Evaluation and Recommendation User Interface of Batamnews Based on User Experience using User-Centered Design

Angelino Sandy Kusuma[*], Indra Lukmana Sardi, Rosa Reska Riskiana

Faculty of Informatics, Information Technology Study Program, Telkom University, Bandung, Indonesia
Email: [1]sandyykusuma@student.telkomuniversity.ac.id , [2]indraluk@telkomuniversity.ac.id , [3,*] rosareskaa@telkomuniveristy.ac.id
Correspondence Author Email: sandyykusuma@student.telkomuniversity.ac.id

Abstract−Batamnews is a media that presents news about Batam. Batamnews currently has an application that aims to make it easier for users to continue to be updated regarding news in Batam. But from the results of interviews and the distribution of questionnaires with Batamnews users, there are problems experienced by application users due to the User Interface which makes users uncomfortable using the application. Users feel that Batamnews is not optimal in terms of appearance, and the user's uninterested use of icons (symbols). In addition, Users complain about features that should be available but not in the app. Therefore, this study aims to make a design using the User-Centered Design (UCD) method because UCD focuses on user needs. Then for testing the design, the System Usability Scale (SUS) evaluation method will be used because it can be measured for effectiveness, efficiency, and satisfaction from users. The results of this study are recommendations for the User Interface Design of the Batamnews application and have an increased value on usability from 54 to 74 which is expected to be a reference for Batamnews application developers. So, it can be concluded that the UCD method can increase the SUS usability value in an application as well.

Keywords: Applications; Batamnews; User-Centered Design; System Usability Scale; Usability

1. INTRODUCTION

Technological developments in 2022 are increasingly developing in Indonesia. The perceived development is the use of mobile applications on smartphones. Mobile applications are very influential in everyday life because it makes it very easy for users to complete activities and problems that exist in society. Mobile applications can also be used to assist business needs. Before the existence of smartphones, people in ancient times still received information/news from newspapers because of their limited knowledge of creating technology.

According to a Nielsen survey, published research results that in Indonesia, online media readers are more than print media because in the last four years newspaper buyers have begun to decrease. Indonesian people prefer to read online media because according to a survey conducted print media penetration is 8 percent. Then followed by television (96%), internet (43%), and radio (37%) [1]. From the results of the Nielsen survey, it can be seen that newspapers are starting to be used less frequently and are being abandoned. Digital media such as news media have created applications that are easily downloaded and accessed from the Play Store for free. The news presented in the application can display information in a structured and accurate as well as the speed in delivering (updates) in real-time.

Currently, one of the cities in Indonesia, namely Batam City, has a news application, namely Batamnews. Batamnews was founded by PT Media Siber Batamnews and has been operating since 2015. Batamnews is one of the media to deliver the latest news about Batam from the newest to the most popular. Batamnews also always provides something new to find information about sports, property, economy, technology, culinary, lifestyle, automotive, and so on. Until now Batamnews continues to grow and is one of the most widely accessed online media by users, especially in the Riau Islands province. Batamnews has an application that can be downloaded for free through the play store and has downloaded and has a readership of more than 1000 users. However, until now no one has ever evaluated the Batamnews application, so it is not known whether the Batamnews application has been effective, efficient, or has usability that gives satisfaction to its users.

So, at the initial stage, an evaluation was carried out by distributing questionnaires as well as interviews with 20 respondents who were users of the Batamnews application or who had used similar applications. Based on data processing using the System Usability Scale (SUS) questionnaire, a score of 57 was obtained, while the average score for SUS was 68. So, it can be concluded that the Batamnews application has low usability. The results of distributing questionnaires and interviews found that there were several shortcomings in usability when users used the Batamnews application, including the absence of a navigation menu on the main page, Users' complaints about features that should be available but not in the app, users feel the display of Batamnews is unresponsive, and the user's disinterest in the use of symbols (icons) presented by Batamnews application. Besides that, users also have difficulty when they want to use the features provided by Batamnews. Based on the results of the initial survey shows that there is a lack of interface display in the current application which results in users no longer using the Batamnews application because it is not designed according to user needs. Therefore, improvements and design recommendations are needed for the Batamnews application.

To overcome the problems experienced by the Batamnews application, a User-Centered Design (UCD) method is needed the design to create and provide recommendations for new UCD improvements to suit the needs of users. This method was chosen because UCD can improve usability which provides comfort, convenience, and

efficiency in using the application [2]. Application design using the UCD method can increase the usability value of the application and can also help design applications according to user needs [3]. While the evaluation method used is the System Usability Scale (SUS) because SUS has several advantages, namely the evaluation process carried out more easily understood by respondents, the sample used is small but describes the maximum results and can distinguish which applications can be used or which cannot be used [4]. This SUS method can also evaluate the user interface with satisfactory results in the application [5].

Some of the studies that have been done before including research conducted by Muhammad Multazam, Irving V Paputungan, and Beni Suranto in 2020 who created a UI/UX website on placeplus using the User-Centered Design method. The author examines how to create a good UI/UX for online coworking space reservation and management and the results of the design get a good impression and response from users [6]. The second research was conducted in 2018 by Edi Susilo, Danang Wijaya, and Rudy Hartanto. In his research, the author examines how to design and evaluate Smart Grid applications that function to sell and buy electrical power to make it easier for people to use it because there are still few studies that discuss Smart Grid applications [7]. The third study was conducted by Ali Imran, Muhammad Nasir, and Lipantri Mashur Gultom. The author examines how to redesign the website of the Bengkalis State Polytechnic Department of Informatics Engineering because the UI/UX of a bad website makes users leave the website. The results of the new website design were also tested by conducting a User Experience Questionnaire and getting good results so that it can increase the level of user satisfaction [8]. Subsequent research conducted by Muhammad Azmi, Agi Putra Kharisma, and Muhammad Aminul Akbar in 2019 examined how to evaluate the User Experience of the Grab food application by testing a prototype in accordance with the design that was made so that it could be used in future input for the Grabfood application [9]. The last research conducted by Abid Bagus Kurniawan, Ismiarta Aknuranda, and Andi Reza Perdana Kusuma in 2019 researched how to evaluate and recommend User Experience designs on the BMKG Info mobile application. The evaluation was carried out because the BMKG Info application got a bad User Experience for users because 17 problems were found [10].

So, the purpose of this research is to provide and produce recommendations for a new Batamnews application prototype using the UCD method so that it can be input and can optimize the Batamnews application as a news media that can be used properly in the future.

2. RESEARCH METHODOLOGY

2.1 Research Steps

The picture below will explain the research steps used to build the application clearly and equipped with a flowchart. The following is a flowchart of the research methodology used in completing the research.
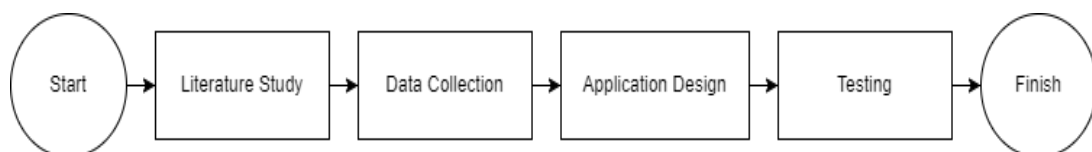

Figure 1. Research Steps

2.2 Literature Study

This stage collects information in the form of theories from the literature that are useful for research as a reference in this study. In addition, this stage becomes a source of reference and reference to be used in research such as studying the use of UCD methods, SUS for evaluation methods, theoretical foundations, and others.

2.3 Data Collection

At this stage, the researcher made a questionnaire and conducted interviews with Batamnews application users and those who have used similar applications to identify problems that occur in the application. This study used 20 respondents who were sampled because it required a minimum of 20 people to become respondents in order to achieve 95% of usability problems [11]. The questionnaire consists of 10 SUS questions which were first introduced by J Brook [12] and the questions are in accordance with Table 1.

Table 1. SUS Questionnaire

No	A list of questions
1	I think that I would like to use this application frequently.
2	I found the application unnecessarily complex.
3	I thought the application was easy to use.
4	I think that I would need the support of a technical person to be able to use this application.
5	I found the various functions in this application were well integrated.
6	I thought there was too much inconsistency in this application.

No	A list of questions
7	I would imagine that most people would learn to use this application very quickly.
8	I found the application very cumbersome to use.
9	I felt very confident using the application.
10	I needed to learn a lot of things before I could get going with this application.

There are rules in the calculation of SUS, namely [13]:
1. For odd-numbered questions, 1 will be deducted from the score obtained.
2. For even-numbered questions, 5 will be deducted from the score obtained.
3. From the results of numbers 1 and 2 then added and the result of the sum is multiplied by 2.5.
4. The results of the SUS usability calculation are considered good when they are equal to or above the number 68.

Furthermore, the researchers distributed the SUS questionnaire in the form of a google form link and distributed it according to the predetermined number of respondents. Filling out SUS questions based on a score of 1-5, namely from Strongly Disagree (SD) to Strongly Agree (SA). The final average score of SUS is 57, so Batamnews is categorized as having low usability.

2.4 Application Design

The next stage is to design a prototype design recommendation for Batamnews. Here the author's design is based on the approach of the User-Centered Design (UCD) method. UCD is a method used for system development that has the aim of developing or making an application or system [14]. UCD consists of stages that focus on user needs to achieve a design. In the UCD method, there are 4 stages in it, namely:
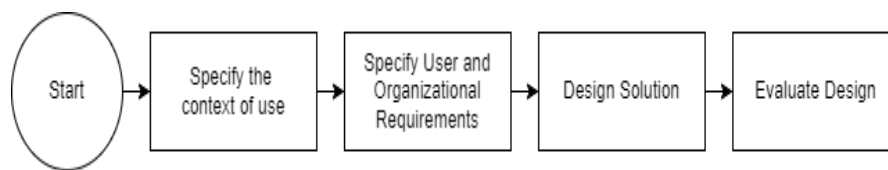

Figure 2. UCD Stages

Image caption [15]:
a. Specify the context of use
   Identify the users who will use the application.
b. Specify User and Organizational Requirements
   Identify what the user needs for the application
c. Produce Design Solution
   Designing the solution design of the designed application
d. Evaluate Design
   Evaluate pre-made designs
   The author here uses the Figma application as a platform to make design recommendations from the Batamnews application.

2.5 Testing

The last stage is testing the application. Testing is carried out to measure the level of usability as well as to evaluate the new design from Batamnews. The testing process uses SUS which contains 10 questions according to Table 1.

3. RESULTS AND DISCUSSION

3.1 Specify The Context of Use

At this stage, the process of creating user personas is carried out based on the results of interviews with several users. User personas provide researchers with precise explanations of how users behave in a group, what they think, what they want to achieve, and why they perform a task. The purpose of this analysis is to determine the needs and requirements of users. This can be used later as a description when creating the user interface.

3.1.1 User Personas

In this study, interviews were conducted to identify and collect data to obtain the user persona of the user's needs. Interviews were conducted with users of the Batamnews application on 5 respondents who are Batamnews users and users of similar applications because according to Jakob Nielson Norman it was enough to get more than 75% of the test results, so there were at least five people involved in the target user survey [16]. The creation of this user persona is based on answers taken from previous interviews and the information obtained is divided into 6

attributes, namely demographic, skill level, behavior, attitude, needs, and goals. The following is a table of user personas:

Table 3. User Personas

Demographic	20-34 years old
	Gender: Male and Female
Skill Level	Smartphone operating level: Good
	Educational background: SMA, D-3, S-1
Behavior	Often use applications on smartphones for daily needs such as transacting online, exchanging information, and others.
	Using smartphones based on Android and IOS
	Using a similar application like Batamnews
Attitude	Liked the attractive and easy to understand interface
	Liked the simple interface
	Liked the latest (updated) information about the condition of Batam City
Goals	Can read the news according to the desired topic
	Can see the news directly in the form of video
	Can save the news according to user's choice
	Can read the information and the news that is presented easily
	Can access all features easily
Needs	Want easiness in reading news according to the desired topic
	Want to see the live news in the form of video
	Want easiness in storing the news according to user's choice
	Want easy access to all the features in the application
	Want easiness in reading the information and the news

3.2 Specify User and Organizational Requirements

At this stage, the process of describing user requirements specifications is carried out based on the results of the user persona obtained. This process is carried out so that the user's needs for the application created will be met. The following is the flow of user requirements specifications, namely user persona analysis, Mental Model, and HTA (Hierarchical Task Analysis).

3.2.1 User Persona Analysis

At this stage, a persona needs analysis was carried out which had been mapped on the previous user persona to 6 respondents from the age of 20-34 years. This analysis is used to find out what are the requirements needed by the user for the Batamnews application.

Table 4. User Requirements

No	Needs	Requirements
1	Want the easiness of reading news according to the desired topic	There is a filter feature to be able to choose topics/categories to be displayed on the home page
2	Want to see the live news in the form of video	There is a watching video feature
3	Want easiness in storing the news according to user's choice	There is a bookmark feature on every news
4	Want easy access to all the features in the application	The design of each feature is made clearer and simpler

3.2.2 Mental Model

A mental Model is a mental depiction of users when they want to complete a task in an application. The mental model is described in the form of a diagram from the results of the previous user persona. The mental model represents the user's understanding and expectations of how the application interacts directly with the user [17]. The mental model aims to capture the user's thoughts about the process of solving the system state.

3.2.3 HTA (Hierarchical Task Analysis)

This stage of HTA development is intended to analyze how users work, how they complete tasks, how they interact with tasks, and processes related to what users need from the system. Converting the format to a diagram makes it easier for designers and stakeholders to understand the system.
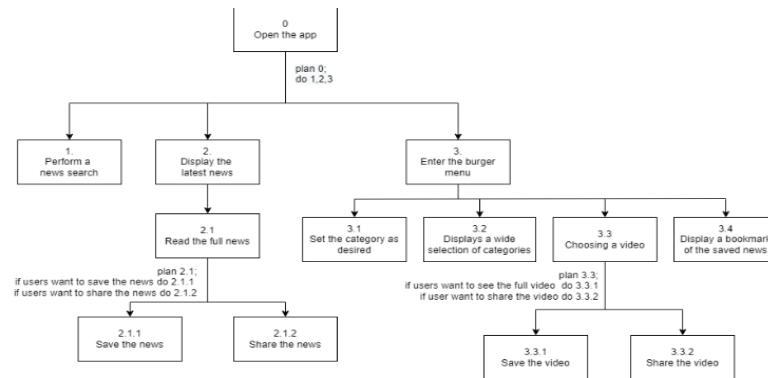
Figure 3. HTA chart

3.3 Design Solutions

At this stage, a design solution is developed, and the result is a prototype. The information obtained is in the form of information about the experience, knowledge, and needs of users about the application, which is obtained from the previous steps. This process goes through several stages sequentially, namely wireframe, mockup, and prototype.

3.3.1 Wireframes

At this stage, it will produce wireframes as the composition, structure, layout, navigation, and organization of new content from the Batamnews application. Here, making wireframes emphasizes the content of Batamnews content which is made in black and white and describes the workflow of the Batamnews application.

3.3.2 Mockup

At this stage, it will produce the final display of the wireframe design which is given colors, fonts, and icons, and it's just that it doesn't look interactive yet. The mockup provides a detailed picture before being made into a prototype. The following is a mockup of the design of the new Batamnews application.

Figure 4. Batamnews Home Page

This page is the start page when opening the application. This page contains news content such as breaking news, the most popular, the latest and others. On this page there is also a newsfeed and also tasks that users will perform, such as a search button, a burger button, and a dark mode button.

Figure 5. Page when the article is selected

This page is the article page when it is opened. This page contains a complete explanation of the news selected by the user. The news that is read can be shared by the user via whatsapp, facebook, copy link, and also the user can save the news to be included in the bookmarks.
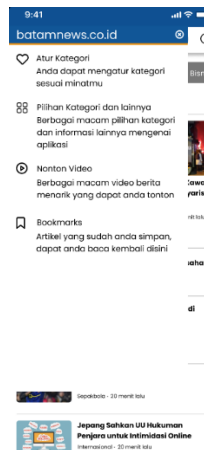

Figure 6. Page when the burger menu is selected

This page is the page when the Burger Button is opened. On this page there are 4 menus, namely set categories, category choices and others, watching videos, bookmarks and each menu has different functions.

Figure 7. Page when set category is selected

This page is the page when the set category option is opened. This page contains various categories that the user will choose to display on the main page (home) according to the user's want. So that when the user has selected at least 3 desired topics, the application will automatically display the 3 selected topics on the home page of Batamnews application. This page can also search for categories to make it easier for users to choose a category.
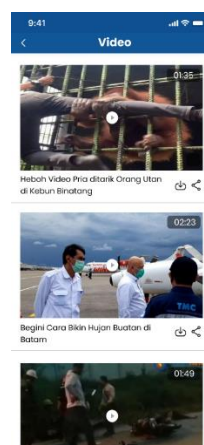

Figure 8. Page when watching a video is selected

This page is the page when the video viewing option is opened. This page contains various kinds of interesting videos presented by Batamnews which can be watched by users according to their choice. On this page, users can save or share the videos they watch.
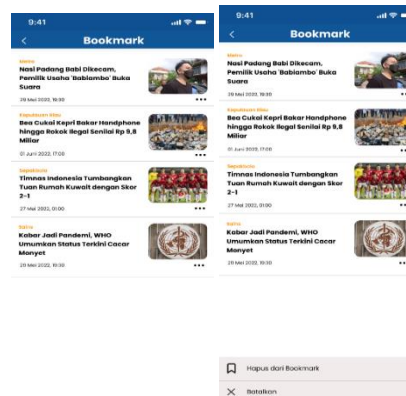

Figure 9. Page when the bookmarks menu is opened

This page is the page when the bookmark option is opened. This page contains news stories that have been previously saved by the user and can be read again. In addition, on this page every news that is stored there is a delete button that serves to delete the news according to the user wants.

3.3.3 Prototype

At this stage, the Batamnews prototype was made based on the wireframe and mockup designs that had been made previously so that it looked interactive. The prototype here simulates how the user interacts with the new Batamnews user interface which can later be used as evaluation material.

3.4 Evaluation

After the prototype stage is complete, the final stage will be carried out, namely evaluation. The evaluation was carried out by testing the new Batamnews User Interface Prototype on 20 Batamnews application respondents, where the authors used the SUS method. The evaluation was conducted to determine whether the final Batamnews design prototype could be accepted or used according to user needs. In addition, the evaluation can also find out whether UCD can increase the usability value of the Batamnews application.

a. Testing

At this stage, a design test that has been made previously will be carried out to determine the usability level of the new design. The test was carried out using the same number of respondents at the beginning of the study with a total of 20 people. This is done because researchers want to maintain consistency in conducting research and respondents can feel the difference in the experience of the initial design with the new design. For the test scenario, the researcher conducted interviews with respondents by providing a link to the Batamnews design prototype which would later be seen and reviewed by respondents. After that, the researcher will provide a google form link containing 10 SUS questions with a score range of 1-5 with the answers "Strongly Disagree" to "Agree". The assessment will be carried out based on the standard calculation of the SUS [13].

b. Testing Analysis

The analysis was carried out by comparing the results of the SUS score at the beginning of the research phase with the final results of the SUS after the recommendation for the new User Interface prototype was made. The following is the result of the SUS calculation from the questionnaires distributed.

Table 5. SUS Calculation Result

List User	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Score (Amount x 2.5)
R1	3	3	4	3	3	3	4	3	3	2	78
R2	2	3	3	4	2	1	3	4	3	2	68
R3	3	4	3	4	4	3	4	4	3	3	88
R4	2	3	3	3	2	3	1	3	2	2	60
R5	3	3	3	4	3	3	3	4	1	3	75
…..	…	…	…	…	…	…	…	…	…	…	…
R20	3	4	4	3	3	3	4	4	2	1	78
Average Score (Final Result)											74

From the results of processing the SUS value above obtained 74 results. Based on the SUS category, the recommendation for the design prototype after being analyzed has increased, namely an increase in Grade Scale "D" to Grade Scale "A", Adjective Rating from "Ok" to "Good", Acceptability Range from "Marginal Low" to "Acceptable". After that, a comparison was made between the initial SUS score and the final SUS score. The following is a comparison image of the initial SUS with the final score SUS.
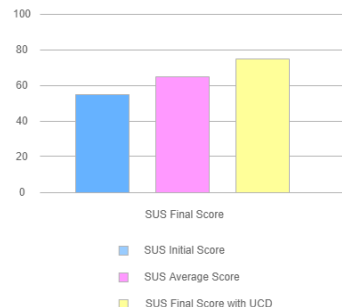

Figure 10. Comparison of SUS Scores

According to the results above, it shows that the initial usability value has increased from a value of 57 to a value of 74. While the average value of SUS is 68 so the comparison results above prove that before using the UCD method the Batamnews application got low usability and after using the UCD method the Batamnews application experienced improved usability.

4. CONCLUSION

Based on the results of research conducted, there are needs needed by Batamnews users, namely users who want to read news according to the desired topic, users who want to watch news directly in the form of videos, users also want to save news as desired, besides that user can also use the following features: features that are presented by Batamnews easily. So the author provides recommendations for making prototype designs by providing a filter feature that can choose topics according to the user's wishes, providing a video viewing feature which later the application will present interesting videos for users, then the author makes a bookmark feature to make it easier for users to save news so that can be read later by the user, besides that the author also makes a simple and uncomplicated design to make it easier for users to use all the features presented by the Batamnews application. Furthermore, before using UCD the Batamnews application had a usability value of 57 and after using the UCD the Batamnews application experienced an increase in the usability value of 74. So, it can be concluded that the UCD method can increase the SUS usability value in an application well. The suggestion in this research is that the design of the new Batamnews prototype can also use other usability evaluation methods in order to find the shortcomings of each usability aspect. So, it is hoped that by using other usability evaluation methods, other deeper problems can be found in the Batamnews application.

REFERENCES

[1] "Survei Nielsen: Masyarakat Indonesia Makin Gemar Internetan." https://mediaindonesia.com/ekonomi/114722/survei-nielsen-masyarakat-indonesia-makin-gemar-internetan (accessed Jul. 03, 2022).

[2] R. Audilla *et al.*, "SATIN-Sains dan Teknologi Informasi Analisis Usability Existing Product dan Development Product Menggunakan PendekatanUser Centered Design pada E-Commerce," 2018. [Online]. Available: http://jurnal.stmik-amik-riau.ac.id.

[3] D. L. Kaligis and R. R. Fatri, "Pengembangan Tampilan Antarmuka Aplikasi Survei Berbasis Web Dengan Metode User Centered Design. JUST IT : Jurnal Sistem Informasi, Teknologi Informasi Dan Komputer, 10(2), 106. https://doi.org/10.24853/justit.10," *JUST IT J. Sist. Informasi, Teknol. Inf. dan Komput.*, vol. 10, no. 2, p. 106, 2020.

[4] "System Usability Scale (SUS) | Usability.gov." https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html (accessed Jan. 13, 2022).

[5] M. S. Hartawan, "ANALISA USER INTERFACE UNTUK MENINGKATKAN USER EXPERIENCE MENGGUNAKAN USABILITY TESTING PADA APLIKASI ANDROID PEMESANAN TEST DRIVE MOBIL," 2019.

[6] M. Multazam, "Perancangan User Interface dan User Experience pada Placeplus menggunakan pendekatan User Centered Design," *Univ. Islam Indones.*, vol. 1, p. 8, 2020.

[7] E. Susilo, F. D. Wijaya, and R. Hartanto, "Perancangan dan Evaluasi User Interface Aplikasi Smart Grid Berbasis Mobile Application," *J. Nas. Tek. Elektro dan Teknol. Inf.*, vol. 7, no. 2, pp. 150–157, 2018, doi: 10.22146/jnteti.v7i2.416.

[8] L. M. G. Ali Imran, Muhammad Nasir, "Perancangan Ulang Desain Website Pada Jurusan Teknik Informatika Politeknik Negeri Bengkalis Dengan Menggunakan Konsep User Interface Dan User Experience," *Semin. Nas. Ind. dan Teknol. (SNIT), Politek. Negeri Bengkalis*, no. November, pp. 270–276, 2020, [Online]. Available: http://eprosiding.snit-polbeng.org/index.php/snit/article/view/144.

[9] M. Azmi, A. P. Kharisma, and M. A. Akbar, "Evaluasi User Experience Aplikasi Mobile Pemesanan Makanan Online

dengan Metode Design Thinking (Studi Kasus GrabFood),” *J. Pengemb. Teknol. Inf. dan Ilmu Komput.*, vol. 3, no. 8, pp. 7963–7972, 2019.

[10] A. B. Kurniawan, I. Aknuranda, and A. R. Perdanakusuma, “Evaluasi dan Perbaikan Pengalaman Pengguna Menggunakan User Experience Questionnaire (UEQ) dan Heuristic Evaluation (HE) Pada Aplikasi Mobile Info BMKG,” *J. Pengemb. Teknol. Inf. dan Ilmu Komput.*, vol. 3, no. 5, pp. 4997–5006, 2019.

[11] R. Alroobaea and P. J. Mayhew, “How many participants are really enough for usability studies?,” *Proc. 2014 Sci. Inf. Conf. SAI 2014*, pp. 48–56, 2014, doi: 10.1109/SAI.2014.6918171.

[12] J. Brooke, “SUS: a retrospective,” 2013.

[13] A. W. Soejono, A. Setyanto, A. F. Sofyan, and W. Anova, “Evaluasi Usability Website UNRIYO Menggunakan S ystem Usability Scale (Studi Kasus : Website UNRIYO),” vol. XIII, pp. 29–37, 2018.

[14] Y. A. Rahman, E. Dwi Wahyuni, and D. Surya Pradana, “Rancang Bangun Prototype Sistem Informasi Manajemen Program Studi Informatika Menggunakan Pendekatan User Centered Design,” *REPOSITOR*, vol. 2, no. 4, pp. 503–510, 2020.

[15] I. Purnama, “Iwan Purnama PERANCANGAN KAMUS MUSLIM BERBASIS SMARTPHONE ANDROID DENGAN METODE USER CENTERED DESIGN (UCD),” vol. 5, no. 3, 2017.

[16] B. R. Momintan, E. Darwiyanto, and J. H. Husen, “Pemodelan User Interface Aplikasi Pengenalan Rambu Lalu Lintas dengan Augmented Reality berdasarkan User Experience untuk Anak Usia Dini,” *e-Proceeding Eng.* , vol. Vol.6, No., no. 2, pp. 9267–9277, 2019.

[17] D. I. Rianto *et al.*, “Perancangan User Interface Pada Aplikasi Edukasi Identifikasi Hoaks Untuk Remaja Penyandang Tunanetra Dengan Metode User Centered Design,” vol. 9, no. 3, pp. 2052–2064, 2022.