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Multi-Branch Veterinary Clinic Management System

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Abstract - **Manual processes in multi-branch veterinary clinics often result in unorganized records, scheduling conflicts, and difficulties in managing sales and inventory, leading to slow and error-prone operations. This study aims to develop a Multi-Branch Veterinary Clinic Management System to improve efficiency, accuracy, and coordination of daily operations across multiple clinic branches. The system was developed using the Agile Software Development Life Cycle, with PHP Laravel, MySQL, Tailwind CSS, and the PhilSMS API, and was evaluated through functional testing and usability assessment. Results showed a 100% functional testing pass rate and a System Usability Scale score of 70.8, indicating good usability and improved operational performance. Overall, the system reduces errors and enhances service delivery, with future work suggesting the inclusion of a Pet Owner Portal to further improve user engagement.**

Keywords - Centralized Management, Multi-Branch, Veterinary Clinic, Web-based System,

I. INTRODUCTION

Web-based information systems have become essential tools for improving service delivery and data management in veterinary clinics [2]. Modern veterinary practices increasingly rely on information systems to manage appointments, pet medical records, and inventory to enhance efficiency and accuracy [1]. However, many multi-branch veterinary clinics still depend on manual or spreadsheet-based processes, resulting in delayed record retrieval, scheduling conflicts, and inaccurate inventory tracking [4]. This study was conducted at a veterinary clinic with branches in Bulua and El Salvador, Misamis Oriental, where the lack of a centralized system affects inter-branch coordination and service delivery, making it an appropriate setting for the development of a Multi-Branch Veterinary Clinic Management System [5].

II. PROBLEM STATEMENT

Multi-branch veterinary clinics often encounter operational challenges due to the use of manual or spreadsheet-based processes. These challenges include difficulty in organizing and retrieving pet medical records, scheduling conflicts in appointments, inaccurate sales and inventory tracking, and delays in inter-branch referrals. Clinic staff experience increased administrative workload and inefficiencies when updating records, monitoring inventory, and coordinating services across branches. At the same time, pet owners are affected by missed follow-up appointments, delayed services, and limited communication, which negatively impact customer satisfaction and service quality. These issues were evident in the veterinary clinic operating in Bulua and El Salvador, Misamis Oriental, where the absence of a centralized system resulted in uncoordinated data management, time-consuming manual inventory checks, and delayed access to patient histories between branches. The lack of automated notifications further contributed to missed appointments and inefficient service delivery. These problems highlighted the need for an improved, centralized system to enhance efficiency, accuracy, and coordination in multi-branch veterinary clinic operations. To address these challenges, a Multi-Branch Veterinary Clinic Management System was proposed to automate and centralize clinic processes. The system aims to streamline appointment scheduling, medical record management, sales and inventory monitoring, and inter-branch data sharing. By utilizing a centralized database, role-based access, and SMS notification features, the proposed system is intended to reduce administrative workload, minimize errors, improve data security, and enhance overall service delivery across multiple clinic branches.

III. OBJECTIVES OF THE STUDY

The general objective of this study is to design and develop a secure and efficient Multi-Branch Veterinary Clinic Management System that supports centralized record-keeping and multi-branch access. Specifically, the study aims to:

1. Develop a web-based system that enhances branch management for super administrators.
2. Design a centralized database for secure and organized storage of patient records, inventory, and appointments.
3. Replace manual processes with automated workflows to improve operational efficiency.
4. Evaluate the system's functionality to ensure it operates as intended.
5. Assess system usability and effectiveness using the System Usability Scale (SUS).
6. Evaluate system performance in terms of speed, reliability, and scalability.
7. Integrate an SMS alert feature for timely appointment reminders and notifications.

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IV. REVIEW OF RELATED WORKS

Several local and foreign studies have explored the development of veterinary clinic and pet care management systems to improve record management, appointment scheduling, and service efficiency. Studies by Yeow Jing and Hazalila [12], Mukhlis et al. [13], and Varca [14] focused on web-based veterinary systems developed using PHP, MySQL, and MVC-based frameworks. These systems successfully automated clinic operations such as reservations, medical records, inventory tracking, and report generation. However, most lacked advanced notification mechanisms, real-time synchronization, and multi-branch support. Other studies, including Putri et al. [15] and Nurnajlaa and Nur Ariffin [16], developed mobile and web-based pet care applications using structured development models such as Waterfall and iterative approaches. While these systems improved data organization and reduced manual workload, limitations were noted in flexibility, scalability, and user-centered feature integration. The absence of automated reminders and centralized data access restricted their effectiveness, particularly for clinics with growing operational demands. More recent studies by Gunaratne et al. [17], Balasooriya et al. [18], and Gallaza et al. [20] emphasized modern technology stacks and Agile methodologies, integrating features such as real-time messaging, cloud hosting, and analytics. Although these systems enhanced user engagement and service accessibility, many focused on specific functionalities such as pet tracking, adoption, or e-commerce and did not fully integrate inventory, billing, and inter-branch coordination. The reviewed studies demonstrate the effectiveness of digital systems in improving veterinary clinic operations. However, gaps were identified in centralized multi-branch management, real-time data synchronization, and integrated appointment, inventory, and notification features. These limitations guided the design of the proposed Multi-Branch Veterinary Clinic Management System, which aims to provide a centralized, scalable, and user-centered solution to address the operational challenges of multi-branch veterinary clinics.

V. METHODOLOGY

This section presents the research methodology used in developing the proposed Multi-Branch Veterinary Clinic Management System. The researchers adopted the Agile Software Development Life Cycle (SDLC) methodology to ensure that the system met the specific needs of the veterinary clinic. The Agile model emphasizes flexibility and iterative development, allowing continuous stakeholder feedback and adaptation to evolving requirements. This approach facilitates early detection and resolution of issues, contributing to improved system quality and alignment with the clinic's operational needs (Ahmad & Salamat, 2024) [25]. The SDLC phases applied in this study include Requirements, Design, Development, Testing, Deployment, and Review, conducted in iterative cycles to support continuous improvement. During the Requirements phase, the researchers gathered all functional and non-functional data necessary for system development. Interviews with the clinic owner, guided by twenty prepared questions, helped identify operational challenges, inefficiencies, and priorities for the proposed system (Gallaza et al., 2024).

Fig. 1. Agile Methodology

In the Design phase, the documented requirements were translated into visual and technological models serving as a blueprint for development. Tools such as ClickCharts were used to create wireframes and diagrams, including Manual Process Flow, Logical Entity-Relationship Diagrams (ERD), Data Flow Diagrams (DFD), Use Case Diagrams, and Flowcharts. These diagrams provided clear visualization of clinic operations, system features, and data flow, ensuring a solid foundation for development (Yeow & Kamaludin, 2023; Neoh & Howe Yik, 2024). The Development phase implemented the system using a Three-tier Architecture—Presentation Layer, Application Layer, and Database Layer—allowing modular development and scalability. Front-end development used HTML, CSS, JavaScript, and Bootstrap to create a responsive and interactive web interface, while the Laravel framework handled backend logic, role-based access, referrals, appointments, sales, and service management. Twilio SMS API was integrated to automate appointment notifications to pet owners. The Database Layer used MySQL to manage normalized tables for users, branches, pets, appointments, services, products, sales, and referrals, ensuring secure and structured data storage (Muhammad Dicky et al., 2025).

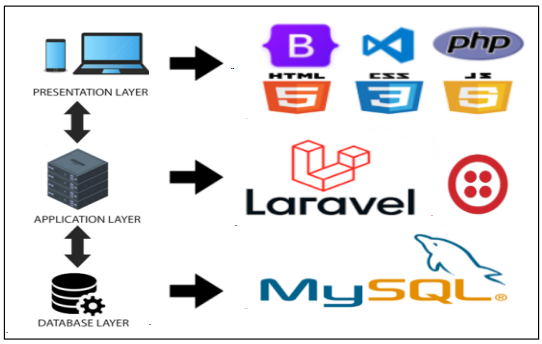

Fig. 2 Three-tier Architecture

Testing involved Functional Testing and Usability Testing using the System Usability Scale (SUS). Functional Testing verified system behavior against requirements (Keploy, 2024), while SUS assessed user experience, interface navigation, and overall usability. This phase ensured the system met functional

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and usability standards before deployment. During the Deployment phase, the system was launched on Hostinger, with server configuration, production database setup, and user training conducted to ensure smooth adoption. Finally, the Review phase included code and design evaluations, stakeholder presentations, and feedback collection, ensuring the system was fully functional, secure, and user-approved for daily operations. The methodology ensured that the Multi-Branch Veterinary Clinic Management System was developed systematically, aligned with user needs, and capable of improving administrative efficiency, data accuracy, and coordination across multiple clinic branches.

VI. RESULT AND DISCUSSION

The results demonstrated that the Multi-Branch Veterinary Clinic Management System performed effectively in automating and streamlining clinic operations. Users were able to complete critical tasks such as pet registration, medical service documentation, inventory tracking, and billing significantly faster than with the previous manual method. The system maintained high performance during testing, and users reported that the interface was intuitive and easy to navigate. By transitioning to a digital platform, the clinic reduced administrative delays, improved data organization, and allowed for more accurate real-time monitoring of multiple branches. When compared to the previous manual workflow, the developed system showed substantial improvements. The manual method relied on paper-based records and physical inventory counts, which were prone to human error and slowed down client service. In contrast, this system enables instant record retrieval, automated stock alerts, and centralized management. Furthermore, the integration of specialized features like SMS notifications and multi-branch data switching provides capabilities that were entirely absent in the manual process, enhancing communication between the clinic and pet owners.

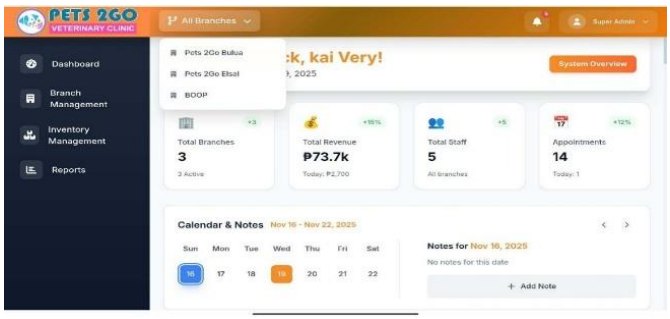

Fig 3.0 High Fidelity User Interface for Super Admin Dashboard

Figure 3.0 presents the High-Fidelity Dashboard for the Super Admin. The interface provides a comprehensive overview of clinic performance, displaying key metrics such as total revenue, staff count, and pending appointments. The left sidebar ensures quick navigation between branch management, inventory, and reports, while the central calendar allows for real-time tracking of clinic activities across all locations.

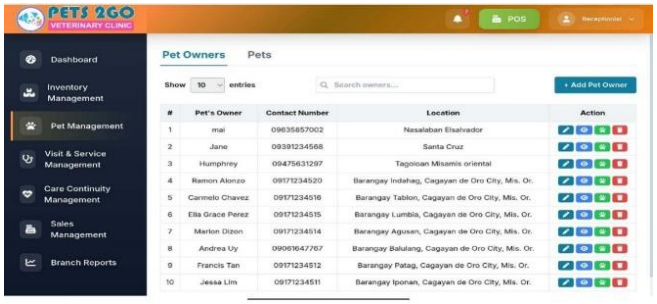

Fig 4.0 High Fidelity User Interface for Pet and Owner Management

Figure 4.0 illustrates the Pet and Owner Registration Interface. This page allows receptionists to manage customer data efficiently. It features a detailed table showing owner contact information and linked pet profiles. Action buttons enable staff to edit records, add new pets, or view medical histories instantly, ensuring that patient data is always up to date and accessible for the veterinarians.

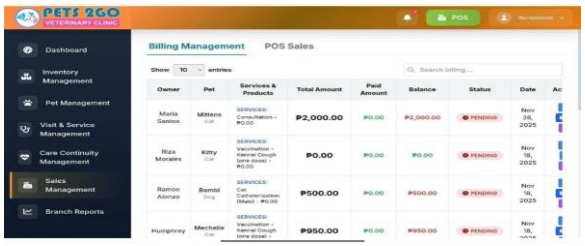

Fig 3.0 High Fidelity User Interface for Billing and POS Management

Figure 3.0 shows the Billing and Point of Sale (POS) Interface. This module automates the financial transition from clinical service to payment. It displays a summary of services rendered, total charges, and payment status. The system supports various payment options and allows for the immediate printing of receipts and billing assessments, reducing the time spent on manual calculations and improving financial transparency. The system successfully addressed the core problems identified in the study. The results proved that digitizing the veterinary process reduced the heavy administrative workload, minimized record-keeping errors, and improved service delivery. User feedback indicated a strong acceptance of the system.

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Table 1.0 Final SUS Score Computation

Participants	Total Score	SUS Score (2.5)
Participant 1	24	60
Participant 2	21	52.2
Participant 3	32	80
Participant 4	34	85
Participant 5	35	87.5
Participant 6	24	60
Overall Mean SUS Score		70.8

The final System Usability Scale (SUS) scores indicate that the system has an average usability score of 70.8, which represents "Good" overall usability. Administrative staff, including the Super Admin and Receptionists (P4, P5), provided the highest scores (85 and 87.5), as the system directly simplified their complex tasks in billing and inventory management. These participants, generally in the 24–35 age range, adapted quickly to the digital workflow. Conversely, some veterinarians and staff with lower digital literacy (P2) gave lower scores, reflecting initial difficulties in navigating a laptop-based system after years of manual record-keeping. This suggests that while the system is intuitive, first-time users may benefit from a brief orientation. The SUS results highlight specific areas for further refinement. While the high scores from administrative users confirm that core functions like branch switching, SMS notifications, and billing are working well, the lower scores from a few participants point to a need for clearer navigation cues and larger text for accessibility. Addressing these minor usability concerns will further reduce user frustration and encourage the long-term adoption of the platform. During the usability testing, several positive and negative insights were recorded. On the positive side, most staff completed their tasks successfully despite initial hesitation, and the system demonstrated fast processing times under stable network conditions. Negative insights included some confusion during the first-time use of the POS module and slower page loads when the internet connection was weak. Some participants asked for assistance with specific fields, such as the Intake Sheet or Service Pairing rules, while others required guidance due to difficulty reading the interface without eyeglasses. However, these issues are manageable through future UI updates and short training sessions. Overall, the system successfully solved the major challenges of slow manual processing and scattered records, proving its value for both clinic staff and pet owners.

VII. SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This study focused on the design, development, and evaluation of a Multi-Branch Veterinary Clinic Management System, a centralized web-based solution intended to address administrative inefficiencies experienced by a veterinary clinic operating multiple branches. The system aimed to improve record management, appointment scheduling, inventory control, billing, and inter-branch coordination while ensuring secure and accurate data handling. The researchers adopted the Agile Software Development Life Cycle (SDLC) methodology, allowing iterative development and continuous feedback throughout the project. The methodology covered requirements gathering, system design, development, testing, deployment, and review. The system was implemented using PHP/Laravel as the backend framework, MySQL as the centralized database, Tailwind CSS for the user interface, and the PhilSMS API for automated SMS notifications related to follow-up appointments. Usability testing and functional validation were conducted in a live hosted environment prior to final refinements.

Results from scenario-based and functional testing showed that the system was fully operational across all tested modules. A total of thirty-five (35) functional test cases covering branch management, pet registration, visit tracking, services, billing, payments, inventory updates, and SMS notifications achieved a 100% pass rate, confirming system reliability and accuracy. The system successfully automated key clinic operations such as billing generation, data synchronization across branches, appointment scheduling, and follow-up reminders, significantly reducing manual workload.

Usability evaluation using the System Usability Scale (SUS) yielded a score of 70.8, which falls within the *Good* and *Acceptable* range. Participants found the system easy to navigate, well-organized, and suitable for daily clinic operations. Although users with lower digital literacy experienced minor difficulties with tasks such as inventory adjustments and product editing, overall feedback confirmed that the system effectively replaced manual processes. Performance testing showed quick response times, with login processes taking 2–6 seconds and most tasks completed within 1–2 minutes, indicating readiness for real-world deployment.

Based on the findings, all seven specific objectives of the study were successfully achieved. The system effectively centralized multi-branch operations, enabling administrators to manage branches, users, services, and records through a unified platform. Seamless data synchronization across branches was validated through system testing, confirming the effectiveness of the centralized database design.

The integration of automated SMS notifications using PhilSMS further enhanced appointment management and customer communication. Functional and usability evaluations confirmed that the system is reliable, user-acceptable, and capable of supporting daily clinic operations. The study demonstrated that a web-based system developed using Laravel and MySQL is an effective solution for modernizing veterinary clinic operations across multiple locations.

Despite minor limitations related to internet connectivity and varying user familiarity with technology, the successful deployment of the system in both Bulua and El Salvador branches demonstrated its scalability and readiness for future expansion. Overall, the system provided an effective solution to administrative inefficiencies, improved service delivery, and enhanced customer satisfaction.

Based on the successful implementation and evaluation of the system, it is recommended that the veterinary clinic proceed with full deployment and continuous use across all branches.

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The system should be consistently utilized for appointment scheduling, billing, inventory management, and pet medical record tracking to maintain data accuracy and operational efficiency. To further enhance system functionality, the clinic may consider acquiring additional equipment such as a digital signature pad for consent forms and a USB camera for capturing pet images. Feature enhancements suggested by the client include dashboard navigation shortcuts for follow-up appointments, photo upload functionality in diagnostics, controlled data entry for grooming records, and a dedicated prescription module. Comprehensive user training programs are also recommended to support users with lower digital literacy. Providing manuals, video tutorials, and on-screen guidance can improve system adoption and long-term usage.

For future development, researchers are encouraged to implement a Pet Owner Portal that allows clients to request appointments, view pet medical records, and monitor payments online. Integration with online payment gateways and additional third-party services is also recommended to further improve system convenience, scalability, and adaptability to future digital healthcare solutions.

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