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Analysis of User Interface Design Using a Desaign Thinking Approach for Mobile Banking Applications

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ABSTRACT

Mobile banking applications have become a crucial tool for financial transactions in the digital era. Hence, a well-designed user interface (UI) vital for an optimal user experience. This research utilizes a Design Thinking methodology to examine the user interface design of mobile banking applications. Data was gathered through a survey of 444 respondents and analyzed using the User Experience Questionnaire (UEQ). Interviews provided additional data, analyzed with NVivo software. The study seeks to improve electronic banking services by examining user experiences with mobile banking applications. It aims to identify user needs, challenges., and proposes intuitive solutions. The UEQ results offer insights into user reactions to current UI designs, focusing on usability, satisfaction, aesthetics, and overall impressions. NVivo analysis of interview data reveals themes in user responses, offering broader insight into their perceptions of mobile banking app UIs. Combining quantitative and qualitative data, researchers gain a comprehensive understanding of user needs and improvement areas. This dual approach enables banks to enhance the user interface, improving customer satisfaction and strengthening client relationships. This study thus has significant practical implications for developing more responsive and user-friendly electronic banking services.

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1. INTRODUCTION

The development of information and communication technology today has grown very quickly and can affect daily activities, so this affects people's lifestyles to always adapt to technology. Human-Computer Interaction (HCI) is a branch of computer science focused on examining how people interact with computers, and it utilizes this understanding to design user interfaces (Yadav, 2020). With the deepening application of digital technology, digital impact is everywhere and digital reshuffling is inevitable (Xiao, 2020). Technology and the internet make many activities done digitally and provide changes and opportunities For various sectors in Indonesia to keep innovating through technology, one example of

innovation from the banking sector is mobile banking. Based on a survey conducted by a digital-based research company, Populix in 2022 found that mobile banking and e-wallets are still the most frequently used financial applications. Consequently, following the advent of innovation and technology, digital communication started to evolve within the socio-political and economic spheres of society, leading to the establishment of a new global economic system known as the digital economy (Salutina et al., 2021).

Mobile banking refers to a banking service that can be accessed directly through mobile networks or cellular devices such as GSM or CDMA and smartphones that already use mobile operator data services. (Adilla et al., 2022). Mobile banking is a software application designed specifically for use on small, wireless devices like smartphones and tablets, as opposed to desktop or laptop computers (Weichbroth, 2020). Mobile banking is considered to enhance the quality of customer transactions. The application should offer services such as information transfer, smart notifications, community integration, and convenience to fulfill consumer needs and strengthen communication and interactive platforms (Li et al., 2020). Therefore, the quality that must be provided by mobile banking must be able to encourage consumers to migrate and continue to use electronic transactions (Begum, 2021).

In today's era, economic growth and development in Indonesia are anticipated to rise, bolstered by government support for the banking sector. High-quality economic development is characterized by innovation and progress that provides the main driving force, coordination that creates endogenous characteristics, and openness that becomes the basic goal and reflects the development of new development concepts (Xiaochen, 2020). The benefits of mobile and internet banking overall is to increase sales revenue and decrease the possibility of losing money. However, many users have expressed negative feedback about this application following updates, primarily due to factors such as errors when opening the app or conducting transactions—be it transfers, top-ups, or purchases—resulting in frequent transaction failures that greatly inconvenience users. Apart from the error factor, some users also find themselves overwhelmed by the multitude of features available in mobile banking application after updating. Considering these issues, the mobile banking application should assess and analyze its user interface with input from end users.

User Interface (UI) design is an important part of a computer system because the user interface is the part that interacts with the user. An effective user interface is one that customers find easy to navigate and use (Gunawan et al., 2021). The User Interface (UI) refers to the interface on a device or program screen that facilitates interaction between the user and the system (Yusaliano et al., 2020). Therefore, the purpose of creating a user interface design is to create technology that is easy for users to understand or user-friendly. The User Interface (UI) plays a crucial role in enhancing User Experience (UX) and increasing the interactivity of websites.

User experience (UX) refers to how users perceive and interact with digital products such as websites and applications (Gabrila et al., 2022). This interaction helps gauge user satisfaction with a system. Enhancing user experience can significantly boost user satisfaction and positively impact the performance of the product (Hidayat et al., 2023). UX is developed in the early phases of the system to explore and fulfill user needs (Juniawan et al., 2022). The success of a system can be seen from the ability of a system to provide a good user experience to users. So in developing a user experience with the aim of increasing user satisfaction is an important thing to do. User Experience is crafted to deliver a positive and engaging interaction, encompassing both visual and non-visual aspects (Wibowo et al., 2023).

In general, evaluation is a systematic process of determining and measuring the value of a system with certain criteria. In this research, the assessment criteria refer to user satisfaction in using mobile banking applications. This UI/UX evaluation is an activity of measuring and assessing the system in the application that produces a recommendation

for improvement. With the measurement results of the evaluation carried out is quantitative data which aims to develop the system to be even better and keep up with technological developments. Therefore, data collection is necessary and can be achieved through literature review, observation, and surveys.

Design Thinking is a creative and iterative framework centered around users, which aims to address complex and challenging problems and drive meaningful change for users and communities. (Rover et al., 2023). The design thinking method influences the way decisions are made in the creation of new and innovative ideas. This method focuses on the user experience based on what the user sees and feels in using a product. This method is a thinking tool that is human-centered or a method that focuses on the user. (Wartika et al., 2023) resulting in the final outcome being an idea, idea, and form of service product that has been developed (Yusaliano et al., 2020). This method has five stages that are all human-centered focusing on needs and finding solutions to problems encountered. (Suryani et al., 2023).

To fulfill user needs design thinking has 5 stages in the process (Suryani et al., 2023).

1. Empathize

   Empathy is a stage that is conducted to identify the issues and desired needs of the user (Purwanto et al., 2022). Empathy comes from observing and interacting with users and absorbing what they need. This process is done through user research or seeing the problem from someone else's perspective. Empathy is a job that designers do to understand people, during this process, designers can collect data such as goals, needs, interests, problems, and input from users by conducting non-participant observations, interviews, giving questionnaires or conducting usability testing to users. Empathy involves focusing on defining the problem, where designers conduct research and surveys to understand the needs of their intended audience.

2. Define

   Define is the stage of defining the problem at hand based on what has been learned. At this stage user needs will be defined concisely by creating user stories so that data analysts can identify common themes and patterns that inform the next design stage (Huda et al., 2023). The term define in design thinking refers to thinking and analyzing the research gathered in the empathy phase to come up with one's own perspective on what the users need. Users express their perspectives at the define stage which contains opportunity statements that are a combination of viewpoints and a series of HMW (How Might We). An example of an HMW statement is as follows:

   - HMW focuses on outcomes or impacts
   - HMW should not be too wide or too narrow
   - HMW It is important to highlight the constraints and the context

3. Ideate

   The next phase is idea generation. This phase is the stage where the specified tasks will be converted into actionable tasks. This phase involves creating tasks, subtasks, goals, and system flow diagrams. It includes brainstorming and generating innovative ideas for product design. (Huda et al., 2023).

4. Prototype

   This stage is an experimental phase in identifying solutions used to overcome the problems that have been identified during the first three stages. At

this stage the designer displays the prototype in the form of sketches to digital mockups. Prototypes are tangible and testable representations of ideas. The advantages of creating and displaying prototypes (to customers) include gaining empathy with customers, exploring innovative approaches to solutions, gaining a deeper understanding of the problem to be solved and building and refining solutions through repeated interactions with designers and users. At this stage prototypes are developed to visualize and refine the design concept. (Huda et al., 2023).

5. Test (Uji)

In the last stage, designers test the final product using the best solution in the prototype phase that has been made with high accuracy so that it can be used as a proof of concept. The purpose of this stage is to get feedback on the prototype that has been created by the designer. During the testing process, users use the design and give views to the designer. The prototype must be tested, criticized and get constructive feedback as material to start the second iteration of the completeness of design thinking, which continues until it can turn the prototype into the expected final product so this step is essential to evaluate the success of the collected solution to the problem (Purwanto et al., 2022).

The User Experience Questionnaire (UEQ) is a survey tool consisting of 26 questions that aim to efficiently evaluate a user's experience of a product, system, or service (Alisya et al., 2023). UEQ encompasses six key aspects: appeal, clarity, efficiency, reliability, stimulation, and innovation. This method has been widely recognized for its ability to provide an overview of users' perceptions, emotions, and interactions with various digital products, services, and interfaces (Prasetya et al., 2023). The UEQ (User Experience Questionnaire) is a type of survey used in usability testing to assess users' experience with a product and efficiently compare their experiences (Elysa et al., 2023). In the application of UEQ, there are 6 assessment scales and 26 questionnaire items used for measurement (Raihan Daniswara et al., 2023), namely:

1. Attractiveness: The user's appeal and overall impression while using the product. This relates to the overall appearance, both what the user can interact with and what is just a visual display. Questions include: annoying or pleasant, unpleasant or pleasant, good or bad, unfavorable or favorable, attractive or unattractive, and friendly or unfriendly.
2. Efficiency: Efficiency is the speed at which the user can use the product. Questions include: fast or slow, inefficient or efficient, cumbersome or practical, and organized or messy.
3. Clarity: Related to the ease of use of the product such as ease of understanding functionality and interactivity. Questions include: incomprehensible or comprehensible, complicated or easy, easy to learn or hard to learn, and clear or confusing.
4. Reliability: Interactivity that can be controlled by the user, safety, and predictability. Questions include unpredictable or predictable, hindering or supporting, safe or unsafe, meeting expectations or not meeting expectations.
5. Stimulation: the attractiveness of the product that can motivate the user to use it: valuable or not valuable, boring or interesting, uninteresting or interesting, and motivating or demotivating.

6. Novelty: the innovation and creativity of a product to make the product more different from other products. Questions include: Creative or monotonous, inventive or conventional, common or leading-edge, and conservative or innovative.

2. RESEARCH METHOD

In the design analysis research process using the design thinking method, 5 stages must be carried out to analyze the design to be studied. Each of the stages is sustainable in design research.

In the first stage, a questionnaire was distributed as a method for collecting data from users. At this stage, 444 data sets were collected as samples so that researchers could find out the needs expected by users. In the second stage, data processing using UEQ, participants were requested to evaluate their experience using mobile banking through a questionnaire. The User Experience Questionnaire (UEQ) evaluates usability and user experience, serving as a fundamental tool for assessing UX (Mizalfi et al., 2022). The UEQ questionnaire includes several dimensions for measuring usability, such as Appeal, Clarity, Efficiency, Reliability, Stimulation, and Innovation (Hartono et al., 2022). The results of the data processing are then used in the next stage, namely the problem identification stage. After the problem identification stage is completed, then move on to the next stage, namely analyzing the problems that have been found and looking for solutions using the design thinking method, at this stage there are several points in implementing it.

In addition to distributing the UEQ questionnaire, this study also conducted interviews with 1 user to gain a deeper understanding of their experience in using m-banking. This interview allowed the researcher to dig into more detail about certain aspects of the user experience that may not be captured by the questionnaire. The results of these interviews were then analyzed together with the questionnaire data to provide a comprehensive picture of the user experience of m-banking applications.

This combined approach will give the researcher a view of what are the strengths and weaknesses of different viewpoints. The UEQ questionnaire allows the researcher to collect a considerable amount of data from a fairly large sample of users, but may not provide an in-depth understanding of the individual user experience, therefore in this study, the researcher also conducted interviews which allowed for a more detailed exploration of the individual user experience, but may be biased due to the smaller sample of users. That way this research can provide a more complete picture of the user experience of mobile banking applications.

3. RESULTS AND DISCUSSIONS

From the results of the data that has been obtained, it is then processed so that it gets the scale data results according to the category of statements in the questionnaire. The scale data in question is the average value of each scale category that has been determined.

Table 1. Scale of average value per person

scale of average value per person

Participants	Attractiveness	Perspicuity	Dependability	Stimulation	Novelty
1	1.83	2.25	2.00	2.00	2.00
2	0.00	0.25	0.25	0.00	0.00
3	0.83	0.75	1.50	1.00	2.25
4	3.00	3.00	3.00	3.00	3.00
5	2.67	2.50	3.00	3.00	3.00
6	1.83	1.75	1.50	1.75	1.25
7	1.33	1.50	1.50	1.00	1.00
8	1.33	1.50	1.50	1.00	1.00
9	1.00	1.25	0.50	0.75	0.50
10	1.50	0.75	2.00	1.75	1.25
...	...	...	...	...	...
444	1.33	1.50	1.50	1.00	1.00

From the results that have been determined, data processing is then carried out on each category that has been obtained. Then the value is processed into an average of each scale category. Then processed with the following formula:

$$Final\ Score\ of\ UEQ\ scale = \frac{Total\ UEQ\ scale\ category\ scores\ for\ each\ participant}{total\ participants}$$

So that it can bring up parameters that represent the average level of each scale.

Table 2. The average value of each UEQ scale

the average value of each UEQ scale	
Attractiveness	1.439
Perspicuity	1.378
Dependability	1.368
Stimulation	1.374
Novelty	1.482

Then from the average of each scale, a data visualization is formed that can provide tests for each scale which can be seen in the figure below.

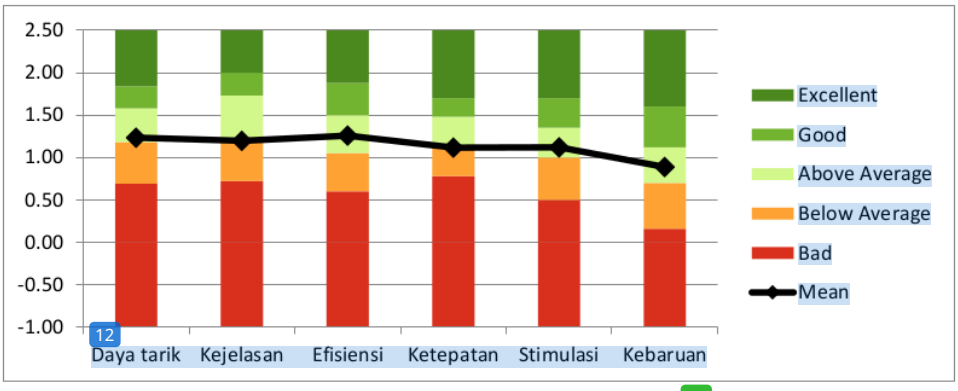

Figure 1. Visualization of mobile banking design test results

As can be seen in Figure 1. can explain that the evaluation results on mobile banking produce 2 scales that are included in the Below Average category. The scales are Clarity and Accuracy. While Attractiveness, Efficiency, Stimulation, and Novelty show Above Average results. This shows that this application requires improvement in the aspects of Clarity, and Accuracy. As seen in Figure 1. the Efficiency category holds the highest average of 1.26, which indicates that this mobile banking has a level of efficiency that exceeds other aspects.

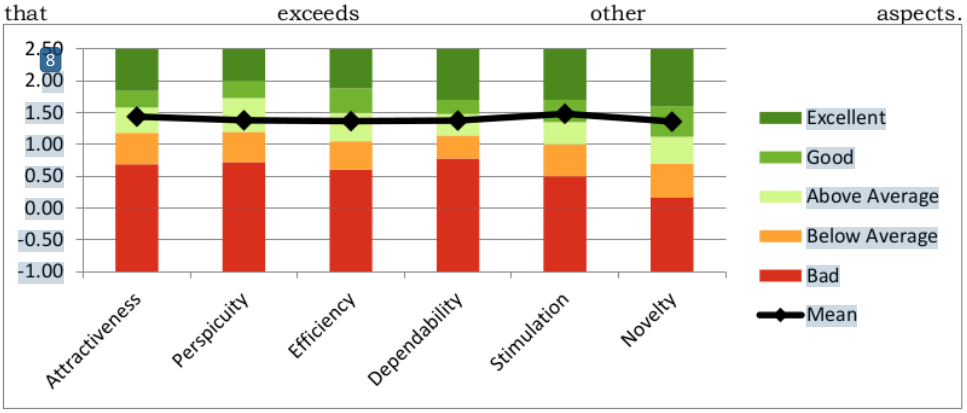

Figure 2. Visualization of testing values for prototype designs made by researchers

As can be seen in Figure 2, the highest parameter lies in the stimulation category with an average value of 1.48. The second highest value is in the novelty category with an average value of 1.36. The comparison results of the two tests can be seen in the figure below.

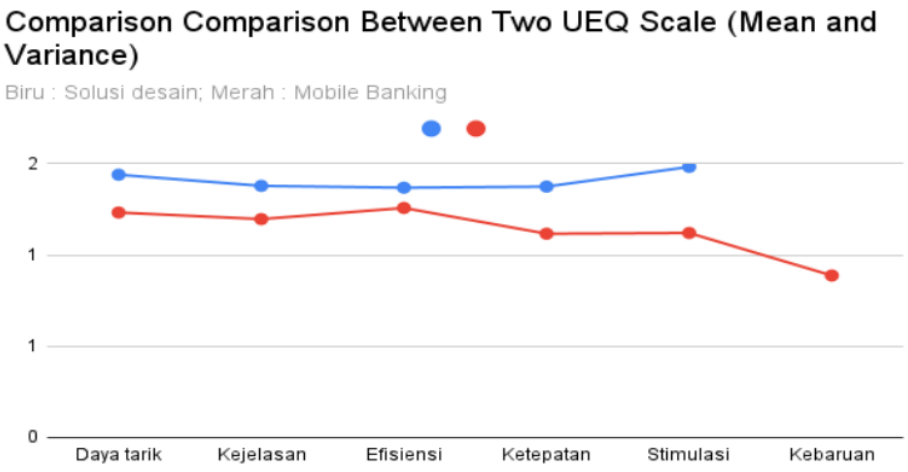

Figure 3. Comparison between two UEQ Scale

As can be seen in Figure 3, there is an increase in the data from the design test results created by the researcher. This indicates that the prototype design made by the researcher has successfully passed the testing phase.

4. CONCLUSION

The conclusion of this study found that there was a comparison of the test values of the intended product and the design created by the researcher. Then the researcher compared the two test results as the main parameter in this study. These results were tested using calculations from the UEQ method as a reference for testing the product. The comparison of the two tests is the increasing value of the average of each category. The attractiveness category increased by 0.21, clarity by 0.18, efficiency by 0.11, accuracy by 0.25, stimulation by 0.36, and novelty by 0.47.

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