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Analysis and Design Pet Healthcare, Pet Adoption, and Pet Community iOS Mobile Application for Animal Lovers

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Abstract - *This research aims to create an iOS based mobile applications that is expected to assist pet owners who want to search for reliable caretaker for their pets, ensuring a safe and trustworthy environment for pet entrustment. The application will also serve as an extensive informational hub, providing users with valuable resouces, including articles about pet and directory of veterinary clinics around the user's area. The development of this mobile application begins with data collection through, literature study, observation and questionnaire. Literature study aims to find supporting theories which can assist the development of this application, observation are made to compare the application to be developed with similar applications, and questionnaire is used to identify the requirement from potential users. After analyzing all the obtained data, the process continues with designing application systems with UML diagrams such as, use case diagram, use case descripton, class diagram, sequence diagram, and activity diagram. Then, after completing the system design phase, the development of the application will be carried out with kanban methodology. After the application has been developed, a survey will be distributed to potential users to asses their level of satisfaction with the developed application. This survey will aim to gather feedback on various aspects, including user experience, functionality, ease of navigation, and overall effectiveness in meeting user needs.*

Keywords: *Pet; iOS; Mobile Application; Agile Development; Kanban Methodology*

I. INTRODUCTION

The advancement of technology has brought many benefits to people's daily lives. From the ease of communicating with others who are not in th esame place, to the convenience of accessing information. Smartphones have become an essential part of everyday life for many people. According to a survey conducted in 2022, Indonesia ranked fourth in the world for the number of smartphone users, with 192.15 million, following China, India, and the United States (Sadya, 2023). Indonesia was also the fifth-largest country for total app downloads, after China, India, the United States, and Brazil in 2022 (Mustajab, 2023). According to Badan Pusat Statistik (BPS), mobile phone users in Indonesia reached 67.88% in 2022, an increase of 2.01% from the previous year (Ahdiat, 2023). Smartphones run on various operating systems, including iOS. As of November 2023, iOS users in Indonesia made up 11.65% (statcounter, 2023). Additionally, a 2022 survey by Rakuten revealed that 67% of Indonesians owned pets, while 10% had previously owned pets and 23% did not have pets (Ridwan, 2023).

Many pet owners abandon their pets for various reasons, such as a lack of knowledge on how to care for them, understanding their needs, or having adequate information about the pets (Rafly et al., 2023). These abandoned animals are usually taken in by animal shelters, which serve as temporary homes for them until they find a new home. The good news is that many people still want to provide these animals with homes

and see them as companions. However, because information about shelters and adoptable animals is often difficult to find, potential adopters may decide not to proceed with the adoption (Febrian et al., 2022).
Several related research journals which are used as references include:

This research, published in the Indonesian Journal of Multidisciplinary Science, was conducted by Putri Intan Sari, Khairun Nashirin, Muhammad Arifudin, and Yanto Setiawan in 2023. The result was a mobile application for searching and booking various services such as veterinarians, grooming, and pet boarding. Users can also view details of their previous bookings.

This research, which is published in the *Jurnal Rekayasa Komputasi Serapan*, was conducted by Putra Muhamad Rafly, Aan Risdiana, and Ai Solihah in 2023. The result was a mobile application on the Android platform. Some of the features provided by this application include articles offering information on how to care for pets, quizzes to assess users' knowledge of pet care, and an alarm for scheduling.

This research, published in the *International Research Journal of Engineering and Technology (IRJET)*, was conducted by Akanksha Magdum, Aniket Magdum, Gayatri Chavan, and Shreya Jadhav in 2023. The result was a mobile application with features that facilitate the adoption process, including searching for animals available for adoption, viewing detailed descriptions of the animals, and completing adoption forms.

There are several existing applications that provide pet-related services, but they come with various limitations that prevent them from offering a complete solution for pet owners. These applications, such as blepi, Pawshake, and Hewania. Blepi allows pet owners to find caretakers and engage in a pet lover community, but it lacks essential features such as veterinary clinic information, pet supply purchases, educational articles, and shelter-related services. Pawshake focuses on connecting pet owners with pet sitters but does not offer a pet community, veterinary clinic information, pet care articles, or shelter-related services. Hewania provides veterinary clinic information, pet supply purchasing, and pet care articles, but it does not support pet caretaker search or shelter-related services.

Due to these reasons, the author plans to design and develop an iOS-based mobile application aimed at addressing the identified issues. The choice of developing the mobile application on iOS is strategic, as iOS is often associated with a higher-income demographic, particularly middle-to-upper class users. This group tends to have the disposable income necessary to afford the additional costs associated with pet ownership, such as pet sitting services, veterinary care, and pet adoption. The main feature of the application will be assisting users in finding available pet sitting services that match their criteria in their surrounding area. This feature will be supported by other functionalities, such as providing information to help users locate shelters for adopting new pets, additional details like the location and operating hours of nearby veterinary clinics, and tips on how to properly care for pets.

II. METHODS

In this research, the application design method used is Kanban which is one of the frameworks within Agile Development.

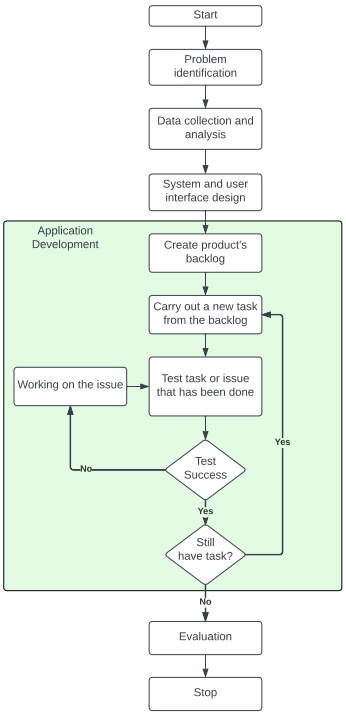

Figure 1. Research Conceptual Framework

The research methods used in this study can be sequentially grouped into problem identification, data collection and analysis, system and user interface design, application development, and evaluation.

2.1 Problem Identification

At this stage, the author analyzes the identified problems and designs a solution tailored to address these issues effectively.

2.2 Data Collection and Analysis

At this stage, data is collected from users by distributing a questionnaire to individuals interested in pets and using iOS-based mobile devices. In addition to gathering user data, this phase also involves analyzing the data from the questionnaire and comparing similar applications. Based on the data received, several key findings were concluded. The majority of respondents currently use smartphones with the iOS platform. Additionally, most pet owners face difficulties in various areas, such as caring for their pets, finding pet sitting services, locating animal shelters for pet adoption, and searching for nearby veterinary clinics. Furthermore, the majority of pet owners expressed interest in using applications related to pet care. Among the features, the most popular request was for an option to find shelter locations and check the availability of pets at these shelters, shown in Table 1 & 2.

Table 1. List of Data Collection Questions and Answers

Category	Possible Answer	Percentage	Quantity
Age of Respondents	<18 years	1.2%	2
	18-30 years	71.7%	119
	31-50 years	25.9%	43
	>50 years	1.2%	2
Usage of iOS Smartphones	Yes	72.9%	121
	No	27.1%	45
Pet Ownership	Own a pet	86.3%	107
	Do not own but want to	12.9%	16
	Do not own and do not want to	0.8%	1
Difficulty in Pet Care	Have experienced difficulties	87%	107
	Have not experienced difficulties	13%	16
Sources of Information for Pet Care (Multiple)	Social media	44.7%	55
	Internet	56.9%	70
	Ask family or friends	20.3%	25
Experience with Pet Boarding	Have used pet boarding services	86.2%	106
	Have never used pet boarding services	13.8%	17
Difficulty Finding Pet Boarding	Have faced difficulties	82.1%	101
	Have not faced difficulties	17.9%	22
Factors Considered in Pet Boarding (Multiple)	Location	60.2%	74
	Caregiver's quality	50.4%	62
Sources of Information for Pet Boarding (Multiple)	Social media	52%	64
	Internet	53.7%	66
	Ask family or friends	15.4%	19
Experience or Interest in Pet Adoption	Have adopted pets	76.4%	94
	Wanted to adopt but did not	17.1%	21
	No interest in adopting	6.5%	8
Reasons for Not Adopting Pets (Multiple)	Lack information on adoption centers	24.4%	21
	Lack information on adoption procedures	29.1%	25
	Mismatched pet descriptions	50%	43
	Pets unavailable at shelters	27.9%	24
	Never failed to adopt	1.2%	1
Difficulty Finding Shelters	Have faced difficulties	86.2%	106
	Have not faced difficulties	13.8%	17
Sources of Information for Shelters (Multiple)	Social media	48.8%	60
	Internet	50.4%	62
	Ask family or friends	20.3%	25

Category	Possible Answer	Percentage	Quantity
	Never searched for shelter information	0.8%	1
Experience Taking Pets to the Vet	Have taken pets to the vet	86.2%	106
	Have never taken pets to the vet	13.8%	17
Difficulty Taking Pets to the Vet	Have faced difficulties	86.2%	106
	Have not faced difficulties	13.8%	17
Sources of Information for Veterinarians (Multiple)	Internet	42.6%	52
	Social media	31.1%	38
	Ask family or friends	25.4%	31
	Never searched for vet information	0.8%	1
Interest in Using a Pet-Related App	Interested	93.5%	115
	Not interested	6.5%	8
Desired Features in the Application (Multiple)	Buy pet supplies	15.4%	19
	Event information	12.2%	15
	Pet boarding search	77.2%	95
	Shelter search	87%	107
	Vet search	78.9%	97
	Pet care tips and articles	74.8%	92

Table 2. Comparison of Similar Applications

ID	Feature	blepi	pawshake	hewania
F1	Searching for Pet Sitting Providers	✓	✓	×
F2	Animal Lover Community	✓	×	×
F3	Veterinary Clinic Information	×	×	✓
F4	Pet Supplies Purchase	×	×	✓
F5	Articles and Information Related to Animals	×	×	✓
F6	Searching for Animal Shelters	×	×	×
F7	Checking Animal Availability at Shelters	×	×	×

2.3 System and User Interface Design

At this stage, the author designs the system using five types of Unified Modeling Language (UML) diagrams: use case diagram, use case description, activity diagram, sequence diagram, and class diagram. UML is a standard language used to create sketches and blueprints for software, serving as a foundation during application development (Seidl et al., 2015). The Use Case Diagram outlines the system's functionalities and interactions from the user's perspective. The Use Case Description provides detailed explanations of each use case, including the flow of events and conditions. The Activity Diagram models the flow of tasks or actions within the system, focusing on the sequence and decision points. The Sequence Diagram illustrates the interactions between system components over time. Lastly, the Class Diagram defines the system's structure by showing the classes, their attributes, methods, and relationships. Additionally, the author uses Figma, a cloud-based design and prototyping tool, to create the user interface (UI) design. Figma allows teams to collaborate on digital projects from anywhere (Sari et al., 2023).

Figure 2. OnePet Use Case Diagram

2.4 Application Development

During the application development phase, the author uses the Kanban framework from Agile methodology, which provides better visualization of ongoing projects and limits tasks being worked on (Matharu et al., 2015). The application is developed using Swift and SwiftUI, with SwiftUI enabling the creation of the user interface in a declarative manner, specifying how it should look and function (Hudson, 2023). For the server side, Firebase, a Backend as a Service (BaaS) by Google, is used, offering tools for building, monitoring, and enhancing user experience, including Authentication, Hosting, Analytics, and Cloud Messaging (Firebase, n.d.).

2.5 Evaluation

At this stage, the developed application is tested using two methods: Black Box Testing and User Acceptance Testing. Black Box Testing is a software testing method that examines the functionality (functional testing) of a software application without looking into its internal structure or how it works (Fahrezi et al., 2022), while User Acceptance Testing is used to ensure that the developed software meets the requirements and can address the problems posed by its users, or if it still contains defects (Tugiman et al., 2021). In addition to evaluating the application's functionality, the author also assesses the user experience and user interface by applying five measurable human factors and eight golden principles of interface design.

III. RESULT AND DISCUSSIONS

Based on the research methods used, problem analysis was conducted using a questionnaire technique, which resulted in 123 respondents. In addition to the questionnaire, observation techniques were employed by comparing similar applications and related journals. The following is the main interface of the developed application.

3.1 Welcome Page

The Welcome page is displayed after the splash screen, where users can choose between two buttons either login or register. The "Log In" button leads to the login page, while the "Register Account" button directs users to the registration page.

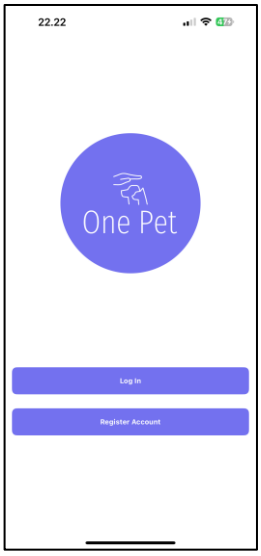

Figure 3. Welcome Page of OnePet Application

3.2 Profile Page

The Profile page displays profiles for each user role. On this page, users can view information about their registered account, including name, phone number, email, avatar, and a gallery specifically for pet sitter's role and pet shelter's role.

Figure 4. Profile Page of OnePet Application

3.3 Clinic Page

The Clinic page displays a list of veterinary clinics within the application. This list is managed by an admin, who is responsible for adding or removing clinic data as needed, shown in figure 5.

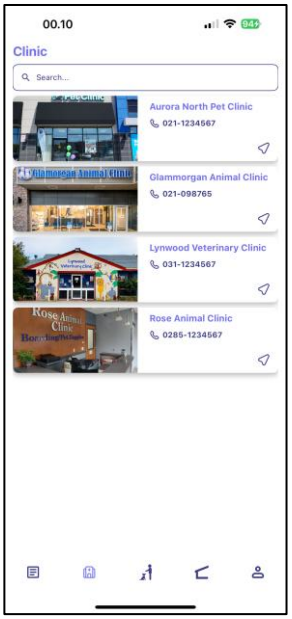

Figure 5. Clinic Page of OnePet Application

3.4 Article Page

The Article page displays a list of animal-related articles within the application. This list is managed by an admin, who is responsible for adding or removing articles as needed, shown in figure 6.

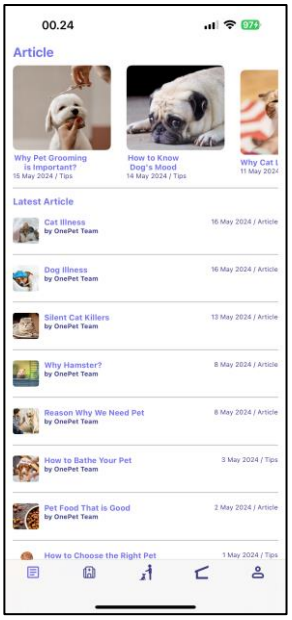

Figure 6. Article Page of OnePet Application

3.5 Pet Sitter Page

The Pet Sitter page displays a list of pet sitters within the application. This list will grow as more users register their accounts as pet sitters, shown in figure 7.

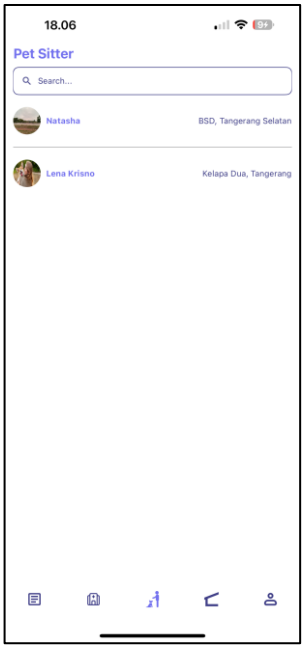

Figure 7. Pet Sitters Page of OnePet Application

3.6 Pet Shelter Page

The Pet Shelters page displays a list of animal shelters within the application. This list will grow as more users register their accounts as animal shelters, shown in figure 8.

Figure 8. Pet Shlters Page of OnePet Application

The author uses several types of assessments for evaluating the developed application, including the five measurable human factors, eight golden rules of interface design, and system evaluation (black box testing).

3.7. Evaluation Five Measureable Human Factors

To evaluate the results of the developed application, the author has asked several testers to use and give feedback regarding the application. There are some key points in the used evaluation such as, time to learn, speed of performance, rate of errors, retention over time and subjective evaluation. The evaluation was conducted with 31 different respondents, and the data obtained from the evaluation are:

Table 3. List of Evaluation Questions and Answers

Key	Quesions	Average
Time to Learn	How easy is it to understand onepet application	4,096 from 5 / 81.9%
	How long does it take to get used to with the Onepet application?	1-30 Minutes
Speed of Performace	How well does the onepet application perform?	4,161 from 5 / 83.2%
Rate of Errors	While you were using the Onepet application, did an error such as, toast or dialog occur?	Errors reported: 90.3%
	How many times did the application produce the errors?	1-2 errors: 66.7%
Retention Over Time	Is the flow of the Onepet application easy to remember?	100% easy to remember
	How long does it take to remember the Onepet application flow?	1-30 Minutes
Subjective Satisfication	How satisfied are you with the user interface of the Onepet application?	3,935 from 5 / 78.7%
	How satisfied are you with the Onepet application features?	3,967 from 5 / 79.3%

The data presented in the Table 3 above highlights several key insights regarding user experience with the OnePet application. Overall, users find the application relatively easy to learn and navigate, with most respondents indicating they can grasp its functionalities within a short timeframe. However, the reports of errors encountered by a significant portion of users suggest that some required fields in forms are not clearly marked, as they lack an asterisk to indicate their necessity. Addressing this issue by ensuring required fields are easily identifiable could enhance the user experience and reduce confusion. In summary, although the OnePet application demonstrates a solid foundation in user-friendliness, it is essential to continuously adapt based on user feedback to improve its performance and overall satisfaction.

3.8. Evaluation Eight Golden Rules of Interface Design

A. Strive for Consistency

The OnePet application is developed with consistency in its interface design. The application itself uses the same type of text fields, buttons, placement of search fields and page titles, and font throughout the application, shown in figure 9.

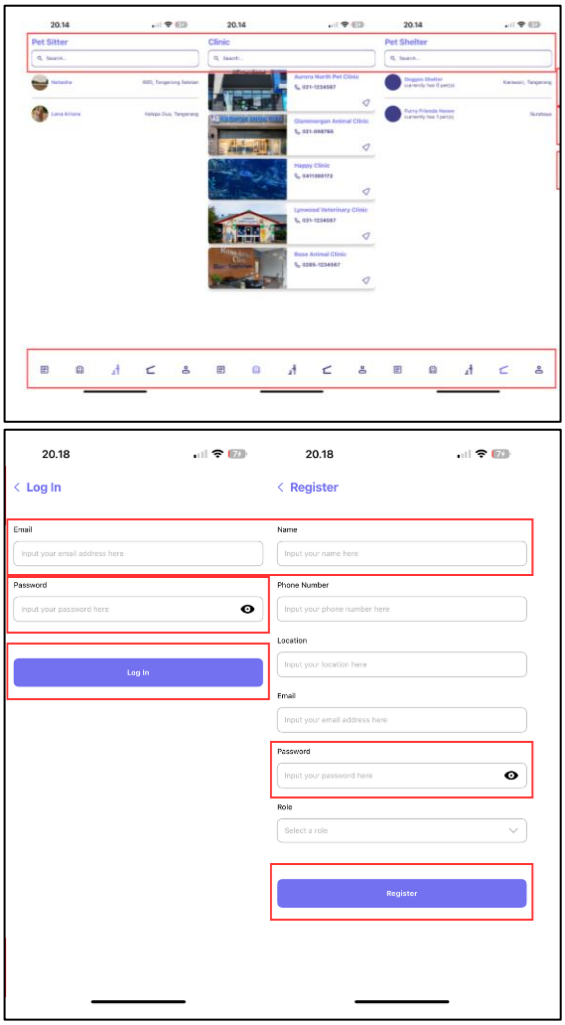

Figure 9. Consistency of the OnePet Application Interface

B. Cater to universal ability

The OnePet application is developed with attention to the diverse abilities of users by incorporating various symbols or icons to help users easily understand the data being displayed, shown in figure 10.

Figure 10. OnePet Application Icon

C. Offer informative feedback

The OnePet application provides several types of feedback to users, such as a loading indicator when an action requires time to process and confirmation dialogs for certain user actions, shown in figure 11.

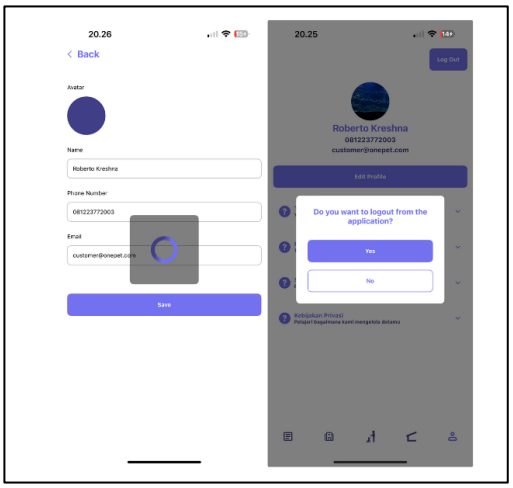

Figure 11. Feedback on the OnePet Application Interface

D. Design dialogs to yield closure

The OnePet application divides actions into several parts. For example, in the image, when users update their profile data, a notification appears at the bottom of the screen indicating that the data has been successfully updated, shown in figure 12.

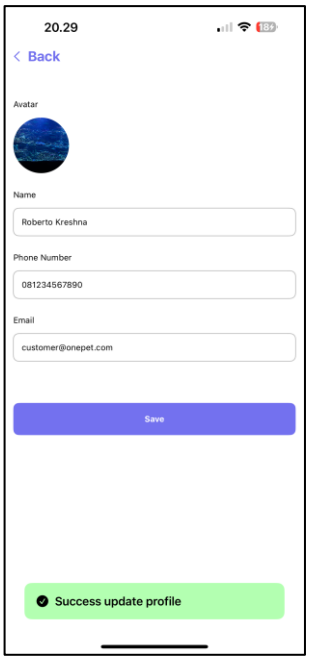

Figure 12. OnePet Application Toast

E. Offer error prevention and simple error handling

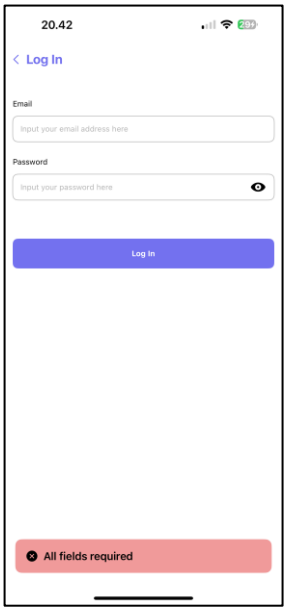

Figure 13. OnePet Application Error Handling

The OnePet application has implemented error prevention measures and displays toasts that provide users with simple instructions on how to resolve any encountered errors, shown in figure 13.

F. Permit easy reversal of actions

The OnePet application itself allows users to return to the previous step when performing an action by providing a back button on the page, shown in figure 14.

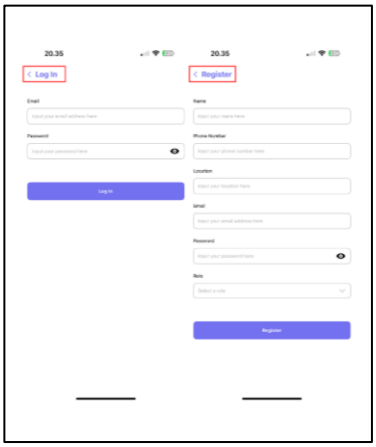

Figure 14. OnePet Application Back Button

G. Support internal locus of control

The OnePet application gives users full control over their actions. For example, when updating personal data, users must press the Save button to store the changes. Users have the option to either save or cancel the changes, thereby deciding whether to keep or discard the modifications, shown in figure 15.

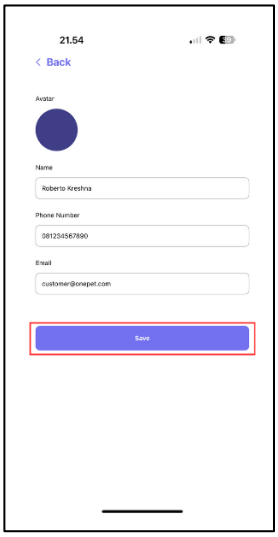

Figure 15. OnePet Application User Control Button

H. Reduce short-term memory load

The OnePet application applies this principle in its update feature by displaying the previously existing data in text fields, so users do not need to remember all their prior information, shown in figure 16.

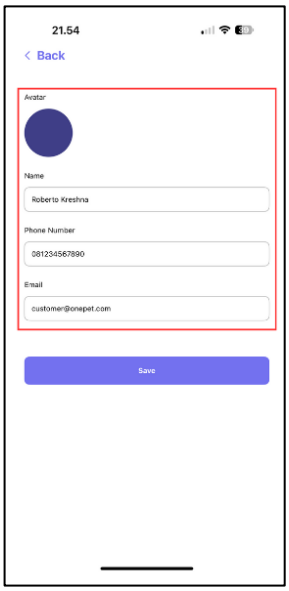

Figure 16. OnePet Application Reduce Memory Load

Table 4. Comparison of the Application with Similar Applications

No	Feature	OnePet	blepi	Pawshake	Hewania
1	Searching for Pet Sitting Providers	✓	✓	✓	×
2	Animal Lover Community	×	✓	×	×
3	Veterinary Clinic Information	✓	×	×	✓
4	Pet Supplies Purchase	×	×	×	✓
5	Articles and Information Related to Animals	✓	×	×	✓
6	Searching for Animal Shelters	✓	×	×	×
7	Checking Animal Availability at Shelters	✓	×	×	×

What makes the developed application superior compared to similar applications is the wide range of features available within a single app, eliminating the need to download multiple apps to access the same functionalities. Additionally, the User Interface (UI) is designed to be simpler, making it more user-friendly. However, due to the need for special configuration to implement notifications and the current lack of urgency for this feature, since the app is only accessible locally (not yet available for direct download from the app store), the development team has prioritized implementing other features first, shown in Table 4.

IV. CONCLUSIONS

From conducting the research on the "Development of an iOS-Based Health, Adoption, & Pet Community Application," several key findings emerged. The developed application addresses the needs of pet owners by offering features that help them find pet sitters when they lack time to care for their pets. It also provides valuable information for users interested in adopting pets, such as shelter locations and pet availability. Additionally, the application supports pet owners by offering access to articles and information on nearby veterinary clinics. These findings highlight the application's potential to significantly improve pet care, adoption, and community engagement for pet owners.

Future work should focus on specific plans to enhance the app, such as adding push notifications to keep users informed, improving the user interface (UI) for better usability, integrating machine learning for personalized pet recommendations, and working on optimizing the database structure.

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