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EVALUATION AND REDESIGN USER INTERFACE METOOCEL APPLICATION USING HUMAN CENTERED DESIGN METHOD

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ABSTRAK

Aplikasi Metoocel merupakan nama aplikasi dari toko yang menjual aksesoris smartphone dan laptop di daerah Surabaya. Aplikasi Metoocel dibuat untuk mempermudah pengguna melihat katalog produk dan melakukan pembelian produk secara online melalui aplikasi tersebut tanpa perlu datang ke lokasi. Tetapi, aplikasi Metoocel belum pernah dilakukan evaluasi terkait usability sejak aplikasi tersebut dibuat. Oleh karena itu, perlu dilakukan evaluasi untuk mengetahui nilai usability aplikasi Metoocel. Melalui evaluasi awal penelitian menggunakan kuesioner System Usability Scale, aplikasi Metoocel memperoleh nilai 54 sehingga termasuk dalam kategori grade scale "F" dan kategori acceptability ranges "Low Marginal". Hal ini menunjukkan bahwa aplikasi Metoocel masih memiliki kekurangan terkait usability aplikasi. Untuk mengatasi permasalahan tersebut maka dilakukan perancangan ulang user interface menggunakan metode Human Centered Design yang berfokus kepada kebutuhan pengguna pada aplikasi Metoocel. Hasil perancangan ulang berupa prototype aplikasi Metoocel. Kemudian, prototype yang telah dirancang dilakukan evaluasi menggunakan SUS untuk mengetahui perbandingan nilai usability aplikasi sebelum dan setelah dilakukan perancangan ulang user interface. Hasil pengujian menunjukkan bahwa prototype memperoleh nilai 80 termasuk kategori grade scale "B" dan kategori Acceptability Ranges "Acceptable" yang berarti fungsi prototype aplikasi telah bekerja dengan baik dan dapat meningkatkan nilai usability aplikasi.

***Kata Kunci**: Aplikasi, Human Centered Design, Metoocel, System Usability Scale, Usability, User Interface.*

ABSTRACT

Metoocel application is the name of the application from a shop that sells smartphone and laptop accessories in the Surabaya area. Metoocel application was created to make it easier for users to view product catalogs and make product purchases online through the application without the need to come to the location. However, Metoocel application has never been evaluated regarding usability since the application was created. Therefore, it is necessary to evaluate to determine the usability value of the Metoocel application. Through the initial evaluation of the study using the System Usability Scale questionnaire, the Metoocel application obtained a score of 54 so that it was included in the "F" grade scale category and the "Low Marginal" acceptability ranges category. This shows that Metoocel application still has shortcomings related to application usability. To overcome these problems, a redesign of the user interface was carried out using the Human Centered Design method which focused on user needs in Metoocel application. The result of the redesign is a prototype of Metoocel application. Then, the prototype that has been designed is evaluated using SUS to compare the usability value of the application before and after redesigning the user interface. The test results show that the prototype gets a score of 80 including the grade scale category "B" and the Acceptability Ranges category "Acceptable" which means the function of the application prototype has worked well and can increase the usability value of the application.

***Keywords**: Application, Human Centered Design, Metoocel, System Usability Scale, Usability, User Interface.*

I. INTRODUCTION

AT this time the development of technology is growing faster along with the times [1]. Technology is needed for various purposes and is used in everyday life [1]. Along with technological developments, mobile phone devices also continue to develop until now there are various types of smartphones [2]. The existence of progress and smartphones are not only as a medium of communication but also as a medium for marketing goods/services used for technology business and attracting consumer interest [3]. In 2018, smartphone users in Indonesia are estimated to have more than 100 million active smartphone users [4]. During the pandemic, starting in 2020, the development of e-commerce in Indonesia is growing very rapidly. The existence of e-commerce makes it easier for people to make buying and selling transactions without the need for face to face [4].There are accessory shops in the area around Surabaya that use smartphones as a medium for selling products through an application called Metoocel.

Metoocel is an online shop and application name that sells various accessories for smartphones and laptops. The

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purpose of the Metoocel application is to make it easier for users to view product catalogs, to make product purchases online without the need to come to the location.

Based on the results of interviews with Metoocel, information was obtained that the Metoocel application had never been evaluated regarding the usability of the application. In addition, Metoocel also said that they are still not satisfied with the current application user interface. This is because the appearance of the Metoocel application user interface is different from other e-commerce in general, so Metoocel feels the need to improve the current application user interface so that users are accustomed to using it.

Based on research such as "Usability Evaluation of UNRIYO Website Using System Usability Scale (Case Study: UNRIYO Website)" the main focus is design improvement where the evaluation uses the SUS method to develop the design [14]. In addition, the research entitled " Evaluation and Design of User Interfaces for Mobile Applications for Online Public Complaints Services Using Human-Centered Design" has the main focus of providing recommendations for interfaces using the Human Centered Design (UCD) approach [13]. There are shortcomings in this study, such as the absence of an explanation of the reasons for obtaining the SUS score and not explaining in detail each stage of human centered design in making improvements to the interface. This evaluation has also never been carried out at the Metoocel company so that it can provide recommendations for improving the application user interface. Therefore, these studies become a reference for researchers to conduct this research by providing a more detailed explanation at each stage of Human Centered Design and analyzing the results of the evaluation of the SUS questionnaire obtained.

Through the initial evaluation of the study using the System Usability Scale (SUS) questionnaire with 20 respondents using the Metoocel application. The results of the questionnaire showed that the Metoocel application obtained a score of 54 from a scale of 0 - 100 and was included in the "low marginal" acceptability ranges category and obtained a grade scale category "F". Therefore, this shows that the Metoocel application still has shortcomings related to the usability of the application that was tested using the SUS questionnaire [5].

To overcome user problems related to the user interface, it is necessary to evaluate and redesign the Metoocel application user interface. The redesign of the user interface uses the Human Centered Design method. To get a good user experience, use the Human Centered Design method which can create a system that focuses on user needs [6]. In addition, the use of the Human Centered Design method aims to develop a user interface by involving users during the system development process and can increase the usability factor of the system [7]. Testing using the System Usability Scale (SUS) is a good instrument to use in measuring usability [5]. The SUS test contains 10 questions as a testing tool and does not require a large number of samples but can provide accurate test results [8].

Based on this background, it is hoped that the evaluation and redesign of the Metoocel application user interface using the Human Centered Design method can increase the usability value in using the Metoocel application.

II. RESEARCH METHODOLOGY

The method used in this research is Human Centered Design. The following is a research methodology that contains the steps taken to solve the problem in this study using a Human Centered Design

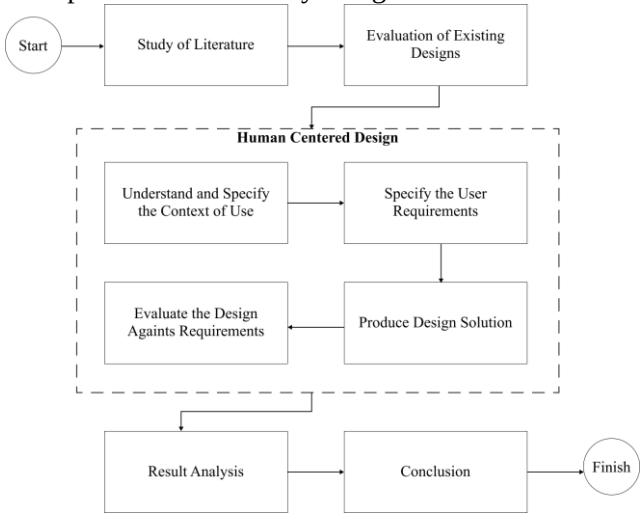

Fig 1. Research Methodology

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This research has five steps: literature study, valuation of existing designs, human centered design steps, analysis of results, and conclusions.

A. Study of Literature

At this step in this project research is conducting a literature study from previous research and other libraries related to this research, such as user interface, usability, Human Centered Design (HCD), and System Usability Scale (SUS).

1) User Interface

According to Satzinger, user interface is a media bridge between users in interacting with the system in accordance with the needs and desires of users with several considerations that make the system can be used properly and appropriately [9]. In creating a good user interface, the design should be made according to the user's usability and how the user accomplishes the task with ease and minimal effort. Apart from that, the user interface should also be pleasant so that users can enjoy a more personal and immersive experience so that they will continue to use it [9].

2) Usability

Usability is a parameter that is quite influential on the success of an application [10]. Usability is used to determine the achievement of a product that is used by users in an effective way and users feel satisfied when using it [11]. According to the International Standard Organization (ISO) there are three aspects of usability measurement, namely [11]:

1. Effectiveness. Effectiveness is an aspect of usability that measures the accuracy and completeness obtained by users.
2. Efficiency. Efficiency is an aspect of usability that measures the ability of users to achieve goals.
3. Satisfaction. Satisfaction is an aspect of usability that measures the comfort and behavior of users from using a product.

3) Human Centered Design

Human Centered Design is basically the same as User Centered Design [12]. Human Centered Design is an approach to system design and development that focuses on activities or activities carried out by users [13]. The use of Human Centered Design can aim to make the system more interactive and more useful by placing the user as the main focus in designing design solutions [13]. In using the HCD method, there are several steps carried out repeatedly [13]:

1. Specify the Context of Use. At this stage, a process will be carried out to determine user characteristics
2. Specify the User Requirements. At this stage it is necessary to carry out a process to determine user needs based on design guidelines and constraints experienced by users
3. Produce Design Solutions. At this stage it is necessary to create a wireframe and user interface mockup based on user needs. Then proceed with making a prototype as a form of design solution made
4. Evaluate the Design. At this stage, testing will be carried out regarding the design solutions that have been made. Then the test results obtained will be analyzed and can get feedback from users to improve the design

4) System Usability Scale

System Usability Scale is an evaluation method that provides adequate results based on consideration of a small sample size, time, and cost [14]. The purpose of this SUS questionnaire is to provide a user perspective regarding the usability of the product and the time required for the user to fill out the SUS questionnaire quickly [11]. The SUS questionnaire uses a scale of 1 which indicates strongly disagree to a scale of 5 which indicates strongly agree [11]. The final assessment of SUS is in the form of an assessment range of 0 to 100 and there are three assessment categories that are displayed based on the usability score obtained [11].

B. Evaluation of Existing Design

1) Collecting Data

Data collection was divided into two stages, namely the System Usability Scale (SUS) questionnaire and interviews. Testing the Metoocel application there were 20 people as respondents with the characteristics of people who had used the Metoocel application. In research related to problem discovery, there are 3-20 respondent participants who can provide valid results with 5-10 respondent participants being a reasonable baseline range.

Interviews were conducted by giving several questions to the users. The purpose of this interview is to find out and get information about the problems faced by users while using the application and find out the needs of users on the application. The interview process is carried out with the company to find out the company's target and

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interviews with users to find out user needs. The interview process was conducted with 5 respondents. The selection of 5-10 respondents is an effective number for finding problems related to design.

2) Conduct Evaluations Using System Usability Scale (SUS)

Based on testing using the System Usability Scale (SUS) method. After filling out the questionnaire, the data containing the test scores that have been obtained previously are calculated.

TABLE I
SCORE SUS EXISTING DESIGN

Respondent	Score										Total	SUS
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		(Total x 2.5)
R1	3	1	1	2	1	0	2	2	1	1	14	35
R2	1	1	3	3	3	1	2	1	2	1	18	45
R3	3	1	2	3	3	2	3	1	3	2	23	58
R4	3	1	2	3	2	2	2	1	2	1	19	48
R5	3	2	3	2	3	2	3	2	3	1	24	60
R6	3	2	3	3	3	2	3	2	3	1	25	63
R7	3	2	3	4	3	1	4	2	3	1	26	65
R8	1	1	1	2	3	1	2	1	2	1	15	38
R9	3	2	3	3	4	1	3	1	1	0	21	53
R10	2	1	1	4	4	0	3	3	3	0	21	53
R11	2	3	3	4	3	0	2	1	0	0	18	45
R12	1	1	1	4	2	0	3	1	1	0	14	35
R13	4	3	3	4	4	2	4	3	3	2	32	80
R14	4	2	3	4	4	2	4	3	2	1	29	73
R15	1	3	3	4	4	1	4	2	3	3	28	70
R16	3	3	3	3	3	0	2	2	2	1	22	55
R17	3	3	2	3	3	1	2	1	2	1	21	53
R18	2	1	3	2	3	0	3	2	2	0	18	45
R19	4	1	1	4	3	2	3	1	1	0	20	50
R20	3	2	3	4	3	1	4	3	2	1	26	65
Mean												**54**

In table I, based on the results that have been obtained so far, it is known that the Metoocel application scores 54 from a scale of 1-100 and is included in the "F" grade scale category and the "Low Marginal" acceptable ranges category which indicates that the Metoocel application is less effective, efficient, and satisfying for users. This shows that the Metoocel application has shortcomings related to application usability, so it is necessary to redesign the application user interface.

C. Human Centered Design Process

1) Understand and Specify the Context of Use

a) User Interview

In this study, to be able to identify user needs can be done by interviewing. The interview process was carried out with 5 respondents with a scheme of giving several questions related to demographics, behavior, environment, habits, and needs of Metoocel application users.

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TABLE II
CONCLUSION USER INTERVIEW

Purpose of the Question	Conclusion
Knowing what users think of the purpose of the Metoocel application	According to users, this application is important, especially during the current pandemic situation because many things are done *online* , starting from looking for information on smartphone accessories products, seeing stock of smartphone accessories to making product purchases *online* at Metoocel. Several other users, have the same interests of needs but have different intensities because this user profile still needs an offline approach so that the information obtained is used as a reference before making purchase transactions directly at the Metoocel store.
Knowing the user's level of understanding	According to users, they have a high understanding and habit in using smartphone applications in everyday life, starting from communicating through social media, looking for information on the internet to making transactions online. Both of them have also purchased a product on other *e-commerce* applications .
Knowing the user's interest in a system	According to users, it is necessary to have an effective design and have complete features in order to make it easier for users and display information in detail. In addition, the design also needs to be simple and not confusing so that users can become interested in using it
Knowing the problems with the Design of the Metoocel application that users feel	According to users, there are obstacles when using the application, especially the absence of a *navigation bar* at the bottom of the application, making it difficult for users to move to other pages and the absence of product search features and *live chat* features. Then, there are similar application designs that are more attractive such as Tokopedia and Shopee.

Selection of 5-10 respondents is an effective number for finding problems related to design [15]. In table II, there are conclusions from the results of the interviews obtained and there are four main points of questions related to user needs.

b) User Persona

Persona is documentation that contains an explanation of user characteristics including profiles, behavior, needs and habits obtained from users [16].

TABLE III
USER PERSONA

	Persona
Demographics	Age : 21 & 22 years old Gender : Male and Female Role : Metoocel application user
Behaviour	• Users are used to using smartphones in their daily lives • Users use smartphones for about 8 – 13 hours per day • Users use smartphones for social media, reading news, to making transactions online
Habits	• Users include paying attention to the design of the application interface • Users will not reuse applications that are considered difficult to use because they are inefficient and confusing
Needs	• Get help moving from one page to another • Get information related to product promos • Make it easy to see the list of product categories • Getting the ease of finding products • Make it easy to ask related questions about the product • Make it easy to see the status of product orders

This step aims to understand researchers to know user needs, create an abstract concept from "user" to be a person with emotions and thoughts, represent users with the same goals and characteristics, and get to know the user more closely to create a better experience. In table III, there are the results of the user persona of the Metoocel application user. The user persona consists of user demographics, behavior, habits, and application user needs.

2) Specify the User Requirements

a) User Persona Requirement

The results of the interviews that have been conducted will be processed to identify user needs. At this stage, we will analyze each need based on the user persona that has been identified at the stage of understanding the user context.

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TABLE IV
USER PERSONA REQUIREMENT

Needs	Requirement
Get help moving from one page to another	Metoocel app design provides navigation bar features
Get information related to product promos	Metoocel application design provides banners containing product promos
Make it easy to see the list of product categories	Changing the design of the Metoocel application on the main page
Getting the ease of finding products	Metoocel app design gives search bar feature
Make it easy to ask related questions about the product	Metoocel app design provides live chat features
Make iteasyto see the status of product orders	Metoocel app design provides a feature of checking order status

In table IV, there are user persona requirements that contain 6 points and each point contains requirements that must be met in order to fit the user's needs. The following requirements have been analyzed. Based on these results, the needs and requirements will be determined to focus and focus on the problems that exist in the Metoocel application.

b) Mental Analysis Model

Mental Model is used as a representation of user concepts so that user needs can be met from the analysis of observational data obtained from users of the Metoocel application [17].

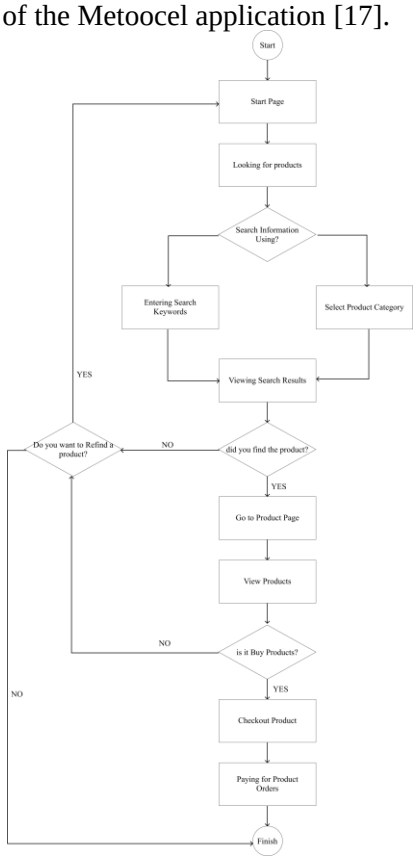

Fig 2. Mental Model

In Fig 2, the mental model explains starting from the user opening the Metoocel application to completing user tasks such as searching for products and buying products. This mental model will be useful in making scenario contexts and conceptual models to making prototypes of the Metoocel application.

c) Task Analysis

Hierarchical Task Analysis (HTA) is used to identify tasks which will then be translated into tasks and sub-tasks to become a task diagram. Making HTA can facilitate the design of the user interface and the design flow to be designed.

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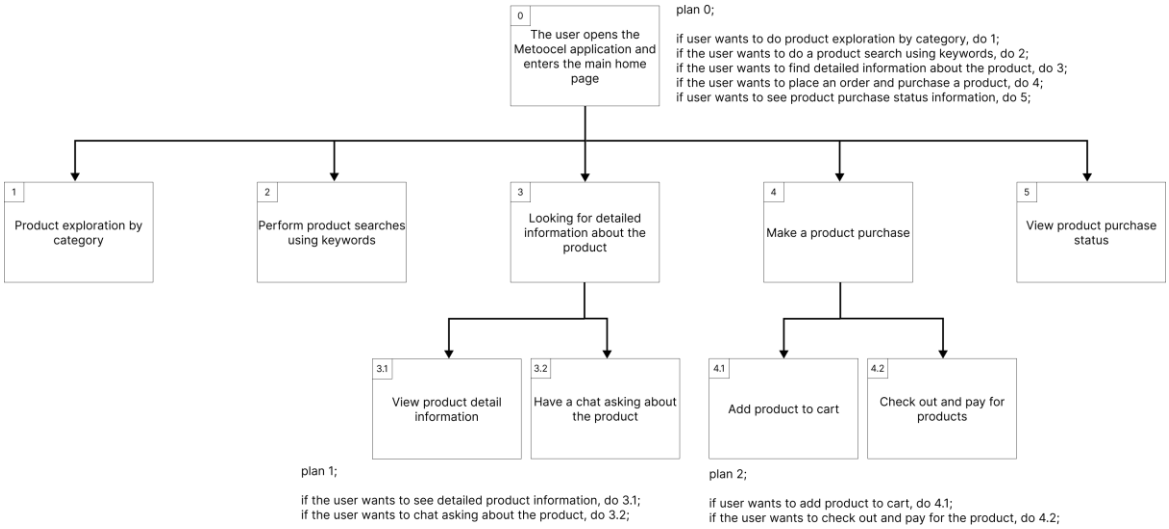

Fig 3. Hiearchical Task Analysis

In Fig 3, HTA in this study has 5 main points and between those 5 there are 2 points that have conditions, namely looking for products and buying products. These conditions can be selected by the user according to the needs of the application user. This method is used to understand the task at hand by breaking down the task into subtasks to find out what the user needs to do to achieve the goal.

d) Scenario Context

The context of the scenario will be translated into a table based on the tasks in the Hierarchical Task Analysis (HTA).

TABLE V
SCENARIO CONTEXT

No.	Task	Sub Task	Goals	Scenario
1.	Display promo information and home page menu options		Find out information related to product promos and the list of menu options available on the main page	a. Open the Metoocel app b. View home page information
2.	Product exploration by category		Find products searched for based on the category you've selected	a. Open the Metoocel app b. Display the main page c. Choose *the* product category icon d. View product category pages
3.	Perform product searches using keywords		Find products searched for by keyword	a. Open the Metoocel app b. Entering the main page c. Select *Search Bar* d. Enter product keywords e. Select search and then the search results will be displayed
4.	Find detailed information about the product	View product detail information	Find detailed information related to the product you're looking for	a. Select a product and then a product page will be displayed b. Select Description and then a complete product description will be displayed
		Chat asking about the product	Obtain information related to product inquiries	a. Select a product and then a product page will be displayed b. Select *the chat icon* then a product question page will be displayed
5.	Make a product purchase	Putting the product in the basket	Obtaining information related to the product was successfully added to the cart	a. Choose a product b. View product pages c. Select Cart and then a notification appears that the product was successfully put in the cart
		Check *out* and pay for products	Acquire the products you're looking for and buying	a. Select a product and then a product page will be displayed b. Select buy on the product page c. View the user data body page d. Choose a payment method e. Make payment for products f. View the payment status of a product
6.	View product purchase status		Get detailed information about purchases made	a. Select the order menu b. View the booking status page c. Select the order information you want to search for d. View detailed information related to a purchase

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In table V, there are 6 scenario context points that contain tasks and sub-tasks that can be performed by users when using the application. Each task contains a goal and a scenario of how the task can be achieved. The context of the scenario is carried out where this stage will be based on the behavior and user experience that has been analyzed in the previous stage, namely the user context and user needs.

3) Produce Design Solution

a) Wireframe

The design of the solution begins with a design concept in the form of a wireframe which is a rough description of the application's user interface. The design concept is made in accordance with the conceptual model that has been made previously.

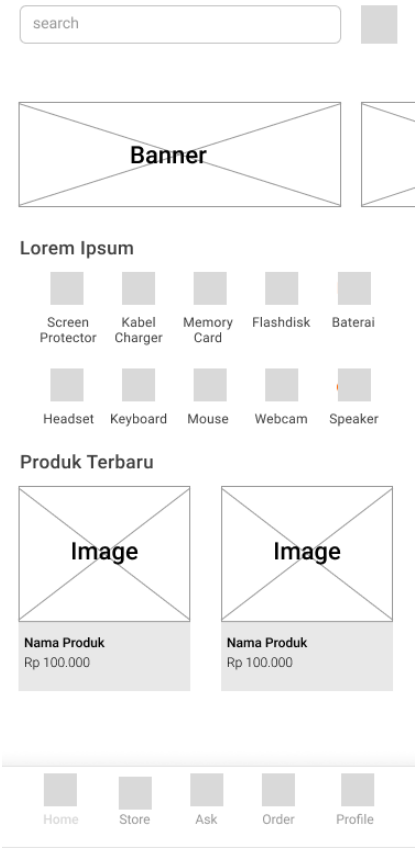

Fig 4. Wireframe Home Page Metoocel

On Fig 4, there is a Metoocel application wireframe that displays the application's main page. On this main page the system will display information to users in the form of promotional banners, a list of product categories, and product brands. Then there are user interface components including navigation bars, search bars, product category icons, and image banners.

b) Mockup User Interface

Based on the wireframe that has been created as a rough description of the user interface, then a UI mockup is made that uses colors, images, and looks similar to the original application. The UI mockup was made using the Figma software.

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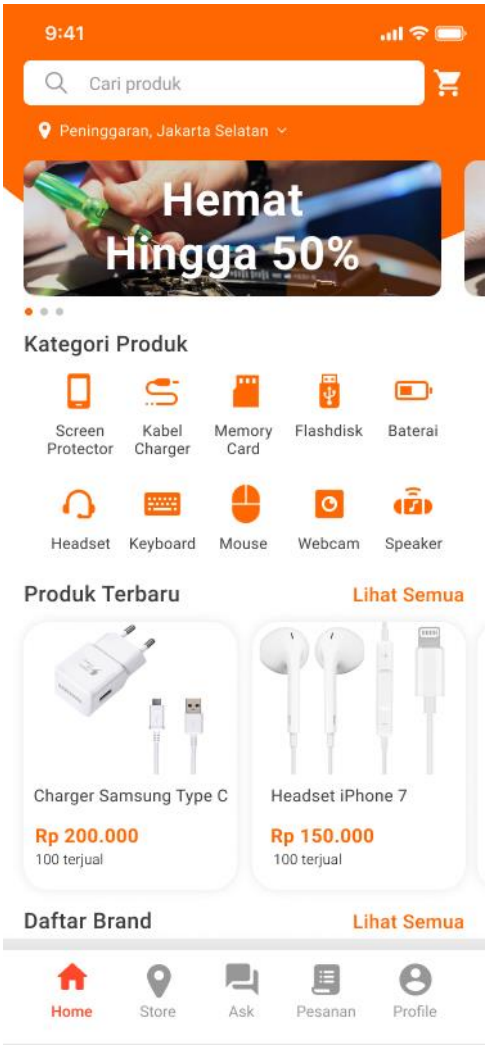

Fig 5. User Interface Home Page Metoocel

On Fig 5, there is a mockup of the Metoocel application's main page UI. This page will open if the user uses the Metoocel application and on that page it displays promos, product categories, latest products, brand lists, there is a navigation bar at the bottom of the application and there is a search bar to make it easier for users.

c) User Interface Prototype Design

After designing the design using a wireframe, the next step is to build the design to be high fidelity. In designing this user interface design using Figma with a user interface style guide that has been built previously.

4) Evaluate the Design Againts Requirements

At this stage, the design recommendations will be evaluated by the user. At this stage, a task scenario will be carried out according to the design solutions identified previously and provide a SUS questionnaire to determine the usability level of the design recommendations that have been made and will be taken to the analysis stage.

III. RESULT & ANALYSIS

A. Test Result

Based on testing using the System Usability Scale (SUS) method. After filling out the questionnaire, the data containing the test scores that have been obtained previously are calculated. In testing using SUS, there were 20 people as respondents and the number of user comparisons was the same as the initial test of the Metoocel application. This is done in order to maintain consistency in research.

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TABLE VII
SCORE SUS REDESIGN USER INTERFACE

Respondent	Score										Total	SUS
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		(Total x 2.5)
R1	4	3	3	4	4	4	4	4	3	3	36	90
R2	3	3	4	4	3	4	4	3	3	3	34	85
R3	4	3	3	3	3	4	3	4	4	2	33	83
R4	4	3	4	3	3	3	4	3	3	3	33	83
R5	3	3	4	4	3	3	3	3	4	4	34	85
R6	3	3	3	3	3	3	4	3	3	2	30	75
R7	4	3	4	3	3	3	4	3	3	3	33	83
R8	4	3	3	3	3	3	3	3	3	3	31	78
R9	3	3	4	3	3	3	4	3	3	3	32	80
R10	3	3	3	4	3	3	3	4	3	3	32	80
R11	3	3	3	3	3	3	3	3	3	3	30	75
R12	4	3	3	3	3	3	3	3	3	3	31	78
R13	3	3	4	4	3	3	3	3	3	3	32	80
R14	4	3	3	3	3	3	4	3	3	3	32	80
R15	3	3	3	3	3	3	3	3	3	4	31	78
R16	3	3	4	3	3	3	3	3	3	2	30	75
R17	3	3	3	3	3	3	3	3	4	3	31	78
R18	4	3	3	4	3	3	3	3	3	3	32	80
R19	3	4	3	4	3	3	3	3	3	3	32	80
R20	3	3	3	3	3	3	3	3	3	4	31	78
Mean												**80**

In table VI based on the tests that have been carried out, the results were obtained that the Prototype of the Metoocel application obtained an SUS value of 80. This shows that Metoocel's application prototypes fall into the grade scale category "B" and the acceptability category ranges "acceptable".

B. Analysis of Test Results

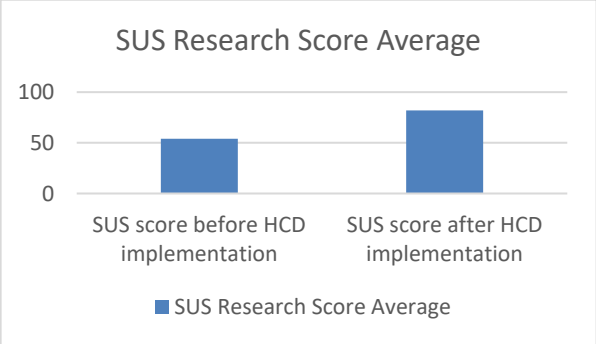

Fig 6. User Interface Home Page Metoocel

At this stage, a comparison of the value of the SUS test results at the beginning of the study was carried out with the value of the SUS test results at the end of the study. There is an average SUS score from many studies, which is 68, so if you get a score below 68, it is considered below the average [18]. On Fig 6, the results of the SUS score of the Metoocel application at the beginning of the study obtained a value of 54. This indicates that the Metoocel application still has an SUS value below the average of 68 points. Then the prototype that was made using the Human Centered Design method obtained an SUS value of 80. Based on this value, it can be seen that the Metoocel application has increased the SUS value by 26 points and has received an SUS value above the average. The grade scale category which was originally "F" becomes "B" and the acceptability ranges category "Low Marginal" becomes "Acceptable".

In the SUS questionnaire there is a scale of 1 to 5 and there are 10 questions given. the SUS result score on the first statement has an average of 4.4 out of 5 and the statement is user will use this system again. In the third question there are 13 respondents who chose a scale of 4 and 7 respondents chose a scale of 5 which indicated that the respondents agreed that the system application was easy to use. In the ninth question has an average of 4.15 of 5 and the statement is there are no problems in using this system. However, in the tenth question, there are 3 respondents who chose a scale of 3 which indicates that the respondents are neutral that they still need to adapt first in using the system. So based on the comparative analysis that has been done above, it can conclude that the recommended design is easier to use and can be understood by users quickly. This shows that the prototype of the Metoocel application produced has a better usability value than before applying the Human Centered Design method.

IV. CONCLUSION

Based on the results of the research that has been done, a prototype of the Metoocel application can be produced using the Human Centered Design method. The redesign of the Metoocel application user interface is carried out with the aim of meeting user needs in using the application. Then the Metoocel application still has shortcomings related to the usability of the application which is below average. There are several user needs, such as ease of moving from one page to another, ease of viewing promos, finding and ordering products effectively and efficiently, to making user interfaces more attractive and following e-commerce in general. In order to produce applications that meet user needs, it is necessary to implement the Human Centered Design stages starting from the creation of personas, mental models, scenario contexts, HTA, wireframes, UI mockups, prototypes to evaluation of the designs created.

Evaluation of the results of the Metoocel application prototype carried out using the SUS questionnaire obtained a score of 80 so that it was included in the "B" grade scale category and the "acceptable" acceptability ranges category. Based on these results, it can be seen that the Metoocel application has increased the SUS value which originally obtained a value of 54. Therefore, this shows that in this study using the Human Centered Design method can produce user interface improvements that have a better application usability value than before applying the Human Centered Design method.

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