

Utilization of Digital Marketing Tools among Livestock Farmers in Taraba State, Nigeria

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Abstract

This study examined the utilization of digital marketing tools among livestock farmers in Taraba State, Nigeria. It specifically examined the types of digital marketing tools available to livestock farmers, the digital marketing tools that are currently used by livestock farmers, the level of utilization of the digital marketing tools. A multi-stage sampling procedure was employed to select 384 respondents for this study. Data were collected primarily through questionnaires administered to livestock farmers. The data collected were analysed using descriptive statistics such as frequency table, percentage, mean, and standard deviation, along with Chi-square tests. The findings reveal that Facebook (90.1%), WhatsApp (87.2%), and SMS (69.0%) were the most utilized digital marketing tools. Despite a statistically significant chi-square test suggesting an association, the weak and non-significant correlation coefficients indicate that the type of livestock farmed has little to no practical effect on farmers' utilization of digital marketing tools. Given the high usage and utilization of Facebook, WhatsApp, and SMS among farmers, extension services and agricultural marketers should prioritize these platforms to disseminate information, provide training, and support farmers in optimizing their digital marketing strategies.

Keywords: Agricultural Marketing, Digital Marketing Tools, Livestock Farmers, Taraba State, Nigeria.

Introduction

The domestication of animals dated back thousands of years, fundamentally altering human societies (Damania & Joshi, 2025). Initially essential for subsistence agriculture, livestock has evolved into a key component of modern agricultural practices, influenced by technological advancements and changing consumer preferences (Achmad et al., 2022). The growth of the livestock sector has been particularly pronounced in the 20th and 21st centuries, driven by urbanization, population growth, and globalization (Sheng et al., 2025). The livestock sector plays a crucial role in the global economy, food security, and sustainable development. Comprising a diverse array of animal species, the sector encompasses cattle, sheep, goats, pigs, poultry, and more, serving as a vital source of meat, milk, eggs, leather, and other by-products (Sekaran et al., 2021; Brar et al., 2021). The livestock sector is one of the significant contributors to the global economy (Rapiya et al., 2025). According to the Food and Agriculture Organization (FAO), it accounts for approximately 40% of the global agricultural economy (Pandey & Upadhyay, 2022). The sector provides livelihoods for millions of people, particularly in developing regions where

it serves as a crucial source of income and employment. Additionally, livestock products contribute to food systems, providing essential nutrients to billions of people worldwide (Banda & Tanganyika, 2021). Beyond economic value, livestock also holds cultural and social importance in many communities. In various cultures, specific animals are linked to traditions, rituals, and social status (Adams et al., 2021). The livestock sector transcends mere commodity production, embodying local practices and cultural heritage that shapes community identities.

However, the livestock sector is also associated with significant environmental challenges. The intensive production methods prevalent in many countries contribute to greenhouse gas emissions, deforestation, land degradation, and water pollution. The need for sustainable practices is becoming increasingly urgent as the world grapples with climate change and biodiversity loss (Mehrabani et al., 2020; Williams, 2024).

The global livestock marketing system comprises various actors, including farmers, livestock traders, wholesalers, retailers, and consumers. This system is influenced by factors such as market demand, supply chain efficiency, and trade regulations (Zanou et al., 2023). In developed countries, the livestock sector is often characterized by large-scale commercial farming, advanced supply chain logistics, and stringent food safety standards. In contrast, developing nations often depend on smallholder farmers and informal markets (Nguyen et al., 2023).

Nigeria has one of the largest livestock industries in Africa, comprising cattle, sheep, goats, poultry, and pigs (Gavrilova, 2020). The sector is integral to the livelihoods of millions of Nigerians and is a vital source of food and income. The livestock marketing system in Nigeria is characterized by a combination of traditional and modern practices (Daniel, 2023). Livestock is often traded in informal markets, with farmers relying on local traders to sell their animals. This system is largely decentralized, with variations in practices across different regions (Mumba et al., 2024). There is significant potential for growth in Nigeria's livestock sector, driven by rising demand for protein-rich foods. The adoption of modern marketing practices, value addition, and improved supply chain management could enhance the competitiveness of the sector (Maniriho, 2024; Kemitare et al., 2021).

Marketing in livestock farming involves a range of activities aimed at promoting livestock products and reaching consumers effectively. This includes market research, product differentiation, branding, and strategic pricing (Bondarenko et al., 2024). Understanding market trends and consumer preferences allows livestock producers to adjust their practices to meet demand, ensuring they remain competitive (Moran & Blair, 2021). For example, as consumers increasingly prioritize sustainability and animal welfare, farmers who adopt environmentally friendly practices and communicate these effectively can enhance their market position.

Moreover, marketing can facilitate better access to markets (Arowosegbe et al., 2024). Many smallholders struggle to reach consumers directly or participate in value chains, limiting their income potential. Effective marketing strategies, such as cooperatives or digital platforms, can empower these farmers, allowing them to gain access to broader markets and negotiate better prices (Bellemare et al., 2022;).

The advent of digital technologies has revolutionized marketing in agriculture, including livestock farming. Social media, e-commerce, and mobile applications provide farmers with tools to engage with consumers directly, promote their products, and streamline sales processes (Morepje et al., 2024). This technological shift also enables better data collection and analysis, allowing farmers to make more informed marketing decisions. Understanding consumer behaviors and preferences through data analytics can lead to optimized pricing strategies and improved product offerings (Sennuga et al., 2023).

Digital marketing tools encompass a wide array of online strategies and tactics, including social media marketing, search engine optimization (SEO), email marketing, content marketing, and data analytics. These tools do not only facilitate direct engagement with consumers but also provide valuable insights into market trends and consumer preferences (Sechele et al., 2024). In agriculture, digital marketing includes initiatives such as farm-to-table campaigns, the use of e-commerce platforms for direct sales, and social media promotions to build brand awareness (Padhiary & Roy, 2025). The rise of e-commerce platforms has enabled farmers to bypass traditional distribution channels, reaching consumers directly and potentially increasing profit margins. Additionally, social media platforms serve as a vital means for farmers to tell their stories, share best practices, and connect with both consumers and other producers (Li & Zhang, 2024). The interactive nature of these platforms allows for two-way communication, fostering trust and transparency in the agricultural supply chain (Obonyo et al., 2023). Despite the numerous benefits of digital marketing tools, the livestock sector also faces several challenges. These include varying levels of digital literacy among producers, concerns related to data privacy, and the need to adapt to rapidly changing technologies (Bose & Kiran, 2021).

Statement of the Problem

In recent years, digital marketing has become an essential tool for businesses and marketers worldwide, offering new opportunities to reach consumers, enhance brand visibility, and boost sales (Sanbella et al., 2024). However, in developing countries like Nigeria, there is a significant gap in understanding and adopting these strategies, particularly within niche agricultural sectors such as livestock marketing (Ali & Xia, 2022). Despite the global shift towards digital solutions that have transformed livestock marketing in many regions where developed countries have widely integrated e-commerce platforms, specialized apps, and data-driven strategies to enhance market access, transparency, and efficiency, Nigeria's reliance on traditional face-to-face methods and informal channels restricts market reach and opportunities for growth. Nigerian farmers predominantly depend on conventional approaches, which limit their ability to expand markets, improve sales efficiency, and increase income, despite the proven benefits of digital marketing elsewhere. This continued dependence on traditional methods persists despite the potential advantages offered by digital tools, highlighting a lack of understanding of the barriers preventing Nigerian farmers from adopting these innovations.

Though Taraba State is known for its pastoral resources and vibrant livestock trade, livestock marketers face significant challenges in connecting consumers beyond their

immediate locality, due to inadequate awareness and access to digital marketing tools. These obstacles hindered their capacities to expand market reach, improve operational efficiency, and remain competitive in an increasingly digital marketplace (Muoghalu & Akanwa, 2021; Sassi, 2024).

Livestock farming is vital to Nigeria's agricultural economy, providing livelihoods for millions, yet many farmers encounter logistic barriers, insufficient information, inadequate infrastructure, price volatility, and fluctuating demand. Smallholder farmers, who comprise a substantial portion of the sector, often face poor market linkages, limited bargaining power, and reliance on informal trading systems (Erick, 2022; Anissa, 2023). Despite the potential benefits of digital marketing tools, there is a notable lack of comprehensive data on their actual usage within this sector, impeding the development of targeted interventions. This study assessed the utilization of digital marketing tools among livestock farmers in Taraba State, Nigeria, to bridge this knowledge gap and foster more effective digital engagement in livestock marketing.

Objectives of the Study

- i. Identify the type of livestock farmed in the study area;
- ii. identify the types of digital marketing tools available to livestock farmers;
- iii. identify the digital marketing tools that are currently used by livestock farmers;
- iv. determine the level of utilization of the digital marketing tools among livestock farmers;

Hypothesis

H₀: There is no significant relationship between the type of livestock farmed (e.g., cattle, goats, poultry) and the level of digital marketing tool utilization.

Theoretical and Conceptual Framework

This study is grounded in the Technology Acceptance Model (TAM). The Technology Acceptance Model (TAM) is a theoretical framework that was developed to understand the factors that influence the acceptance and use of technology. The foundation of TAM can be traced back to the early 1980s when Fred Davis, a researcher at the Massachusetts Institute of Technology (MIT), sought to explain the determinants of computer usage in organizations. He introduced the model in his doctoral dissertation in 1985 (Davis & Granić, 2024).

The adoption of technology, encompassing the recognition, integration, and embrace of novel technological advancements, represents a pivotal aspect of contemporary discourse. The initial phase of this process, known as technology acceptance, is characterized by an individual or organization's attitude toward technology, influenced by many variables. Consistent with the seminal Innovation Diffusion Theory (IDT) introduced and subsequently refined in 1995, the definition of technology adoption is a strategic decision to harness the

overall potential of technological innovation, contingent upon the idea perception, behavior, or product as novel and innovative (Gandasari et al., 2024).

Technology acceptance and adoption theories are important in investigations into online technology. Some prominent theoretical frameworks in this field include the chronological order presented in IDT by Rogers (2003). Based on the Theory of Reasoned Action (TRA), Davis in 1986 proposed the TAM to predict and explain the acceptance of a new technology, which was further refined in 1989 (Prasetyowati et al., 2022).

TAM has progressed into a crucial framework for comprehending predictors of people's behavior concerning whether they would accept or reject one technology, particularly in the context of newly introduced technology. Supposing a rationality paradigm, TRA, introduced by Fishbein and Ajzen (1975), suggests that intention, a primary predictor of behavior, is influenced by both the attitude toward engaging in the behavior and the perceived social influence (subjective norms). Behavioral intention (BITU), in turn, is characterized as the personal likelihood of performing a specified behavior, with attitude representing the emotional assessment or affective response to the behavior and subjective norm referring to people's perception that is important to the individual about the behavior (Vieira et al., 2022).

To construct a robust model predicting the effective utilization of any technology, Davis modified TRA by emphasizing attitudes rather than BITUs. The motivation of an individual could be explicated by perceived ease of use (PEOU), perceived usefulness (PU), and attitude to use. Consequently, TAM posited that intention to use technology, which will lead to actual behavior, is influenced by PU and PEOU (Gandasari et al., 2024). Individual attitude toward technology significantly determines whether the user will embrace or discard it. This attitude is shaped by two crucial beliefs: PU and PEOU, with PEOU directly impacting PU. PEOU is the perception degree of an individual in how easy using the technology is. In contrast, PU is the individual perception of how using the new technology would cause an improvement (Gandasari et al., 2024).

PEOU and PU have been empirically proven as sound predictive factors significantly influencing the acceptance of learning technologies. In essence, TAM stands as a robust and enduring theoretical framework that continues to shape our understanding of technology adoption and acceptance, particularly in the dynamic landscape of educational technology (Figure 1).

This theory is important for this study because the Technology Acceptance Model (TAM) provides a useful framework for understanding how livestock farmers assess the availability and utilization of digital marketing tools. TAM posits that two primary factors Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) influence an individual's decision to adopt and use technology. TAM serves as a lens through which we can analyze how livestock farmers assess the availability of digital marketing tools and make decisions about their utilization.

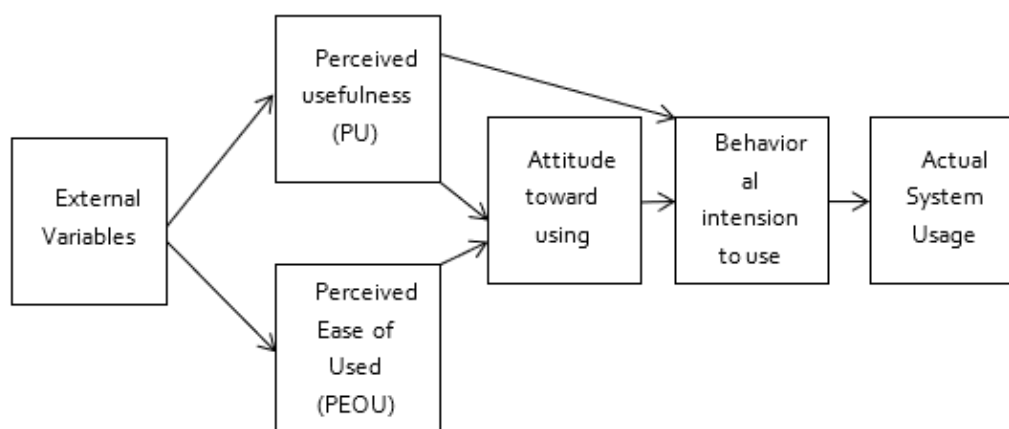


Figure 2.2: Framework of TAM. Source: Davis et al. (1989)

Literature Review

Types of Digital Marketing Tools Available to Livestock Farmers

Recent studies have highlighted various digital marketing tools employed by farmers in Nigeria and other developing countries, including livestock farmers. Nwoye et al. (2022) found that among fresh African catfish marketers in Nigeria, digital tools such as social media platforms, messaging apps, and online marketplaces are available and actively utilized to reach customers, facilitate transactions, and promote their products. Their research indicated that these tools significantly increased market access and sales volume for fish farmers.

Afolayan et al. (2024) reviewed the adoption of digital marketing among Nigerian oil palm farmers, identifying key digital tools such as Facebook, WhatsApp, and mobile money applications. Their findings revealed that these platforms enhance marketing efficiency, enable direct communication with buyers, and support transactions, thereby improving farmers' market presence and profitability. Similarly, Abioye et al. (2024) reported that farmers in Ogun State are willing to adopt digital application tools such as mobile apps, SMS services, and social media channels for marketing purposes, driven by the potential to expand their reach and improve sales.

In the context of smallholder farmers, Bidemi et al. (2025) demonstrated that digital marketing tools, including social media, SMS, and online marketplaces, have a positive impact on food security by enabling farmers to access broader markets and secure better prices. Their study emphasizes the importance of awareness and training to maximize the benefits of these tools.

Further, Adetunbi and Oluyemi (2023) found that arable crop farmers in Nigeria are aware of various digital marketing channels, including Facebook, WhatsApp, and agricultural apps, although the level of utilization varies. Their research suggests that increased awareness correlates with higher adoption rates, which subsequently improves marketing outcomes.

Ashasim et al. (2025) examined groundnut farmers in Taraba State and identified that knowledge of media tools such as social media, radio, and mobile messaging enhances marketing efficiency. Their findings indicate that farmers who are more knowledgeable about these digital tools tend to have better market performance and wider reach.

Chaudhari and Anute (2022) studied agricultural service companies in India, noting that digital marketing practices include the use of websites, social media, and SMS marketing to promote services and products. Their work underscores the importance of adopting multiple digital platforms to diversify marketing strategies and increase farmer engagement.

Ajibola (2025) discussed the role of digital marketing and mechanized agriculture in Sub-Saharan Africa, emphasizing tools such as social media, mobile applications, and online marketplaces. His findings suggest that these tools are crucial for smallholder farmers to adopt sustainable practices and improve market access.

These studies collectively demonstrate that livestock farmers and other agricultural producers in Nigeria and similar contexts have access to a variety of digital marketing tools, including social media platforms (Facebook, WhatsApp), messaging applications (SMS, mobile apps), online marketplaces, and websites. Adoption of these tools enhances marketing reach, facilitates direct communication with buyers, and improves overall market efficiency.

Digital Marketing Tools that are Currently used by Livestock Farmers

Social Media Platforms

Social media has emerged as a powerful tool for livestock farmers to market their products, share information, and connect with customers. Platforms such as Facebook, Instagram, and Twitter enable farmers to showcase their livestock, share success stories, and engage with potential buyers. According to Mojeed et al. (2025), many farmers utilize Facebook groups to connect with consumers and other farmers, facilitating networking and sales.

A review of existing study by Joshi and Tripathy (2024) reviewed that WhatsApp emerges as the most preferred platform among Nigerian livestock farmers due to its user-friendly interface, real-time communication capabilities, and relatively low-cost data usage. Research highlights how farmers utilize WhatsApp groups to discuss best practices, share insights on disease management, and access veterinary services. Additionally, Facebook serves as a valuable platform for broader information dissemination and networking, where farmers can join various agricultural groups, attend webinars, and receive updates on government policies affecting the agricultural sector. Such interactive online environments foster a sense of community among farmers, promoting collaboration and the exchange of innovative farming techniques.

Mobile Applications

Mobile applications specifically designed for agriculture, such as Farmcrowdy and Agroconnect, provide livestock farmers with tools for marketing their products. These applications can connect farmers directly to consumers, streamline the buying process, and

offer features such as price comparisons and customer reviews (Fatumo, 2023). Additionally, farmer-to-farmer applications can facilitate peer-to-peer sales and information sharing.

Sennuga et al. (2023) investigated the impact of smartphone apps on livestock farmers in Nigeria, revealing that these digital tools offer a convenient and efficient means for farmers to record, analyze, and monitor data in real-time. The ability to access timely information on weather conditions, market prices, and disease alerts empowers farmers to make data-driven decisions, thereby potentially increasing productivity and profitability.

Sennuga et al. (2024) investigated the factors influencing farmers' likelihood to adopt mobile phone services. These services included information about purchasing and selling goods, notifications regarding activity relating to agriculture or livestock, and information about agriculture and animals. The findings showed that the use of mobile services is more likely among those who own a personal smartphone and are members of agricultural organizations. According to the study, mobile service providers should design their products for basic or feature phone customers to increase the distribution of agro-meteorological information to the farmers.

According to Mapiye et al. (2023), the introduction of mobile apps in the agriculture and allied sectors has sped up the pace at which farmers are transferring technology to one another. It has developed into a channel through which farmers can obtain information about farming, including seeds, crop selection, crop cultivation, weather, fertilizer, pesticides, and other related topics, from a variety of sources that are dispersed across different regions based on the product's origin, processors, producers, or vendors who use the app. The app provides a simple way to manage and communicate with farmers efficiently.

Ahikiriza et al. (2022) used data from Ugandan dairy farmers to examine the adoption of mobile phones in the agri-food sector in Sub-Saharan Africa. According to the study, one of the main factors influencing the adoption of mobile phones is perceived ease of use. However, perceived benefit and perceived utility have a negative impact on the uptake of mobile phones. This was somewhat expected, as most of the farmers in the research used their phones primarily for everyday communication rather than to market their produce by looking up and exchanging pricing information. For these reasons, awareness campaigns by pertinent parties are necessary to alter these farmers' perspectives regarding the use of mobile phones.

Hoang and Nguyen (2023) on the factors that influence Vietnamese farmers' use of mobile phones for fruit marketing. The study found that young male farmers with high incomes who live far from local markets and take part in training programs are more likely to use ICT tools mobile phones for fruit marketing. When choosing marketing information strategies to distribute to small-scale farmers in developing nations, as well as when encouraging farmers to adopt ICT tools for agricultural produce marketing, it is important to consider their demographic, socioeconomic, situational, and institutional characteristics. Farmers' adoption of ICTs (mobile phones) for fruit marketing is hampered by the high cost of using them and their lack of experience or skill in using applications.

E-Commerce Platforms

E-commerce platforms, both local and international, have also become crucial for livestock farmers. Websites like Jumia and Konga offer farmers the opportunity to list their livestock for sale, reaching a wider audience beyond their immediate locality. Research conducted by Morepje et al. (2024) indicates that farmers using e-commerce platforms report increased sales and market visibility.

Email Marketing

Email marketing remains an effective tool for reaching both existing and potential customers. Farmers can use email newsletters to provide updates on livestock availability, promotional offers, and educational content. This method has been shown to enhance customer retention and engagement (Chiekezie et al., 2022).

Online Marketplaces and Forums
Platforms like OLX and Nairaland provide spaces for livestock farmers to post advertisements. Such online marketplaces simplify the buying and selling process, allowing farmers to reach a diverse clientele. Participation in online forums helps farmers gain insights into market trends and consumer preferences (Chiekezie et al., 2022).

The literature shows that livestock farmers widely use digital marketing tools like social media platforms such as Facebook and WhatsApp. These tools help farmers reach more customers, share information, and improve sales. Many studies agree that these platforms make marketing easier, faster, and more efficient (Mojeed et al., 2025; Joshi and Tripathy, 2024). Mobile applications designed for agriculture, like Farmcrowdy and Agroconnect, also play a big role by providing real-time data and helping farmers manage their products better (Fatumo, 2023; Sennuga et al., 2023). These tools support decision-making and can increase productivity.

However, there are differences in how farmers adopt these tools. Some studies highlight that ease of use and awareness influence whether farmers start using mobile phones or apps for marketing (Ahikiriza et al., 2022; Sennuga et al., 2024). Factors like high costs, lack of skills, and poor internet are common barriers. For example, Ugandan farmers mainly use phones for daily communication rather than marketing, showing that many are not fully utilizing digital tools for business purposes (Ahikiriza et al., 2022). Demographic factors like age, income, and training also affect adoption, especially in developing countries (Hoang and Nguyen, 2023).

Online marketplaces and e-commerce platforms like Jumia, Konga, and OLX are helping farmers sell beyond their local areas, increasing sales and visibility (Morepje et al., 2024). Yet, issues like limited digital literacy and poor infrastructure still restrict many farmers from fully benefiting from these tools. Overall, there is agreement that digital marketing tools have great potential to improve livestock marketing, but challenges remain in ensuring wider adoption. Addressing these barriers can help farmers use digital tools more effectively to expand their markets and increase profits.

Methodology

Study Area

This study was conducted in Taraba State. The state is located between latitude 6°30'N and 9°36'N and longitude 9°10'E and 11°50'E of the Greenwich meridian. It has a landmass area of 60,291.82km², with a population of 2,294,800 (NPC, 2006) and a projected 3,785,747 people as at 2025 based on 3.2% annual population growth of the State. Taraba State is bordered by Bauchi and Gombe State to the North-East, Adamawa State to the East and by Plateau State to the North- West. It is bordered to the West by Nasarawa and Benue States. It shares an international boundary with the republic of Cameroon in the South-Western part. The state has a mean annual rainfall of about 1000-1500mm with a temperature of 15°C to 38°C depending on the season and locality within the state. The dry and rainy seasons common to the tropical regions are also the dominant climatic features found in the State. The rainy season start by early April and last till October while the dry season start by November and ends in March. It has undulating topography with complex group of mountains and hills. The soil type ranges from sandy to sandy – loamy which makes it rural inhabitants mostly farmers (Emmanuel et al., 2024). The state is endowed with many rivers and streams and large water bodies. This natural environment with its seasonal climate, varied topography, and abundant water resources creates favorable conditions for diverse livestock production systems (Oruonye et al., 2024).

The state comprises three distinct vegetation zones: the Guinea Savannah in the southern parts such as Wukari, Takum, and Donga LGAs, characterized by forests and tall grasses; the Sudan Savannah in areas like Jalingo and Lau, marked by short grasses interspersed with short trees; and the semi-temperate zone on the Mambilla Plateau, featuring grasses with tall trees. Crops and livestock production are the major sources of employment for the inhabitants, with rice, maize, yam, and cassava being the predominant staples of most peasant families. The majorities of LGAs are connected to the national grid and have access to modern means of communication, which support the growth of digital marketing. Institutions such as banks and savings and learning centers provide essential financial and educational services, including mobile banking, digital literacy, and capacity building for local entrepreneurs and farmers. Educational institutions further facilitate digital skills development, enabling smallholder farmers and traders to leverage online platforms for marketing their products. Additionally, the presence of markets and trading centres, combined with telecommunications infrastructure, creates opportunities for digital marketing of agricultural produce, crafts, and other local products. The diverse ethnic composition, including groups like the Jukum, Hausa-Fulani, Mumuye, Yandang, Wurkum, Kuteb, Tiv, and Mambila also allows for culturally tailored digital marketing strategies, reaching various communities effectively.

Sampling Procedure

The study employed a multi-stage and snowball sampling procedure to select respondents. In the first stage, all the four agricultural zones in the state were used for the study. In the second stage, simple random sampling techniques were used to select two blocks from the

six blocks in Zone I, three blocks from the four blocks in Zones II and III, and one block in Zone IV. The selected blocks included Ardo-Kola and Lau in Zone I, Bali, Gassol, and Wukari in Zone II, Donga, Takum, and Kurmi in Zone III, and Sardauna in Zone IV.

In the third stage, two cells were selected from each chosen block using simple random sampling. These included Jauro Yinu and Iware in Ardo-Kola, Jimlari and Mayo-Lope in Lau, Garba-Chede and Daka in Bali, Nannai and Tella in Gassol, Rafinkada and Bantaje in Wukari, Mararraba and Tor-Damisa in Donga, Tampa and Rogo in Takum, and Abong and Kpwola in Kurmi, as well as Gembu I and Nguroji in Sardauna.

In the fourth stage, Stratified sampling was employed to ensure representative inclusion of farmers across different livestock categories. The population was first divided into strata based on the type of livestock i.e., cattle, goats, sheep, poultry, and pigs. Within each stratum, farmers were selected using snowball sampling techniques. Initial respondents were identified through local leaders and extension agents, and these farmers were asked to refer other farmers involved in livestock rearing who met the study criteria. This process continued until the desired number of respondents per cell was reached.

The total sample size for this study was determined using Cochran's formula for sample size calculation, considering an estimated proportion of livestock farmers engaged in digital marketing activities, a 95% confidence level, and a 5% margin of error. A total of 384 respondents were used for this study, rounded to the nearest whole number, based on the calculations.

Data Collection

The data for this study were collected from primary sources through the administration of structured questionnaires.

Analytical Framework

Frequency, percentage, mean and standard deviation were used to analyse the types of digital marketing tools available to livestock farmers, digital marketing tools that are currently used by livestock farmers, the level of utilization of the digital marketing tools. Chi-square tests was used to test the hypothesis.

Ethical Considerations

The study "Utilization of Digital Marketing Tools among Livestock Farmers in Taraba State, Nigeria" was conducted following ethical standards for research involving human participants. Approval was obtained from the Institutional Ethics Review Framework of Taraba State University, Jalingo, Nigeria. This approval ensures that the research adhered to ethical guidelines for protecting the rights, privacy, and welfare of the respondents. The study complied with all relevant ethical requirements, including informed consent, confidentiality, and voluntary participation, in line with institutional and national research ethics standards.

The study on the utilization of digital marketing tools among livestock farmers in Taraba State, Nigeria, reported a high response rate of 96.88%. Specifically, out of the 384 questionnaires distributed, 384 responses were valid for analysis. The questionnaire

constructs demonstrated good internal consistency, with a reported Cronbach's alpha reliability coefficient of 0.82, indicating acceptable reliability for the survey instrument. This high response rate and strong reliability support the robustness of the study findings, which highlight the prevalent use of platforms like Facebook, WhatsApp, and SMS among farmers.

Result and Discussion

Type of Livestock Farmed

Table 1: Type of livestock farmed

Type of Livestock Farmed	Frequency	Percentage
Cattle	93	24.2
Goats	48	12.5
Sheep	59	15.4
Poultry	108	28.1
Pigs	76	19.8

Source: Field Survey, 2025

The result in Table 1 shows that the majority of the respondents were into poultry farming, accounting for 28.1%. This implies that poultry farming is a popular livelihood or agricultural practice within the surveyed population, reflecting its significance or preference compared to other types of farming and due to its relatively low capital requirement and quick turnover. This finding aligns with the insights from Obialo (2024), that the prospects and challenges among Ibadan poultry farmers. Obialo highlights that poultry farming is favoured by many farmers because of its accessibility, cost-effectiveness, and rapid returns, which support its widespread adoption within the agricultural community. Cattle farming were also significant, with 24.2% of the respondents engaged in this activity. This underscores the importance of cattle as a traditional and economically valuable livestock in the region. The sizable proportion of farmers engaged in cattle rearing highlights its role in livelihood sustenance and cultural practices. This finding aligns with studies such as Sennuga et al. (2022), which highlight the critical role of cattle in rural livelihoods, providing not only income but also cultural and social benefits. Additionally, Garba (2022) emphasize that cattle rearing is a key component of livestock systems in many developing regions, contributing to food security and income diversification.

Type of Digital Marketing Tools Available to Livestock Farmers

Table 2: Type of Digital Marketing Tools Available to Livestock Farmers

Digital Marketing Tools	Frequency	Percentage
Facebook	346	90.1
WhatsApp	335	87.2
SMS/Text messaging	265	69.0
YouTube	189	49.2
Instagram	163	42.4

Digital Marketing Tools	Frequency	Percentage
Online marketplaces (e.g., Jiji, OLX)	150	39.1
Farm management apps	122	31.8
Google My Business	103	26.8
Others	16	4.2

Source: Field Survey, 2025

The result in Table 2 shows that the major types of digital marketing tools available to livestock farmers were Facebook (90.1%), WhatsApp (87.2%) and SMS/Text messaging (69.0%). This implies that Facebook, WhatsApp and SMS/Text messaging were the dominant social media platforms among these farmers, likely due to their widespread popularity, ease of access, and user-friendly interface. This high usage rate implies that Facebook, WhatsApp and SMS/Text messaging provide a valuable channel for livestock farmers to reach potential customers, share information, and promote their products. This finding agrees with the finding of Nwoye et al. (2022) on the significant role of digital marketing tools among African catfish marketers in Nigeria, emphasizing how accessible and user-friendly platforms like Facebook facilitate marketing activities. Similarly, Tijani (2023) underscores the influence of social media on youth involvement in livestock production, suggesting that platforms like Facebook serve as vital channels for marketing, information sharing, and engagement within livestock communities. Maduka and Nwankwo (2025), in their study on analysis of access and use of social media for agricultural information among poultry farmers in Abia State, Nigeria affirm that Facebook and WhatsApp were highly accessed for agricultural information, and utilized among poultry farmers in Abia State.

Digital Marketing Tools Currently Used by Livestock Farmers

Table 3: Digital marketing tools currently used by livestock farmers

Digital Marketing Tools	Frequency	Percentage
Do you currently use any digital platforms	290	75.5
Facebook	303	78.9
WhatsApp	287	74.7
SMS/Text messaging	210	54.7
YouTube	117	30.5
Instagram	105	27.3
Online marketplaces (e.g., Jiji, OLX)	85	22.1
Farm management apps	73	19.0
Google My Business	60	15.6
Others	8	2.1

Source: Field Survey, 2025

The results in Table 3 show that 75.5% of livestock farmers currently use digital platforms for marketing. This high percentage implies a growing adoption of digital marketing tools among farmers, reflecting the increasing importance of digital platforms in agricultural

practice and marketing strategies. The widespread use of these tools could be attributed to factors such as improved access to information, broader market reach, and the convenience offered by digital technology. These findings align with Rahmadani and Elinur (2024) that emphasizes the role of digital platforms in enhancing market accessibility for farmers, thereby potentially increasing their competitiveness and profitability. Also, Triatmojo et al. (2024), emphasise the importance of demographic targeting in mobile applications for livestock digital marketing among smallholder cattle farmers. This high usage rate underscores the potential effectiveness of tailored digital marketing strategies in reaching the majority of smallholder farmers, as highlighted in their study.

The various types of digital marketing tools currently used by livestock farmers in the area are displayed in Table 3. Findings of the study indicate that Facebook (78.9%), WhatsApp (74.7%) and SMS/Text messaging (54.7%) were the major digital marketing tools currently in use by livestock farmers. This finding implies that digital marketing tools, particularly Facebook and WhatsApp, are the primary digital tools leveraged by livestock farmers to enhance their marketing strategies. The high utilization of digital marketing tools among livestock farmers may be influenced by their educational background, as most of the respondents are literate and familiar with these digital marketing tools. The result may also be attributed to the capability of digital marketing tools in changing the marketing landscape. Also, digital marketing tools provide marketers with improved ways of marketing that enable users to engage with existing customers and reach new ones while allowing them to promote their desired culture, mission, or tone. This finding is similar to the finding of Akinwale et al. (2023) that digital marketing tools enable farmers to engage with existing customers, reach new markets, and promotes their products more effectively, thereby enhancing their marketing strategies. Tijani (2023), who noted that social media involvement increases youth participation in livestock production due to improved digital competencies. Additionally, Nazifi et al. (2023) emphasized that socioeconomic factors like education significantly influence the effectiveness of digital marketing activities among livestock marketers.

Level of Utilization of Digital Marketing Tools by Livestock Farmers

Table 4: Level of utilization of digital marketing tools by livestock farmers

Digital Marketing Tools	Mean	Std. Deviation
Facebook	3.6	1.53
WhatsApp	3.1	1.57
SMS/Text messaging	3.0	1.44
YouTube	2.3	1.37
Online marketplaces (e.g., Jiji, OLX)	2.2	1.24
Google My Business	2.1	1.27
Farm management apps	2.1	1.21
Instagram	2.0	1.27

Source: Field Survey, 2025

The result on the level of utilization of digital marketing tools amongst the livestock farmers is shown in Table 4. The result reveals that there were high levels of utilization of Facebook ($\bar{x} = 3.6$), WhatsApp ($\bar{x} = 3.1$) and SMS/Text messaging ($\bar{x} = 3.0$). These findings imply that livestock farmers mainly use Facebook, WhatsApp, and messaging apps for digital marketing, while their use of other digital tools is less common. The variation in usage levels, indicated by the higher standard deviations, may be due to differences in digital skills, access to technology, or how useful farmers find these tools. Since these platforms are widely used, agricultural extension services, marketers, and policymakers can use Facebook, WhatsApp, and SMS to share information, promote products, and support farmers. This finding is similar to the study of Triatmojo et al. (2024) who highlight the importance of demographic targeting on mobile applications, indicating that smallholder farmers tend to favor specific digital platforms based on their demographic profiles, which aligns with the observed preference for Facebook and WhatsApp in this study. Mapiye et al. (2023) also emphasize the potential of ICTs to enhance the dissemination of agricultural information among smallholder farmers in sub-Saharan Africa, suggesting that leveraging widely used platforms like Facebook and WhatsApp can significantly improve communication and information flow. Additionally, Konoplyannikova et al. (2024) discuss the role of social media strategies in agricultural marketing, reinforcing the idea that these digital tools are vital for effective marketing and communication in the agricultural sector.

Relationship between the type of livestock farmed (e.g., cattle, goats, poultry) and the level of digital marketing tool utilization.

Table 5: Relationship between the type of livestock farmed (e.g., cattle, goats, poultry) and the level of digital marketing tool utilization

Test	Value	Df	p-value
Pearson Chi-Square	583.267	104	0.000
Likelihood Ratio	565.996	104	0.000
Linear-by-Linear Association	2.535	1	0.111
Measures of Association			
Measure	Value	Std. Error	p-value
Pearson's Correlation (r)	-0.081	0.051	0.111
Spearman's Rank Correlation	-0.063	0.049	.215

Source: Field Survey, 2025

Table 5 show the results of chi-square test of the relationship between the type of livestock farmed (e.g., cattle, goats, poultry) and the level of digital marketing tool utilization. The results of the Chi-Square test of independence indicated a statistically significant association, ($\chi^2 = 583.267$, $p < 0.001$), implying that there may be a relationship between these variables.

However, further analysis using correlation coefficients revealed that the strength of this relationship was negligible. Pearson’s correlation coefficient was $r = -0.081$ ($p = 0.111$), and Spearman’s rank correlation coefficient was $p = -0.063$ ($p = 0.215$). Both coefficients were close to zero and not statistically significant, indicating that the relationship between the

type of livestock and digital marketing tool usage is weak and unlikely to be practically meaningful.

This shows that despite the initial indication from the Chi-Square test, the type of farm animals raised does not have a substantial effect on farmers' use of digital marketing tools. The large Chi-Square value may have been influenced by the sample size or distribution, but it does not translate into a meaningful or strong relationship.

Based on these findings, the null hypothesis that there is no significant relationship between the type of livestock and digital marketing tool utilization is accepted. The result shows that other factors, such as access to technology, education, or awareness, are likely more influential in determining farmers' use of digital marketing tools. This study agreed with the finding of Ahmed and Ahmed (2023) who emphasized that technology adoption in agriculture is often more strongly influenced by infrastructural and socio-economic factors than by the type of livestock farmed. Similarly, Duncan (2023) argued that access to information, digital literacy, and infrastructural support are critical determinants of digital technology uptake, often overshadowing farm-specific variables such as livestock type.

Transferability Limitations of the Findings

Although this study provides valuable insights into the utilization of digital marketing tools among livestock farmers in Taraba State, Nigeria, caution must be exercised when applying these findings to other regional contexts. The socio-economic, cultural, and infrastructural conditions unique to Taraba State such as levels of internet connectivity, digital literacy, access to mobile devices, and traditional marketing practices may differ significantly from those in other regions within Nigeria or neighboring countries. These regional disparities influence the adoption and utilization of digital marketing tools, thereby affecting the generalizability of the results. Additionally, variations in livestock types, market structures, and cultural attitudes toward technology can lead to different patterns of digital tool usage elsewhere. Consequently, the transferability of these findings is limited, and future research should consider regional-specific factors to better understand digital marketing adoption across diverse agricultural contexts.

Conclusion

Based on the results, livestock farmers predominantly utilize familiar digital marketing tools like Facebook, WhatsApp, and SMS, which are highly accessible and user-friendly. However, the analysis indicates that there is no meaningful relationship between the type of livestock farmed and the level of digital marketing tool utilization.

Recommendation

This study recommended that;

- i. Given the high usage and utilization of Facebook, WhatsApp, and SMS among farmers, extension services and agricultural marketers should prioritize these platforms to disseminate information, provide training, and support farmers in optimizing their digital marketing strategies.

- ii. Taraba State Agricultural Development Programmes should encourage the creation of customized digital marketing strategies that leverage popular platforms like Facebook, WhatsApp, and SMS to reach specific farmer demographics.
- iii. Given the high usage of Facebook and WhatsApp but lower engagement with other tools like YouTube, Taraba State Government should develop a programmes that focus on improving digital literacy to encourage adoption of diverse digital marketing tools.

References

- Abioye, D. O., Popoola, O., Akande, A., Fadare, D. A., Omitoyin, S. A., Yinusa, B., & Kolade, O. O. (2024). Farmers' willingness to adopt digital application tools in Ogun State, Nigeria. *Journal of Strategy and Management*.
- Achmad, B., Sanudin, Siarudin, M., Widiyanto, A., Diniyati, D., Sudomo, A., ... & Ruswandi, A. (2022). Traditional subsistence farming of smallholder agroforestry systems in Indonesia: A review. *Sustainability*, 14(14), 8631.
- Adams, F., Ohene-Yankyera, K., Aidoo, R., & Wongnaa, C. A. (2021). Economic benefits of livestock management in Ghana. *Agricultural and Food Economics*, 9, 1-17.
- Adetunbi, S. I., & Oluyemi, A. J. (2023). Level of Awareness and Utilization of Digital Marketing Channels Among Arable Crop Farmers in Surulere Local Government Area, Oyo State, Nigeria. *International Research Journal of Economics and Management Studies IRJEMS*, 2(3).
- Afolayan, A. F., Oke, T. T., Ojo, R. A., Raji, M. A., & Olodo, H. B. (2024). Adoption of the digital marketing among oil palm farmers: A review of methods, successes and challenges in Nigeria.
- Ahikiriza, E., Wesana, J., Van Huylbroeck, G., Kabbiri, R., De Steur, H., Lauwers, L., & Gellynck, X. (2022). Farmer knowledge and the intention to use smartphone-based information management technologies in Uganda. *Computers and Electronics in Agriculture*, 202, 107413.
- Ahmed, H., & Ahmed, M. (2023). Influencing factors on adoption of modern agricultural technology in developing economy countries. *Developing Country Studies*, 13(2), 1-15.
- Ajibola, A. S. (2025). Digital marketing and mechanized agriculture for smallholder farmers in Sub-Saharan Africa: Boosting adoption and sustainability. *International Journal of Agriculture and Agricultural Technology*.
- Akinwale, J. A., Wole-Alo, F. I., & Oluwale, B. O. (2023). Digital platforms for linking agriculture investors with smallholder farmers in Nigeria. *Journal of Agricultural Extension*, 27(2), 65-72.
- Ali, A., & Xia, C. (2022). Current and prospective impacts of digital marketing on the small agricultural stakeholders in the developing countries. In *Application of machine learning in agriculture* (pp. 91-112). Academic Press.
- Anissa, B. P. (2023). *Improving smallholder access to markets: the role of asymmetric information, market power, and relational contracting in low-income countries* (Doctoral dissertation, Wageningen University).
- Arowosegbe, O. B., Alomaja, O. A., & Tihamiyu, B. B. (2024). The role of agricultural extension workers in transforming agricultural supply chains: enhancing innovation, technology adoption, and ethical practices in Nigeria. *World Journal of Advanced Research and Reviews*, 23(3), 2585-2602.
- Ashasim, T. I., Nicodemus, F. L., Philemon, J. T., & Gideon, R. (2025). Knowledge of Media Tools and Marketing Efficiency among Groundnut Farmers in Ardo-Kola Local Government, Taraba State, Nigeria. *Journal of Agricultural Extension*, 30(1), 173-181.
- Banda, L. J., & Tanganyika, J. (2021). Livestock provide more than food in smallholder production systems of developing countries. *Animal Frontiers*, 11(2), 7-14.

- Bellemare, M. F., Bloem, J. R., & Lim, S. (2022). Producers, consumers, and value chains in low-and middle-income countries. In *Handbook of Agricultural Economics* (Vol. 6, pp. 4933-4996). Elsevier.
- Bidemi Hyekonni, N. D. A. G. A. N. A., & Glory, D. K. P. (2025). Impact of Digital Marketing on Food Security among Small Holders'farmers in North East Nigeria. *Journal of Management Science and Entrepreneurship*.
- Bondarenko, V., Sidorenko, V., Hryshchenko, A., Vyshnivska, B., Nahorna, O., Barylovyh, O., ... & Grydzhuk, I. (2024). *Development of Marketing at Agricultural and Processing Enterprises*. International Science Group.
- Bose, S. C., & Kiran, R. (2021). Digital marketing: a sustainable way to thrive in competition of agriculture marketing. *Bioinformatics for agriculture: High-throughput approaches*, 135-144.
- Brar, P. S., Mehta, N., Singh, A., Sivakumar, S., & Phand, S. (2021). Value addition of Milk and meat: A push to entrepreneurship [E-book]. *Hyderabad: Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana & National Institute of Agricultural Extension Management, Hyderabad, India*.
- Chaudhari, M. G., & Anute, N. (2022). Digital marketing practices adopted by agricultural service companies in India. *Journal homepage: www. ijrpr. com ISSN, 2582, 7421*.
- Chiekezie, N. R., Nwankwo, E. C., & Ozor, M. U. (2022). Analysis of small scale broiler poultry production in south East Nigeria, West Africa. *International Journal of Animal and Livestock Production Research*, 6(1), 1-16.
- Damania, A. B., & Joshi, P. (2025). Agricultural transformations: early crop cultivation and farm animal domestication in South America, South Asia and India: EARLY CROP AND FARM ANIMAL DOMESTICATION. *Indian Journal of Traditional Knowledge (IJTK)*, 24(4), 361-371.
- Daniel, A. S. (2023). Assessing the Impact of Livestock Marketing on Taraba State Economy: A Look at Jalingo Local Government Area. *Sapientia Global Journal of Arts, Humanities and Development Studies*, 6(2).
- Davis, F. D., & Granić, A. (2024). Introduction:"Once Upon a TAM". In *The Technology Acceptance Model: 30 Years of TAM* (pp. 1-18). Cham: Springer International Publishing.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). Technology acceptance model. *Journal of Management Science*, 35(8), 982-1003.
- Duncan, E. (2023). *The Affordances of Digital Agricultural Technologies* (Doctoral dissertation, University of Guelph).
- Emmanuel, G., Zubairu, A. I., Danji, M. B., Hassan, C. K., & Bakari, B. W. (2024). Adoption of Organic Farming Practices Among Vegetable Farmers in Jalingo Local Government Area of Taraba State, Nigeria. *Journal of Arid Agriculture*, 25(1), 130-137.
- Erick, D. S. (2022). The role of livestock marketing in improving the livelihoods of pastoralists. *International Journal Og Livestock Policy*, 1(1), 2003-2005.
- Fatumo, D. E. (2023). Design and Development of Mobile-based e-Marketing Application for Communal Farmers in Eastern Cape. South Africa.
- Fishbein, M., & Ajzen, I. (1975). Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Addison-Wesley.
- Gandasari, D., Dwidienawati, D., Tjahjana, D., & Taopik, O. A. (2024). The acceptance of social media as a channel of communication and livestock information for sheep farmers. *Open Agriculture*, 9(1), 20220354.
- Garba, D. S. (2022). Economic Significance of the Livestock Sector in Nigeria. *Yobe State University, Damaturu, Nigeria*, 10(2), 17.
- Gavrilova, N. (2020). Improving food security in Nigeria through livestock innovation. In *E3S web of conferences* (Vol. 176, p. 01010). EDP Sciences.
- Hoang, H. G., & Nguyen, D. V. (2023). Determinants of smallholders' adoption of mobile phones for vegetable marketing in Vietnam. *Global Knowledge, Memory and Communication*, 72(4/5), 506-522.

- Joshi, P., & Tripathy, A. K. (2024). Social Media for Extension Services. *INNOVATIONS IN DIGITAL EXTENSION*, 111.
- Kemitare, G., Kabuye, F., Olyanga, A. M., & Rudaheranwa, N. (2021). Value chain, productivity and trade performance in the dairy industry. *Modern Supply Chain Research and Applications*, 3(1), 24-40.
- Konoplyannikova, M., Radkevych, L., Netreba, M., Bilan, M., Lorvi, I., & Nahorna, O. (2024). Digital marketing and communication strategies of agri-food enterprises on social media platforms. *Agronomy Research*, (22 (S1)), 444-463.
- Maduka, P. O., & Nwankwo, G. (2025). Analysis of Access and Use of Social Media for Agricultural Information among Poultry Farmers in Abia State, Nigeria. *Journal of Community & Communication Research*, 10(1), 58-67.
- Maniriho, A. (2024). Consumption of protein-rich food items: effect of cattle ownership and land-use consolidation. *Cogent Food & Agriculture*, 10(1), 2306720.
- Mapiye, O., Makombe, G., Molotsi, A., Dzama, K., & Mapiye, C. (2023). Information and communication technologies (ICTs): The potential for enhancing the dissemination of agricultural information and services to smallholder farmers in sub-Saharan Africa. *Information Development*, 39(3), 638-658.
- Mehrabi, Z., Gill, M., Wijk, M. V., Herrero, M., & Ramankutty, N. (2020). Livestock policy for sustainable development. *Nature Food*, 1(3), 160-165.
- Mojeed, T. A., Olajide, B. T., John, O. B., Adebayo, O. O., Setsoafia, M. E. K., Adebayo, G. D., & Adeniyi, G. A. (2025). Effect of ICT Utilization on the Efficiency of Rice Marketing in Ogbomoso North, Oyo State, Nigeria. *African Journal of Agricultural Science and Food Research*, 18(1), 257-294.
- Moran, D., & Blair, K. J. (2021). Sustainable livestock systems: anticipating demand-side challenges. *Animal*, 15, 100288.
- Morepje, M. T., Sithole, M. Z., Msweli, N. S., & Agholor, A. I. (2024). The influence of E-commerce platforms on sustainable agriculture practices among smallholder farmers in Sub-Saharan Africa. *Sustainability*, 16(15), 6496.
- Mumba, C., Kasanga, B., Mwamba, C. T., Sichilima, T., Siankwilimba, E., Sitali, D. C., ... & Muma, J. B. (2024). An in-depth analysis of factors influencing small-scale cattle farmers' participation in livestock markets in Western Province of Zambia: navigating challenges and barriers. *Frontiers in Veterinary Science*, 11, 1397000.
- Muoghalu, L. N., & Akanwa, A. O. (2021). Ecological intensification for sustainable agriculture: the Nigerian perspective. *Ecological Intensification of Natural Resources for Sustainable Agriculture*, 521-564.
- Nazifi, B., Garba, M. G., & Ibrahim, M. (2023). Cashless Transactions Socioeconomic Determinants and Its Effectiveness in Livestock Marketing Activities among Livestock Marketers in Katsina State, Nigeria. *Research Journal of Agricultural Economics and Development*, 2(1), 49-60.
- Nguyen, V. D., Nguyen, C. O., Chau, T. M. L., Nguyen, D. Q. D., Han, A. T., & Le, T. T. H. (2023). Goat production, supply chains, challenges, and opportunities for development in Vietnam: A Review. *Animals*, 13(15), 2546.
- Nwoye, I. I., Onubogu, O. H., & Uzochukwu, I. E. (2022). Availability and utilization of digital marketing tools among fresh African catfish marketers in Omambala Region of Anambra State, Nigeria. *Journal of Agricultural Extension*, 26(2), 61-69.
- Obialo, F. K. (2024). Farmers' Livelihood and Performance Improvement: Prospects and Challenges Among Ibadan Poultry Farmers. *Agripreneurship and the Dynamic Agribusiness Value Chain*, 85-101.
- Obonyo, E., Formentini, M., Ndiritu, S. W., & Naslund, D. (2023). Information sharing in African perishable agri-food supply chains: a systematic literature review and research agenda. *Journal of Agribusiness in Developing and Emerging Economies*.
- Oruonye, E. D., Dinshiya, U., Anger, R. T., & Ahmed, Y. M. (2024). Assessment of Rural Livelihood Strategies in Taraba State, Nigeria. *JALINGO JOURNAL OF SOCIAL AND MANAGEMENT SCIENCES*, 5(4), 216-231.

- Padhiary, M., & Roy, P. (2025). Collaborative Marketing Strategies in Agriculture for Global Reach and Local Impact. In *Emerging Trends in Food and Agribusiness Marketing* (pp. 219-252). IGI Global.
- Pandey, H. O., & Upadhyay, D. (2022). Global livestock production systems: classification, status, and future trends. *Emerging issues in climate smart livestock production*, 47-70.
- Prasetyowati, R. A., Meiria, E., & Hamid, A. (2022, February). Warehouse receipt system using technology acceptance model (TAM) for agricultural islamic financing. In *2022 International Conference on Science and Technology (ICOSTECH)* (pp. 1-7). IEEE.
- Rahmadani, E., & Elinur, E. (2024). Digital marketing strategies in increasing the competitiveness of agricultural products in the digital economy era. *Global International Journal of Innovative Research*, 2(9), 2153-2164.
- Rapiya, M., Mndela, M., Truter, W., & Ramoelo, A. (2025). Assessing the economic viability of sustainable pasture and rangeland management practices: a review. *Agriculture*, 15(7), 690.
- Sanbella, L., Van Versie, I., & Audiah, S. (2024). Online Marketing Strategy Optimization to Increase Sales and E-Commerce Development: An Integrated Approach in the Digital Age. *Startupreneur Business Digital (SABDA Journal)*, 3(1), 54-66.
- Sassi, N. E. Y. (2024). *Optimizing Digital Marketing Strategies for Enhancing Sales Performance* (Doctoral dissertation, Higher School Of Management and Digital Economy).
- Sechele, G., Rabedzwa, G., Nongayo, S., & Thango, B. (2024). Systematic Review on SEO and Digital Marketing Strategies for Enhancing Retail SMEs' Performance.
- Sekaran, U., Lai, L., Ussiri, D. A., Kumar, S., & Clay, S. (2021). Role of integrated crop-livestock systems in improving agriculture production and addressing food security—A review. *Journal of Agriculture and Food Research*, 5, 100190.
- Sennuga, S. O., Bamidele, J., Joel, O. J., Olaitan, M. A., Joel, A. F., & Raymond, T. (2024). Assessment of the factors affecting smallholder livestock farmers' use of information and communication technologies to access market information in Nasarawa State, Nigeria. *Journal of Veterinary and Biomedical Sciences*, 6(2), 17-27.
- Sennuga, S. O., Lai-Solarin, W. I., Adeoye, W. A., & Alabuja, F. O. (2022). Extension's role in improving livestock production: information needs, institutions and opportunities. *Int. J. Agric. Nutr*, 4, 43-51.
- Sennuga, S. O., Ujoyi, S. A., Bamidele, J., Onjewu, S. S., Lai-Solarin, W. I., & Omole, A. A. (2023). Exploring the role of smart-phone apps for livestock farmers data management extension and informed decisionmaking in Nigeria. *Int J Probiotics and Dietetics*, 3(2), 46-53.
- Sheng, D., Edmonds, J. A., Patel, P., Waldhoff, S. T., O'Neill, B. C., Wise, M. A., & Zhao, X. (2025). Labour market evolution is a key determinant of global agro-economic and environmental futures. *Nature Food*, 6(2), 139-150.
- Tijani, S. A. (2023). Effects of social media on youth involvement in livestock production in Oyo State, Nigeria. *AGRICULTURA TROPICA ET SUBTROPICA*, 56.
- Triatmojo, A., Muzayyanah, M. A. U., Syahlani, S. P., & Guntoro, B. (2024). Demographic Targeting of Users in Mobile Applications for Livestock Digital Marketing among Smallholder Cattle Farmers. *Agrisocionomics: Jurnal Sosial Ekonomi Pertanian*, 8(2), 602-613.
- Triatmojo, A., Qui, N. H., El Sayed, Y. B., Muzayyanah, M. A. U., Syahlani, S. P., & Guntoro, B. (2024). Technological Acceptance of Cattle Farmers in Mobile Applications for Livestock digital Marketing. *Buletin Peternakan*, 48(2), 153-161.
- Vieira, K. C., Pinto, G. A., & Sugano, J. Y. (2022). Consumer Behavior Towards Technological Innovations: A Systematic Review. *JISTEM-Journal of Information Systems and Technology Management*, 19, e202219004.
- Williams, J. (2024). Contribution of Livestock Farming to Environmental Pollution in China. *Journal of Animal Health*, 4(1), 43-53.

Zanou, M. A. M., Zannou, A., Dossa, L. H., Antoine-Moussiaux, N., Aoudji, A. K. N., Voronine, V., ... & Houinato, M. R. B. (2023). Market structure, trader behaviour and performance of small ruminants marketing in Benin, West Africa. *Cogent Food & Agriculture*, 9(1), 2184934.