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# UI design of buying and selling application and renting items at Telkom University Campus through the user-centered design method

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A R T I C L E I N F O

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ABSTRACT

Online buying and selling activities and renting goods are familiar to young people or college students. For instance, the Telkom University campus has a buying and selling forum (FJB Telkom) using Line social media platform as a buying and selling activity. However, Line social media primarily known as an instant messaging application, and as a result, the researchers conducted a survey among Telkom University students related to buying and selling activities on FJB Telkom and renting activities around campus. Based on the results of 105 respondents, it was found that 69,5% stated that FJB Telkom using the Line platform could have been more efficient due to the lack of feature needs for buying and selling activities. Therefore, this study aims to design a user interface (UI) design for the FJB Telkom application by adding rental features that can assist Telkom University students in buying, selling, and renting items activities around campus. UI design was conducted with the User Centered Design (UCD) method approach that focused on the characteristics of user needs. The UCD method included a testing stage or usability testing. The user interface of the FJB Telkom application was tested using prototype testing and the System Usability Scale (SUS). The test results obtained from respondents indicated that the UI design of the FJB Telkom application achieved an average SUS score of 85,5% and received an excellent grade on the SUS score. Thus, the user interface of the FJB Telkom application successfully build a system with high usability.



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## 1. INTRODUCTION

Buying and selling activities are familiar to the community, especially among young people who enjoy shopping and end up with unused items. Consequently, these unused items can be a source of profit for them by promoting on a platform or marketplace. On the other hand, there are also people who prefer not to sell their belongings but instead choose to rent them out for a temporary period. The benefit of renting is as an alternative

for using items that are not needed for a long time and without having to buy them (Pandawana et al., 2022).

The Telkom University campus has a Buying and Selling Forum/*Forum Jual Beli* (FJB). This is a facility or place for buying and selling items for students around campus. FJB Telkom utilizes Line's social media as an activity to buy and sell items. The Line is a social media platform with the main function as a communication medium between users (Line Sahabat Terbaikmu, n.d.). Telkom's Line FJB account has 20.000 followers. Given this number of users, there is a need for a more reliable application and a system compared to the current system. Since Line prioritizes communication media, researchers conducted a survey to Telkom University students to find out whether Telkom FJB on the Line platform is efficient in buying and selling activities and whether students need help leasing items around campus.

According to the survey results, 25 respondents were obtained, and 60% experienced difficulties in buying and selling activities. As for item rental activities, 56% need help in renting items around campus and 76% need a place to rent items around campus. The difficulties experienced by FJB Telkom users on the Line application platform include the process of selling items that cannot be fast because the FJB Telkom admin cannot quickly reply to user messages that want to sell items, buyers cannot directly send messages to sellers because the seller's contact is only in the description of the items, and users cannot immediately search for the items they need because the buying and selling forum on the Line platform does not have a search feature or filter based on the item category.

Based on the above problems, this study aims to create a mobile-based user interface design by raising the problem of FJB Telkom on the Line platform and adding a feature of leasing items to the FJB Telkom application. This research is expected to help Telkom University students buy and sell activities and rent items around campus. In order to ensure the smooth development of the user interfaces, the methods are required to aid the visual appearance and users' experience according to their needs. One such method is User Centered Design (UCD) method which focuses on the user needs in making design. The UCD method involves prospective users in the early stages of development to provide feedback on the system's interface (Yatana Saputri et al., 2017).

## 2. RESEARCH METHOD

The buying and selling forum is a place for sellers and buyers to sell or buy items (Nur & Indra, 2021). In buying and selling forums, buyers and sellers can interact directly even though the existence of their places is different, this makes it easier for buyers to negotiate or ask questions related to the products sold. This activity through electronic media or E-commerce often occurs fraud in the transaction process to the detriment of consumers (Roberto Ranto, 2019). Usually, the existence of buying and selling forums is found in the sub-forum segment in a forum portal that is useful as a forum for e-commerce activities of its members so that all forms of transactions can be controlled by the moderator on duty (Saragih & Ramdhany, 2012).

Rent is an agreement to use a product or property with a predetermined time span and price from both parties (Gunadi & Zakaria, 2018). In rental process, the usual activities carried out by customers are ordering items for rent and returning items (Hartasih et al., 2019). Renting can occur because of the possibility of the seller having items that are not used then the items are used as profits or rented with a specified rental time limit. As for buyers, they are likely looking for the product they need quickly but want to avoid buying it and only to rent it for a few days.

User Interface is a visual display of a product that has the function of connecting the system with users. User interface is a collection of tools with which users interact with a machine, device, computer program, or other special equipment (Aisyiyah, 2019).

The user interface becomes the main part of the application as it is the first thing that the users see, and it can give a first impression of the capabilities about the application (Yazid & Jantan, 2017). It can be concluded from some experts that the definition of user interface focuses on the application's visual aspects, including shapes, colors, icons, and writing made based on the characteristics of user needs.

User experience refers to the overall experience of users when using, viewing, or interacting with the product (Kurniawan & Romzi, 2022). User experience has become an important role in application development because it greatly affects the success or failure of the product (Yazid & Jantan, 2017). The benefit of user experience includes facilitating users' interaction with the application by incorporating aspects of assessment within the application. Enhancing usability and user-friendliness can attract users' interest in using the application.

User-Centered Design (UCD) is a design method to solve a product problem by focusing on user characteristics' needs. User-centered design concerns the target user's details as the object of design because this method establishes the user as the center of system design. The purpose of the UCD method is to overcome the problem of the user's inability to use the system and it is expected that the user can know the system's function only in one use (Yatana Saputri et al., 2017). This method focuses on human characteristics and perceptions in common, as well as user-specific traits and features (Pratama et al., 2020). User-centered design has five stages in its design (Lombardi (FIMI), 2010). The UCD stage is as shown in Figure 1.

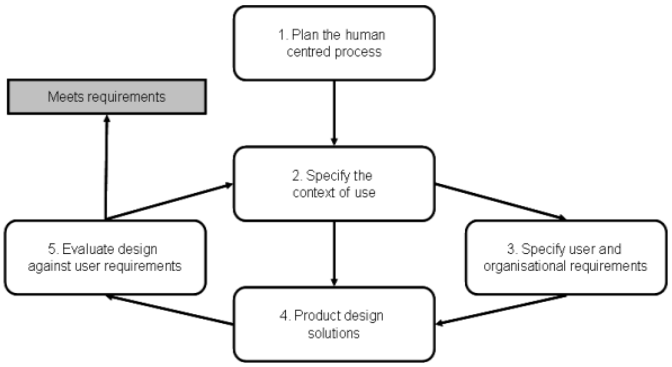


Figure 1. User-Centered Design (UCD) stage

## 3. RESULTS AND DISCUSSIONS

The FJB Telkom application user interface design used the User Centered Design (UCD) method. User-centered design is the right method in UI design for FJB Telkom problems on the Line application platform and rental of items around campus because this method focuses on the characteristics of user needs. The UCD method includes five stages in the design process, as in Figure 2 is a more detailed stage as well as a research flow from the user-centered design method. Below is a more detailed explanation of the stages of the research flow in designing the FJB Telkom application user interface through the UCD method.

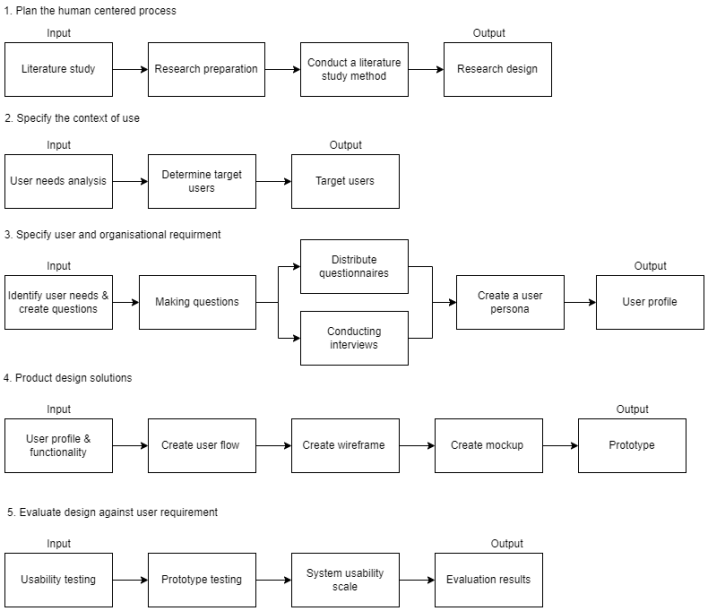


Figure 2. Research flow with UCD method

In the initial stage, a literature review is conducted. The literature review process involved research preparation by conducting literature study methods to enhance understanding of the researched concepts. The literature study method was carried out by searching, reading, and understanding books, journals, or other media as a reference to obtain data as well as strengthening theories related to research. This stage produces a research design to complete the design of the FJB Telkom application user interface design using the user-centered design method.

A user needs analysis is conducted in this stage. The process of user needs analysis aims to find out as well as determine the target user. From the results of the analysis of user characteristics related to the UI design design of the FJB Telkom application, the target respondents were obtained with the following characteristics. (a) The target respondents are the students of Telkom University. (b) Students with an age range of 18-25 years. (c) Proficient in operating mobile phones. (c) Have experienced or familiar with the Telkom buying and selling forums on the Line platform.

Thi stage involves the user needs identification and data collection. This identification aims to find out the needs of user characteristics. Identification of user needs was done by making questionnaires or questions about user needs for buying, selling, and renting applications. The questions were created using a Google Form and distributed to the target respondents. From the questionnaire results, the number of respondents was 105. The answers provided by the respondents are collected to identify the most problems from user needs on the FJB Telkom application. From the results of data collection, three user profiles or user personas were obtained as shown in Figure 3. The user persona is a reference related to feature problems made in the UI design of the FJB Telkom application. The conclusion drawn from the responses of the 105 respondents is as follows. (a) Users prefer an application with easy and secure payment systems. (b) Users prefer an application with secure shopping systems. (c) Users prefer to input detailed information when selling items. (d) Users like the presence of ratings and reviews of products. (e) Users prefer to have images and descriptions of items on sale. (f) Users like communication or live chat with sellers. (g) Users like the ability to search for items and filter them based on the category. (h) Users like having a shopping cart or wishlist feature.

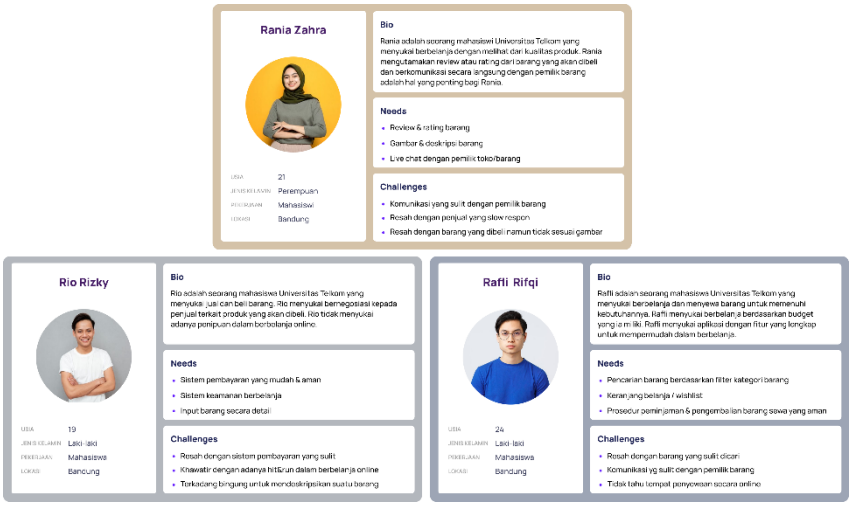


Figure 3. *User persona*

This stage involves designing the solution based on user profile and functionality. The design of the solution design aims to clarify the creation of the user interface FJB Telkom application. Design the solution is created using the Figma tool. It is a web-based tool or application that serves as a prototyping tool in digital projects (Kurdiansyah et al., 2022). The creation of user interface design involves several stages.

The initial stage in solution design aims to create a user flow or application system workflow. User flow refers to how the user interacts with the system (Suhaili, 2022). The creation of user flow aims to make it easier for users when using the FJB Telkom application. This feature is created based on each feature of user needs. The system flow begins with a login as shown in Figure 4, when the user enters the FJB Telkom application, the user is asked to log in first. If the user does not have an account, the user is required to create an account by clicking register then entering his name, email, and password. If they forget the password, they can choose *forgot password* then enter the email contained in the user account.

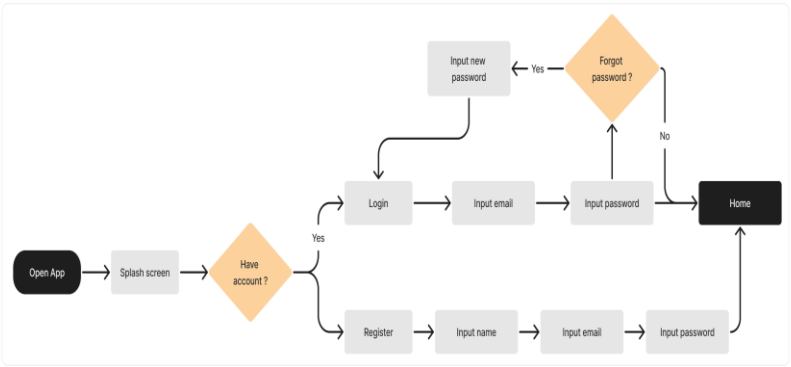


Figure 4. *Login system flow*

The user can sell goods or items. The system flow for selling items as shown in Figure 5 begins with clicking the *plus icon* to enter the sales page then the user selects the sell category or sell items. On the sell item page, the user is asked to fill in the data of the item they want to sell, such as name, category, condition, price, and photo of the item. After filling in the items data, then fill out personal data verification as security in the sale of goods.

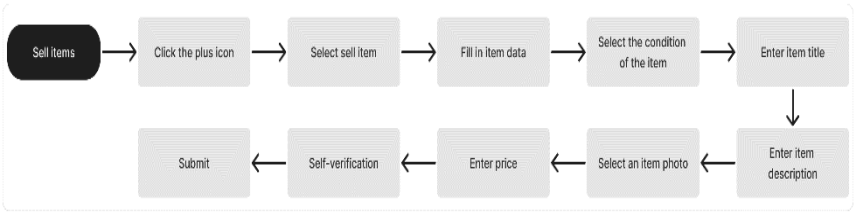


Figure 5. Flow of the items selling system

The user can sell items for rent. The system flow for leasing items as shown in Figure 6 begins with clicking the *plus icon* to enter the item sales page then the user selects the *rent* category or *rental items*. On the item rental page, user is asked to fill in the data of the item they want to rent, such as name, category, description, rental time range, price, and photo of the item. After filling in the item data, the users are asked to fill out personal data verification as security in leasing items.

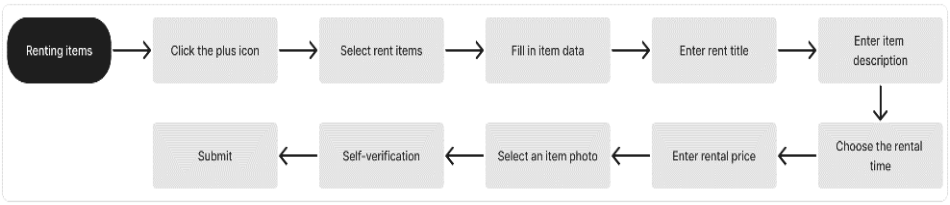


Figure 6. Flow of the freight rental system

The user can purchase items. The flow of the system to buy items as shown in Figure 7 is that the user selects one of the items then enters the item detail page. Then, the user selects payment *now* and fills in the delivery destination address, payment method, and personal data verification to secure purchasing items.


Figure 7. The purchase system flow

The user can search for items and filter by *item category*. The system flow for item search as shown in Figure 8 is that user can search for items on the *search bar icon. The search bar icon* is located on the main and *search* pages. After the user clicks the search *bar* icon, then fill in or type the item you want to search and the user can click the filter *icon* to filter items based on the category of the item being searched.

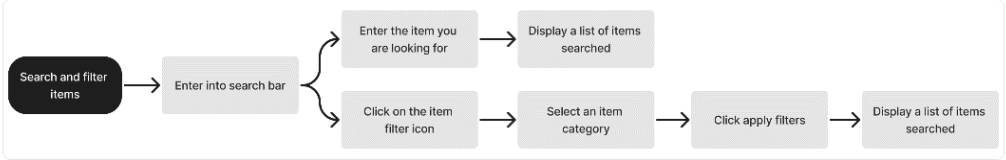


Figure 8. The flow of the system searching and filtering items

The user can send messages to sellers. The system flow to send messages to sellers as shown in Figure 9 is that the user selects one of the items being sold then, there is an option to *chat with the seller* or send a message. After the user clicks *chat with the seller*, the user can communicate directly with the item's owner or seller.

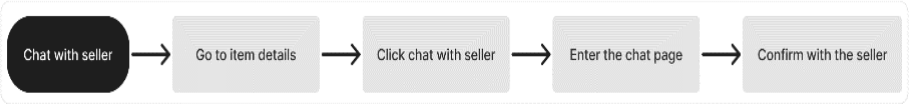


Figure 9. *Chat with seller* system flow

The user can save or put items in the shopping cart. The system flow for shopping carts, as shown in Figure 10, is that the user goes to the main page or *search*, and clicks *the save item icon* in one of the posts of items sold. After the item is saved, the user goes to the *saved page* or basket of items to see that have been entered or saved before.

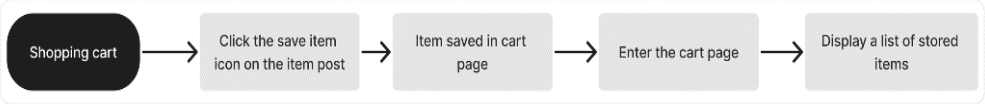


Figure 10. Shopping cart system flow

The user can withdraw funds on user accounts. The flow of the disbursement system as shown in Figure 11 is that the user enters the *profile* page, then selects *selling,* clicks *seller credit*, *cashout*, chooses the bank's name and destination account number, and clicks *save and continue* for the process of disbursing funds on the user's account.

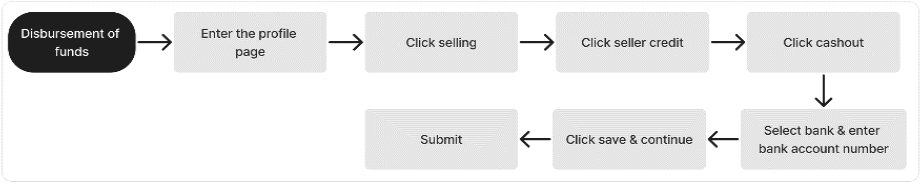


Figure 11. Disbursement system flow

The user can confirm the items purchased and have arrived in the hands of the user and provide *ratings* related to the seller. The flow of the item confirmation system purchased, as shown in Figure 12, is that the user enters the *profile* page, selects *buying*, *checklist* the items that have arrived, and then click *confirm*. The user will be asked to assess the *rating* for sellers with a one- to five-star scale, and click *submit* to confirm the items received. Confirmed items will disappear from the item purchase page.

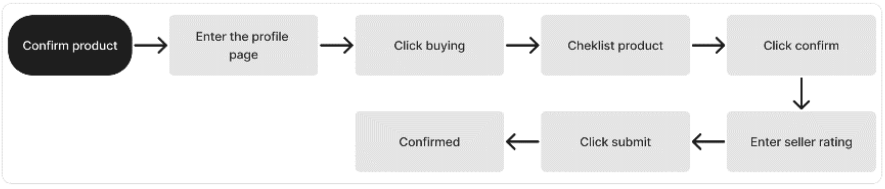


Figure 12. Product confirmation system flow

The next stage is to create a *wireframe* or rough overview of the application. *A wireframe* is a simple system design or initial framework of an application page (Hartawan, 2022). The *wireframe* from FJB Telkom application is formed in *high-fidelity* type as shown in Figure 13 with the aim of facilitating design when there are changes. *Wireframe* is created with attention to typography, fonts, icons, and layouts. Typography is one aspect that is considered in user interface design. The font type chosen is simple to provide good readability (Rachmawan, 2022). The icon is a sign that describes a status or function. Labeling icons can make it easier for the user to understand the context of an icon.

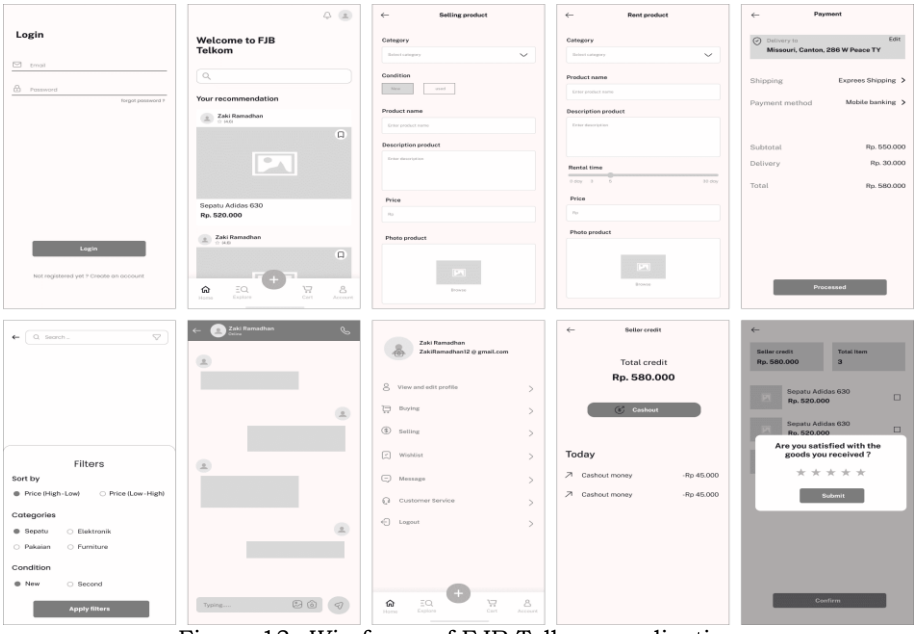


Figure 13. *Wireframe* of FJB Telkom application

After creating a rough overview of the application, a visual design in the form of a *mockup* is conducted. The shape of the mockup is a *high-fidelity* picture in which it describes the overall appearance of the product design, such as design colors, layout, typography, and visual navigation (Dinda et al., 2021). FJB Telkom application *mockup* can be seen in Figure 14. This design finalization process aims to clarify the application description to users. The colors and logos given to the FJB Telkom application are dark blue, red, and white. The colors are taken based on the identity function of the Telkom University logo.

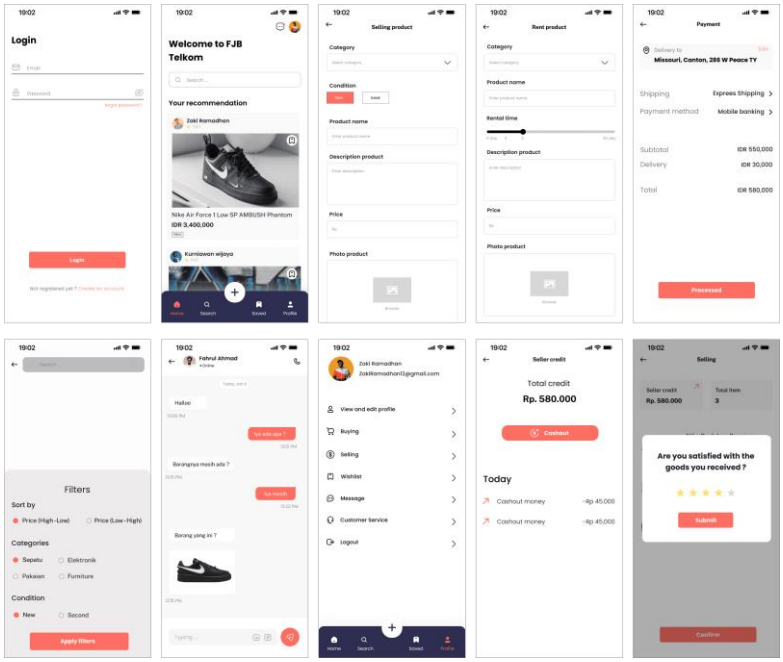


Figure 14. *Mockup* of FJB Telkom application

The final stage of solution design is *the prototype*. *A prototype* is a modeling that develops a picture from a sketch into a final product based on user needs (Muhyidin et al., 2020). With prototypes, users can interact directly with existing features. Prototypes are made with the aim of testing or testing while making it easier for users to provide input or *feedback* from the products that have been made (Rusdiansyah, 2018).

In the final stage, the evaluation is conducted through usability testing. This is a technique used to evaluate a system or product where the testing process is directly to users who have been previously targeted (Ningrum et al., 2019). Usability testing is carried out to determine whether the user *interface* design is aligned with the characteristics and needs of the users. System Usability Scale (SUS) is one of the testing methods to get a scale of value from user satisfaction with the user interface design that has been created. The usability scale consists of 10 questions as in Table 1 that make respondents are easy to complete the test. Each question has a value or scale of 1 – 5 points that ranges from a value of 1 which is "strongly disagree" to a value of 5 which is "strongly agree" (Sidik, 2018). This stage results in an evaluation of the results of usability testing. The results of the trial can be input or feedback from the user to further optimize the user interface design of the application.

Table 1. System Usability Scale (SUS) Questions

| No. | Question | Scale |
|---|---|---|
| 1 | I feel, I want to use this application | 1 - 5 |
| 2 | I find this application is complicated to use | 1 - 5 |
| 3 | I find this application is easy to use | 1 - 5 |
| 4 | I thought, I need help from other people or technicians in using this system | 1 - 5 |
| 5 | I feel that the features of this system are working properly | 1 - 5 |
| 6 | I feel that there are a lot of inconsistencies in this system | 1 - 5 |
| 7 | I feel that others can quickly understand how to use this application | 1 - 5 |
| 8 | I find this application is cumbersome or confusing | 1 - 5 |
| 9 | I feel that there is no obstacle in using this application | 1 - 5 |
| 10 | I need to learn a lot before using this application | 1 - 5 |

Basically, the User-Centered Design (UCD) stage is a stage that focuses on extracting information to collect needs from users. Information or data from user needs that have been collected, then information arrangement is carried out to obtain an overview in designing product designs. The final product design is in the form of a prototype which is then tested to the user.

2.1 Testing results

Based on the user-centered design method, testing is carried out at the evaluate design on the user requirement stage or design evaluation stage. At the design evaluation stage, usability testing was carried out with prototype testing from the FJB Telkom application user interface. Then, Prototype testing is carried out using a web-based application, namely maze. In identifying usability problems in an application, it is sufficient to involve 5 users in the test (Nielsen, 2022). This test was carried out by giving task scenario to complete or search for features contained in the FJB Telkom application. Task scenario is a test conducted to measure the level of success in completing a task (Azhardika et al., 2021). Task scenarios can be seen in Table 2. After completing the tasks, given 10 system usability scale questions to determine the efficiency level of the FJB Telkom application.

Table 2. *Task* User Scenarios

| User Tasks | Goals |
|---|---|
| Login features | Users can log in or enter the FJB Telkom application |
| Features of buying items | Users can purchase items according to their needs |
| Features of selling items | Users can sell items by posting items for sale |
| Features of selling items for rent | Users can rent out items by posting items for rent |
| Item search and item filter features | Users can search for the item being searched and filter by item category |
| Chat features with sellers | Users can communicate to the owner of the items or the seller |
| Shopping cart features | Users can save or enter items sold into the shopping cart page |
| Features of disbursement of funds | Users can withdraw funds from their sales on user accounts |
| Product confirmation features | Users can confirm that the goods related to the purchased goods have arrived in the user's hands |

After conducting prototype testing, calculations were carried out using the *System Usability Scale* (SUS) method. The scoring method involves subtracting 1 from the odd-numbered statements, subtracting 5 from the even-numbered statements, adding up the scores from the odd and even-numbered statements, and multiplying the sum by 2.5 (Widayanti & Maknunah, 2021). The System Usability Scale calculation results can be seen in Table 3, which is obtained from five respondents with an average SUS score value of 85,5%.

Table 3. Results of respondents' assessment

| Respondents | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | SUS Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R1 | 5 | 1 | 4 | 1 | 4 | 2 | 5 | 1 | 4 | 1 | 90 |
| R2 | 5 | 2 | 5 | 2 | 4 | 2 | 3 | 1 | 4 | 4 | 75 |
| R3 | 5 | 2 | 4 | 1 | 5 | 1 | 4 | 2 | 5 | 1 | 90 |
| R4 | 4 | 1 | 4 | 1 | 4 | 2 | 5 | 2 | 4 | 2 | 82,5 |
| R5 | 4 | 1 | 5 | 1 | 4 | 2 | 5 | 1 | 5 | 2 | 90 |
| Average | | | | | | | | | | | 85,5 |

Description:
R: Respondent
Q: Question

3.2 Analysis of test results

According to the SUS score calculation shown in Table 3, an average SUS score of 85,5% classifies into the grade B or excellent category. Therefore, the user interface design of the FJB Telkom application succeeded in building a user-friendly system.

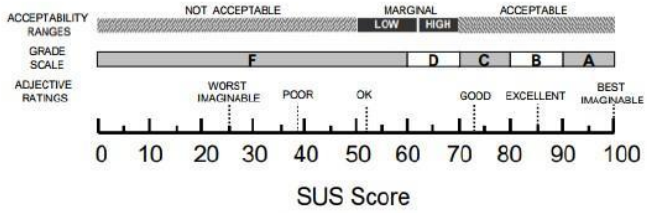


Figure 15. *System usability scale score*

## 4. CONCLUSION

The User-Centered Design (UCD) method has succeeded in creating a user interface design for the FJB Telkom application based on the needs of user characteristics. It can solve user problems on FJB Telkom on the Line application platform. From the results of trials or usability testing using a usability scale system, the user interface design of the FJB Telkom application is at grade B or excellent, with an average SUS score of 85,5%. The main findings or contributions of this research is that this research has been successful design of the FJB Telkom application user interface and succeeded in building a user-friendly system with a high level of ease. Future research is expected to be able to carry out designs that can be used in all places and can be applied easily for all users.

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