# Cover Page

**AGROPET VETCONNECT:**

**A Web-Based Platform for Veterinary Services in Nigeria**

**BY**

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**BU/23A/IT/8001**

**DEPARTMENT OF COMPUTER SCIENCE**

**BAZE UNIVERSITY**

**ABUJA**

# SEPTEMBER, 2025

# Title Page

**AGROPET VETCONNECT:**

**A Web-Based Platform for Veterinary Services in Nigeria**

**Project Submitted in Partial Fulfilment of the Requirement for the Degree of**

**B. Sc.**

**In**

**Computer Science**

**By**

**CHUKWUNONSO ANIKPE LAWRENCE**

**BU/23A/IT/8001**

**To**

**The Department of Computer Science**

**Baze University, Abuja**

**September, 2025**

# DECLARATION

I hereby declare that this project entitled “AGROPET VETCONNECT: A Web-Based Platform for Veterinary Services in Nigeria” was carried by me under the supervision of Dr. Usman Bello Abubakar. The work has not been presented in any previous work for the award of a BSc degree to the best of my knowledge. The work is entirely mine and I accept the sole responsibility for any error that might be found in the work, while the reference to publish material have been duly acknowledged.

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**CHUKWUNONSO ANIKPE LAWRENCE Date**

**BU/23A/IT/8001**

**APPROVED BY**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Head of Department,**

**Department of Computer Science**

# CERTIFICATION

This is to certify that this project entitled “AGROPET VETCONNECT: A Web-Based Platform for Veterinary Services in Nigeria”, being submitted by Chukwunonso Anikpe Lawrence in partial fulfilment of the requirement for the award of degree for B.Sc. in Computer Science to the Department of Computer Science, Baze University Abuja, Nigeria is a record of the candidate’s own work carried out by the candidate under my supervision. The matter embodied in this project is original and has not been submitted for the award of any other degree.

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Date Dr Usman Bello Abubakar

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# APPROVAL

This is to certify that this project entitled, Design And Implementation of a Collaborative Academic Platform for Computer Science Students with Inter-University Leader Board Competitions by Chukwunonso Anikpe Lawrence with BU/23A/IT/8001 has been approved by the Department of Computer Science, Faculty of Computing and Applied Science, Baze University, Abuja, Nigeria.

**By**

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Full Name Date/Sign

Supervisor

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Dr. C. V. Uppin Date/Sign

Head, Department of Computer Sciences

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Prof. Peter Ogedebe Date/Sign

Dean, Faculty of Computing and Applied Science

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External Examiner Date/Sign

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# DEDICATION

I dedicate this work to God Almighty, whose grace and mercy made this accomplishment possible. To my family, whose endless love, support, and encouragement have kept me grounded and focused throughout my academic journey. And to all individuals passionate about improving lives through technology this project is a reflection of that vision.

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# ACKNOWLEDGMENT

I am deeply grateful to God Almighty for the wisdom, perseverance, and strength to complete this project. My profound appreciation goes to my supervisor, Dr. Usman Bello Abubakar, for his patience, guidance, and valuable insights. Special thanks to my parents and family for their unwavering support, motivation, and love. I also extend gratitude to my lecturers and colleagues in the Department of Computer Science, Baze University, whose teachings and encouragement inspired me. Finally, to everyone who played a role — directly or indirectly — in the success of this project, I say thank you.

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# ABSTRACT

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# CHAPTER 1: INTRODUCTION

## 1.1 Background of the Study

In Nigeria, agriculture and animal husbandry are vital for sustaining rural livelihoods and contributing to the national economy. However, farmers and pet owners often struggle to access timely veterinary care, especially in remote areas where veterinary clinics are scarce (Babalobi, 2007). The rise of digital technology provides an opportunity to bridge this gap by connecting animal owners with veterinary professionals: digital platforms and mobile apps can enable remote consultation, appointment scheduling, and knowledge-sharing that reduce travel burdens and improve early disease detection (Lwoga, 2017; Teller, 2020). Studies of veterinary telemedicine and mobile veterinary applications show that telehealth tools increase access to care and can improve animal welfare when used alongside appropriate clinical oversight (Abu-Seida, 2024; Lundahl et al., 2022). In the Nigerian context, however, adoption is constrained by infrastructure gaps, limited digital literacy among rural users, and the need for verified veterinary content and localised services (Babalobi, 2007; PositiveNaija, 2022). Given these realities, the AgroPet VetConnect project aims to create an accessible web-based platform that connects Nigerian farmers and pet owners with certified veterinarians, provides a knowledge base of region-appropriate information, and supports appointment booking and reminders to improve livestock and pet health outcomes.

## 1.2 Statement of the Problem

Many small-scale farmers and pet owners in Nigeria face challenges in obtaining expert veterinary assistance when needed. Veterinary services are often concentrated in urban centers, requiring rural farmers to travel long distances for care. This lack of accessible animal healthcare can result in untreated diseases, loss of livestock, and poor animal welfare. Additionally, there is currently no unified system that allows animal owners from different regions to easily consult veterinarians or share knowledge. The absence of a centralized platform for veterinary support leads to inefficiencies, information gaps, and increased health risks in animal agriculture.

## 1.3 Aim and Objectives

The aim of this study is to design and implement AgroPet VetConnect, a web-based platform that connects Nigerian animal owners with veterinary professionals to improve animal healthcare and livestock management.

1. Objectives:  
   To develop an intuitive web and mobile interface where farmers and pet owners can register, log in, and post animal health queries.
2. To implement a database of certified veterinarians, allowing users to browse and select specialists based on animal type and location.
3. To incorporate features for scheduling appointments and sending reminders for livestock check-ups and pet treatments.

## 1.4 Scope of the Project

The scope of this project includes the development of an online platform accessible via web browsers and mobile devices throughout Nigeria. The system will focus on livestock (such as poultry, cattle, and goats) and common pets (such as dogs and cats). Core functionalities will include user registration, a veterinarian directory, appointment booking. This project will deliver a functional Minimum Viable Product (MVP) that addresses basic needs of veterinary connection and information sharing. Advanced features such as automated disease diagnosis, offline access, or integration with hardware (e.g., IoT tracking devices) are outside the scope of this initial phase.

## 1.5 Limitations of the Project

The limitations of this project are:  
- Internet connectivity is required to access the platform, which may exclude users in areas with poor network coverage.  
- Initial content may be limited, as the platform will launch with a small number of registered veterinarians and seed health information.  
- The system will not provide real-time remote diagnostics or telemedicine capabilities beyond messaging and scheduling.  
- Cultural and language diversity in Nigeria may limit usability if the platform initially supports only English and major regional languages.

## 1.6 Significance of the Project

This project is significant because it provides a centralized veterinary support network for Nigeria, a feature that can greatly improve animal health outcomes and agricultural productivity. By bringing veterinary expertise closer to farmers and pet owners, AgroPet VetConnect helps prevent the spread of diseases, reduce livestock losses, and enhance animal welfare. The platform encourages knowledge exchange and collaboration, building a community of users who learn from each other’s experiences. In the long term, better animal healthcare contributes to food security and economic growth in Nigeria’s agricultural sector. Adopting this system can modernize traditional veterinary care approaches and make expert advice more accessible.

## 1.7 Risk Assessment

Table 1.1: Risk Assessment

|  |  |  |
| --- | --- | --- |
| RISK DESCRIPTION | MITIGATION | IMPACT |
| Low user adoption in rural areas | Partner with agricultural agencies and NGOs to provide training and awareness campaigns | High |
| Inaccurate or inappropriate content on the platform | Implement content moderation, expert vet reviews, and a reporting system | Medium |
| Unstable internet connectivity | Optimize the platform for low bandwidth and consider SMS or offline notification options | High |
| Data privacy breaches and security vulnerabilities | Use strong encryption, secure authentication, and conduct regular security audits | High |

## 1.8 SWOT Analysis

Table 1.2: SWOT Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| STRENGTHS | WEAKNESSES | OPPORTUNITIES | THREATS |
| Improves access to veterinary expertise nationwide Fosters a community of animal owners and vets Encourages preventive care through scheduling Centralizes animal health information | Depends on reliable internet connectivity Requires initial user base and data seeding Requires vet verification and content moderation Limited to online platform in first phase | Expansion to include more animal species Partnerships with government agencies and NGOs Potential integration with mobile payment systems Scale to other African markets with similar needs | Resistance to technology adoption by some users Competition from traditional veterinary clinics Misinformation if content is not well moderated Security breaches if platform data is compromised |

## 1.9 Organization of the Project

The project is organized into five chapters: Chapter 1: Introduction – Presents the background of the study, problem statement, objectives, scope, limitations, significance, risk assessment, SWOT analysis, and an overview of the project structure.

Chapter 2: Literature Review – Reviews existing research, frameworks, and systems related to veterinary services, animal health information systems, and agricultural technology platforms.  
Chapter 3: System Design and Architecture – Details the design of the AgroPet VetConnect system, including diagrams, data models, and technical architecture.

Chapter 4: Implementation and Testing – Describes the development process, technology stack, user interface, and reports on functional and usability testing of the platform.  
Chapter 5: Conclusion and Recommendations – Summarizes the project findings, evaluates how objectives were achieved, discusses limitations, and provides recommendations for future improvements.

# Chapter Two

# LITERATURE REVIEW

## ****2.0 Introduction****

This chapter presents a critical review of existing scholarly literature relevant to the design and implementation of a web based veterinary service platform in Nigeria. The review interrogates contemporary research on veterinary service delivery, digital health systems, agricultural information platforms, and technology enabled service coordination. Rather than summarising prior studies, the chapter evaluates how existing research conceptualises access to veterinary care, the role of digital platforms in addressing systemic inefficiencies, and the extent to which current solutions respond to the realities of developing economies. Emphasis is placed on recent peer reviewed studies published between 2020 and 2025 to ensure conceptual and empirical relevance. The chapter is structured into three major sections: conceptual review, thematic and theoretical review, and review of related empirical studies, culminating in the identification of a research and system design gap that justifies the present study.

## ****2.1 Conceptual Review****

The conceptual review examines the core concepts that underpin this study and clarifies how they are interpreted within the context of digital veterinary service delivery. Conceptual clarity is essential because terms such as veterinary service delivery, digital platforms, telemedicine, and preventive animal healthcare are often used inconsistently across disciplines. This section therefore synthesises how contemporary literature defines and operationalises these concepts, while critically examining their relevance to the Nigerian agricultural and animal health context. By grounding the study in clearly articulated concepts, this section establishes a coherent foundation for the subsequent theoretical and empirical analyses.

## ****2.1.1 Concept of Veterinary Service Delivery****

Veterinary service delivery is increasingly conceptualised as a multidimensional system that extends beyond clinical treatment to include disease prevention, advisory support, surveillance, and information exchange. Contemporary literature emphasises that effective veterinary service delivery depends not only on professional expertise but also on the systems that enable interaction between veterinarians and animal owners (FAO, 2022; Chieloka et al., 2023). In developing economies, veterinary services are shaped by spatial dispersion of livestock farmers, limited institutional capacity, and weak coordination mechanisms, which collectively constrain access to timely and professional animal healthcare.

Empirical studies from sub-Saharan Africa demonstrate that traditional veterinary service models remain predominantly clinic centred and reactive in nature, responding to disease outbreaks rather than supporting preventive care practices (Okaiyeto et al., 2021; OIE, 2021). This approach has been linked to higher livestock mortality rates, delayed disease reporting, and reduced productivity among smallholder farmers who lack the resources to seek frequent professional intervention. In Nigeria, veterinary services are often concentrated in urban centres, leaving rural communities dependent on informal advice, self-medication, or untrained animal health workers, thereby increasing the risk of misdiagnosis and disease spread (Babalobi, 2007; Chieloka et al., 2023).

Recent research increasingly frames veterinary service delivery as a socio technical system in which information flow, communication channels, and service coordination are as critical as physical clinical infrastructure (Basu et al., 2023; Abu Seida et al., 2024). From this perspective, the effectiveness of veterinary services is determined by how efficiently knowledge, guidance, and professional oversight can reach animal owners at the point of need. Studies on livestock health management indicate that timely advisory support and early intervention significantly reduce disease severity and economic losses, particularly in poultry and small ruminant production systems common in Nigeria (FAO, 2022; OIE, 2021).

Digital technologies are increasingly positioned in the literature as enablers of a restructured veterinary service delivery model. Rather than replacing physical veterinary practice, digital systems extend professional reach by supporting consultation, appointment coordination, and continuous engagement across geographical boundaries (Lundahl et al., 2022; Basu et al., 2023). This reconceptualisation shifts veterinary service delivery from a location bound activity to a networked service ecosystem, where veterinarians and animal owners interact through digital intermediaries. Such systems are particularly relevant in contexts characterised by infrastructural limitations and uneven distribution of veterinary professionals.

Within the Nigerian context, scholars argue that improving veterinary service delivery requires integrated platforms that connect certified veterinarians directly with animal owners while supporting preventive care and knowledge dissemination (Chieloka et al., 2023). The absence of such platforms perpetuates fragmentation and limits the impact of veterinary expertise. This study adopts this systems-oriented conceptualisation of veterinary service delivery, positioning AgroPet VetConnect as a digital infrastructure designed to mediate access, coordination, and professional engagement.

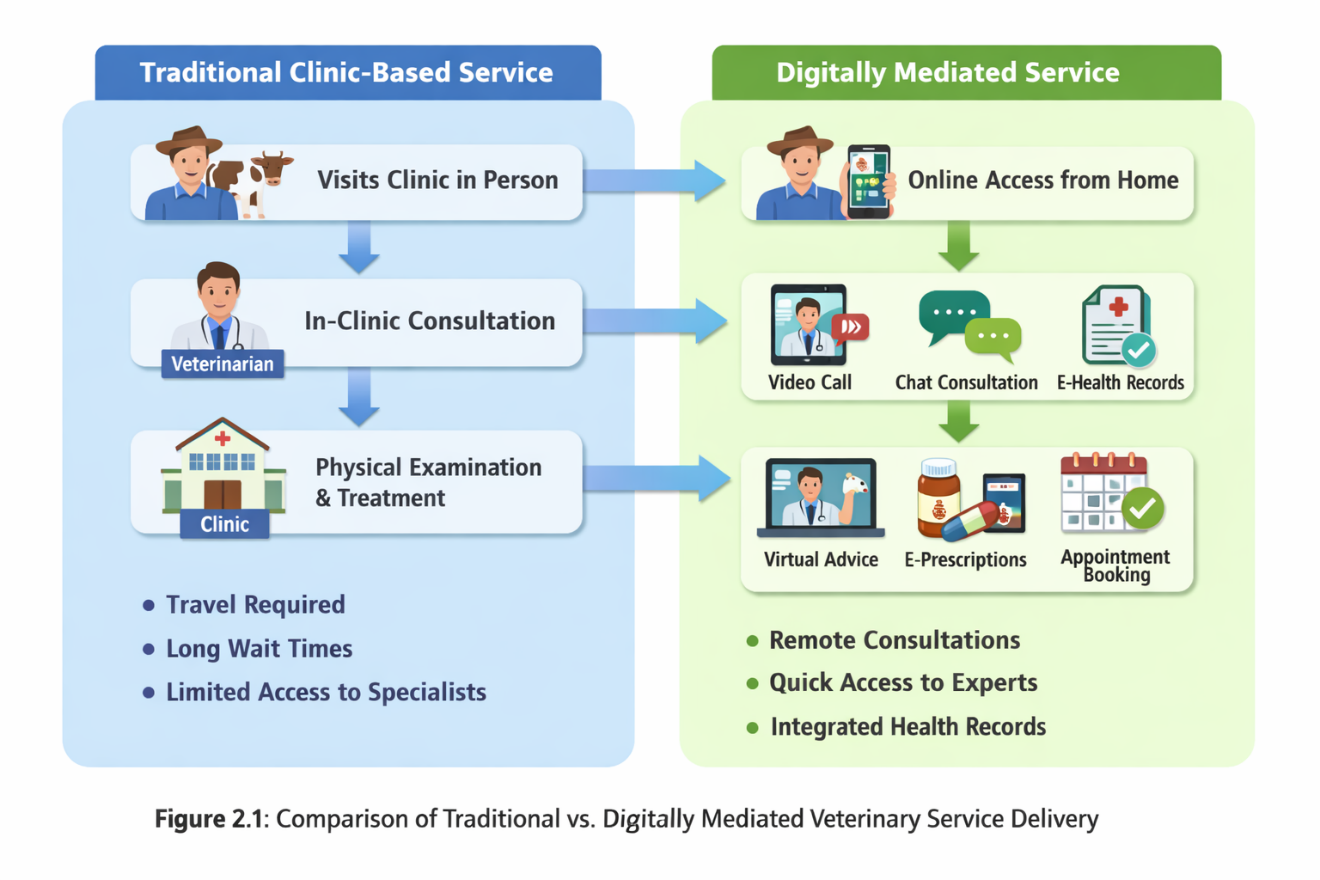


Figure 2.1 Comparison of Traditional vs. Digital Mediated Veterinary Service Delivery

### ****2.1.2 Concept of Digital Platforms in Animal Healthcare****

Digital platforms in animal healthcare are conceptualised as multi sided information systems that enable structured interaction between veterinary professionals and animal owners through shared digital infrastructure. Unlike static information websites, platform based systems support continuous service exchange, scalability, and user role differentiation (Wolfert et al., 2021). This platform logic enables veterinarians and animal owners to interact within a coordinated digital environment rather than through fragmented communication channels.

The literature identifies three core functions of digital veterinary platforms: connectivity, information management, and service coordination (Basu et al., 2023; FAO, 2022). Connectivity allows animal owners to locate and communicate with veterinarians beyond their immediate locality. Information management supports the storage, validation, and dissemination of animal health knowledge. Service coordination enables structured processes such as appointment scheduling, follow ups, and reminders that are essential for preventive care adoption.

However, empirical studies caution that platform effectiveness is highly context dependent. Systems designed without consideration for digital literacy, infrastructural constraints, and trust mechanisms often experience low adoption and limited impact (Ibrahim et al., 2023; Lwoga, 2017). In Nigeria, unreliable internet connectivity and limited exposure to digital health tools necessitate platforms that prioritise usability, low bandwidth optimisation, and professional verification (PositiveNaija, 2022).

Recent agricultural technology research emphasises that digital platforms must align with local practices and institutional realities to achieve sustained use (Wolfert et al., 2021; Okaiyeto et al., 2021). Within this conceptual framing, AgroPet VetConnect is positioned as a context sensitive platform that integrates veterinary expertise into a user centred digital environment.

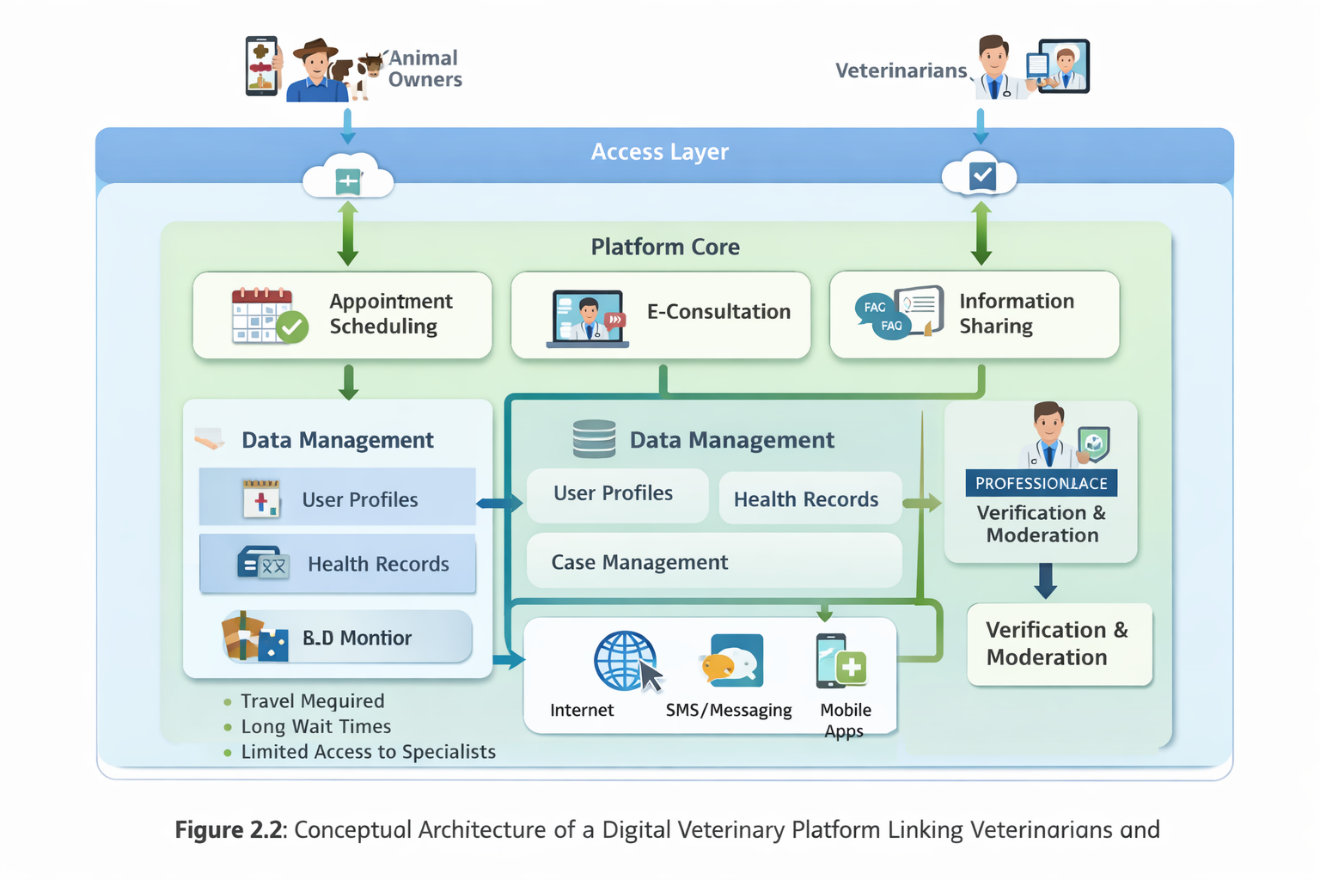


Figure 2.2 Conceptual Architecture of a Digital Veterinary Platform linking veterinarians and animal owners

### ****2.1.3 Concept of Veterinary Telemedicine****

Veterinary telemedicine refers to the application of information and communication technologies to deliver veterinary services remotely, including consultation, triage, follow up care, client education, and professional advisory support. Within contemporary veterinary and digital health literature, veterinary telemedicine is increasingly conceptualised as a complementary extension of conventional veterinary care rather than a complete substitute for physical examination and in person clinical procedures (Teller, 2020; Abu-Seida et al., 2024). This conceptual distinction is particularly important because veterinary diagnosis often relies on physical assessment, laboratory testing, and direct observation, which cannot be fully replicated through digital interfaces. As such, telemedicine is positioned as an enabling tool that enhances access and continuity of care while preserving ethical and professional standards.

From an ethical perspective, veterinary telemedicine raises important considerations related to diagnostic accuracy, animal welfare, and professional accountability. Scholars caution that remote consultation without appropriate safeguards may lead to misdiagnosis, delayed treatment, or inappropriate medication, thereby compromising animal health outcomes (OIE, 2021; Lundahl et al., 2022). Consequently, the literature emphasises that telemedicine systems should be designed with clearly defined functional boundaries, focusing on advisory support, triage, and follow up rather than definitive diagnosis in complex or emergency cases (Teller, 2020; Abu-Seida et al., 2024). This ethical framing has shaped contemporary best practice guidelines and informs system design decisions in digital veterinary platforms.

Empirical evidence further supports this complementary conceptualisation. Studies examining the practical application of veterinary telemedicine indicate that it is most effective for non-emergency cases, preventive guidance, routine follow up, and post treatment monitoring (Lundahl et al., 2022; Basu et al., 2023). In such contexts, telemedicine improves communication between veterinarians and animal owners, enhances convenience, and reduces delays in accessing professional advice. For example, follow up consultations conducted through digital platforms allow veterinarians to monitor recovery progress, adjust treatment plans, and provide reassurance without requiring repeated physical visits, which can be costly and logistically challenging for animal owners.

In developing country contexts, the form and functionality of veterinary telemedicine systems are further shaped by infrastructural constraints. Limited internet connectivity, inconsistent power supply, and restricted access to high bandwidth devices necessitate low complexity and adaptable communication models (Ibrahim et al., 2023; FAO, 2022). Asynchronous telemedicine approaches such as text messaging, image sharing, and voice notes are therefore widely regarded as more suitable than real time video consultations, which demand stable connectivity and advanced devices. Empirical studies indicate that these asynchronous models still provide substantial value by enabling early symptom reporting and professional guidance while remaining accessible to users with basic digital resources (Ibrahim et al., 2023; Okaiyeto et al., 2021).

Despite its potential benefits, the literature highlights significant regulatory and governance challenges associated with veterinary telemedicine. In many jurisdictions, particularly in developing economies, telemedicine guidelines are either underdeveloped or inconsistently enforced, creating uncertainty around professional responsibility, data protection, and scope of practice (World Organisation for Animal Health, 2021; Basu et al., 2023). Without clear regulatory frameworks, telemedicine platforms risk enabling unqualified individuals to provide advice, thereby increasing the likelihood of misinformation and harmful practices. This concern is amplified in open digital environments where content is user generated and poorly moderated (Lwoga, 2017; PositiveNaija, 2022).

As a result, contemporary scholarship increasingly advocates for veterinary telemedicine systems that integrate certified professionals within structured and moderated digital environments (Abu-Seida et al., 2024; Wolfert et al., 2021). Professional verification mechanisms, role-based access controls, and clear service workflows are identified as essential components of ethical and effective telemedicine platforms. Such systems enhance trust, accountability, and service quality while mitigating the risks associated with misinformation and unregulated advice.

Within the Nigerian context, veterinary telemedicine holds particular relevance due to uneven distribution of veterinary professionals and limited access to formal veterinary services in rural areas (Babalobi, 2007; Oluwasola et al., 2022). However, the prevalence of informal advisory practices and weak regulatory oversight heighten the risks associated with poorly designed telemedicine solutions. This underscores the importance of adopting a conservative and ethically grounded telemedicine model that prioritises communication, guidance, and coordination over remote diagnosis.

AgroPet VetConnect adopts this conceptualisation of veterinary telemedicine by focusing on communication, advisory support, and appointment coordination rather than direct diagnosis or treatment. By embedding certified veterinarians within a structured digital platform and supporting asynchronous interaction suited to local infrastructural realities, the system aligns telemedicine functionality with ethical, regulatory, and contextual constraints. In doing so, AgroPet VetConnect leverages the benefits of veterinary telemedicine while safeguarding animal welfare and professional accountability.

### ****2.1.4 Concept of Centralised Veterinary Information Systems****

Centralised veterinary information systems are digital platforms designed to aggregate animal health data, veterinary knowledge, and service records within a single, unified digital environment. Conceptually, these systems aim to reduce information fragmentation, enhance consistency of professional advice, and support evidence-based decision making in animal healthcare delivery (FAO, 2022; Lwoga, 2017). By consolidating veterinary information that would otherwise be dispersed across clinics, institutions, and informal communication channels, centralised systems provide a structured foundation for coordinated animal health management.

From an information systems perspective, centralisation improves data integrity, standardisation, and accessibility. When veterinary knowledge and service records are stored within a unified system, animal owners and veterinary professionals gain access to consistent, professionally validated information, reducing reliance on anecdotal advice or unverified sources (Wolfert et al., 2021; Abu-Seida et al., 2024). Empirical studies show that access to reliable and centralised veterinary information enhances disease awareness, improves compliance with preventive health practices, and supports earlier intervention, particularly in livestock dependent communities (FAO, 2022; Okaiyeto et al., 2021).

Centralised veterinary information systems also play a critical role in supporting continuity of care. By maintaining digital records of consultations, vaccinations, and follow up interactions, these systems enable veterinarians to track animal health histories and provide more informed guidance over time (Steeneveld and Hogeveen, 2021). For animal owners, access to structured records improves understanding of health requirements and reduces the likelihood of missed treatments or duplicated interventions. This continuity is particularly important in preventive animal healthcare, where long term engagement and consistent monitoring are essential for effective outcomes (World Organisation for Animal Health, 2021).

Despite these benefits, the literature identifies a persistent conceptual tension between openness and accuracy in centralised veterinary information systems. Open platforms encourage broad participation, rapid information exchange, and community engagement, which can enhance reach and inclusivity. However, such openness also increases vulnerability to misinformation, unqualified advice, and inconsistent content quality, particularly in contexts where regulatory oversight is weak (Lwoga, 2017; Chieloka et al., 2023). In contrast, closed systems that restrict content creation to professionals may offer higher accuracy and accountability but often lack responsiveness, local relevance, and user engagement, limiting their practical impact (Wolfert et al., 2021).

Contemporary research increasingly advocates for hybrid models that balance these competing demands by combining expert moderation with controlled community participation. In such models, certified veterinary professionals validate core content, provide authoritative guidance, and moderate discussions, while animal owners contribute experiential knowledge and contextual insights within defined boundaries (Abu-Seida et al., 2024; Okaiyeto et al., 2021). This hybrid approach preserves information quality while maintaining relevance and accessibility, aligning system design with both professional standards and user needs.

In developing countries, the importance of centralised veterinary information systems is further amplified by weak institutional coordination and widespread informal information exchange. In Nigeria, for example, veterinary information is frequently shared through informal social media groups, messaging platforms, and word of mouth, which offer accessibility but lack professional oversight and accountability (PositiveNaija, 2022; Ibrahim et al., 2023). While these channels facilitate rapid communication, they also expose animal owners to misinformation, inappropriate treatment advice, and unsafe practices, undermining animal health and productivity.

Centralised platforms with verified veterinary contributors are therefore conceptualised in the literature as mechanisms for mediating trust and improving information quality in such environments. By embedding professional verification, role based access, and content moderation, centralised systems create trusted digital spaces where animal owners can access reliable guidance and interact with certified veterinarians (FAO, 2022; World Organisation for Animal Health, 2021). Trust is a critical determinant of sustained platform use, and systems that visibly demonstrate professional accountability are more likely to achieve long term adoption (Lwoga, 2017; Abu-Seida et al., 2024).

From a systems design standpoint, centralised veterinary information systems also support scalability and integration with other digital health components, such as appointment scheduling, telemedicine, and disease surveillance. Integration reduces duplication, enhances data sharing, and strengthens coordination across veterinary service workflows (Wolfert et al., 2021; Basu et al., 2023). These characteristics align closely with One Health objectives by enabling early disease detection, coordinated response, and informed decision making across animal and public health domains.

AgroPet VetConnect aligns with this conceptual framework by embedding certified veterinarians within a moderated and centralised information environment that supports both knowledge dissemination and service coordination. By combining professional validation with accessible digital interaction, the platform addresses the dual challenges of misinformation and fragmentation identified in the literature. In doing so, AgroPet VetConnect operationalises the concept of a centralised veterinary information system tailored to Nigeria’s infrastructural realities, user capabilities, and animal healthcare needs.

**2.1.5 Concept of Appointment Scheduling and Preventive Animal Healthcare**

Appointment scheduling systems are digital tools designed to structure interactions between service providers and clients by organising availability, allocating time slots, and facilitating planned engagements within defined timeframes. In veterinary care, such systems play a critical role in enabling preventive animal healthcare by supporting routine check-ups, vaccination schedules, follow up consultations, and long-term health planning (Lundahl et al., 2022; FAO, 2022). Unlike reactive models of veterinary service delivery, which focus primarily on treating disease after symptoms become severe, appointment scheduling systems operationalise a preventive care paradigm that emphasises early intervention and continuous health management.

Preventive animal healthcare is widely recognised in the literature as a cost effective and sustainable strategy for improving livestock productivity, animal welfare, and food security. Preventive measures such as timely vaccination, routine health monitoring, and biosecurity practices reduce disease incidence, lower mortality rates, and minimise the economic losses associated with livestock disease outbreaks (World Organisation for Animal Health, 2021; FAO, 2022). However, despite its well documented benefits, adoption of preventive veterinary care among smallholder farmers and pet owners remains limited, particularly in developing economies. One of the most persistent barriers identified in empirical studies is the absence of structured scheduling and reminder mechanisms that support continuity of care (Okaiyeto et al., 2021; Ibrahim et al., 2023).

Poor scheduling practices contribute to missed vaccinations, delayed treatment, and fragmented veterinary engagement, reinforcing crisis driven patterns of care. Many animal owners only seek veterinary assistance when disease symptoms become severe, by which time treatment costs are higher and health outcomes are less predictable (OIE, 2021; Basu et al., 2023). Weak reminder systems further exacerbate this problem, as animal owners may lack awareness of appropriate vaccination intervals or follow up timelines, particularly in rural settings characterised by limited access to veterinary information (Lwoga, 2017; FAO, 2022). These challenges highlight the importance of integrating appointment scheduling systems into digital veterinary platforms to support planned and proactive healthcare behaviours.

Digital appointment scheduling systems address these gaps by embedding reminders, notifications, and structured timelines into veterinary service workflows. Through automated alerts and calendar-based scheduling, such systems prompt animal owners to attend routine check-ups and adhere to vaccination schedules, thereby reducing reliance on memory or informal practices (Lundahl et al., 2022; Steeneveld and Hogeveen, 2021). From a behavioural perspective, scheduling systems reduce cognitive and logistical barriers to preventive care by simplifying planning and reinforcing health related routines. This shift supports a transition from episodic veterinary interaction to continuous engagement and long-term health monitoring.

From a system design standpoint, integrating scheduling functionality within digital veterinary platforms enhances coordination between veterinarians and animal owners. Scheduling systems provide veterinarians with greater visibility into client engagement patterns, enable better allocation of professional time, and support follow up care through structured workflows (Wolfert et al., 2021; FAO, 2022). For animal owners, scheduling systems improve access to veterinary services by reducing uncertainty around availability and enabling planned interaction, particularly in contexts where veterinary professionals are scarce (Babalobi, 2007; Oluwasola et al., 2022). This mutual benefit reinforces sustained platform use and strengthens service continuity.

In the context of preventive animal healthcare, appointment scheduling systems also contribute to broader public health and environmental sustainability goals. Improved vaccination coverage and early disease detection reduce the likelihood of zoonotic disease transmission and limit the need for excessive therapeutic interventions, including the misuse of antibiotics (World Organisation for Animal Health, 2021; Basu et al., 2023). By promoting preventive practices, digital scheduling systems indirectly support antimicrobial stewardship and environmentally responsible livestock management, aligning with global One Health objectives (FAO, 2022).

Within the Nigerian context, the relevance of appointment scheduling systems is particularly pronounced due to widespread informal veterinary practices and limited access to certified professionals. Many livestock farmers and pet owners operate without structured veterinary engagement, relying instead on ad hoc consultations and informal advice (Babalobi, 2007; PositiveNaija, 2022). Digital platforms that integrate appointment scheduling offer a mechanism for formalising veterinary interactions, improving continuity of care, and encouraging preventive health behaviours. AgroPet VetConnect adopts this conceptual logic by embedding appointment scheduling and reminder features as core system functionalities. By facilitating planned interaction, follow up, and preventive care, the platform shifts veterinary service delivery from reactive disease treatment to proactive health management, thereby improving animal welfare, productivity, and long-term health outcomes.

## ****2.2 Thematic and Theoretical Review****

The thematic and theoretical review examines the major theories and analytical themes that explain the adoption, effectiveness, and sustainability of digital veterinary service platforms. This section moves beyond conceptual clarification to interrogate how technology adoption theories, information systems frameworks, and public health perspectives explain user behaviour, system performance, and service outcomes in digitally mediated veterinary care. These theories provide the intellectual foundation for system design decisions and justify the selection of platform features implemented in AgroPet VetConnect.

### ****2.2.1 Technology Acceptance Model and Digital Veterinary Platforms****

The Technology Acceptance Model posits that user adoption of information systems is primarily influenced by perceived usefulness and perceived ease of use (Davis, 1989). Within agricultural and veterinary contexts, this model has been widely applied to explain why farmers and service providers adopt or reject digital tools. Recent studies demonstrate that farmers are more likely to adopt digital platforms when they perceive clear practical benefits such as improved access to expert advice, reduced travel costs, and faster response times (Okaiyeto et al., 2021; Ibrahim et al., 2023).

Empirical evidence from developing economies suggests that perceived usefulness outweighs technological novelty in determining adoption. Platforms that fail to demonstrate immediate value to users often experience abandonment despite technical sophistication (Wolfert et al., 2021). In veterinary service delivery, usefulness is strongly linked to the credibility of information and the presence of certified professionals, as animal owners are reluctant to rely on unverified advice that may jeopardise livestock health (Abu Seida et al., 2024).

Perceived ease of use is equally critical, particularly in rural contexts characterised by limited digital literacy. Studies show that complex interfaces and high data consumption significantly reduce adoption among smallholder farmers (Ibrahim et al., 2023; FAO, 2022). This has direct implications for AgroPet VetConnect, which prioritises a simple user interface, minimal data requirements, and intuitive navigation to enhance acceptance. The Technology Acceptance Model therefore provides a strong theoretical justification for emphasising usability and functional relevance in the platform design.

### ****2.2.2 Diffusion of Innovation Theory and Adoption of Veterinary Technologies****

Diffusion of Innovation Theory explains how new technologies spread within social systems over time, highlighting the roles of relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). In agricultural settings, adoption is rarely an individual decision but is shaped by social networks, professional authority, and peer influence. Research indicates that farmers are more likely to adopt digital tools when they observe successful use by trusted peers or receive endorsement from recognised professionals (Okaiyeto et al., 2021; Chieloka et al., 2023).

Relative advantage is particularly significant in veterinary service platforms, as farmers must perceive digital consultation as superior to existing informal practices. Studies show that when digital platforms offer faster access to veterinarians and reduce disease related losses, adoption rates increase substantially (Basu et al., 2023). Compatibility with existing farming practices also influences diffusion, as platforms that require drastic behavioural change often face resistance.

Complexity remains a major barrier in rural environments. Systems perceived as technically demanding or dependent on advanced devices diffuse slowly, particularly among older farmers (FAO, 2022). Diffusion theory therefore supports the design of AgroPet VetConnect as a low complexity, web based platform that aligns with existing communication habits such as messaging and appointment coordination. By embedding professional veterinary authority within the platform, the system also leverages social trust mechanisms that accelerate diffusion.

### ****2.2.3 Information Systems Success Model and Platform Effectiveness****

The Information Systems Success Model, originally proposed by DeLone and McLean (1992) and later updated by DeLone and McLean (2003), provides a comprehensive framework for evaluating the effectiveness of information systems beyond purely technical performance. The updated model identifies six interrelated dimensions of system success: system quality, information quality, service quality, system use, user satisfaction, and net benefits. This model has been widely applied in health, agricultural, and public sector information systems research to assess how digital platforms deliver value to users and organisations in real world contexts (DeLone and McLean, 2003; Wolfert et al., 2021).

System quality refers to the technical and functional performance of an information system, including reliability, usability, accessibility, and responsiveness. In the context of digital veterinary and agricultural platforms, system quality is a critical determinant of trust and sustained use. Empirical studies indicate that unstable systems, slow response times, and frequent downtime significantly undermine user confidence and discourage continued engagement, particularly among rural users with limited tolerance for technical failure (Wolfert et al., 2021; Ibrahim et al., 2023). Usability is especially important in developing contexts, where users may have low digital literacy and limited experience with complex interfaces. Systems that are intuitive, lightweight, and responsive are more likely to be adopted and used consistently.

Information quality refers to the accuracy, relevance, timeliness, and completeness of content provided by the system. In veterinary platforms, information quality is particularly critical because inaccurate or outdated advice can result in serious animal health consequences, economic losses, and public health risks (World Organisation for Animal Health, 2021). Studies consistently show that professionally validated and up to date veterinary information enhances user confidence, reduces misinformation, and improves decision making among animal owners (Lwoga, 2017; Abu-Seida et al., 2024). Poor information quality, by contrast, erodes trust and limits the perceived usefulness of digital platforms, regardless of technical sophistication.

Service quality encompasses the quality of support and interaction provided through the system, including responsiveness, empathy, reliability, and professional engagement. Within veterinary platforms, service quality is closely linked to the availability and active participation of certified veterinarians who can provide personalised guidance and timely feedback. Empirical research demonstrates that platforms offering only static information or automated responses experience low long term engagement, as users value interactive professional support over generic content (Basu et al., 2023; Okaiyeto et al., 2021). Service quality therefore represents a critical differentiator between informational websites and effective digital service platforms.

System use refers to the extent and manner in which users engage with the platform. In the DeLone and McLean model, use is both an outcome of system quality, information quality, and service quality, and a precursor to user satisfaction and net benefits. In veterinary contexts, system use is influenced not only by access but by perceived relevance to daily practices, ease of integration into existing routines, and the presence of clear functional value such as appointment scheduling and follow up support (Steeneveld and Hogeveen, 2021; FAO, 2022).

User satisfaction reflects users’ overall evaluation of their experience with the system. High levels of satisfaction are associated with perceived reliability, trustworthy information, and meaningful professional interaction. In agricultural and veterinary systems, satisfied users are more likely to continue using the platform, recommend it to others, and rely on it for critical decision making (Lwoga, 2017; Ibrahim et al., 2023). User satisfaction therefore serves as a key indicator of system effectiveness and sustainability.

Net benefits represent the positive outcomes generated by system use at individual, organisational, and societal levels. In digital veterinary platforms, net benefits may include improved animal health outcomes, reduced disease incidence, increased productivity, cost savings, enhanced preventive care, and strengthened public health surveillance (FAO, 2022; Basu et al., 2023). At a broader level, effective veterinary information systems contribute to food security, economic resilience, and One Health objectives.

AgroPet VetConnect aligns closely with the Information Systems Success Model by addressing each of these dimensions in its system design. The platform prioritises system quality through a simple, reliable, and low bandwidth architecture; information quality through professionally validated veterinary content; and service quality through structured interaction with certified veterinarians. By integrating appointment scheduling, advisory support, and moderated information exchange, the platform encourages sustained use and enhances user satisfaction. Ultimately, these design choices aim to maximise net benefits by improving preventive animal healthcare, strengthening veterinary service coordination, and supporting broader public health and agricultural development goals.

### ****2.2.4 One Health Framework and Digital Veterinary Systems****

The One Health framework is a multidisciplinary and integrative approach that recognises the fundamental interconnectedness of animal health, human health, and environmental sustainability (FAO, 2022; World Organisation for Animal Health, 2021). The framework is premised on the understanding that health threats such as zoonotic diseases, foodborne illnesses, and antimicrobial resistance emerge from complex interactions between humans, animals, and ecosystems (Basu et al., 2023; OIE, 2021). Within this paradigm, veterinary services are positioned as a critical frontline mechanism for disease prevention, food safety assurance, and public health protection, particularly in livestock dependent economies (FAO, 2022; Chieloka et al., 2023).

From a theoretical standpoint, One Health emphasises prevention, early detection, and coordinated response as more sustainable and cost-effective strategies than reactive disease control (Basu et al., 2023; Wolfert et al., 2021). Veterinary systems play a central role in this process by monitoring animal health trends, implementing vaccination and biosecurity measures, and facilitating early intervention before diseases spread to human populations (OIE, 2021; Fasina et al., 2020). However, traditional veterinary service delivery models in many developing countries remain fragmented, clinic centred, and reactive, which limits their effectiveness in supporting the integrated approach required by One Health (Babalobi, 2007; Lwoga, 2017).

Digital veterinary systems are increasingly conceptualised in the literature as enabling infrastructures that operationalise One Health principles by strengthening surveillance, communication, and service coordination across stakeholders (Wolfert et al., 2021; FAO, 2022). Digital platforms allow animal health data to be captured and shared more efficiently, supporting early disease detection and timely professional response (Basu et al., 2023; Msoffe et al., 2020). Empirical evidence indicates that delayed veterinary intervention significantly increases the risk of zoonotic disease spillover, particularly in livestock dense regions characterised by close human animal interaction (Fasina et al., 2020; Basu et al., 2023). Platforms that facilitate early symptom reporting, professional advisory support, and follow up therefore contribute directly to reducing public health risks.

Effective communication is another core pillar of the One Health framework. Studies consistently report that weak information flow between farmers, veterinarians, and regulatory institutions undermines disease surveillance and response capacity (Chieloka et al., 2023; World Organisation for Animal Health, 2021). In many African contexts, including Nigeria, informal animal health practices and unregulated advisory channels dominate decision making, increasing the risk of misinformation and inappropriate treatment (Lwoga, 2017; PositiveNaija, 2022). Digital veterinary platforms that embed certified professionals within structured and moderated environments improve trust, accountability, and coordination, thereby strengthening One Health implementation (Abu-Seida et al., 2024; Okaiyeto et al., 2021).

Environmental sustainability is also central to the One Health framework. Poor animal health management contributes to environmental degradation through inefficient production systems, increased waste, and the misuse of veterinary pharmaceuticals, particularly antibiotics (FAO, 2022; Basu et al., 2023). Such practices accelerate antimicrobial resistance, which represents a major global health challenge affecting both human and animal populations (OIE, 2021). Digital veterinary systems can support environmentally responsible practices by promoting preventive care, guiding appropriate treatment protocols, and encouraging compliance with vaccination schedules and biosecurity standards (Steeneveld and Hogeveen, 2021; FAO, 2022).

In the Nigerian context, the relevance of One Health is particularly pronounced due to extensive livestock production systems, close human animal contact, and weak veterinary service coordination (Babalobi, 2007; Chieloka et al., 2023). Despite the recognised importance of veterinary services to food security and public health, access to certified veterinarians remains limited, especially in rural areas, while coordination between animal owners and institutions is weak (Ibrahim et al., 2023; Oluwasola et al., 2022). These conditions constrain Nigeria’s capacity to operationalise One Health strategies effectively.

AgroPet VetConnect is conceptually aligned with the One Health framework by functioning as more than a digital service delivery platform. By enabling structured interaction between animal owners and certified veterinarians, supporting preventive care through appointment scheduling, and facilitating timely advisory support, the platform contributes to early disease management and improved animal health outcomes (FAO, 2022; Abu-Seida et al., 2024). In this sense, AgroPet VetConnect represents a socio technical intervention that strengthens Nigeria’s veterinary infrastructure and enhances its capacity to operationalise One Health principles through digitally mediated veterinary system.

## ****2.3 Review of Related Empirical Literature****

This section critically reviews empirical studies that have examined digital veterinary services, agricultural technology platforms, veterinary telemedicine, and related health information systems. The review focuses on how these studies conceptualise system design, evaluate effectiveness, and address contextual challenges in both developed and developing economies. Rather than discussing each study in isolation, the section synthesises findings across the literature to identify dominant patterns, limitations, and unresolved issues relevant to the present study.

Several international studies have explored the effectiveness of veterinary telemedicine in extending access to professional care. Teller (2020) examined veterinary telemedicine adoption in Europe and found that remote consultation improved access to veterinary advice and client satisfaction, particularly for follow up care and preventive guidance. However, the study noted that telemedicine effectiveness declined in cases requiring physical examination, highlighting the importance of complementary rather than substitutive system design. Similarly, Lundahl et al. (2022) investigated veterinary telehealth experiences among clients and veterinary students and reported improved communication and convenience, while also identifying concerns related to diagnostic uncertainty and professional liability. These findings underscore the need for platforms that support advisory and coordination functions rather than full remote diagnosis.

Abu-Seida et al. (2024) conducted a multi country study on veterinary telemedicine and animal welfare, demonstrating that digital consultation systems improved early intervention and reduced unnecessary animal suffering when integrated into routine veterinary practice. However, the authors cautioned that the absence of professional verification mechanisms increased the risk of misinformation in open platforms. This reinforces the argument that digital veterinary systems must embed credential validation and professional oversight to ensure service quality.

Within the agricultural technology domain, Wolfert et al. (2021) analysed big data driven and platform based agricultural systems and concluded that digital platforms significantly enhance service coordination and decision making when aligned with user needs and institutional structures. Their findings highlight that technological sophistication alone does not guarantee impact, as adoption is constrained by usability, trust, and contextual relevance. Basu et al. (2023) further extended this analysis by examining digital health tools within the One Health framework, showing that integrated digital platforms improve disease surveillance and preventive care outcomes. Nevertheless, their study identified weak implementation in low-income countries due to infrastructural limitations and fragmented service delivery.

Empirical studies focusing on developing economies provide further insight into contextual constraints. Okaiyeto et al. (2021) examined the adoption of agricultural information systems among smallholder farmers and found that perceived usefulness and professional endorsement were stronger predictors of adoption than technological features. Farmers were more willing to engage with systems that provided direct access to trusted experts rather than static information repositories. Ibrahim et al. (2023) similarly reported that digital divide factors such as internet reliability, device access, and digital literacy significantly affected platform usage in rural Nigeria. These studies highlight the importance of designing low complexity, accessible systems that align with existing user capabilities.

Lwoga (2017) analysed web-based animal health information systems in Africa and found that most platforms lacked content validation mechanisms, resulting in inconsistent information quality. Although users valued accessibility, trust remained a critical barrier to sustained use. Chieloka et al. (2023) investigated the application of geographic information systems in livestock disease surveillance and emphasised that fragmented information systems undermine coordinated disease management. Their study recommended integrated platforms that connect veterinarians, farmers, and institutions within a shared digital environment.

Research by the Food and Agriculture Organization (2022) demonstrated that digital platforms supporting appointment scheduling and preventive care significantly improved vaccination compliance and disease prevention outcomes in pilot agricultural programmes. However, the report noted that most existing platforms focus on crop production, with limited emphasis on veterinary service coordination. The World Organisation for Animal Health (2021) similarly highlighted the absence of structured digital veterinary systems in many developing countries, identifying this gap as a major obstacle to effective animal health governance.

Empirical research by Aker and Mbiti (2020) examined the use of mobile based advisory and information systems across sub–Saharan Africa, including livestock and animal health services. The study found that digital advisory platforms improved farmers’ access to expert knowledge and enhanced responsiveness to animal disease symptoms. However, the authors noted that most platforms operated as fragmented information channels without integration into formal veterinary systems, limiting continuity of care and professional accountability. This finding underscores the need for digital veterinary platforms that are structurally linked to certified professionals rather than informal advisory networks.

Similarly, Steeneveld and Hogeveen (2021) investigated the adoption and impact of digital herd health management systems among livestock farmers in Europe. Their empirical analysis demonstrated that platforms integrating veterinary consultation, health records, and reminder systems significantly improved disease monitoring and treatment timeliness. Nevertheless, the study revealed uneven adoption rates, largely influenced by system complexity and perceived relevance to daily farm routines. These findings highlight that effective digital veterinary platform must align closely with user workflows and minimise technical barriers.

In a study focused on agricultural innovation systems, Klerkx, Jakku, and Labarthe (2019) empirically analysed digital platforms supporting advisory and professional services, including animal health. The authors found that while digital tools improved coordination between farmers and service providers, their effectiveness was constrained when platforms operated independently of institutional and professional networks. The study concluded that digital platforms function best as integrated service ecosystems rather than isolated technological solutions, reinforcing the importance of linking veterinarians, users, and institutions within a unified system.

From a public health perspective, Fasina et al. (2020) examined digital disease surveillance and reporting systems for livestock diseases in West Africa. Their findings showed that delayed reporting and weak communication between farmers and veterinary authorities significantly undermined outbreak response. Platforms that enabled early reporting and professional feedback improved disease detection and response times. However, the study identified limited farmer engagement and poor interface usability as key challenges, suggesting that system design and accessibility are critical to effective digital disease management.

Research by Oluwasola et al. (2022) investigated the adoption of digital agricultural extension services with veterinary advisory components among Nigerian livestock farmers. The study found that farmers strongly preferred platforms that enabled direct interaction with recognised experts rather than generic informational content. Despite this preference, most platforms lacked structured appointment scheduling and follow up mechanisms, limiting their effectiveness in supporting preventive animal healthcare. This highlights a significant functional gap in existing Nigerian digital veterinary solutions.

Also, Msoffe et al. (2020) evaluated digital livestock health reporting and advisory systems in East Africa. Their empirical findings indicated that platforms integrating advisory services with reporting and reminder functions improved early disease detection and farmer compliance with preventive practices. However, the study noted that sustainability was challenged by inconsistent connectivity and weak integration with national veterinary services. These findings reinforce the importance of designing context sensitive platforms that support both professional engagement and infrastructural realities.

Nigerian focused studies further illustrate systemic deficiencies. Babalobi (2007) identified long standing challenges in veterinary service accessibility and coordination, many of which remain unresolved despite technological advancement. PositiveNaija (2022) reviewed Nigerian animal health applications and found that most platforms provide informational content without integrating certified veterinarians or structured service workflows. This limits their capacity to deliver reliable and actionable veterinary support.

More recent empirical work by Basu et al. (2023) and Abu Seida et al. (2024) suggests that hybrid digital platforms combining professional interaction, information management, and service coordination offer the most promise for improving veterinary care outcomes. However, these studies were largely conducted outside Nigeria and did not address local infrastructural constraints or cultural factors influencing adoption.

Collectively, the reviewed literature demonstrates that digital veterinary platforms can improve access to professional care, enhance preventive practices, and support coordinated service delivery. However, the evidence also reveals persistent limitations related to professional verification, contextual adaptation, system integration, and usability in developing economies. Most existing platforms are either information centred without interactive professional support, or telemedicine focused without structured appointment and follow up mechanisms.

**2.3.1 Summary of related literature review**

Table 2.1 summarises the related empirical literature reviewed in this section in terms of the study focus, methodological approach, key empirical findings, identified limitations or gaps, and their relevance to the present study.

**Table 2.1** Summary of related literature review

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author(s) & Year** | **Method / Scope** | **Key Empirical Findings** | **Identified Limitations / Gaps** | **Relevance to Present Study** |
| Teller (2020) | Empirical literature review | Improved access, convenience, and client satisfaction, especially for follow up care | Less effective for cases requiring physical examination | Supports telemedicine as complementary to physical veterinary services |
| Lundahl et al. (2022) | Mixed method pilot study | Enhanced communication and convenience | Diagnostic uncertainty and liability concerns | Justifies advisory and coordination focus rather than remote diagnosis |
| Abu-Seida et al. (2024) | Multi country empirical study | Early intervention and reduced animal suffering | Risk of misinformation without professional verification | Reinforces need for credential validation and vet oversight |
| Wolfert et al. (2021) | Empirical platform analysis | Improved coordination when aligned with user needs | Poor adoption if usability and trust are weak | Supports user centred and context aware platform design |
| Basu et al. (2023) | Empirical and analytical study | Improved disease surveillance and preventive outcomes | Weak implementation in low-income contexts | Aligns platform with One Health and public health goals |
| Okaiyeto et al. (2021) | Quantitative empirical study | Adoption driven by perceived usefulness and expert endorsement | Limited role of advanced technical features | Informs prioritisation of practical value over complexity |
| Ibrahim et al. (2023) | Empirical survey study | Internet access, devices, and literacy affect usage | Infrastructure constraints remain unresolved | Justifies low complexity and low bandwidth system design |
| Lwoga (2017) | Empirical system review | High accessibility but low information quality | Lack of content validation undermines trust | Supports moderated and verified information systems |
| Chieloka et al. (2023) | Empirical case study | Fragmented systems weaken coordinated disease management | Poor system integration across stakeholders | Supports need for centralised veterinary platforms |
| FAO (2022) | Empirical programme evaluation | Improved vaccination compliance and prevention outcomes | Platforms focus mainly on crops, not veterinary services | Justifies integrating scheduling and preventive care tools |
| World Organisation for Animal Health (2021) | Institutional empirical report | Lack of structured digital veterinary systems | Weak coordination and governance mechanisms | Reinforces the system gap addressed by the study |
| Babalobi (2007) | Empirical and contextual analysis | Poor access and urban concentration of veterinary services | Structural issues persist despite technology growth | Establishes long standing Nigerian context problem |
| PositiveNaija (2022) | Exploratory empirical review | Apps focus on information sharing | No vet verification or workflow integration | Highlights deficiencies in existing Nigerian platforms |
| **Aker & Mbiti (2020)** | Empirical regional analysis | Improved access to expert advisory services via mobile platforms | Fragmented services and weak professional integration | Supports need for platforms linked to certified veterinarians |
| **Steeneveld & Hogeveen (2021)** | Empirical livestock system study | Improved disease monitoring and treatment timeliness | Adoption limited by system complexity | Reinforces workflow aligned and user friendly system design |
| **Klerkx et al. (2019)** | Empirical innovation systems analysis | Digital tools improve coordination within service ecosystems | Weak impact when platforms operate in isolation | Supports integrated multi stakeholder platform architecture |
| **Fasina et al. (2020)** | Empirical public health study | Early reporting improves outbreak response | Low farmer engagement and usability challenges | Justifies simple interfaces and early engagement features |
| **Oluwasola et al. (2022)** | Empirical Nigerian extension study | Farmers prefer direct interaction with experts | Lack of scheduling and continuity of care | Supports appointment scheduling and follow up mechanisms |
| **Msoffe et al. (2020)** | Empirical regional evaluation | Improved early disease detection and preventive compliance | Connectivity and institutional integration challenges | Reinforces context sensitive and resilient system design |

## ****2.4 Identified Research and System Gap****

Despite growing empirical evidence supporting digital veterinary platforms, there is a clear gap in the literature regarding integrated, web based veterinary service systems tailored to the Nigerian context. Existing studies largely focus on telemedicine effectiveness, agricultural information dissemination, or disease surveillance in isolation. Few systems combine veterinarian verification, appointment scheduling, centralised information management, and context sensitive design within a single platform. Additionally, Nigerian specific platforms lack structured workflows that support preventive care and sustained professional engagement.

This gap underscores the need for a unified digital veterinary platform that directly connects animal owners with certified veterinarians, supports coordinated service delivery, and accommodates infrastructural and digital literacy constraints. AgroPet VetConnect is designed to address this gap by integrating professional verification, advisory support, and appointment coordination within a user centred web-based system tailored to Nigeria’s animal healthcare landscape.

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