Redesign of E-Commerce Mobile Application with Design Thinking Method: A Case Study of RP2, Online Household Retailer

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Abstract - RP2 is one of the growing e-commerce sites in Indonesia offering products for home and living. Recently, RP2 launches a mobile application to reach users by using mobile devices to facilitate purchases on RP2. However, the development of this mobile application has not been through a good application development process, so several weaknesses are found. The aim of the research was to redesign the RP2 mobile application using the design thinking method. The method had five stages: empathize, define, ideate, prototype, and test. However, the research only focused on the first four stages. Moreover, a survey using a questionnaire and interviews were done with 34 users of the RP2 mobile application. The research results are a prototype of the RP2 mobile application, which has been tailored to users' needs and the project owner's input. Changes have been made to the RP2 mobile application using the design thinking method. Changes are applied in several views, such as home, navigation and notifications, search bar, Product Detail Page (PDP), cart and payment, and profiles. With these changes, it is expected that users of the RP2 mobile application will increase, so the number of transactions through the RP2 mobile application will increase too.

Keywords: e-commerce, mobile application, design thinking method

I. INTRODUCTION

In this modern era, smartphones have become part of everyday life in Indonesia. The number of smartphone users and various mobile applications continues to grow over time. A functional and elegant mobile application enhances the daily life of its users. The Internet began to enter Indonesia in 1990. In fact, over time, Indonesia has become one of the largest Internet users in the world. Based on the results of a survey conducted by the Indonesia Internet Service Provider Association (Asosiasi Penyelenggara Jasa Internet Indonesia (APJII)), the growth of Internet users in Indonesia has reached 143,26 million out of Indonesia's total population of 262 million. Internet users increased by 22,5 million in 2015-2016. Meanwhile, in 2016-2017, it increased by 10,56 million users (Asosiasi Penyelenggara Jasa Internet Indonesia, 2018).

The current development of the Internet also influences the changes in the industry. One example is the development of the online shopping industry. Many new channels have emerged for people to shop over the Internet. With these online purchases, people can make transactions anywhere and anytime. In 2018, the average spending for daily needs via the Internet by Indonesians was US$89, excluding travel and digital media spending, which involved 100 million Indonesians. This value was 30% more than the previous year, making Indonesia the fastest growing online market (Kemp & Moey, 2019).

The number of online shoppers in Indonesia is targeted to reach 119 million by 2025. Local e-commerce, such as Tokopedia, Traveloka, Bukalapak, and Gojek, dominates the market. They represent four of seven ASEAN Unicorns. The development of e-commerce in Indonesia is supported by the development of smartphones, growing middle-class economy, direct investment from foreign investors, and development of digital payments. One of

the daily needs that people buy online is furniture and household appliances. In 2018, the total expenditure in this sector was US$1.674 (the fourth after fashion and beauty, electronics and physical media, and food and personal care) (Kemp & Moey, 2019).

With the mentioned conditions, the researchers choose to review one of the furniture sellers in Indonesia. It has just launched a new sales channel through a mobile application. The company name is RP2. Based on the interview, RP2 is a retail store that sells a wide variety of furniture and appliances. In addition to having physical stores in Indonesian malls, RP2 has started to develop its online sales channels through a website or mobile application. RP2 has more than ten thousand products in ten different categories, focusing on home and living products like various household needs, kitchen, bed and bath needs, home improvement, furniture, automotive, hobbies and lifestyle, health, sports, electronics, and toys and baby needs.

To compete with other competitors, companies need new methods to promote their products. One of the ways is by applying technology in the business (Setiawan, Muna, Arumi, & Sukmasetya, 2020). In June 2019, RP2 launched a mobile application. The development of this mobile application is only carried out based on the perspective of the user interface designer and developer team. Before the development takes place, the research stage is not carried out, so some aspects still do not meet the standards. In previous research, user experience is considered by e-commerce users (Kumaresh, Haran, & Jarret, 2021). The research applies the design thinking method to redesign the RP2 mobile application. With this change in the user interface design, it is expected that the application will be more user-friendly and can attract more users to make transactions through this mobile application (Mitchell, 2017). Based on previous research, user interface design has become one of the factors that influence users' trust. A website navigation design that is easy to use will increase the level of customer trust. In addition, it will also increase customer loyalty to the company (Bilgihan, 2016). So, with the redesign of this mobile application, it is expected that the sales revenue will also increase (Mitchell, 2017).

II. METHODS

The methodology applied in the research is the design thinking method. Design thinking is a human-centered methodology for creative problem-solving. This method prioritizes users' empathy to lead to solutions (Kamran & Dal Cin, 2020). The design thinking method in the research is based on the design thinking method discovered by the Hasso Plattner Institute of Design at Stanford University in 2005. This method has five stages: empathize, define, ideate, prototype, and test (Pham, Fucci, & Maalej, 2018). Figure 1 shows the design thinking method. However, the research will only focus on the first four stages.

In the first stage of emphasizing, the researchers must understand the users and know the users' problems. At this stage, the researcher will use the User Experience Questionnaire (UEQ) to get input from users. Moreover, interviews will be conducted to obtain more in-depth information. In the next stage, defining, the researcher must deeply understand the users' problems and create a scope for the problems to be solved. The third stage is ideating. Researchers begin to generate ideas to solve problems. After getting the idea, the researchers begin to put the idea into a real prototype. This prototype serves to test the functionality of the system more easily. The last stage is a test that researchers use to get feedback from users (Dam & Siang, 2020). The application of design thinking of Hasso Plattner allows the stages of each process not to be run sequentially, but the stages can return to the previous stage (Tschimmel, 2012).

III. RESULTS AND DISCUSSIONS

In the first stage (empathize), researchers use UEQ to discover the problems faced by users with a current mobile application. The main purpose of the UEQ is to measure the user experience when using the application quickly and accurately. The UEQ considers aspects of pragmatic and hedonic quality (Schrepp, Hinderks, & Thomaschewski, 2014). It also has 6 aspects that will be measured through 26 questions. The first aspect is attractiveness. The product must look attractive, fun, friendly, and comfortable. The
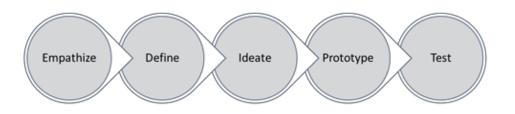

Figure 1 Design Thinking Method

second aspect is efficiency. Users must perform the tasks with the product quickly, efficiently, and in a pragmatic manner. The third aspect is perspicuity. Products must be easy to understand, clear, simple, and easy to learn. The fourth aspect is dependability. Interactions with the product must be predictable, safe, and meet the users' expectations. The fifth aspect is stimulation that using the product should be engaging and motivating. The last aspect is a novelty. Products must be innovative, inventive, and creatively designed (Schrepp, Hinderks, & Thomaschewski, 2017). UEQ can evaluate the user experience of a product quickly and efficiently. Each item will be assessed using two contradictory terms (Mushthofa, Sabariah, & Effendy, 2018). Figure 2 displays the overall UEQ.

This questionnaire is given to current users of the RP2 mobile application to get their opinions about the application. Then, the questionnaire will be delivered in Indonesian to avoid bias. The results of the questionnaire that have been obtained will be processed using the data processing template that has been provided by (Schrepp *et al.,* 2014). The results of this UEQ will be used as the basis for conducting interviews to change the appearance of this RP2 mobile application.

The UEQ questionnaire is completed by 34 respondents aged between 25 and 34 years. From the data, it can be concluded that all aspects in UEQ still score below average, with the novelty aspect having the lowest score. Based on previous research, aspects, such as efficiency and ease of use, are the factors that affect user trust in an e-commerce application (Casare, Da Silva, Basso, & Moraes, 2021). The results of UEQ data processing can be seen in Table 1 and Figure 2.
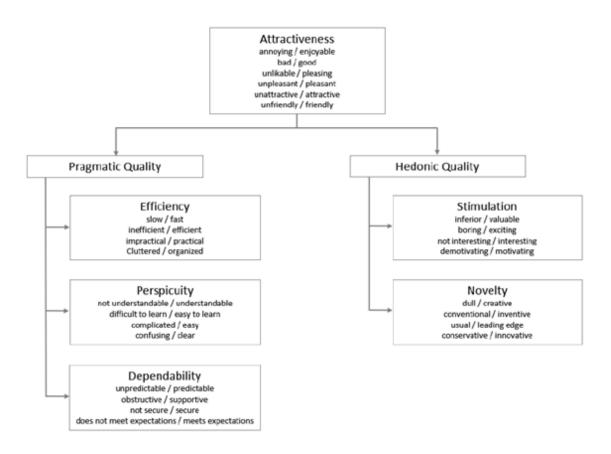

Figure 2 User Experience Questionnaire

Table 1 UEQ Result

Scale	Mean	Comparison to Benchmark	Interpretation
Attractiveness	0,78	Below Average	50% of results are better, and 25% of results are worse
Efficiency	0,77	Below Average	50% of results are better, and 25% of results are worse
Perspicuity	0,77	Below Average	50% of results are better, and 25% of results are worse
Dependability	0,92	Below Average	50% of results are better, and 25% of results are worse
Stimulation	0,70	Below Average	50% of results are better, and 25% of results are worse
Novelty	0,40	Below Average	50% of results are better, and 25% of results are worse

To get more detailed information on the UEQ result, the researchers conduct interviews with several users ranging from 25 to 34 years old. Information on this RP2 mobile application is obtained from the results of the interview. Users feel that the user interface of the RP2 mobile application is not structured yet. In addition, the layout of the user interface components is cluttered and less attractive. In addition, at this stage, an interview is also held with the project leader to find out the direction of the board of directors on the development of this RP2 mobile application.

Based on the information obtained from questionnaires and interviews, the researchers continue the second stage of design thinking (define). The researchers create a person that represents the types of users of the RP2 mobile application. A persona is a description of the user that describes the goals, interests, and abilities. Persona must display information, such as name, occupation, family, gender, age, ethnicity, education, socioeconomic status, goals, life histories, and tasks performed (Valentim, Silva, & Conte, 2017). Persona is essential in designing user-oriented applications. The researchers show two personas to describe the users of this RP2 mobile application. The first persona in Figure 3 shows a user who is busy because of the demands of his job. Therefore, this user needs an application that offers alternative delivery and low prices compared to other competitors. Meanwhile, the second persona in Figure 4 shows the user who has a job as a drop shipper. Therefore, these users look for products with low prices and large quantities. It also includes the discounts offered.

The next stage is the ideating stage. This stage is based on the defining stage and focuses on creating ideas and details. Table 2 (see Appendix) summarizes the problems found from the previous stages as well as the proposed solutions.

In general, the obtained recommendations include improvements to the appearance, layout, structure, and additional features that will be applied to the following RP2 mobile application home pages, navigation, notifications, search bar, Product Catalog Page (PCP), Product Detail Page (PDP), cart, payment, and profile. Home is the first page that appears when the RP2 application is opened. Then, the navigation bar is a frame that contains navigation menus with their respective functions. In the RP2 mobile application, the navigation bar is located at the bottom of the home page. Moreover, notifications on RP2 serve as a place to find out the latest promotions. The search bar is a combination of an input field and a submit button. It is used to search for items on the RP2 mobile application. Then, PCP displays a catalog of items sold by RP2. Meanwhile, PDP shows detailed information of an item, such as product descriptions, specifications, and available shipping information. Cart is a shopping cart that contains items to be purchased before being processed to the payment page. Next, the payment page contains the process of choosing a shipping method and picking up goods to complete the payment. The profile page has users' information. In addition, there are users' wish lists, membership information, exchange points, and others.

Bella

Age
25 to 34 years

Highest Level of Education
Bachelor's degree (e.g. BA, BS)

Social Networks

Industry
Finance

Organization Size
201-500 employees

Goals or Objectives

To fill my new home, I want to find furniture that is cheapest among many other providers, is of good quality, and gets home quickly.

Pain Point

Most e-commerce selling furniture do not provide suitable delivery services and are expensive

Identifiers

Likes something easy and simple
Busy

Figure 3 Persona 1

Christian

Age
25 to 34 years

Highest Level of Education
Bachelor's degree (e.g. BA, BS)

Social Networks

Industry
Retail

Organization Size
Self-employed

Goals or Objectives

I am interested in e-commerce that sells household items at discounted prices that I can resell in my online store. My target customers are customers located far from the city center.

Pain Point

It's hard to find an online store that sells household items for a great price tag

Identifiers

Interested in a discount
Looking for goods at the cheapest prices
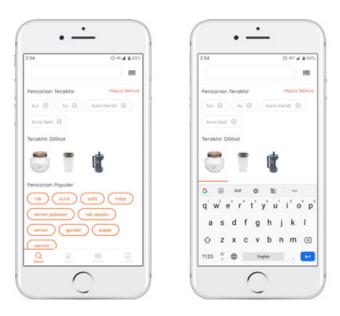
Figure 4 Persona 2

Figure 5 Old User Interface of Search Feature

The next stage of design thinking is to make a prototype of the RP2 mobile application. One of the changes made is in the search feature. Figure 5 shows the search screen used by the current RP2 mobile application, and Figure 6 is the new view of the search feature. In Figure 6, the search bar gives the recommendation to inspire users. Then, the position of popular search is moved to the second section and given the original image to provide more information to users about that category. In Figure 5, the last-

seen section only displays product images. Then, it is converted into a product card that displays the product brand and name, as shown in Figure 6.
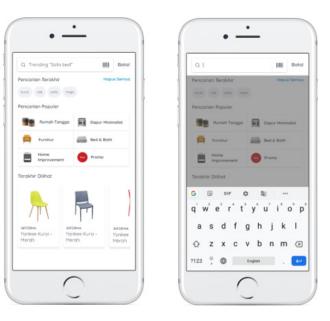

Figure 6 New User Interface of Search Feature

In the PCP, when the users select a category, the main view of the category page will display a banner containing images from that category. The goal is to make the display more attractive and clarify the illustration. This banner can be seen in Figure 7.

However, this feature is not available in the current RP2 mobile application. In addition, the sub-category display, which is originally in a drop-down menu, has been changed to a slider to save space and help users to stay focused on their initial search goal.
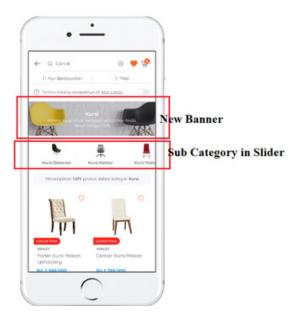

Figure 7 New User Interface of Category

Figure 8 shows that the PCP is displayed with more specific information than before by adding tags according to product specifications, such as the lowest price. In addition, changes are made in displaying product names and brands. In the new appearance, the brand and product names are shown in a different line. The goal is for users to differentiate brands and product specifications easily.

Figure 8 New User Interface of Product Card Page

Moreover, the filter feature is optimized by bringing up frequently used or popular filters on the main page, as shown in Figure 9 on the right. Therefore, it shortens the process of finding items. In addition, the arrangement has also been changed to be shorter on one page, so users do not have to scroll to see all the existing filters, as shown in Figure 9 on the left.

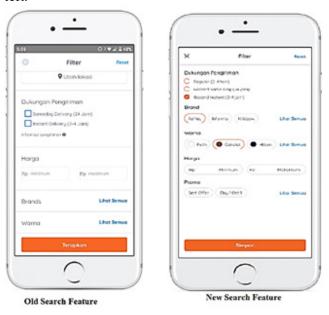Old Search Feature   New Search Feature

Figure 9 Search Feature

Next, the delivery information page is changed to a tab form. The first tab contains delivery information, and the second tab has information about picking up items at the store. The first tab will display information about the delivery address, courier options, delivery fee, and estimated items arriving at the location. Meanwhile, the second tab will contain information on the store that can be selected if the customer wants to pick up items directly at the store. This new user interface can be seen in Figure 10.
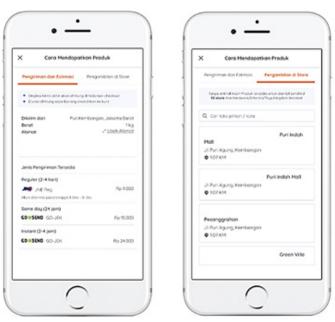

Figure 10 New User Interface for Delivery Information

Question and answer are new features added to enrich information about a product. Every question related to the product will be displayed on this page. So, it can shorten the time the user has a question that he wants to ask. Figure 11 shows the feature.

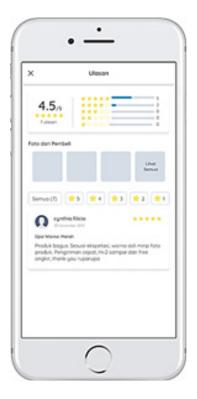Figure 11 Question and Answer Feature

Figure 12 Review Feature

The last feature added is the review. In this feature, users can see reviews from other users who have bought the product. The reason for adding this feature is because users trust other users' reviews more than advertisers and marketers. RP2 can show users the average rating of a product and how many reviews are posted. To write a review, the users must have received the item, which later the order status will change to a review on the profile page. Then, the users will be directed to write a review. Figure 12 shows the review page.

IV. CONCLUSIONS

A mobile application that is equipped with a good user experience will help users to adjust to the application more comfortably. Moreover, a beautifully designed user interface can be more attractive and help users to navigate the application. Hence, balancing function and visual appeal is essential to increase the level of user satisfaction and loyalty to an application.

From the results of the distributed UEQ, it obtains six aspects to be assessed. The six aspects still have a values below average, with novelty as the lowest value. Based on this information, researchers conduct more in-depth interviews with users and project leaders. From the three processes above, it can be concluded that the problems contained in the RP2 mobile application are the lack of quality user experience from this mobile application, many unavailable features, and the not well-ordered interface display.

Changes have been made to the RP2 mobile application using the design thinking method to solve this problem. Changes will be applied in several views such as home, navigation and notifications, search bar, product detail page, cart and payment, and profiles. With these changes, it is hoped that users of the RP2 mobile application will increase. Then, the number of transactions through the RP2 mobile application will also increase. It is also expected that the users can easily search for information and find the product they are looking for by adding new features. The research limitation is that the results of the research have not been retested to find out whether the user interface redesign has met the users' expectations. For further research, it can be done to perform usability testing on the RP2 mobile application.

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APPENDIX

Table 2 Proposed Solutions based on Research

Page	Problem	Solution
Home	The structure and organization of the home page are less attractive and do not display attention-grabbing items.	The appearance of the home page is improved by prioritizing the personalization of each user.
Home	The process of searching for goods through the category menu is less effective.	The category of each item has its page, and its sub-categories are displayed on that page.
Home	Categories that appear when searching for products with the search bar are too many and take up space.	The search bar display is updated, and the categories on the search page are changed to the most searched popular categories.
Home	Categories on the home page are too many and take up space.	Categories on the home page are made according to the categories that users see most often and are partially displayed with the option "See All".
Home	Order status in the navigation bar is less familiar.	It is moved to the account on the profile page.
Home	"How we can help you today" takes up space on the home page.	"How we can help you today" is deleted and replaced with "there is something left out" to display the items that have been put into cart shopping but have not been checked out yet.
Home	Call center on the left is less helpful.	Call center in the top left header is removed. On the profile page, there is a chat feature with User Service (customer service).
Home	People's choice is less necessary.	People's choice is removed and replaced with wishlist and best-selling products.
Home	It is difficult to view information on ongoing promotions.	A new page is made. It contains all ongoing promotions.
Home	Placeholder that exists in the search bar is less appropriate ("try a chair").	Placeholders are made to be more attractive so that users are more interested in looking for items.
Home	The promo display in the home section does not attract attention.	Home displaying promo banners of brands and others are made to be more attractive and more compact with sliders for mobile users.
Home	There are recommendations from project leaders.	The sections on the home are made according to each user's history (personalized).
Home	There are recommendations from project leaders.	The navigation bar is added to the signature button, namely scanning the barcode in the middle.
Home	There are recommendations from project leaders.	The shopping cart on the home page is moved to navigation, and the notification feature is changed.
Navigation	There are recommendations from project leaders.	A scan button is added in the middle of the navigation for barcode scanning to make it more exposed to users.
Search	No search results appear with synonymous keywords in the search bar.	The results of the search show synonyms of keywords.
Search	No search results appear if there is a misspelling in the search bar.	Search result corrections are added if there is a misspelling.
Search	There are recommendations from project leaders.	Popular searches on the search bar have an image display to make it more attractive.
Search	There are recommendations from project leaders.	Features of autocompleting are added when the users type something in the search bar.
Profile	Profile page is less attractive and less complete.	Profile page (account) is designed repeated by displaying the order, changed profile, store locator, wishlist, last-seen items, address of the delivery, and assistance and information that exist.
Profile	Order status page looks simple and less attractive.	Design is improved with a more appealing and presentable look.
Profile	There are recommendations from project leaders.	New features are added to the profile, namely store locator and last-seen item.
PCP	Sub-categories that emerged from the results of search products are too much and take up space.	The sub-categories that appear are made into sliders.

Table 2 Proposed Solutions based on Research
(Continued)

Page	Problem	Solution
PCP	The users cannot distinguish between brand and item name.	Brand has its line.
PCP	The users are unable to know the number of filter results.	The number of filter results is displayed.
PCP	The users do not know the color variations of the products.	Color swatches are displayed.
PCP	There are recommendations from project leaders.	"Set Location" feature is added to display items that are in certain locations only. Banners are also added according to the selected category.
PDP	The users are unable to determine color variations of the products.	Color swatches are displayed.
PDP	The PDP display is too long.	The PDP is divided into several sections (delivery, questions and answers, and reviews). It also displays some product information.
PDP	The product detail page is not neat in terms of placement, fonts, and colors.	System layout and placement of the divider are set again.
PDP	There is no place to ask questions related to the product.	Page for questions and answers is provided so that the users can ask questions, and the same questions cannot be repeated.
PDP	There are no reviews, so users cannot find out other people's ratings of the product.	A review page (rating and review) is created.
PDP	Information delivery is less obvious and not interesting.	Delivery information has its page and is updated.
PDP	There is no delivery estimation.	Delivery estimation is added.
PDP	There are recommendations from project leaders.	Item details, such as quantity and color, are determined when the users want to add items to the basket.
PDP	There are recommendations from project leaders.	Detail of the product is minimized. It displays many products at the bottom to accentuate other items there.
PDP	There are recommendations from project leaders.	The shipping page is divided into two tabs to highlight shipping and collection methods.
Cart	The name of the checkout button is less familiar to ordinary people.	The name of the checkout button is changed into order review.
Payment	The users do not know the estimated shipping cost.	The estimated shipping cost is displayed on the payment page until delivery.
Payment	The location of the promo code is less clear and familiar.	Layout of the code promo is changed. The design is zoomed in and placed on the top.
Payment	The feature of entering the address on each item when purchasing is less visible and difficult to understand.	Features of some addresses are removed, so the users are directed to choose the items that want to be sent to a different address from the item checks.

PDP = Product Detail Page & PCP = Product Catalog Page