MODEL VIEW CONTROLLER METHOD FOR ANIMAL CARE (PETCARE) INFORMATION SYSTEM AT NIZ PETCARE LAWANG

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ABSTRACT

Pet Care is a company that offers animal care services that are equipped with a variety of pet shop products such as food, vitamins and care Pet Care is a company that offers animal care services that are equipped with a variety of pet shop products such as food, vitamins and care. In addition, Daily Pet Care sells pet equipment and also offers medical and animal care services that require a service that is available through technology and digital businesses that can be accessed via a computer. Pet sitting services are one of the best solutions for the majority of Indonesian people who have pets but have to travel far and cannot bring their pets with them. The owners of Niz Petcare see this as a great business opportunity. However, currently they still use manual recording in their business processes, sometimes resulting in loss of material and customer confidence. The purpose of this research is to solve this problem by designing a flow and design of a pet care application prototype that is integrated and more organized using information technology that is developing rapidly and makes it easier for customers to access online. Given these needs, the authors apply the prototyping method to accommodate these needs. The implementation of making software uses the model view controller (MVC) method which adopts the CodeIgniter framework. In this study, an evaluation was carried out using UAT and Usability Testing with ISO/IEC 9126. The evaluation results show that the application of the MVC method can produce good software products that work according to their functionality. Based on the ISO/IEC 9126 percentage, the criteria with the greatest value for understanding on P05, P07, and P09 is 89%, usability on P05 is 89%, and learning on P07 is 89% and 88% power handling at P10. From the evaluation results of making an information system adapting MVC as measured using ISO/IEC 9126 it states that there are several features that need to be improved but overall the application of the MVC method in building websites can provide convenience for users in understanding the system, studying the system, using and attractiveness of the system that has been developed.

Keywords: *Model View Controller, Petcare, Prototyping, ISO IEC 9126*

1. INTRODUCTION

Information technology is a technology for processing data and processing, receiving, compiling, storing and manipulating data in various ways to produce high quality data, namely data that is relevant, accurate and timely. Therefore, the application of this information technology brings benefits to animal care service providers that enable them to carry out their business processes faster, more accurately and reduce errors, which allows them to improve the quality and quality of customer service [1]. Pet Care is a small and medium sized company that sells a wide range of pet products such as equipment, food, vitamins and supplies. Niz Petcare is located on Jl. Bima Sakti II No.21, Meling, Bedali, Kec. Lawang, Malang Regency, East Java. Apart from animal care, selling animal needs, Niz petcare also offers grooming and animal treatment services. Among the problems faced by Niz Petcare Lawang are data processing problems that have not been computerized or data processing is still manual.

Previous research was carried out by Asih Rumanti (2021) entitled "Design of Sales Transaction Information Systems on Daily Pet Care with a Prototype Model" [2]. The results of this study are in the form of an information system that aims to help the process of recapitulating sales transaction data and stock availability of goods in real time where this system can store sales data, expenditure data, product data, service data, supplier

data, stock data and employee data. Another research was also conducted by Syafitri (2023) entitled "Pet Care Information System at Darussalam Pet Shop Based on Android" [3]. The results of this study are to design and build suitable Android-based applications using Entity Relationship Diagrams. In this journal, the researchers utilized both the Quantitative research methods and the Waterfall method for application development. Sakina Fikry (2020) has also conducted another study entitled "Web-Based Animal Care Information System" [4]. The result of this research is that customers can make pet care transactions online, and provide better quality pet care services.

In this study the Model View Controller method was adapted because it has been proven to provide convenience to developers in software design. In previous research discussing the Model View Controller method in the application of creating information systems, Lu (2022) had the title "Petcare Management System Front End Design" [5]. The results of this research are that the system can help pet owners to care for their baby pets more comfortably and this project adopts the MVC design pattern which makes it easier for developers to build websites. Subsequent research by Mukhlis (2023) entitled "Application of the Model View Controller in Website Design for Culinary Tourism Centers in the City of Surabaya" [6]. The result of this research is the efficiency of working on information systems with the adoption of the model view controller method so as to produce software that is easy to use and easy to understand. Research on the MVC method has also been carried out by Yutanto (2023) entitled "Student Organization Management Control System (Ormawa) in Higher Education with Website Applications" [7]. The system developed adopts the model view controller method to produce good software at the college level. The latest research that is used as a reference in the implementation of this research is research that was conducted by Aldisa (2022) entitled "Application of the Model View Controller and Clustering Methods for Android-Based Menu Ordering Systems" [8]. In this research the system development uses the Model View Controller method which divides the business login display and the user interface or the display seen by the user, while clustering is a way to search for information data in a system, with a key, for example looking for a fried rice food menu. then all kinds of fried rice menu will appear. With this system it is very easy for customers to view and search for food menus without having to open a food menu book.

From the several journals above, the purpose of applying the Model View Controller method to the development of the Petcare information system at Niz Petcare Lawang is to simplify and provide support for both petcare owners and customers [9]. After analyzing research on petcare information systems, the author's contribution is the application of model view controller architecture technology on the website platform. Another contribution is the use of the latest CodeIgniter framework, version 4.0, where this framework is based on the PHP programming language which can make websites more powerful and easy to use, when compared to traditional PHP methods, this framework adopts Model, View and Controller including being faster and easier [10]. Other contributions are the application of the waterfall method and system testing using the User Acceptance Test based on ISO/IEC 9126. Evaluation based on ISO/IEC 9126 criteria resulted in the greatest understanding value at P05, P07, and P09 at 89%, usability at P05 at 89%, and learning at P07 at 89% and power handling at 88% at P10. From the evaluation results of making an information system adapting MVC as measured using ISO/IEC 9126 it states that there are several features that need to be improved but overall the application of the MVC method in building websites can provide convenience for users in understanding the system, studying the system, using and attractiveness of the system that has been developed [11].

Another contribution is the application of the prototyping method in the design so that it is expected to be a source of reference and literature for other researchers. Therefore, we propose a solution to this problem by designing a pet information system that can assist in bookkeeping and facilitate transactions [12].

2. RESEARCH METHOD

In this study, we developed a pet information system using the Model View Controller framework by utilizing the recommended working procedure in the prototyping method [6]. We also test and evaluate how users perceive the developed pet information system through functional tests and user acceptance (UAT) [13]. To check whether the developed system is successful and operates according to the expected process. Additionally, a system evaluation process is also performed through usability testing using the ISO/IEC 9126 framework to find out how many users understand the system being built. Prototyping methodology is a software development methodology that integrates developer-user interactions into the system design process. Prototyping techniques help visualize the created system model [14]. The purpose of using the prototyping method is to facilitate information gathering from users [15]. The methodology in this study can be seen in Figure 1.
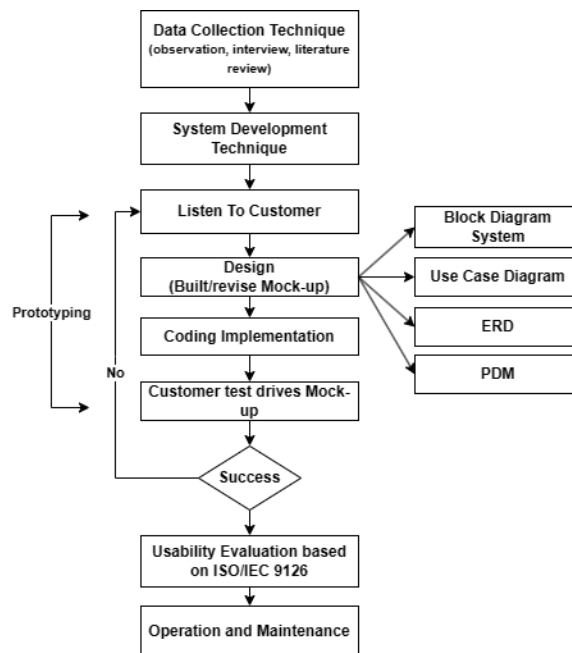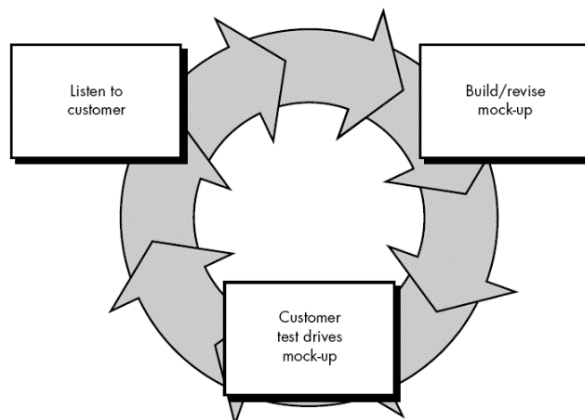
Figure 1. Stages in research

Figure 2. Prototyping Methodology

The initial stage in research is to identify data collection techniques. The second stage is to identify the software development techniques that will be used. The third stage has entered the implementation stage of the prototype method, namely listening to customers, built/revising mock-ups, coding implementations, and customer test drives mock-ups. After success the next stage is usability evaluation based on ISO/IEC 9126 and the last stage is operation and maintenance[16]. The recommended development stages for a prototyping methodology are shown in Figure 2. Based on the figure shown in Figure 2, the following are the implementation of the petcare information system that will be developed.

2.1 *Listen To Customer*

As shown in Figure 3, researchers are using a variety of techniques to capture the following needs:
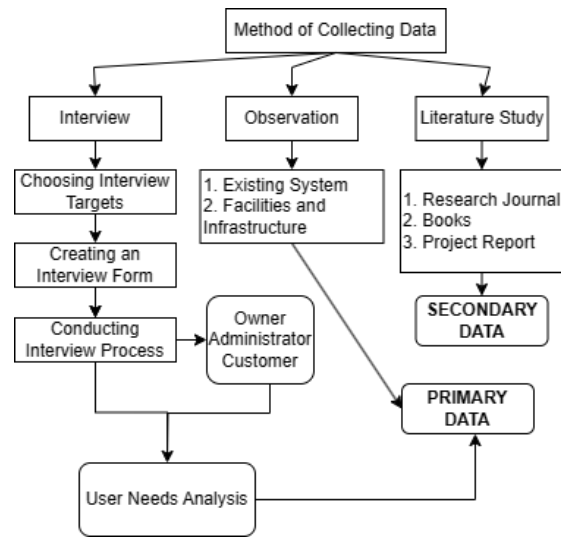
Figure 3. Method of Collecting Data

2.1.1 Interview

The interview method involves interaction between the researcher and the research subject through direct conversation. The main purpose of the interview is to obtain in-depth information regarding the subject's views, experiences, attitudes, and knowledge regarding the research topic. Interviews can be structured (pre-planned questions) or unstructured (more flexible questions, follow the flow of the conversation) [13].

The purpose of creating an interview form is to understand the user's needs [17]. The focus and goals in system design also depend on the results of the interview briefs. This is because the required function is clearly described in the form. A form used in the interview process. You will be asked questions about the interview form based on a question grid that looks like this:

1. Questions about User Requests.
2. Questions about problems encountered
3. Questions about desired features
4. Questions about the look and design of menus
5. Questions about infrastructure preparation during system deployment.

2.1.2 Observation

The observation method involves direct observation of behavior, interactions, or events in contexts that are relevant to the research topic [18]. The researcher becomes a passive observer or sometimes interactive, but the goal is to collect objective data about what is happening.

a. Existing System

On the old system, petcare owners use Microsoft 365 which has limited features. Owners want a system that is easy to adopt and effective in bridging pet care owners and customers.

b. Facilities and Infrastructure

Niz Petcare's information technology infrastructure is sufficient. Large numbers of computers and Internet networks are also available and highly feasible as a practical network infrastructure for implementing software.

2.1.3 Literature Study

The literature study method involves research, collection, and analysis of literature and written sources that already exist on the research topic. This includes books, journal articles, research reports, and other relevant sources.
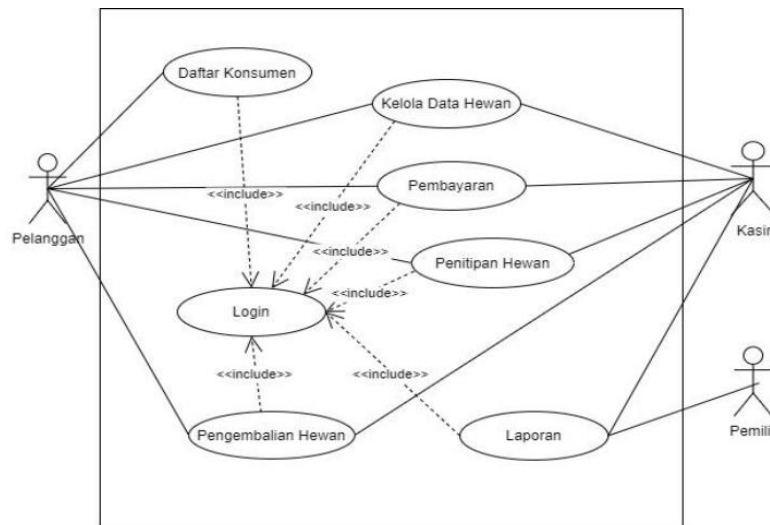
Figure 4. Use Case

2.2 *Built / Revise Mockup*

2.2.1 System Design

Based on the identified user needs, there are three stakeholders in this use case diagram: the owner, the cashier, and the customer. For more information on system tasks and features, see the use case diagram in Figure 4. Use case diagrams are diagrammatic depictions that describe all activities of users or actors with the system, in this case it will be known how the system activities or activity processes in the system [19].

Entity Relationship Diagrams (ERDs) also aim to describe the relationships between objects in the system [20]. The resulting ERD (Entity Relationship Diagram) design is created according to the system requirements as shown in Figure 5 below. Entity-Relationship Diagram (ERD) is a visual diagram that is used to describe the structure and relationships between entities in a database. ERD assists in planning, designing, and modeling how data will be stored and linked in a particular system or business. ERD uses graphic symbols to describe entities, attributes, and relationships between these entities. In ERD as described in Figure 5 , there are several main components:

1. Entity: An entity is an object or concept in the real world that you want to represent in the database. Entities can be physical objects, abstracts, or concepts. For example, in a petcare business, entities could be "Pet," "Owner," and "Vet."
2. Attributes: Attributes are characteristics or information associated with an entity. For example, on the "Patron" entity, the attributes could include name, type, and age. Attributes provide details about the entity.
3. Relationships (Relationships): Relationships describe the way entities interact or relate to each other in the database. For example, the "Owned" relationship between "Care Animal" and "Owner" indicates that each pet is owned by one owner.
4. Cardinality (Cardinality): Cardinality indicates how many entities are involved in a relationship. For example, a cardinality of 1:1 or 1:N describes how many entities are connected in the relationship.

ERD helps visually describe the structure of data and how these entities interact, thereby helping developers, analysts and stakeholders to better understand the design basis data before implementation. ERD is also useful in identifying data requirements, avoiding ambiguity, and planning the logical layout of information in database systems.

Physical Data Model or PDM is a schema model that implements the first concept of a conceptual data model or database so that it is ready to be implemented as an actual database, at that time it is necessary to overcome the concept of a database model [20]. It is also very important for the completeness of the design process in the database [21].
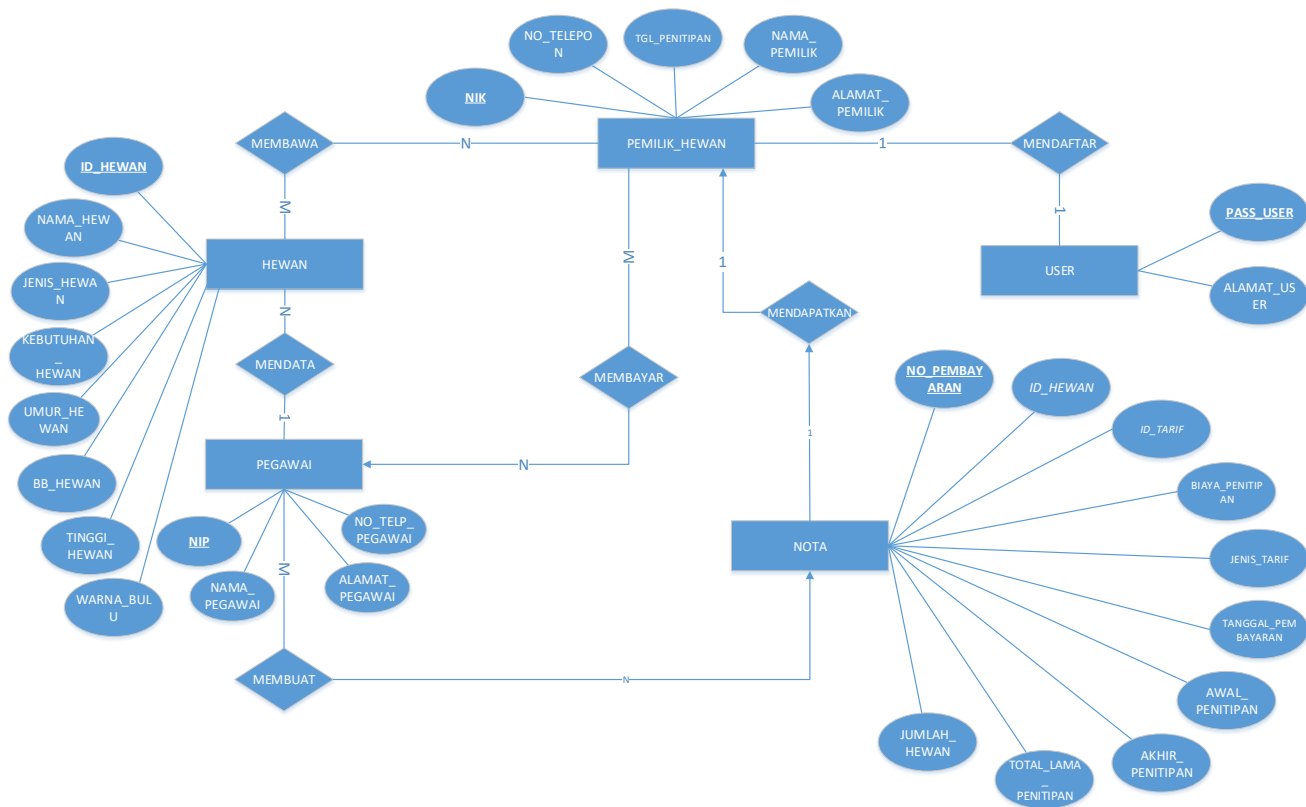
Figure 5. Entity Relationship Diagram
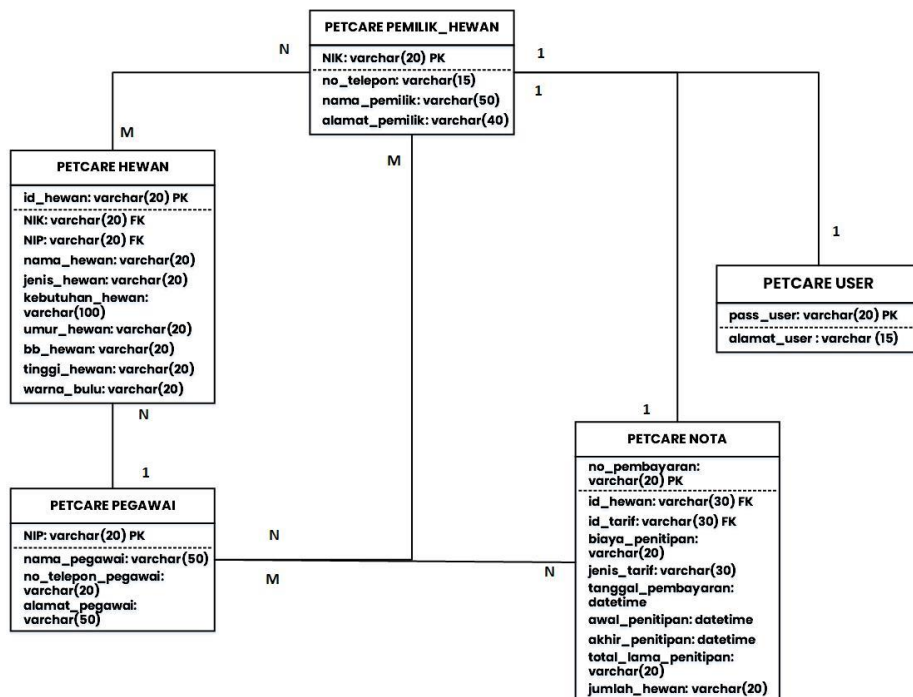

Figure 6. Physical Data Model (PDM)

The Physical Data Model (PDM) is a concrete representation of the data structure in a database, which includes technical details such as data types, sizes, indexes, keys and constraints. PDM is an advanced stage after the Entity-Relationship Diagram (ERD) in the process of designing an information system or database. In the context of the petcare

system, PDM will detail how the entities and relationships in the ERD will be implemented in the form of tables, columns and constraints in the database.

The following is an explanation of PDM in the petcare system as described in Figure 6 :

1. Tables and Columns: In PDM, each entity in the ERD will be converted into a table in the database. Each attribute of the entity will be represented by a column in the table. For example, in a petcare system, you might have a "Pets" table with columns like "AnimalID", "Name", "Type", and so on.
2. Data Type and Size: Each column will have a data type corresponding to the type of information stored in it. For example, a column that stores pet names might use a string (varchar) data type of a certain size, while a column that stores ages might use an integer data type.
3. Primary Key and Foreign Key:PDM will determine the primary key (primary key) of each table, which uniquely identifies each row in that table. If there is a relationship between the tables, the PDM will also define a foreign key that links the primary key of one table to the primary key of another table.
4. Index: Indexes are structures in the database that help speed up searching and retrieving data. In PDM, you'd plan to create indexes on specific columns that are frequently used in search or sort operations.
5. Constraints and Limitations: The PDM will also include other constraints or restrictions, such as data validation rules, value limitations, or certain business rules that must be enforced in the database.
6. Normalization: Normalization is the process of organizing tables and columns in a database to avoid redundancy and maintain data integrity. PDM will ensure that the database structure has been normalized according to needs.

By detailing all these technical aspects, PDM helps database developers and administrators to implement a conceptual design (ERD) into a ready-to-use database. This ensures that the database is well built, efficient, and can optimally support the business needs of the petcare system.

Based on Table 1, after carrying out testing queries, relating them in the form of an erd schema, it can be produced that the design of the database is running well and is ready to be applied to the next stage of the coding process in information system development. Make a temporary design based on problem analysis and elicitation of user needs obtained from the needs gathering stage through interviews and observation [22]. Where the expected design features are explained in Table 2.

Based on Table 2, the customer owner and administrator created login forms and dashboards, for the owner more specifications to the report. For customers with more specifications to manage animal data and payment. For administrators more specifications to manage data.

Table 1. Validation of Data

Name Table	ERD Scheme	Testing Query	Validation
Table User	4 Atribute	Define Good	Valid
Table Animal Owner	5 Atribute	Define Good	Valid
Table Employee	4 Atribute	Define Good	Valid
Table Animal	8 Atribute	Define Good	Valid
Table Price	4 Atribute	Define Good	Valid
Table Memorandum	8 Atribute	Define Good	Valid

Table 2. Feature Design

Owner	Customer	Administrator
Login Forms	Login Forms	Login Forms
Dashboard	Dashboard	Dashboard
Report	Change Personal Data	Change Personal Data
	Manage animal data	Manage Customer Data
	Payment	Manage animal data
	Report	Payment
		Report

Figure 7. Mockup Mobile Customer

In Figure 7 above Mockup Mobile Customer on petcare is a rough visual representation of the user interface (UI) for mobile applications aimed at customers in the petcare business. This mockup provides an initial idea of how the app will look and interact with the user. The main goal of this mockup is to depict the layout, structure, and basic interaction flow in an app without going into too much detail.

Here are some points that need to be considered in making a Mobile Customer Mockup for petcare as described in Figure 7:

1. Page Layout: The mockup will depict the general layout of the pages in the app, including the header, footer and content areas. This includes elements such as page titles, petcare business logos, and navigation buttons.
2. Navigation: The mockup will show how users can move between different parts of the app, for example navigation menus or tabs.
3. Pet List: In a petcare application, users may wish to view a list of pets owned by them. The mockup will show how to present this information, including a picture, name, and type of pet.
4. Schedule and Appointments: If the app allows the user to make appointments or view pet grooming schedules, the mockup will show a calendar or list view of the schedule.
5. Pet Details: Users may want to see more information about their pet, such as medical history or vaccination data. The mockup will show how this detail page will look like.
6. Vet Contact: If the app allows the user to contact the vet, the mockup will show an interface for making a call or sending a message to the vet.
7. Search: If the app has a search feature, the mockup will show the search view and search results.
8. Basic Interaction: The mockup may not interact fully like a real app, but it will show how buttons and other elements change appearance when clicked or interacted with.
9. Color and Visual Design: While the mockup may not be as detailed, it will provide guidance on using colors, icons, and other visual elements that match the brand identity of the petcare business.

By using this mockup, the development team can better communicate interface design to the design team or other stakeholders before starting to develop the full application. This helps ensure that the customer's mobile applications for petcare businesses are well designed and match the user's needs and business goals.

By designing a mobile application like the one below, it will help progress in promotions and facilitate transactions where users can register directly and can order online and pick up and drop off. In this case, the user application will be distinguished from Niz Petcare because later there will be transaction bookkeeping in it [23]. Apart from that, the other advantages of this mobile application are helping customers wherever and whenever they are more efficient in terms of time, online ordering, reminder notifications and much more.
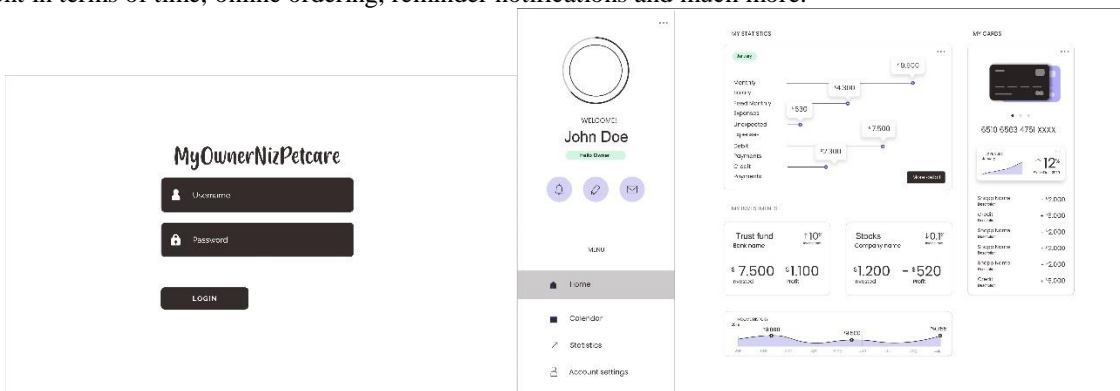

Figure 8. Mockup Login and Dashboard Owner

The Login and Dashboard Owner Mockup in the context of a petcare application is a visual representation of the user interface concept that focuses on the login steps to the account and the main panel view for the pet owner. The Login Mockup as described in Figure 8 section will feature elements such as a login form which includes fields for entering an email address and password, as well as a "Sign In" button which will take the user to the dashboard if authentication is successful. Additionally, a "Forgot Password" link or similar help button may be included to assist the user in resolving login issues.

On the other hand, the Owner Dashboard Mockup will illustrate how pet owners can interact with the app after logging in. This includes a welcome view, a list of pets with basic information such as name and picture, and the option to view notifications regarding scheduled appointments or grooming. The dashboard section will also provide access to a grooming schedule calendar, with options to view the pet's medical history and vaccinations. Users will be able to add new pets, manage their profile and log out of the account via intuitively integrated buttons.

In terms of design, this Mockup will reflect the brand identity of a petcare business by using a suitable color palette, pet-relevant icons, and an easy-to-navigate layout. This Owner Login and Dashboard Mockup helps the development and design team in designing a user-friendly interface that suits the needs of pet owners in managing and caring for their pets through the application.

The owner dashboard in the context of petcare is an interface or page specially designed for pet care business owners. This dashboard provides fast access and critical information needed by business owners to manage and monitor the daily operations of their petcare business. The following is an explanation of the components that are generally found in the petcare owner dashboard based on Figure 8:

1. Business Summary: An overview of business performance, including revenue, number of customers and most demanded services.
2. Schedule and Appointments: Details about the scheduled appointment.
3. Ability to add, change or delete appointments.
4. Notifications about upcoming appointments.
5. Service Management: Management of services offered, including description, price, and duration.
6. Ability to add or remove new services.
7. Arrangement of service availability schedules and officers.
8. Customers: List of customers who have used the service.
9. Contact details and customer information.
10. Service history that has been taken by each customer.
11. Finance (Financial):
12. Monitoring of business income and expenses.
13. Financial reports, including profit and loss statements, balances, and customer payments.
14. Integration with payment systems and transaction tracking.
15. Product Stock (Product Inventory):Stock management of products such as food, toys or pet supplies.
16. Product availability monitoring and alerts when stock is low.
17. Analytics and Reports: Business performance reports, such as monthly revenue reports, new customers and most popular services.
18. Data analysis to assist business decision making.
19. Settings (Settings): Dashboard configuration and business settings.
20. Setting hours of operation, prices, discounts, and other preferences.
21. Notifications and Messages: Notifications about new appointments, payments, or other important information.
22. Ability to communicate with customers through messaging systems.
23. Emergency Contacts: List of emergency contacts who can be contacted in urgent situations.

Customer Login and Dashboard Mockups in the context of a petcare application refer to a visual representation of a user interface specially designed for customers using pet care services. The Login Mockup as described in Figure 9 above will depict login elements, including a form for entering login information such as email address and password. A "Sign in" button will connect the user to the Customer Dashboard if authentication is successful, while an option to resolve forgotten password may also be provided for convenience.

In the Customer Dashboard Mockup, the first view after entering will be shown, displaying welcome information and icons of the petcare business. The main area of the dashboard will display a list of pets owned by the customer, with the animal's photo and name as the main information. Notifications and reminders regarding scheduled appointments or treatments will also be prominently displayed. This section will also show the option to view maintenance schedules in calendar or list form.
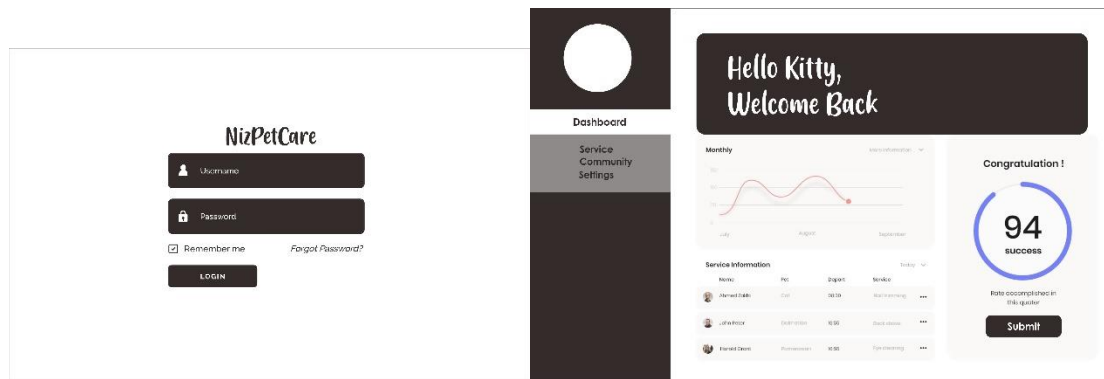
Figure 9. Mockup Login and Dashboard Customer

In the pet details view, users can click on an animal to view further information such as medical history, vaccinations and care records. In addition, options to add new pets or manage customer profile information are clearly visible in the dashboard. All elements will be designed with ease of use and intuitive layout in mind, using a color palette and visual elements that are consistent with the brand identity of the petcare business. This Customer Login and Dashboard Mockup provides a clear initial view of how a customer will interact with the app to effectively manage their pet care.

Customer dashboard (customer) in the context of petcare is an interface or page designed to provide a better experience for pet owners who use the services of a pet care business. This dashboard allows pet owners to access and manage information regarding services, appointments, grooming history, and interactions with petcare businesses. The following is an explanation of the components commonly found in the petcare customer dashboard based on Figure 9 :

1. Customer Profile (Customer Profile):Pet owner's personal information, such as name, address, phone number and email.
2. Pet data, including breed, name, age and medical history.
3. Appointments: List of scheduled appointments.
4. Ability to change or cancel appointments.
5. Notifications about upcoming appointments.
6. Service History:
7. Complete record of care services that have been taken by the pet.
8. Information about the type of service, date, results, and health records.
9. Booking and Payments: Ability to place new service orders online.
10. Information about prices, discounts, and available payment methods.
11. Payment history and receipts.
12. Notifications:
13. Notifications about appointments, payments, or other important information.
14. Notification of special offers or promotions that pet owners may be interested in.
15. Remote Consultations: If a remote consultation service is offered, pet owners can access information regarding consultations with veterinarians.
16. Emergency Contacts: Emergency contact information that can be contacted in an urgent situation.
17. Account Settings (Account Settings): Management of account preferences, such as passwords, notifications, and communication preferences.
18. Reviews and Ratings (Reviews and Ratings): Ability to provide reviews and ratings of services that have been taken.
19. Reviews and ratings provided by previous pet owners.
20. Questions or Help (Questions or Help): Feature to ask a question or seek help if needed.
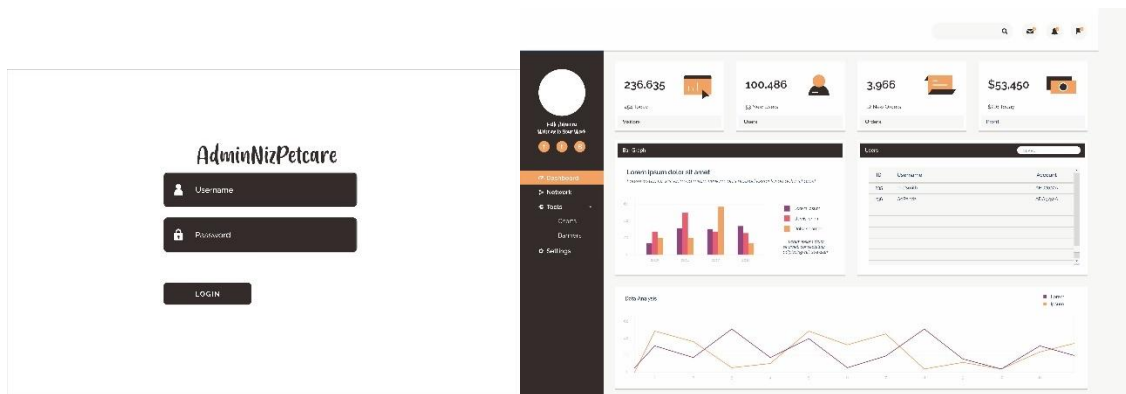21. Possible interaction with the customer service team.

Figure 10. Mockup Login and Dashboard Administrator

The admin dashboard in the context of a pet care business is an interface or page specifically designed for the administration and operational management of the business. This dashboard gives the management team or business owner access to oversee and manage various aspects of operations, including managing staff, services, customers, and financial reports. The following is an explanation of the components commonly found in the petcare admin dashboard based in Figure 10 above:

1. Business Summary: An overview of business performance, including revenue, number of customers and other statistical details.
2. Staff Management (Staff Management): Information about working staff, including name, title, schedule, and assigned tasks.
3. Ability to add, modify or remove staff.
4. Service Management: Setting and managing the services offered, including description, price and duration.
5. Scheduling services and assigning staff to specific services.
6. Customer Management (Customer Management):A list of registered customers, including contact information, service history and pet health records.
7. Ability to add, modify or delete customer data.
8. Operational Schedule: Scheduling of staff, services, and maintenance rooms.
9. Coordination of appointments, service availability, and staff assignments.
10. Finance and Reports (Financial and Reports): Monitoring of business income and expenses.
11. Financial reports, including profit and loss statements, balances, and tax reporting.
12. Data analysis to assist business decision making.
13. Inventory Management: Stock management of products such as food, toys and pet supplies.
14. Product availability monitoring and notifications when stock is running low.
15. Analysis and Statistics (Analytics and Statistics): Business performance reports, including trend analysis and relevant statistical data.
16. Monitoring the success of a promotion or marketing campaign.
17. System Settings: Basic dashboard configuration and business settings.
18. Setting hours of operation, prices, staff preferences, and more.
19. Messages or Notifications (Messages or Notifications): Internal communications and notifications from staff or business owners.
20. Information about schedule changes, alerts, or other important events.
21. Security and Access: User access and permission settings by roles and responsibilities.
22. Protect sensitive data and customer privacy.

2.2.2 System Architecture and Coding

The system architecture in the Petcare application is a crucial foundation to ensure the smoothness and reliability of all operational processes. This architecture will consist of several components that interact with each other to create a seamless experience for users. In general, a system will have three main layers: a presentation layer, a business logic layer, and a data layer. The presentation layer will be responsible for the user interface, including the Administrator Dashboard view and the Login page. The business logic layer will govern all core operations such as pet management, appointment scheduling and product management. The data layer will manage the storage and retrieval of necessary information, such as user data, pet data, and transaction information.
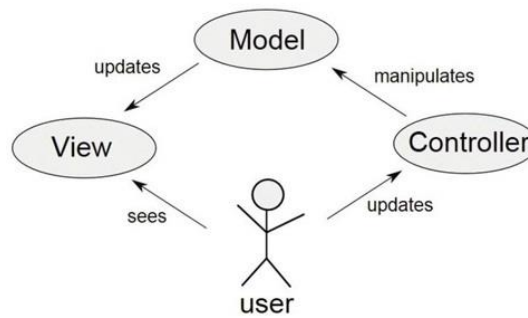
Figure 11. System Architecture

Table 3. Codings form Model View Controller

Model	View	Controller
Master_Model	Login Forms	Login_Forms
Login_Model	Animals	Animals_Register
UserLevel_Model	Customer	User_Insert
UserAkses_Model	Payment	User_Update
User_Model	Setting	User_Edit
Animal_Model	Manager	User_Delete
Payment_Model		User_Level
		User_Menu
		Payments_Menu
		Settings_Menu

The communication between the layers will be managed through an API (Application Programming Interface) which will enable secure and efficient exchange of data between the components. The use of a robust and scalable database will support proper data storage and management, while the integration of security technologies such as data encryption will ensure the protection of sensitive information. In an increasingly connected environment, scalability will also be taken into account in this architecture, allowing the system to grow according to needs without sacrificing performance.

The importance of system architecture in Petcare applications as described in Figure 11 below reflects how the overall success and effectiveness of this platform depends on how the components interact and support one another. By designing a careful architecture and adhering to best practices, the Petcare app will be ready to better meet the challenges of managing information and operations in the pet care industry.

With the model ready, the next step is design the system architecture. System architecture designed based on system requirements to facilitate the system development process and clarify system behavior. The code system used employs a Model View Controller (MVC) framework that facilitates the transformation of information systems by developers. The program code is then compiled into the PHP programming language using the CodeIgniter 4.0 framework and the MySQL database. System architecture design shown in Figure 11.

The implementation of the MVC architecture in coding this Petcare information system is shown in Table 3. Table 3 is the view controller model implemented in coding. the model describes the data, the view describes the display and the controller describes the logic and functions in programming.

2.2.3 System Testing & Evaluation Blackbox Testing

Subsequent testing is intended to be performed in a variety of ways, including functional testing, user acceptance testing (UAT), Blackbox testing and usability testing.

User Acceptance Testing is testing performed directly on Niz Petcare implementing the system. The system is evaluated through usability testing to measure the quality of software developed according to the ISO/IEC 9126 standard. The ISO/IEC 9126 classification is used to rate user responses according to their level of comprehension. The development system he consists of four parts: easy to understand, easy to learn, user friendly and engaging.

2.3 *Customer Test Drive Mockup Testing*

Evaluation of prototype iteration is a crucial process in product or system development. In this method, a phased model is started or a prototype is built based on initial requirements and specifications. Each prototype is thoroughly evaluated to identify strengths, weaknesses, and fitness for purpose. This evaluation includes gathering feedback from users or stakeholders that helps direct improvements in each subsequent iteration. With this approach, products can be continuously added incrementally over time, minimizing the risk of costly design errors in the final stages of development, like the Table 4.

The evaluation and iteration process of the prototype in the context of the Petcare application is an important step to ensure that the solution developed is truly effective and meets user needs. At this stage as described in Table 4, an initial prototype of the system will be introduced to a group of test users which includes pet service admins as well as pet owners. These test users will have the opportunity to actively operate prototypes and provide feedback on the interface, functionality, and ease of use. Evaluation is carried out through observation, interviews, and surveys to identify strengths, weaknesses, and areas of improvement that need to be changed in the next iteration.

After getting feedback from test users, the development team will iterate on the prototype by fixing the problems identified. Changes may include user interface enhancements, workflow enhancements, and customization of features based on expressed needs by test users. Furthermore, the updated prototype will be tested again by test users in repeated cycles of evaluation and iteration. This process takes place several times until the prototype reaches an adequate level of maturity, according to the expectations and needs of the user. By carrying out this evaluation and iteration cycle, the Petcare application can experience continuous improvement to produce an optimal solution to support the operation and management of pet care services as a whole.

The final iteration of the prototype evaluation is carried out iteratively by several parties until the desired system is achieved. Four iterations of evaluating animal care information system development based on the results of user interviews for model evaluation.

Table 4. Evaluation Iteration of Prototype

| First Iteration		
Pages	**Revision Note**	**Reason of Revision**
Administrator Login Pages	Add admin logo on administrator login page	the admin logo will differentiate from other users when entering the system
Customer Login Pages	Add a forgot password feature on the customer login page	the forgot password feature will be very good if the customer forgets the username and password
Owner Login Pages	Add the owner logo on the owner login page	the owner logo will differentiate from other users when entering the system
Dashboard Pages	Animal images are clearer and more detailed	animal type characteristics and animal details need to be added on the dashboard page as this is an important feature
Animals Register Page	Add the type of animal on the register page page	the type of animal signifies the price of the safekeeping
Second Iteration		
Pages	**Revision Note**	**Reason of Revision**
Section Page	Add page sections to secure pages on different devices	to secure the device when accessed from a different device
Payment Pages	Add location features	The location feature determines the price when the pet will be picked up and delivered
Third Iteration		
Pages	**Revision Note**	**Reason of Revision**
Logout Page	Add a Logout Page	To make it easier for users to secure their data
BackUp Data	Add Database Backup feature on Administrator Page	Facilitate administrators in backing up and restoring data
Fourth Iteration		
Pages	**Revision Note**	**Reason of Revision**
Finished	Finished	Finished

Figure 12. Mainpage Website
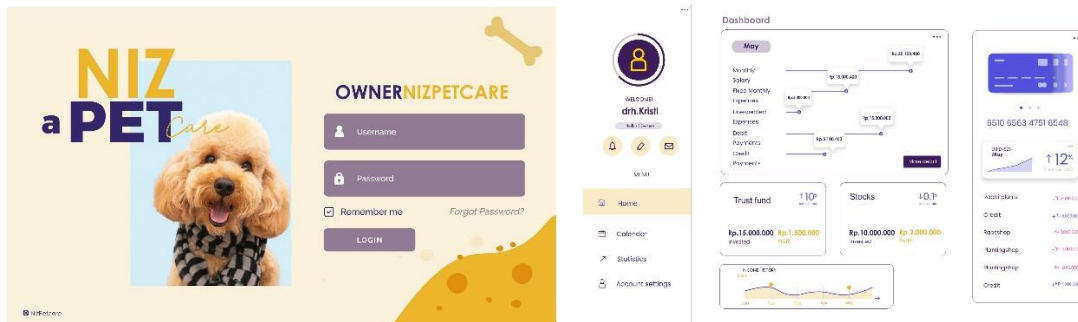
Figure 13. Login & Dashboard Owner

3. RESULT AND DISCUSSIONS

Due to issues with NIZ Petcare, it is known that the old system still does not meet the expectations and expectations of pet owners. Therefore, there is a need to develop a pet care information system that can support the pet care process and report results in real time. From the coding stage, the system is defined as: The main page of a Niz petcare website has an important role in providing an overall picture of the services and objectives of the platform.

On Figure 12 explain this main page, visitors will be greeted with an informative and inviting display, which includes information about the various pet grooming services offered, such as health care, grooming, day care and training. In addition, attractive pictures of happy and healthy pets can give visitors an emotional touch, increasing visual appeal. The main page (Mainpage) of the Petcare website is designed as an inviting and informative gateway for visitors. On this main page, users are greeted with an attractive visual design, perhaps with a picture of a cheerful pet or a comfortable grooming atmosphere. Important information such as the services offered, Petcare's vision and mission, as well as special offers can be displayed clearly and attractively at the top of the page. A call-to-action button such as "Schedule an Appointment" or "Pet List" will provide directions for visitors to take further action.

This page may also feature testimonials from pet owners who are satisfied with the services provided, which can build trust in potential customers. Finally, the intuitive layout and easy navigation help visitors quickly find the information they are looking for, such as service schedules, contacts, and clinic or treatment center locations. Thus, the main page of a petcare website acts as an inviting gateway to understand more about what this platform has to offer in caring for and caring for pets with the utmost care and expertise.

The login section of the petcare platform is the initial interface that allows pet owners to access their personal accounts. Here, pet owners can enter their unique credentials, such as a username and password, to log into the system. Upon successful login, the pet owner will be redirected to the owner dashboard which provides comprehensive access to information and features related to their pet. The owner dashboard provides important information such as treatment schedules, medical history, vaccination records, and the possibility to make or manage an appointment with a veterinary care professional. With an intuitive interface, pet owners can efficiently manage and care for their pets, making the animal care experience more organized and meaningful.
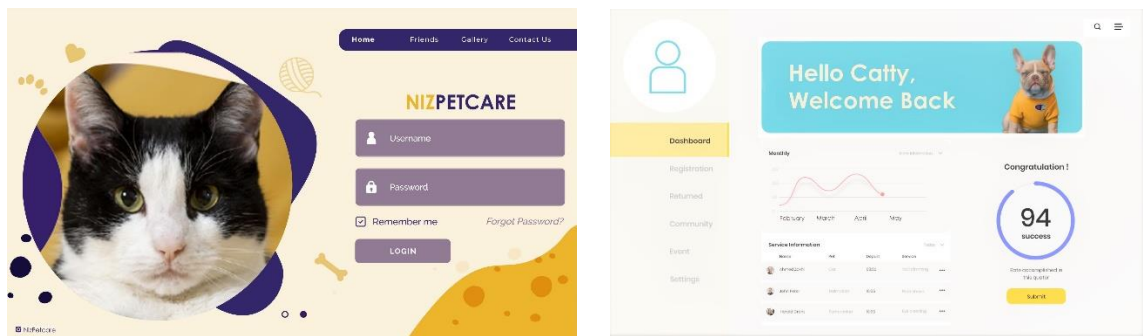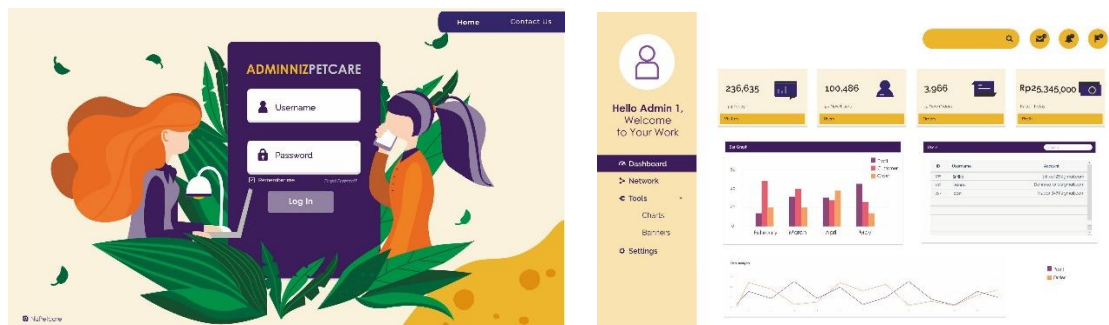
Figure 14. Login &Dashboard Customer

Figure 15. Login &Dashboard Administrator

On Figure 13 explain The Owner Login & Dashboard features in the Petcare application are designed to provide a personalized and integrated user experience. On the Login page, the pet owner will be able to access his personal account using a secure username and password combination. Once logged in, they will be redirected to the intuitive Owner Dashboard. This dashboard gives pet owners easy access to information related to their pets, including health data, vaccination schedules, and history of visits to Petcare services. Appointment booking features and additional services can also be accessed through this dashboard. With an easy-to-understand interface and clear navigation, pet owners can easily manage their pet's needs and schedule services efficiently through this Owner Login & Dashboard.

The login section on as described in Figure 14 is the starting point where customers can access their personal account by using credentials such as username and password. After a successful login, the customer is directed to the customer dashboard which provides complete access to various features and information related to pet services. The customer dashboard provides the ability to set appointments, view past service history, access animal care articles, and communicate with care professionals via integrated messaging. With a user-friendly interface, customers can easily plan and manage their pet care, creating a well-planned and comfortable experience in caring for their pet's welfare.

The login section in the petcare system is the entry point for admins to access their administration panel using unique credentials. After a successful login, the admin is redirected to the admin dashboard as described in Figure 15 which gives full control over the operation and management of the entire platform. The admin dashboard provides tools for managing service schedules, managing a team of grooming professionals, monitoring customer activity, and managing pet and owner information. With a streamlined interface, admins can manage daily operations in a more structured and effective way, keeping petcare services running smoothly and ensuring customer satisfaction and pet welfare are maintained.

3.1 *Functional Testing*

Functional Testing is a Blackbox type software testing approach that successfully tests all the functions and features of an application or system without paying attention to the details of the internal code. By focusing on the expected input and output, this test ensures that the software behaves as it should according to its functional specifications.

Table 5. BlackBox Testing

No	Test Scenario	Result	Conclusion
	BlackBox Testing		
1	Testing Login entering the correct "Username & Password", then click "Enter"	Succed	Valid
2	Testing View Dashboard each user	Succed	Valid
3	Testing View, Add, and Edit each Data	Succed	Valid
4	Testing Payment Page	Succed	Valid
5	Testing Validation Payment	Succed	Valid
6	Testing Register Animal	Succed	Valid
7	Testing Register Customer	Succed	Valid
8	Testing Section	Succed	Valid
9	Testing backup feature	Succed	Valid
10	Testing logout	Succed	Valid

In this test, several test scenarios are used to validate each feature, identify bugs, and ensure proper integration between different components. The success of Blackbox Functional Testing lies in its ability to uncover problems that may occur on the user side and ensure that the software provides the experience that the end user expects. Functional testing uses blackbox testing which is useful for knowing system readiness and bugs contained in each feature. Black box tests for administrators, teachers, and students are shown in Table 5.

3.2 *User Acceptance Testing (UAT)*

User Acceptance Testing (UAT) on Niz petcare websites is an important testing stage in which pet owners or potential users these days are actively involved to enable the functionality and performance of the website. At this stage, the user will perform a number of scenarios and tasks including registration, making appointments, accessing the desired treatment information, and interacting with other features. UAT aims to ensure that websites meet users' expectations, are easy to use, and match their needs. Feedback provided by users during the UAT stage is invaluable in identifying issues, errors or improvements needed before the website is officially launched.

A system evaluation was conducted to determine the user evaluation of the constructed NIZ Petcare information system. During the evaluation phase, usability tests are performed using various models to check how well users understand the system to be created. The type of usability testing used is the ISO/IEC 9126 standard, which focuses on understanding software. Four criteria are used: Easy to understand, easy to use, easy to learn, and interesting.

In the context of Petcare applications as described in Table 6, ISO/IEC 9126 is a crucial criterion for assessing software quality holistically. This criterion covers a number of important aspects, such as functionality, graphics, efficient, ease of maintenance, portability and security. Petcare applications must meet mandatory standards by providing features that suit user needs, such as pet management, appointment scheduling, and product management. Reliability is an important factor in ensuring the system operates uninterruptedly, with good error handling and failure recovery. Efficiency measures how well an application manages resources and time to provide a fast and effective response. Ease of maintenance involves a well-structured structure and adequate documentation to facilitate future development and repair. Portability ensures applications can run in a variety of environments, while protecting sensitive data and users from outside threats. By meeting these ISO/IEC 9126 requirements, the Petcare application can provide users with a reliable, efficient and safe experience.

Table 6. ISO/IEC 9126 Criteria

No	Criteria
	Understandability
P1	User understand how the information contained in the Niz Petcare system is presented
P2	An easy-to-understand introduction to the menus and functions of the NIZ Petcare system
P3	The operation of the NIZ Petcare system is easy to understand without explanations or instructions.
	Operability
P4	Easy to use payment system
P5	User quickly learned how to use the features available in the NIZ Petcare System
P6	User can operate all functions and layouts available in the NIZ Petcare system
	Learnability
P7	User easy to learn how to use this NIZ Petcare system
P8	User have no problems using the system
P9	User had no problems entering and collecting data
	Attractiveness
P10	User interested the features of this NIZ Petcare System

No	Criteria
P11	User did not require duplicate work
P12	User like the NIZ pet care system because very simple

Table 7. ISO/IEC 9126 Calculation

No	Value Amount					Total Value	Value Min	Value Max	Percentage (Total/Max)* 100%
	SA	A	N	D	SD				
P1	8	5	2	0	0	66	15	75	88%
P2	7	6	2	0	0	65	15	75	87%
P3	9	4	1	0	0	64	15	75	85%
P4	8	5	2	0	0	66	15	75	88%
P5	9	4	2	0	0	67	15	75	89%
P6	6	6	3	0	0	63	15	75	84%
P7	8	6	1	0	0	67	15	75	89%
P8	8	5	2	0	0	66	15	75	88%
P9	7	7	1	0	0	66	15	75	88%
P10	8	5	2	0	0	66	15	75	88%
P11	8	5	2	0	0	66	15	75	88%
P12	9	4	2	0	0	67	15	75	89%

Notes: SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree

A total of 15 respondents consisting of 2 owners, 3 managers and 10 customers questioned the subjectivity of various choices namely: strongly agree, agree, neutral, disagree and strongly disagree. The results were then measured by assessing respondents' responses on a Likert scale. Calculated results based on measurements using ISO/IEC 9126 Likert scale shown in Table 7.

Based on Table 7 to identify the ISO/IEC 9126 score, the total value is used, which is the total accumulated score from SA + A + N + D + SD, the **Value Min** is the minimum value of the total sum of SA + A + N + D + SD and the **Value Max** is the maximum value of the total sum of SA + A + N + D + SD. The maximum total percentage is 100%. From the results of the data above it can be noticed that out of the 12 criteria (P1 - P12) no one gets the Disagree (D) and Strong Disagree (SD) values. If you look at it, Strongly Agree (SA) is the number that is often filled in by respondents. Figure 16 shows the recapitalization results based on the ISO/IEC 9126 assessment.

Based on the ISO/IEC 9126 percentage chart shown in Figure 16 above, the criteria with the greatest value for understanding on P05, P07, and P09 is 89%, usability on P05 is 89%, and learning on P07 is 89% and 88% power handling at P10. From the results of the summary of the evaluation, it can be concluded that there are if the users of the system are owners, customers, administrators, fully aware of the ease of understanding, learning, use and attractiveness of the NIZ pet care information system created.
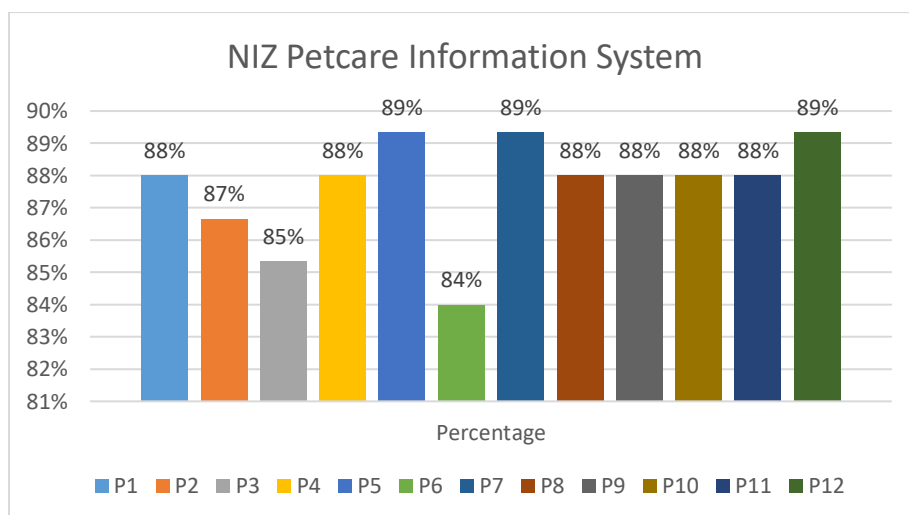

Figure 16. Graph of the recapitulation results

4. CONCLUSION

Based on the research and experiments conducted, this research uses a four iterative process to keep the system running well and make it easier for NIZ Petcare owners to operate this information system. The coding test using the BlackBox test shows a valid conclusion and the user satisfaction rating using ISO/IEC 9126 is successful with a percentage of more than 80%. Based on calculations using a Likert scale, the average percentage of P1 to P10 with the Understandability, Operability, Learnability and Attractiveness criteria shows more than 80%.

After going through the evaluation process, there are several suggestions to further improve the information system being developed, including (1) Data security is further enhanced, because this information system involves transactions; (2) Development to newer methods and features of artificial intelligence to detect pets based on their characteristics; (3) If possible, develop for mobile functionality with multilingual support.

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