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Application of The User Centered Design Method To Evaluate The Relationship Between User Experience, User Interface and Customer Satisfaction on Banking Mobile Application

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Abstract

The aim of this research is to evaluate user satisfaction through UI/UX design in mobile banking and find out what kind of UI/UX appearance users want using the user-centered design method. This research uses a qualitative approach. In addition to the qualitative approach, this research also incorporates a quantitative approach. Data collection in this research used usability testing, interviews, and questionnaires. We calculated the data obtained from the questionnaire statistically using Microsoft Excel. The results of questionnaire data analysis can be in the form of graphs or numbers. Researchers create a list of required elements or features to maintain, add, improve, or remove after collecting and analyzing data. Researchers will implement the requirements list by providing prototype design recommendations. The research results showed that 90% of participants successfully completed the 10 task scenarios given during the evaluation of ongoing mobile banking usability testing. Furthermore, during the evaluation of mobile banking prototype recommendations, 99% of participants successfully completed the 10 task scenarios that had been given. The appearance that users want is a more attractive appearance by adding more icons and illustrations, as well as making the appearance more modern. Additional features that users want, namely adding an e-wallet top-up feature, not limiting the account mutations that can be seen, adding a share feature after transfer, adding fingerprint and face ID features in the login section, and adding a copy feature to be able to copy account numbers.

Keywords: User Satisfaction, Mobile Banking, User-Centered Design, User Experience.

1. Introduction

Rapid technological developments can influence daily activities, which encourages people to adapt to technology. Technology and the internet enable people to perform numerous activities digitally. The digital era has made big changes for companies in serving their customers [1]. Currently, the internet seems to be a major human need, and smartphones have become a very important item. Therefore, many service provider manufacturers create applications to maintain their services and make them accessible to a wide range of users [2]. This also applies to the banking industry, which is now starting to give rise to various financial applications. Survey revealed that 68% of respondents utilized financial applications, as shown in the image above [3]. Within the group of respondents who utilized financial applications, they were asked to once again choose among these three options. Mobile banking is the most frequently used financial application at 90%, followed by e-wallets at 80%, and digital banking at the lowest percentage of 30% [4]. Banks provide mobile banking services that enable customers to carry out transactions such as transfers at an ATM, top-up credit, electricity tokens, and others using a smartphone. An e-wallet is a digital wallet that functions to store money and carry out transactions. Meanwhile, digital banking is a banking service that uses digital means through the customer's own electronic media, so a digital bank is not like banks in general, which have branch offices [5].

The object of this study is the most widely used mobile banking application in 2022, with a percentage of 62%. It is projected to become the most popular mobile banking application in Indonesia in 2022, with a TBI score of 48%, according to a survey conducted by the Top Brand Award. The top three reasons why people use mobile banking are that it is convenient, time-efficient, and simple to use [6]. Mobile banking is an innovative way to serve customers using smartphones, making it a practical and efficient choice for users. Apart from these 3 reasons, other reasons for using mobile banking are that it is easy to track transactions, it is more convenient, has

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many features, is integrated with e-commerce and e-wallets, is safer, and there are also customers who use mobile banking because of recommendations from friends and family [7]. People's goals for using mobile banking. Refilling the application is the most common goal of using mobile banking. The other most common purposes are purchases on e-commerce and money transfers. Mobile banking functions to serve customers using smartphones in banking activities [8].

Technological developments have introduced new features in mobile banking services to increase convenience and efficiency for customers. One of them is the ability to make cash withdrawals without a card, as well as the launch of the QRku feature, which allows transfers between customers via scanning a QR code. However, it is unfortunate that the QRku feature will be discontinued on November, 2022. The developer's response to user reviews on the App Store stated that the closure of this feature was a form of support for QRIS as the new national QR code standard [9]. In 2020, the mobile banking service also launched an account opening feature, making it easier for customers who no longer need to come to a branch office for this process. Reviews from users regarding the mobile banking display show dissatisfaction with the user interface (UI), which does not receive updates from year to year [10]. Users consider the provided design less modern and fresh compared to other mobile banking applications. Further development of this mobile banking service requires more frequent updates, especially in terms of UI design to better suit the expectations of modern users [11]. Additionally, while new features can increase user convenience, it is also important to consider and explain to users the discontinuation of certain features, such as QRku, with clear reasons and possible alternative solutions [12].

User interface design is an important part of a computer system because the user interface is the part that interacts with the user. A user interface that is too difficult can make it difficult for users to run the system. One of the failure factors on a website is a user interface that is difficult to operate [13]. A user interface that is too difficult for users to understand can make them confused. Therefore, the aim of creating a user interface design is to create technology that is easy for users to understand, or what is usually known as user-friendly [14]. The satisfaction and ease felt by users in making transactions using mobile banking is one of the factors in retaining customers through the use of mobile banking. Banks are strongly advised to create mobile banking by designing a user interface that is very comfortable and prioritizes customer satisfaction, such as icons, colors, sizes, buttons, and language, so that customers can easily use mobile banking [15]. If users feel that mobile banking is not ready for its infrastructure and technological developments, then this can cause user discomfort and satisfaction. This dissatisfaction can lead to mobile banking that is not optimal, so in creating a system, it is necessary to have infrastructure readiness and technological capabilities that refer to user satisfaction [16].

user reviews regarding the user experience, it can be concluded that users are less satisfied with the user experience provided because of the long process that users have to carry out to achieve their goals, and there are still many features that are not yet available in mobile banking. Some of the problems faced by users are that logging in still uses an access code [17]. utilizing face ID or fingerprint technology, after making a transaction there is no save and share feature on proof of transaction. With the mutation feature, the mutation period that can be selected is only seven days and the maximum account mutation is one month ago [18]. This is very difficult for customers who want to see account mutations for more than one month because it cannot be done using mobile banking. Users who are using the application for the first time find it difficult to make transfers because users have to register the destination account number first before they can make transfers, and there are many more complaints experienced by users [19]. The results of interviews conducted with mobile banking users support this application review. Mobile banking does not yet have a share feature after making a transfer; the login section still uses an access code and does not utilize fingerprint or face ID features; and viewing account mutations is still very limited, only being able to view the last 1 month. The appearance of mobile banking is still very lagging behind other mobile banking; it needs to be improved to make it more modern; it needs to add icons because the current display has more text; add an e-wallet feature so you don't need to enter the application code when you want to top up the application balance; and add a copy feature to copy the account number [20]. The transfer and transfer list sections should be combined into one, and the most important thing is to shorten each stage in achieving the goal so that it is simpler and easier to use [21].

User experience (UX) is a person's opinion or experience in using a system; this experience functions to measure user satisfaction with a system [22] [23]. No matter how good a system is, if users experience difficulties and do not feel comfortable interacting, the level of user satisfaction is very low. User experience plays an important role in assessing user satisfaction with digital products [24]. A system's success is evident in its ability to provide users with a good user experience [25]. Therefore, developing a user experience to increase user satisfaction is a very important thing to do. Evaluation, in general, is a systematic process for determining and measuring the value of a system based on certain criteria [26]. In this study, the assessment criteria refer to user satisfaction with using mobile banking [27]. UI/UX evaluation is the activity of measuring and assessing an application or system, the results of which will provide recommendations for making improvements [28]. The measurement results of the evaluation can be in the form of quantitative and qualitative assessments [29]. The purpose of evaluating an application is to develop a better system and keep up with technological developments. Data

collection is necessary to determine user satisfaction and identify issues with UI/UX [30]. Researchers can collect data using literature study methods, observation, questionnaires, interviews, and usability testing. Usability testing measures user satisfaction by testing applications according to predetermined scenarios or tasks. Usability measures the success of an easy-to-use application in achieving its goals [31].

In the context of system or application development, such as mobile banking, the user-centered design (UCD) approach is a user-centered method to ensure an optimal user experience [32]. This method prioritizes user needs, preferences, and experience at every stage of development, recognizing that user satisfaction is the key to the application's success [33]. The user-centered design method consists of five interrelated stages. The first stage, “plan the human-centered design,” involves planning and strategizing to focus on user needs. The next stage is “specify context of use,” where the environment and situations in which the application will be used are analyzed in depth [34]. The third stage, “specify user requirements,” involves collecting data from users to understand their needs, preferences, and expectations for the application [35]. Next, the "design solutions" stage develops solutions that meet previously identified user needs and preferences [36]. The final stage, “evaluating against requirements,” involves testing and evaluating the developed solution to ensure compliance with user needs. The application of the user-centered design method in research related to mobile banking is very relevant because the focus is on user satisfaction [37]. By collecting data from users, whether in the form of criticism, suggestions, or preferences, this method helps build UI/UX that better meets user expectations. This approach also allows developers to continuously improve the application based on user feedback, thereby ensuring a satisfying user experience that meets their needs [38].

2. Research Methods

This research uses a qualitative approach. In addition to the qualitative approach, this research also incorporates a quantitative approach. To take a qualitative approach, the researchers collected information and data from usability testing and interviews. Researchers observed the participants carry out usability testing and explained the results in descriptive form, highlighting the problems users faced in the given task scenario. Researchers also conducted unstructured interviews with participants to find out more in-depth information regarding their experiences and suggestions for using mobile banking applications. We collected data for the quantitative approach by having participants fill out questionnaires. We calculated the data obtained from the questionnaire statistically using Microsoft Excel. The results of questionnaire data analysis can be in the form of graphs or numbers. After collecting and analyzing the data, the researchers created a list of required elements or features that the mobile banking application needed to maintain, add, improve, or remove. The researchers will implement the requirements list by providing prototype design recommendations.

3. Results and Discussion

Based on the calculation results from usability testing, participants successfully completed an average of 90% of the total of 10 task scenarios given. None of the participants experienced failure in completing the task scenarios, but some of them needed help in certain task scenarios. The 9th task scenario (A1), which involves examining transfer evidence in detail, poses the greatest difficulties. As many as nine of the total participants needed help, while only three participants could complete it without help. The account mutation feature, (A3) also requires a lot of help. A total of 10 participants needed help in this scenario, while five participants were able to complete it without help. Participants can complete two task scenarios, namely A1 (related to the login feature) and A6 (related to the transfer feature between accounts), without help. The results indicate that the majority of participants encountered difficulties, particularly in task scenarios that involved viewing transfer proof in detail and the account mutation feature. On the other hand, participants found logging in and transferring between accounts easier, and they were able to complete these tasks without assistance. These areas in the application need improvement to enhance the user experience, particularly in features that most participants still require assistance with.

There are currently 10 problems with the mobile banking application. The problem most users experience is that a detailed proof of transfer is not in the account statement. Participants do not know the initial virtual account code to top up the application balance. Participants experience difficulties in transferring funds if they have not saved their account number, and they also face confusion in locating the account mutation feature. In particular, new users don't know that if they want to transfer, they need to save their account number. There are users who are confused about finding balance information because balance information on other applications is usually on the main page. Users are also confused because there are two account mutation options, which makes it hard to tell the difference between them. They also have trouble finding the share button; the transaction history doesn't show up right away when they open an account mutation; they can't see account mutations older than seven days; there is no share feature after a transfer; there are two interbank options; they enter the wrong interbank account number into the inter account; and mobile banking is currently receiving a number of criticisms and suggestions from its users. Users criticize the length of stages required to achieve goals, which causes difficulties and

inefficiency. One suggestion is to shorten each stage, making it simpler. Apart from that, users also hope that there is an e-wallet top-up feature to make it easier to top up their balance without needing to know the initial code for the destination application's virtual account. Limitations in viewing account mutations are also a major criticism because the mutation period can only be selected for a maximum of seven days with a limit of one month. Users hope that there will be no restrictions on viewing account mutations. There is also a proposal to change the name "account mutation" to "transaction history" to make it easier to understand, although this may be difficult to do because the term "account mutation" is standard banking language.

Apart from that, users hope that there will be a share feature after transfers to make it easier to send proof of transfer. Some also want a more attractive appearance change and integration between several features, such as combining the transfer list with the transfer feature. Users also want increased security with the addition of a login feature using a fingerprint or face ID. There is a proposal to combine detailed transfer proof with transaction history to make it easier to access. Additionally, some users want balance information displayed directly on the main page for easy access. Other criticisms include merging the transfer feature between accounts and between banks to make it more efficient, as well as adding a copy feature to easily copy account numbers. There is also a suggestion to place account mutations directly on the main page to make them easier to access. Thus, this series of criticisms and suggestions from users can become the basis for improving and developing mobile banking in the future. The evaluation, which resulted in a score of 50 for mobile banking, indicates that this application has not been able to meet the expectations of its users. Acceptance that falls into the "not acceptable" category illustrates that the response from users to this application is less positive. On a grading scale, a grade of "F" or "very poor" indicates performance that falls short of expected standards. The "poor" adjective rating confirms that participants gave this application a bad rating. Apart from that, the net promoter score results, which are in the "Detractor" category, indicate that the majority of participants gave a negative response to the experience of using the application. The evaluation implies that there is great room for improvement to increase user satisfaction in the future. Improvements in terms of simpler navigation, increased security with the adoption of biometric features, incorporation of features for user efficiency, as well as simplifying the user interface and providing more intuitive features, may be some of the steps that can help increase positive responses from users in the future.

The first evaluation of the currently running mobile banking application's UEQ score results show that it scores above average on the efficiency and dependability scale. However, on the scale of attractiveness, perspicuity, stimulation, and novelty, they got low scores. This shows that although the app performs well in terms of efficiency and reliability, aspects such as attractiveness, clarity, stimulation, and novelty require improvement. The UEQ measurement results show that the attractiveness score is 0.5, perspicuity is 0.15, efficiency is 1.2, dependability is 1.5, stimulation is 0.35, and novelty is -1.0. The app needs visual improvements to enhance its attractiveness to users. Users also experience difficulty using the application because they feel confused, so improvements are needed in the clarity of the user interface. Furthermore, the application requires updates to enhance user convenience and comfort. By considering the results of this UEQ evaluation, improvements to aspects that received low scores, such as an attractive appearance and clarity in use, as well as feature updates to increase user comfort, are important things to pay attention to in the future development and improvement of this mobile banking application. The process at this stage aims to visually depict the steps users must take to carry out certain functions in the application. A type of task flow is used for the user flow, which describes the workflow by using symbols and arrows to connect each step. After that, a wireframe is created as an initial guide for making a prototype. In designing wireframes, researchers use a list of user requirements and user flow as the main guidelines. Researchers use wireframes to illustrate the layout of the content and navigation in the application. Even at the wireframe stage, color details have not been fully considered. The next step is designing a prototype, where the researcher creates a style guide first. The purpose of the style guide is to serve as a guideline in developing user interfaces so that the resulting design has consistent components. These components include the use of colors, typography, and icons that will be used in designing the application interface. Thus, this process ensures that the resulting interface design has consistency in every element to achieve a better user experience.

You can see that the color palette above is separated based on the function of each color. The primary color is chosen based on the color of mobile banking, namely blue. Blue is considered a calm color, representing intelligence and responsibility. The color blue is also very appropriate for financial and technology companies. Secondary colors function as additional information or things that you want to see more clearly. The secondary color here is light blue with the hex code #CCE. The light blue color was chosen because it is a bright and calm color, so it looks in harmony with the dark primary color. Furthermore, there is a special color that functions to color the icon and to clarify when providing information. All blue, green with hex code #147 and #7CB, orange, and yellow serve as icon colors and illustrations to make them look more attractive. The green color with the hex code #2EC is used for success information. This color was chosen because green is synonymous with success, and the striking green color chosen is a sign of important information. Outgoing money information is conveyed

using the red color. The last color palette is background and text. We chose white as the background because it looks neutral and simply. The text uses black and gray. Aside from text, the gray color with the hex code #C2C is also utilized for lines and button colors.

The design team chose Roboto as the font for the mobile banking design. It was chosen for the mobile banking design due to its popularity as a commonly used font in mobile applications. The main reason for using Roboto is the readability it offers to users. This font has round and clean letter shapes with a geometric design that provides visual comfort for application users. The main advantage of Roboto is its high suitability for use on digital platforms. Roboto font is designed to enhance user comfort, improve text readability, and provide a superior visual experience in mobile applications. Thus, using the Roboto font can improve the clarity and readability of text, as well as provide a clean and professional appearance in application design. In designing the design, the use of icons and illustrations is based on the resources available in the plugin features of Figma, namely Iconify and Freepik. Iconify enriches the appearance of the application interface with a variety of icons, while Freepik offers additional interesting and relevant visuals for design through its collection of illustrations. After the style guide creation stage, the next step is to design a prototype of mobile banking recommendations at a high-fidelity level. The prototyping process uses Figma as the main tool. By using Figma, designers can describe in detail the layout and interface components, as well as the integration of icons and illustrations that have been selected from Iconify and Freepik in the prototype. Utilizing resources such as Iconify and Freepik from Figma makes it easier for designers to get a variety of high-quality icons and illustrations to enrich prototype designs at a high-fidelity level. This helps in presenting a more realistic appearance that is closer to the desired final appearance for the mobile banking application.

From the results of the usability testing calculations above, it can be concluded that, on average, participants were able to complete 99% of the total of 10 task scenarios given. None of the participants experienced failure in completing task scenarios, but they needed help in several task scenarios to be able to complete them. Participant O5 needed help in the task scenario of viewing balance information and sharing account movements for the last 7 days. Meanwhile, O8 participants need help viewing account mutations. We analyzed and visualized the problems found in usability testing on mobile banking prototype recommendations using the NVivo application. It can be seen that there are three problems found in the mobile banking prototype recommendation. The problem that users experience is that they don't know that to see the balance, they need to click on the eye icon. Second, users rarely look at the bottom area of the application or the navigation bar, so they don't know if the mutation is in the navigation bar. Third, users do not know that the share feature in the mutation menu is at the bottom. Participants provided three relevant criticisms and suggestions for the mobile banking application: First, some users criticize the use of the unfamiliar eye icon, suggesting the addition of "view balance" to enhance user understanding of its function. The addition of the words "view balance" to the eye icon enhances user understanding of its function. Second, participants suggested adding a Mutation menu on the home page in the application menus section. The reason behind this suggestion is that users tend to pay less attention to the bottom of the app, so placing the Mutations menu in a more visible section can improve the accessibility and usability of the feature. Third, participants also suggested placing filters and shares at the top of the Mutation menu. Users tend to rarely look at the bottom of the application, so placing filters and shares at the top makes it easier for them to access these features. To enhance clarity and ease of understanding, categorize the filters into "date" and "type." This collection of criticisms and suggestions underscores the importance of understanding user habits when using applications and emphasizes improving layout and better visual understanding to improve the overall user experience.

Based on participant assessments, which resulted in a score of 90 for mobile banking, this evaluation places this application in a very positive category in the opinion of users. Users generally receive the application well, as indicated by its placement in the "acceptable" category for user acceptance. Furthermore, participants highly appreciate the application's very high performance, as evidenced by its score of 90 on the assessment scale, which falls into the "A" or "very good" category. In terms of adjective rating, the score is in the "best imaginable" category, indicating that this application received the highest assessment from participants. In addition, in the net promoter score (NPS) measurement, a value falls into the "promoter" category, indicating that the majority of participants tend to give positive responses and recommend this application to others. The evaluation score illustrates that mobile banking received a very positive response from participants, indicating that this application has met or even exceeded user expectations in many aspects. You can see the results of the second evaluation of the UEQ score on the prototype recommendation, resulting in an excellent score in all aspects. This shows that the recommended mobile banking prototype has excellent attractiveness, clarity, efficiency, accuracy, stimulation, and novelty values. The results of measurements using UEQ obtained an attractiveness score of 2.5, perspicuity with a score of 2.8, efficiency with a score of 2.6, dependability with a score of 2.5, stimulation with a score of 2.5, and novelty with a score of 2.2. When compared with UEQ, the first evaluation shows improvements in all aspects. This means that the prototype recommendation results are better than the currently running mobile banking application.

4. Conclusion

Several conclusions can be drawn from the research conducted, as follows: This research used the user-centered design method, with evaluation carried out twice. We used the first evaluation to determine the level of convenience as well as gather criticism and suggestions from the currently running mobile banking application. The results of this evaluation served as a reference basis for making improvements. From the results of the first evaluation, it is known that the difference between mobile banking and e-wallet top-up is that there is no e-wallet top-up feature. The advantage of user-centered design is that the research focus is on the user, where each stage of this method involves the user; therefore, the results of this research produce a good user experience. 85% of participants successfully completed the 10 task scenarios given during the ongoing evaluation of mobile banking. During the evaluation of mobile banking prototype recommendations, 99% of participants successfully completed the 10 task scenarios. The results of interviews regarding the user interface in the first evaluation obtained information regarding the appearance that users wanted, namely a more attractive appearance by adding more icons and also adding illustrations, as well as making the appearance more modern. The participants in the second evaluation interview responded positively to the implementation of these suggestions into the mobile banking prototype recommendations. The first evaluation interviews yielded information about additional features desired by users, including an e-wallet top-up feature, the ability to view unlimited account mutations, a share feature after transfer, fingerprint and face ID features for the login section, and a copy feature for account numbers. We implemented these suggestions into the mobile banking prototype recommendations, which received a positive response from participants during the second evaluation interview. The recommendation results for the mobile banking prototype provide a better user experience compared to current mobile banking. The results of the SUS and UEQ questionnaires support this, as follows: The results of the first evaluation on user satisfaction scores with ongoing mobile banking obtained an average score on the SUS questionnaire, meaning that the level of user acceptance was in the not acceptable category, the grade scale level fell into the F category, and the adjective rating fell into the poor category.

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