clarity of information in the vehicle rental process.

The final design of the Viclerent application provides a better user experience through an intuitive display, a fast booking system, transparent rental costs, and additional features such as vehicle availability notifications and a user review system. Thus, this design is expected to serve as the basis for the development of a more optimal Viclerent application that meets the needs of potential users in the real world.

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