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UX Analysis and UI Development of iOS-Based Bali Calendar Application with Double Diamond Method

I Gusti Ngurah Darma Paramartha[1*], Ni Luh Wina Sinta Ariesta[2], Adie Wahyudi Oktavia Gama[3], Gede Humaswara Prathama[4]
[1*,2,3,4]Program Studi Teknologi Informasi, Universitas Pendidikan Nasional

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ABSTRACT
The Bali Calendar iOS application is designed to make it easier for users to access information related to the traditional Balinese calendar, such as determining rahina. However, the current features of the application are not yet optimal. Based on reviews on the App Store, many users have suggested adding features such as searching for dewasa ayu, otonan, Tri Sandhya alarms and chants, panca sembah, and daily prayers. The purpose of this research is to understand user needs and design the interface of the Bali Calendar iOS application based on user feedback to improve user satisfaction. The research method used is the Double Diamond approach, which consists of two phases: the research phase and the design phase. Each phase comprises two stages. The research phase includes the discover and define stages, while the design phase encompasses the develop and deliver stages. The outcome of this research is a prototype design for the Bali Calendar iOS application, which will be tested by users. The prototype design is evaluated using concept testing to assess the concept and usability testing to evaluate the prototype design. The results of the usability testing achieved high scores, indicating that the design is satisfactory and effectively meets user needs.

Corresponding Author:
I Gusti Ngurah Darma Paramartha
Program Studi Teknologi Informasi, Universitas Pendidikan Nasional
ngurahdarma@undiknas.ac.id

INTRODUCTION

The Balinese calendar or commonly referred to as the Saka calendar has always been used by the Hindu community, especially in Bali, as a guide to determine good days (dewasa ayu) in carrying out regular activities (Antara, Sukarsa, and Buana 2022) . The Balinese calendar is a calendar system that combines two calendar systems, namely the Gregorian calendar and the Tika calendar (Traditional Balinese Calendar), from here then obtained a good day or rahina for Balinese Hindus to carry out an activity or religious ceremony (Utami 2020) . With the development of technology today, everything has become completely digital including the Balinese calendar which is already available in the form of a website that can be accessed online and also a mobile application that can be accessed easily via smartphone (Sukarsa, Buana, and Yogantara 2020) .

Problems that are usually encountered by users of the Bali calendar application are the incomplete features of the Bali Calendar application (Antara et al. 2022) . These problems

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also occur in users of the iOS-based Bali Calendar application, based on the reviews available on the App Store from 65 reviews as many as 60% of users who reviewed suggested adding some additional features such as tri sandhya alarms, mantram panca worship and daily prayers, otonan search and adult ayu, 30.7% of users who reviewed thanked the developer for providing the iOS-based Bali Calendar application and as many as 9.2% of users gave complaints related to bugs in the application.

Meanwhile, based on the results of a survey that the author has conducted on 15 users of the iOS-based Bali Calendar application, 86.7% of users chose the option very important to add the Tri Sandhya feature to the iOS-based Bali Calendar application. As many as 80% of users chose the option very important to add the Panca Sembah mantram feature and daily prayers on the iOS-based Bali Calendar application, and as many as 80% of users chose the option very important to add a good day search feature or adult ayu on the iOS-based Bali Calendar application. In addition. In addition to reviews and surveys from users, the author has also contacted the developer regarding the problems experienced by users. The developer confirmed that he is currently focusing on developing and redesigning the appearance of the iOS-based Bali Calendar application but still has obstacles in terms of understanding the UI UX application that is still lacking. Because in making application design, a good understanding of User Experience and User Interface is needed.

Analyzing UX (User Experience) is an important first step before starting to develop the UI (User Interface) of an application, in order to understand user problems while using the application and what needs are needed by users while interacting with existing systems (Yehdeya et al. 2023) . User Experience refers to the feelings or emotions of a person when interacting with an existing system (Andryadi and Fatonah 2021) . So that analyzing UX (User Experience) is very important to do, if ignored, it will cause users to leave the existing system because it does not match the habits and needs of users (Subhan and Indriyanti 2021) .

In focusing on developing the UI (User Interface) of the iOS-based Bali Calendar application, the author uses the Double Diamond approach method which consists of 2 diamond phases, namely Research, which is the phase of finding problems and Design, which is the phase of creating solutions to existing problems. Each phase of the Double Diamond method has two stages, making it 4 stages, namely the Research phase there are stages of discover and define and the Design phase there are stages of develop and deliver (Banbury et al. 2021) .

Based on several complaints submitted by users in reviews on the App Store and surveys conducted and the obstacles faced by developers who do not understand the design of the application display. So in this research, the author analyzes and designs solutions to the problems of iOS-based Balinese Calendar application users who suggest adding several features such as the addition of tri sandhya features, mantra panca worship, daily prayers, otonan search features and adult ayu. The author uses the Double Diamond approach method, where after the author finds user problems at the discover and define stages, it will then proceed to the develop and deliver stages to provide results and input from users on the prototype design that has been made. This process will be carried out iteratively until a maximum solution is found. The tool that the author uses in designing the UI (User Interface)

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display is Figma, which allows the author to create designs to interactive prototypes quickly and flexibly. The testing method used is usability testing which has 5 main components that must be considered when testing, namely learnability, efficiency, memorability, errors and satisfaction. The design testing process with the usability testing method will be assisted by using the Maze test tool, where each usability testing component will be adjusted to the calculation variables in Maze.

METHODS

Literature Review

Bali Calendar

Indonesia uses a national calendar that officially organizes important national days. However, some regions in Indonesia have traditional or local calendars that contain information related to certain days in accordance with local culture. For example, there is the Javanese calendar, Sundanese calendar, Hijriyah calendar, Balinese calendar and other calendars. In particular, what the author will discuss in this research is the Balinese calendar which contains local content full of Hindu religious activities in Bali (Ramdhani 2020) .

Double Diamond

Double Diamond is an approach method consisting of 2 main phases or commonly called "Diamond" each phase consisting of the research phase (first diamond) and design (second diamond) (Pyykkö, Suoheimo, and Walter 2021) . Each phase in the Double Diamond method consists of 2 stages, namely the research phase consists of the discover and define stages, the design phase consists of the develop and deliver stages (Maknun and Kusuma n.d.) .

Figma

Figma is a free cloud-based design tool and can be operated in a web browser, so many designers use Figma in designing because it is considered flexible, where designers can access Figma via a web browser or desktop application on Windows OS, MAC OS or Linux as long as the device is connected to the internet (Muhyidin, Sulhan, and Sevtiana 2020) . This is an added value for Figma when compared to other design tools such as Adobe XD and Skecth which must be installed first to be able to operate it (Rully Pramudita et al. 2021) . Apart from being a cloud or web-based application, Figma also has many communities and plugins or tools in designing and facilitating team collaboration as well as designers and users in designing designs (Putra, Ajie, and Safitri 2021) .

Concept Testing

Concept testing is an initial test before starting to design the next stage, where the design design tested in concept testing is in the form of a low fidelity prototype which is still in the form of a basic framework and does not yet have a clear visualization. Concept testing is usually done when the author has several design concepts and is confused about which design concept to use. So this concept testing will help the author to be able to determine which design concept is in accordance with user needs (Anon n.d.) .

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Usability Testing

Usability testing is one of the design design testing methods that aims to find out whether users can easily understand and use the design design in achieving their goals (Maricar and Pramana 2020) . Usability testing used in testing designs directly to users has 5 important components that must be considered in its implementation, including Learnability (the ease with which users can use the design design), Efficiency (how efficient the design is for users), Memorability (how easily users remember the design design), Errors (how many mistakes users make) and Satisfaction (user satisfaction with the design design tested) (Larasati 2020) .

Maze

Maze is a website-based design testing platform, designed to facilitate the process of testing design designs to users more quickly and efficiently. Maze allows authors to test design designs in the form of prototypes, collect data and analyze the results of design design tests easily (Febriani et al. 2023) .

RESEARCH METHOD

In the Double Diamond approach method, interface design is done in the design phase of the develop stage where the author will develop and design the interface of the iOS-based Bali Calendar application based on the problems that have been found in the previous stage. The first step in designing the interface is that the author creates a wireframe papper using the crazy eight brainstorming method to facilitate the author when designing the application design. After completing the papper wireframe, the author will choose 2 of the 8 papper wireframe concepts which will then be made into digital wireframes. This digital wireframe will later be made into a low fidelity prototype and will be concept tested to find out what needs to be improved before proceeding to the next design stage. After concept testing is done, the author continues to create a system design consisting of colors, typography, iconography, popups, buttons, and cards which will later be applied to the design design until it becomes a high fidelity prototype. After that, the author will conduct usability testing of the design design to users of the iOS-based Bali Calendar application.

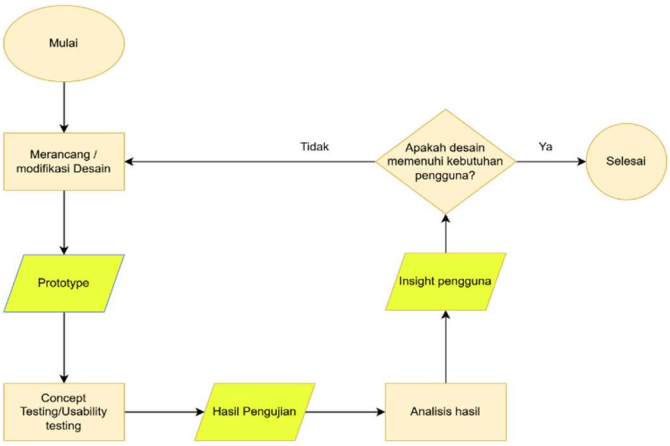

Figure 1 . Overview of Solution Evaluation and Validation Flow

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Evaluation and validation of this research solution is carried out using the usability testing method. But before testing, the author first determines the number of respondents, which is based on the Nielsen Norman Group theory which says "85% of usability problems faced by users can be found in 5 users. For more complex problems, using 15 participants can help find more and more accurate usability problems" (Nielsen 2000) . So in this study, the authors used 15 users for both the survey at the beginning of the research and usability testing. The authors create a script or flow of testing such as questions that will be asked to users. The tool that will be used in testing the design design is Maze, where all tasks during testing will be available on Maze and users will test the design design online where the testing process is carried out using the moderated remote usability testing method. After the test is carried out, the author will collect the results of usability testing on Maze using a spreadsheet and then the data will be calculated for the MIUS and MAUS values whether the results of the MIUS (Mean Usability Score) and MAUS (Maze Usability Score) calculations show the level of user satisfaction and design effectiveness. MAUS has a score level that reflects the performance and quality of the tested design which is listed in table 1 below.

Table1 . Maze Usability Score Levels

No.	Score Level	Score Range
1	0 - 50	Low
2	50 - 80	Medium
3	80 - 100	High

A score level of 0 - 50 indicates a low score range meaning that the tested design is considered unsatisfactory and does not meet the standards expected by users. A score level of 50 - 80 indicates a medium score range meaning that the tested design is considered to be performing reasonably well but there is still room for improvement. A score level of 80 - 100 indicates a high score range meaning that the tested design is considered very satisfactory and has met the standards expected by users (Ulfa and Ambarwati 2022) .

RESULTS AND DISCUSSION

Results

Discover

At this stage, the author conducts a literature study, collects information from user reviews of the iOS-based Bali Calendar application which there are 65 reviews and surveys conducted to 15 users. The results of this information collection are insights from users that are processed into an empathy map which has 4 points in it, namely Says (what the user says), Thinks (what the user thinks), Does (what the user does), and Feels (what the user feels).

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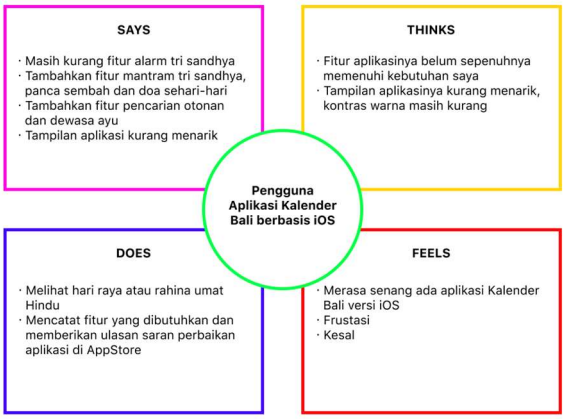

Figure 2 . Emphathy Map

Based on Figure 2 which shows the user's empathy map related to what users say, think, do and feel when using the iOS-based Bali Calendar application. It can be concluded that the main problem faced by users is the lack of features needed in the application such as tri sandhya alarms, mantram features, and the search for otonan and adult ayu. In addition, the appearance of the Balinese calendar application is still less attractive and needs to be improved again. These problems will be used as a reference by the author in continuing to the next research process.

Define

Figure 3. Paint & Gain Points

Based on the pain & gain points listed in Figure 10 above, there are several problem points faced by users of the iOS-based Bali Calendar application including, the application does not yet have a tri sandhya alarm feature, where the solution is that the author makes a display of the tri sandhya alarm feature, considering the iOS-based Bali Calendar application developer who does not understand the UI UX application. Then the application does not yet have a mantram feature that contains several mantrams such as tri sandhya mantrams, panca worship and daily prayers, the solution is to design the appearance of the mantram feature in the application which can be a reference for developers to develop applications in the future. Then there is no search feature for otonan and dewasa ayu, the solution to this problem is

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also to design a feature display to search for otonan and dewasa ayu. Then the application still experiences bugs when used, as for the solution can be the addition of a feature display for users to provide feedback so that user problems can be directly conveyed to the developer and more quickly addressed. Finally, in terms of the appearance of the application and its poor contrast, the solution to this problem is to redesign the appearance of the iOS-based Bali Calendar application by paying attention to its accessibility based on WCAG guidelines.

Develop (Cycle 1)

This design is based on the pain points experienced by users who suggest making improvements to the appearance of the iOS-based Bali Calendar application. So that the author designs a low fidelity prototype which will be tested to users at a later stage to find out whether the concept display can be understood properly by users.

On the initial appearance of the iOS-based Bali Calendar application (Homepage) the author makes 2 different concepts to find out which concept is more preferred and easily understood by users. Figure 4 below displays the two homepage concepts that the author designed.

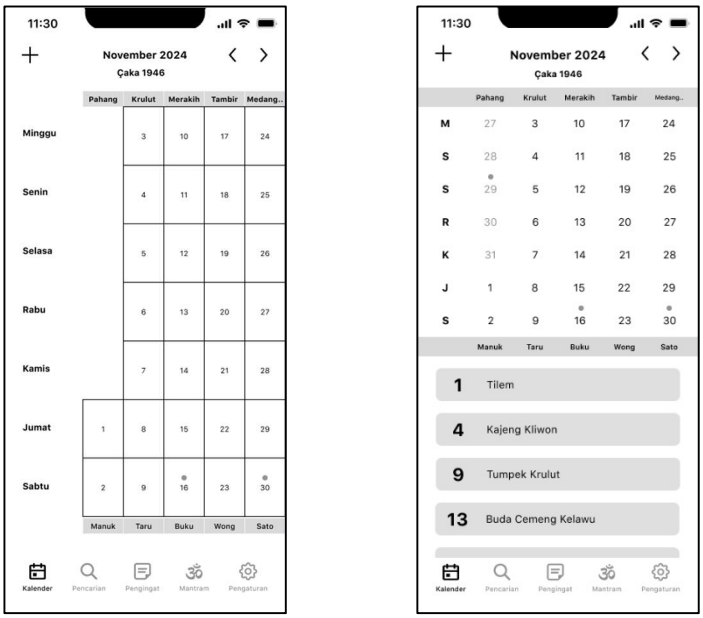

Figure 4 . Comparison of Wireframe Concepts for Homepage Layout

Deliver (Cycle 1)

After the wireframe design is completed, the next stage is to conduct a concept test to find out the obstacles experienced by users before continuing to the stage of designing a mock up. The concept test was tested on 15 users using the maze tool, the results of this test can be seen in Figure 5 below. Figure 5 below shows the results of the *usability score* from the concept test of the iOS-based Bali Calendar application display of 57/100, which means the score is good enough but still needs some improvement.

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Figure 5 . Maze Usability Score Concept Testing

Develop (Cycle 2)

In designing the mock up which later became a high fidelity prototype, the author based on the pain & gain points obtained at the define stage as well as from the insight concept testing conducted at the deliver stage (first cycle). In addition, to improve user experience, the author designed the display into light and dark themes. Where by providing 2 display themes, users can choose the desired display according to the lighting conditions. Based on the insight from the first concept testing task in the form of multiple choice, 87% of users chose concept 2 for the application homepage display. So the author continues concept 2 for the homepage display of the iOS-based Bali Calendar application which looks like Figure 6 below.

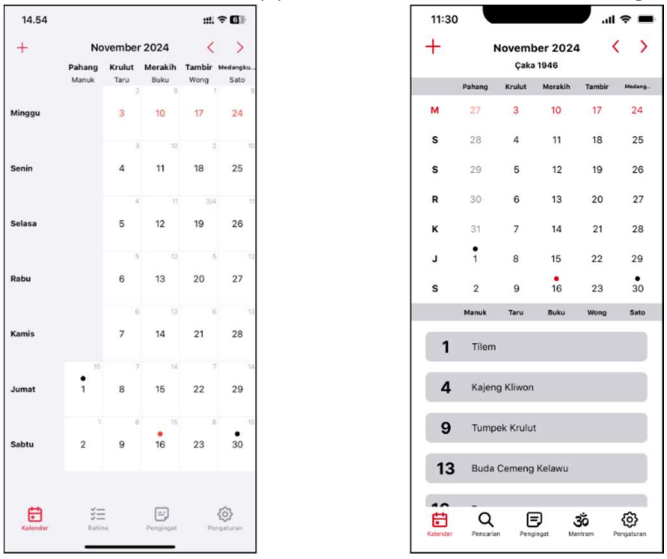

Figure 6. Comparison of Homepage Layout Before and After Redesign with Light Theme

Figure 6 above shows a comparison of the appearance of the homepage before and after the redesign, where there are significant differences in terms of date layout and the addition of the mantram menu in the navigation bar and the change of the rahina menu to the

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search menu. In redesigning the appearance of the homepage, the author has discussed with the developer, where the developer provides a reference to the new appearance of the layout resembling the default iOS calendar application whose purpose is to maintain consistency of user experience. In addition, the author also involved users in determining the latest appearance of the homepage, where the author conducted a survey to ensure that the previous concept or the latest concept was in accordance with user needs. In addition to the light mode, the author also designed a dark mode that can be seen in Figure 7 below.

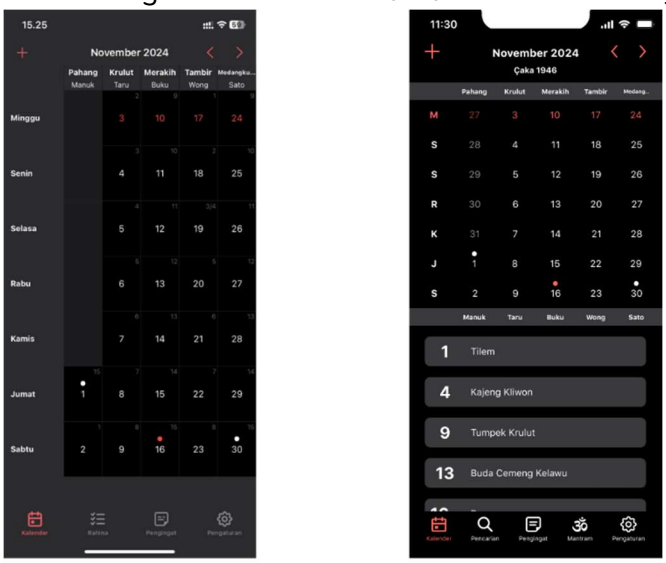

Figure 7. Comparison of Homepage Layout Before and After Redesign with Dark Theme

Figure 8 below is a display of the mantram menu, starting from the leftmost image there is a display when the user selects the mantram menu, an option list display will appear containing a choice of tri sandhya mantrams, panca worship, daily prayers and tri sandhya alarms. Then the second picture from the left is the display of the tri sandhya mantram, the third picture from the left is the display of the panca sembah mantram. Furthermore, the fourth image from the left is a display of daily prayers in the form of an option list, the use of option lists on this display to make it easier for users to see the existing prayer options and the fifth image from the left is the prayer display when the user presses the option on the option list.

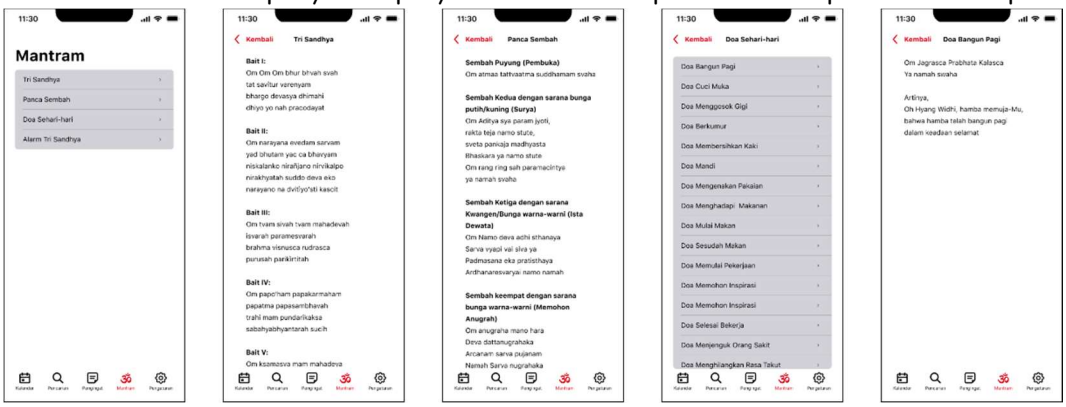

Figure 6. Mantram Menu Layout

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Figure 9 below shows the flow of the ayu adult search feature, at the top there is a search bar, users can enter keywords in the search bar, then it will display the ayu adults searched according to the keywords typed in the selected 1 month range. In addition, in the header section there is a month name and right and left arrows, users can select the desired month to search for ayu adults.

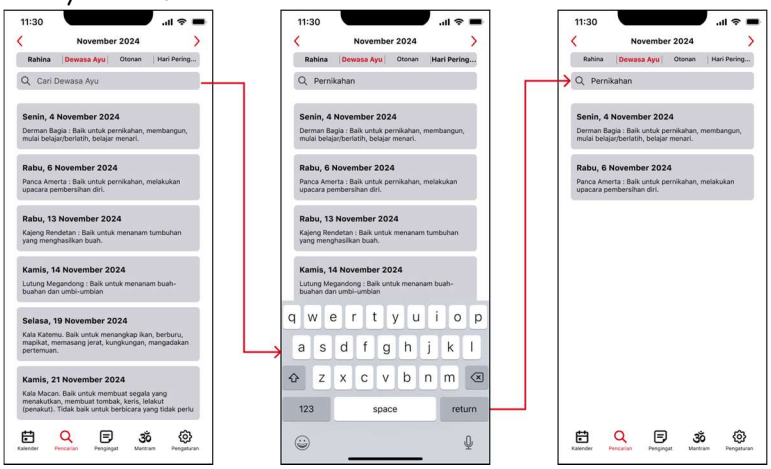

Figure 7. Adult Ayu Search Layout Feature

Figure 10 below shows the flow of the otonan search feature, as seen in the picture at the top there is a navigation bar for several feature options. Then below it is the date of birth and otonan to: which on the right is a box to enter the date of birth and otonan that you want to search for. After the user fills in the date of birth and what otonan to look for, then the user must press the search for otonan button which will then display the otonan being searched. This otonan search display is based on reference from the Android-based Bali Calendar application which already has an otonan search feature.

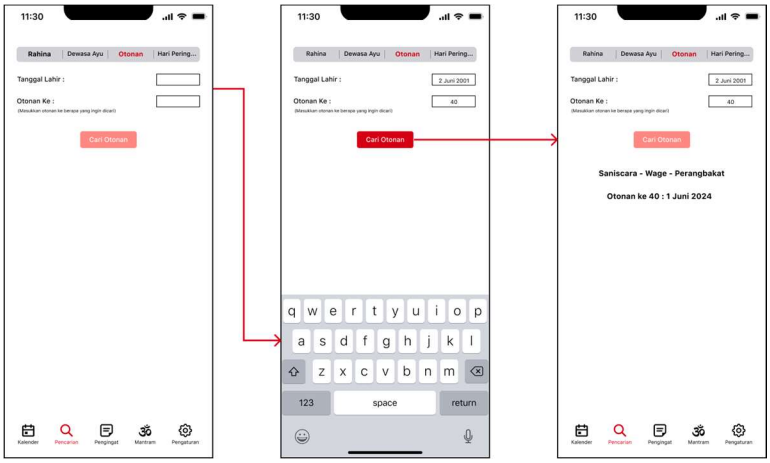

Figure 8. Otonan Search Feature Layout

Deliver (Cycle 2)

After the prototype design is completed, the next stage is to conduct usability testing to determine the extent to which the prototype can be used effectively and efficiently by users. This usability test aims to identify problems that users may encounter when interacting with

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the prototype, as well as to evaluate the extent to which the design that has been created meets the needs and expectations of users. With the results of this usability test, developers can make the necessary improvements to enhance the user experience before the prototype is officially launched. Figure 11 below shows the results of the usability testing that has been carried out, where the maze usability score of 87/100 shows a high score range, which means that the tested design is considered very satisfactory and has met the standards expected by users. In addition, there is a significant increase when compared to the maze usability score in concept testing which is 57/100 which is classified in the medium category.

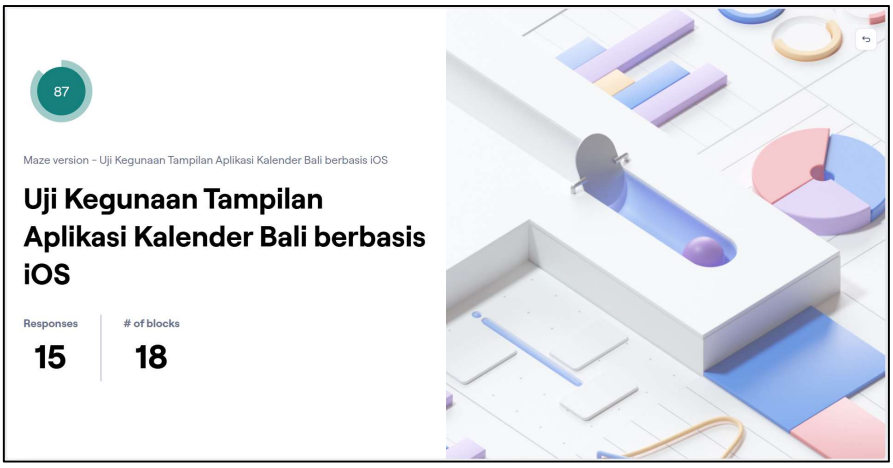

Figure 9. Maze Usability Score Usability Testing

Discussions

The results of the UI/UX design of the Bali Calendar application show that several important factors, such as understanding the user persona, user goals, and the need for a simple yet informative interface, play a major role in improving the user experience. Based on the analysis, the main factor that influences the success of the app design is how the app is able to provide relevant information related to important dates in the Balinese calendar, such as holidays, adult ayu and otonan with a display that is easily understood by users from various backgrounds.

The simple yet informative design of the app proves to provide an intuitive user experience. The choice of white background color and the use of SF Pro Text font results in a display that is not only comfortable to look at, but also easy to read for users of all ages. Based on the usability testing results, most users found the app very easy to use, with a fast and efficient information search process. The clear navigation and neat arrangement of elements allow users to easily access the information they need.

Overall, the results of the UI/UX design of the Bali Calendar application show that a deep understanding of user needs and the application of simple yet effective design principles greatly influenced the success of this application in providing a satisfying user experience. The use of user personas in the design process has helped in designing an application that is not only functional but also relevant to the culture and needs of the users. The findings provide

a strong basis for further development in creating better apps that better meet the expectations of users in the future.

CONCLUSION

Based on the results of the author's analysis of the user experience of the iOS-based Bali Calendar application through reviews on the AppStore 60% of the total 65 user reviews complained about the lack of features available on the application such as the tri sandhya alarm feature, the tri sandhya mantram feature, daily prayers and the search feature for otonan and dewaasa ayu. Meanwhile, 30.7% of the total 65 reviews thanked the developer and 9.2% complained about bugs that occurred in the application. User Interface (UI) design is carried out in the Design phase which consists of the develop and deliver stages, each of which is carried out with 2 cycles. At the develop stage of the first cycle, the author makes a low fidelity prototype design based on the insights gained in the research phase. Then at the first cycle deliver stage, the author conducted a concept test to 15 users to find out which of the several concepts that had been designed best suited the user's needs. After getting insight from the first cycle deliver stage, the author designed a system design and high fidelity prototype at the second cycle develop stage which was then carried out usability testing at the second cycle deliver stage to ensure whether the design design was in accordance with user needs. Based on the results of the testing, the user response to the implementation of the user interface (UI) design shows positive results, this is shown through the usability testing results which received a score of 87/100 which shows a high score range which means that the design design tested is considered very satisfying and has met the standards expected by users. In addition, there is a significant increase when compared to the maze usability score in concept testing which is 57/100 which is classified in the medium category.

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