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Mobile Based Animal Health Consultation Service Information System Using the Agile Feature-Driven Development Method

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Abstract

Digital transformation in the field of animal health has become urgent along with the increasing need for fast, easily accessible, and efficient services. This study aims to develop a mobile-based animal health consultation service system to facilitate interaction between animal owners and veterinary medical personnel online. This system is designed to be able to answer the limitations of conventional services that are often constrained by distance, time, and limited information. The development was carried out using the Feature Driven Development (FDD) method, which focuses on designing and implementing key features based on user functional needs. The FDD method allows for an iterative and structured development process, with an emphasis on team collaboration and feature sustainability. The final result of this study is a mobile application that supports real-time consultation features, recording animal health history, integrating doctor and user data, and managing service queues. System trials were conducted through a heuristic approach and direct testing by prospective users, which showed a high level of functionality and usability. With this approach, the developed system not only improves service efficiency but also contributes to the acceleration of the digitalization of the animal health sector in Indonesia.

Keywords: *Information Systems, Online Consulting, Feature-driven development, Mobile Applications, Feature Driven*

1. Introduction

Digital transformation in the health sector has not only touched the human sector, but has also begun to penetrate animal health services. In Indonesia, the pet population has increased significantly, especially in urban areas. Based on data from the Indonesian Veterinary Association (ADHI), the number of pets such as dogs and cats in Indonesia in 2023 is estimated to reach more than 27 million [1]. However, the distribution of veterinary medical personnel is still uneven; with a ratio of only around 1 veterinarian per 5,000–7,000 animals, especially outside Java [2]. This condition shows an urgent need for a more accessible, efficient, and geographically equitable animal health service system. A mobile-based consultation information system is a strategic solution because it is able to reach users in real-time, flexibly, and location-based [3]. A survey by the Indonesian Pet Health Tech Forum (2022) also showed that 72% of pet owners in big cities prefer online consultation services to face-to-face visits, especially for minor complaints or initial consultations [4]. This service is also considered more time and cost-effective, and allows pet owners to get initial medical advice without having to leave their homes.

Along with the increasing needs, the design and development of reliable and user-friendly systems are the main factors for the success of technology adoption. Therefore, an adaptive, structured, and user-focused software development approach is needed. One relevant approach is Feature Driven Development (FDD), an agile methodology that prioritizes system development based on the features needed by users. FDD starts its process from mapping domain needs, feature grouping, to modular implementation that can be developed iteratively [5]. In previous studies, the FDD method has been shown to increase system development efficiency up to 30% faster than the waterfall method on similar systems [6]. In addition, limited infrastructure and operational costs are often obstacles for conventional animal health facilities, especially in remote areas. Lack of integration of animal medical data, minimal historical documentation health, and manual administrative processes slow down case management and medical decision making. Implementation of an integrated mobile-based information system can facilitate more accurate and documented recording of disease history, storage of vaccination data, and monitoring of therapy. This approach can also be a communication bridge between veterinarians and animal owners through interactive features such as*chat*, upload a picture of symptoms, or a video of a consultation.

Although several animal health consultation service applications have begun to emerge, most are still generic, not specific to the context of local needs, and have not fully used a structured development approach. This causes limitations in terms of scalability, data security, and system sustainability. Therefore, this research not only contributes to the development of information systems technically, but also fills the gap in academic studies related to the application of Feature Driven Development methodology in the domain of animal health services.

Thus, this research offers a technology-based solution that is not only functional, but also socially relevant, contextual, and ready to be widely implemented.

2. Theoritical Framework

2.1. Digital Based Animal Health Services

Conventional animal health services still face many obstacles, especially in terms of affordability, efficiency, and medical documentation. Information technology-based innovations have begun to be adopted to address these needs, such as in the form of online consultation applications and digital recording systems for animal medical histories. Studies show that mobile-based animal health consultation systems can increase access to medical services by up to 55% in urban areas [7]. In addition, digital systems also enable efficiency in case triage, communication between veterinarians, and ongoing education of animal owners [8].

2.2. Mobile Information Systems in Veterinary Context

The development of mobile-based information systems offers high flexibility, speed, and affordability. In the context of animal health, Android or iOS-based applications are able to provide features such as text or video consultations, uploading photos of symptoms, and vaccination history. Users are more likely to use application-based services than websites because of the more practical and personal user experience (UX) [9]. The implementation of responsive interface design and integration with cloud databases also play an important role in ensuring system reliability [10].

2.3. Feature Driven Development (FDD) in System Development

Feature Driven Development (FDD) methodology is an Agile approach that focuses on developing small features that can be implemented and tested immediately. FDD has proven to be efficient in projects with evolving needs and lots of user interaction. In previous research, FDD was able to accelerate the application release cycle up to 30% faster than traditional methods such as waterfall, especially in medium-scale projects [11]. FDD starts from mapping domain requirements (*domain modeling*), feature list identification, feature-by-feature planning, and collaborative modular coding [12].

2.4. Research Gaps and Study Contributions

Although many studies have been conducted in the development of animal health applications, most have not integrated a specific and structured Agile development approach such as FDD. In addition, the adaptation of the system to the local context in Indonesia, including language, user culture, and specific needs, has not been discussed in depth. Therefore, this study is here to bridge the gap through the development of a mobile-based animal health consultation system designed using the Feature Driven Development approach, with a focus on the context of local needs and system sustainability.

3. Methodology

This research uses a software engineering approach with the Feature Driven Development (FDD) method,**s**One of the methods in Agile Development that focuses on developing systems based on features that users need directly [13]. This method was chosen because of its iterative, modular characteristics, and is suitable for small to medium development teams in projects with medium complexity [14].

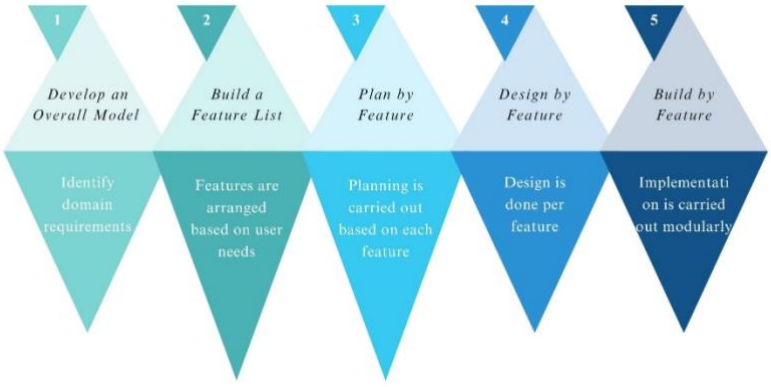

Fig. 1: Stages of Feature Driven Development

3.1. Development Method

The FDD stages in this research include five main phases [15] :

1. Develop an Overall Model : Identify domain needs and map the overall animal health consultation process.
2. Build a Feature List : Features are arranged based on user needs, such as registration, consultation via chat, uploading symptoms (images), notifications, and medical record management.
3. Plan by Feature : Planning is done based on each feature with time and resource allocation.

4. Design by Feature : Design is done per feature, including creating UI mockups, database structures, and system logic architecture.
5. Build by Feature : Implementation is done incrementally and modularly. Each feature is unit tested before full integration.

3.2. Types and Subjects of Research

This type of research is Research and Development (R&D) which focuses on the design and implementation of a mobile-based animal health consultation service system. The research was conducted in several stages: needs analysis, system design, implementation, testing, and user evaluation. The research was conducted in the Makassar City Agriculture and Fisheries Service environment. The research subjects included 2 veterinarians, 1 UI/UX designer, 1 developer, and 15 active users of the application who were selected purposively.

3.3. Tools and Materials

The application is developed using React Native for mobile platforms,Firebase as backend and database, as well as Figma for user interface design. Testing is done with tools such as Postman for APIs and Firebase Analytics for user behavior.

3.4. Data Collection Techniques

Data were collected through several methods to ensure the depth and diversity of information. First, participant observation was conducted on user interactions when accessing and using the system prototype, in order to understand natural behavior and potential obstacles in using the application. Second, semi-structured interviews were conducted involving veterinarians and end users as respondents, to explore their perspectives on needs, expectations, and experiences in online animal health consultation services. Finally, data were also obtained through a User Acceptance Test (UAT) questionnaire designed to assess the extent of ease of use (usability) and level of user satisfaction with the developed system.

3.5. Data Analysis Techniques

Qualitative data from interviews were analyzed by grouping answers based on themes or similarity of responses. Meanwhile, quantitative data from UAT results were analyzed descriptively using percentages and average scores from the Likert scale. System evaluation also considered usability and functionality as indicators of system quality.

4. Result and Discussion

4.1 Requirement Analysis

The application was developed based on six main user needs, namely: user authentication, chat-based consultation, uploading symptom photos, consultation history, interactive notifications, and veterinarian profile management. These features are designed to support responsive, safe, and easily accessible animal health services digitally.

4.2 System Design

The system has two main actors: User (Animal Owner) and Veterinarian. Each actor interacts with the system through specific features. The use case diagram illustrates the main scenarios that support online animal health consultation services. Use Case Diagram The system design used in this study includes the following:

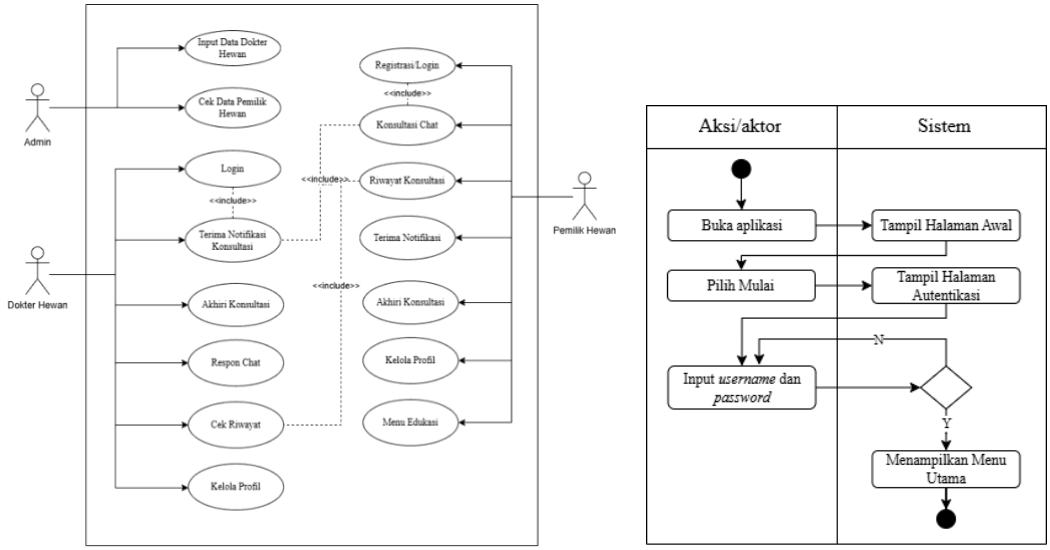

Fig. 2: Use Case Diagram and Activity Diagram

4.3. User Interface

The user interface is designed with an approach*user-centered design* to ensure ease of navigation, clarity of display, and comfort of use. The visual design is made simple, intuitive, and consistent to minimize the learning curve and increase the efficiency of interaction in using the application, both by general users and veterinarians.

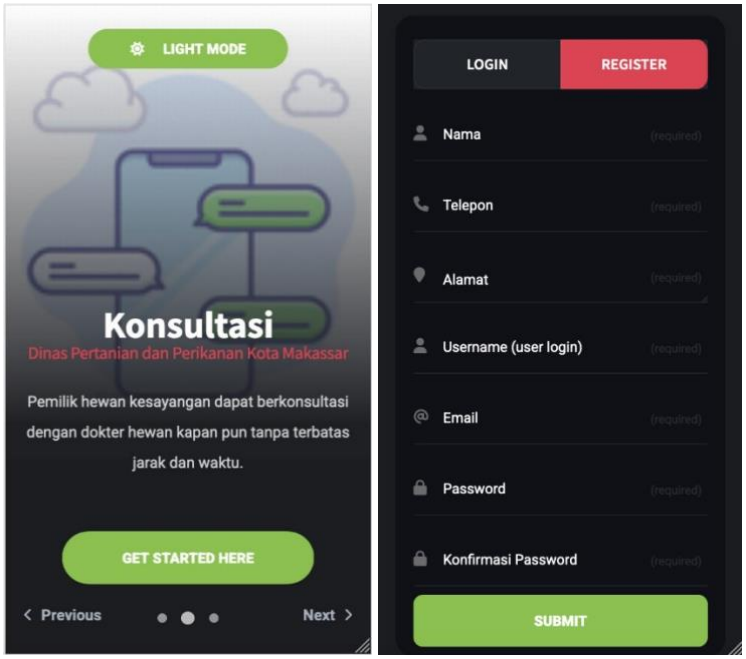

Fig. 3: Home Page View and Login Menu

Based on Figure 3, this initial page is created so that users can get initial information regarding the application and users can access the main page after logging in/registering for first-time users.

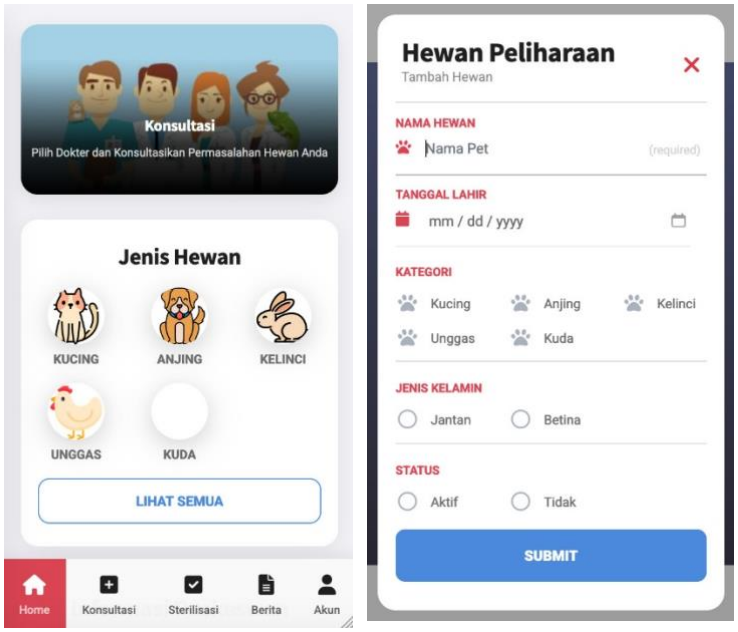

Fig. 4: Main Menu and Consultation Menu Display

The interface in Figure 4 shows the design of an online consultation system for animal health that is user-friendly and easy to access. On the main page (home), users are greeted with a consultation banner that directs pet owners to start an online consultation session with a veterinarian. Right below the banner, there is an "Animal Type" section that displays the main categories such as cats, dogs, rabbits, poultry, horses and other types of animals. Each category is equipped with a visually appealing icon illustration, so that users can quickly recognize and select the type of pet. The "View All" button allows access to additional categories if any. The application navigation is designed simply and is located at the bottom of the screen, with icons representing the five main menus: Home, Consultation, Sterilization, News, and Account. This makes it easy for users to move between features without confusion.

On the "Add Pet" form (second image), users can enter complete data about their pets. Information that can be inputted includes the name of the animal, date of birth, animal category (with the same options as on the main page), gender (male or female), and animal status (active or inactive). All options are displayed in the form of interactive and responsive radio buttons and icons. The color design used is predominantly white and blue, creating a clean, professional, but still friendly impression. The use of clear typography and a systematic form structure make this application usable by various groups of users, including those who are not used to using digital applications.

Overall, This interface reflects a design approach that focuses on user convenience and efficiency in managing pet data and accessing healthcare services online.

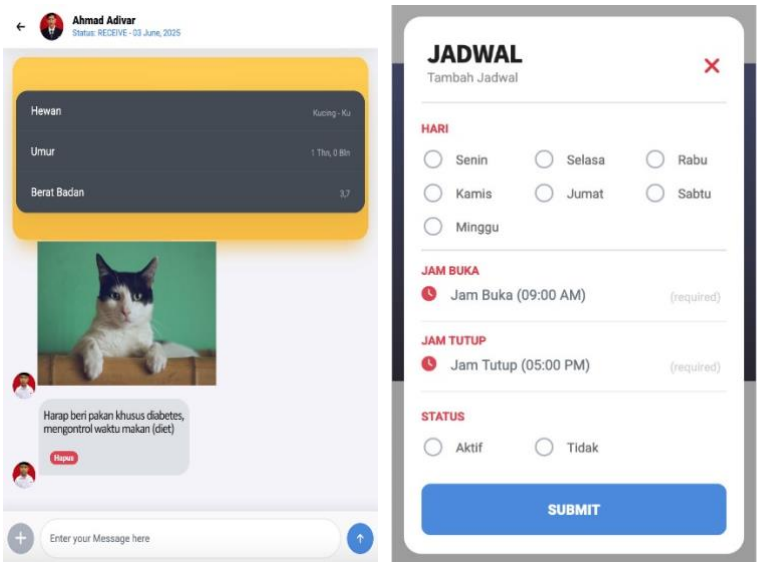

Fig. 5: View of the Consultation Chat Menu and Practice Schedule Settings Menu

Figure 5 displays two important features, namely the online consultation menu and the veterinary practice schedule setting. In the chat consultation feature between the veterinarian and the animal owner, there is brief information about the animal being consulted, such as the animal's name, age, and weight, which makes it easier for the doctor to provide relevant and targeted advice. At the bottom, there is a two-way communication flow menu via text message. The doctor provides medical instructions, such as providing special feed and regulating diet, which shows that this feature can be used for routine consultations or handling specific cases. The input column at the bottom allows users to send reply messages in real time.

The second image shows a display of the practice schedule setting form for veterinarians. This feature allows doctors to determine the days and hours of operation, including the opening and closing hours of the consultation service. There is also an option to set the schedule status whether it is active or not. All elements of the form are arranged systematically and responsively, making it easier for doctors to manage consultation time flexibly and efficiently. These two menus are integrated to support online-based animal health consultation services, prioritizing ease of use, speed of communication, and flexibility of practice schedules.

4.4. System Testing

System testing was conducted using the Black Box Testing approach to verify that each major function in the application runs correctly according to specifications. The test results are shown in Table 1, which covers six major features of the system. The table shows that all features, from user registration to veterinarian profile management, have been tested and declared**valid**. The registration feature can run smoothly, while the chat-based consultation feature has successfully implemented real-time communication. The process of uploading symptoms in the form of images also produces optimal resolution. In addition, notification of responses from doctors appears quickly, consultation history is automatically saved, and doctor profiles can be updated as needed.

Table 1: System Test Results

No	Feature	Testing Status	Information
1	User registration	Valid	No errors
2	Chat-based consultation	Valid	Real-time communication
3	Upload symptoms (images)	Valid	Optimal image resolution
4	Doctor response notification	Valid	Notifications appear quickly
5	Consultation history	Valid	Data is saved automatically
6	Veterinary profile	Valid	Data can be updated

4.5. User Acceptance Test (UAT) Evaluation

In addition to functional testing, a User Acceptance Test (UAT) was also conducted on the comfort and feasibility aspects of the system. This evaluation involved users who represented the final target of the application, with a scale assessment of 1–5 on several usability aspects. The evaluation results are shown in Table 2. The ease of use (UX) aspect received the highest score of 4.7, indicating that the application interface is easy to understand and use by users. The feasibility of the system for use obtained the highest average value of 4.8, followed by user satisfaction (4.6), system response speed (4.5), and completeness of features (4.4). These values indicate that the system has been very well received by users and is ready for operational use.

Table 2: User Acceptance Test (UAT) Evaluation

No	Evaluation Aspect	Average Score (1–5)
1	Ease of use (UX)	4.7
2	System response speed	4.5
3	Completeness of features	4.4

4	User satisfaction	4.6
5	Eligibility for use	4.8

5. Conclusion

The development of a mobile-based animal health consultation service system with a Feature Driven Development (FDD) approach has produced an application that is able to bridge the interaction between animal owners and veterinarians effectively, efficiently, and in a structured manner. The application of the FDD method allows feature development to be carried out in a modular manner and oriented to the real needs of users, resulting in a system that is adaptive and focused on the main functional value. This application integrates six initial features, namely user authentication, chat-based consultation services, symptom uploads in the form of photos, consultation history, interactive notifications, and doctor profile management. The implementation results show that this system is able to provide responsive and easy services.

Accessible, while accelerating the consultation process and early decision-making in handling animal health problems. With its contribution to the digitalization of veterinary services, this system not only increases accessibility, but also opens up opportunities for the development of a sustainable technology-based animal health service ecosystem. For further research, development can be directed at integrating artificial intelligence (AI) features for early diagnosis and expanding the reach of services to remote areas with the support of technology *offline-first*.

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