The Role of Artificial Intelligence in Digital Communication for Enhancing Agricultural Extension Services among Michael Okpara University of Agriculture, Umudike Staff.

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Abstract

This study aimed at investigating the role of artificial intelligence in digital communication for enhancing agricultural extension services, among staff of Michael Okpara University of Agriculture, Umudike (MOUAU). The specific objectives were to assess the level of awareness of AI and its application in digital communication among MOUAU staff, evaluate their opinions on the benefits, relevance, and challenges of using AI in agricultural extension, and examine their views on strategies r overcoming identified challenges. The diffusion of innovation and adoption of behaviour theory was used for the study. The study adopted a survey research designfo, using a questionnaire as research instrument for data collection from 357 MOUAU staff. The data was analysed using descriptive statistics such as tables and simple percentage. Based on the objectives, the study established a moderately significant level of awareness of AI and its usage among MOUAU staff; the study also found out that respondents perceived AI as beneficial for improving information dissemination, decision-making and the overall effectiveness of extension delivery; the outcome also indicated that there challenges that comes with using AI for extension services such as inadequate ICT infrastructure. Based on these findings, the following recommendations among others were suggested: that government, university management, and other

relevant stakeholders should organise a special training programmes for both extension workers and farmers on the application of AI for digital communication; government should strengthen digital infrastructure for smooth use of AI for digital communication among the beneficiaries of extension services.

Keywords: Artificial Intelligence, Digital Communication, Agricultural Extension

Introduction

The rapid growth of Artificial Intelligence (AI) is gradually changing and reshaping how we communicate across multiple sectors, including agriculture (Abdalla, 2025). In recent times, it has turned out to be a transformative tools for improving information gathering, dissemination, data analysis, feedback mechanisms, and decision-making processes within the field of agriculture (Jamal, Raza, Erdenetsogt, Singh, Farooq, MohsinKabeer, and Aslam, 2025). Agricultural extension services, which serve as a veritable connecting platfnm for research institutions and farmers, increasingly depends on digital platforms to enhance outreach, efficiency, and responsiveness. The integration of AI into digital communication technologies therefore presents significant opportunities for modernising extension delivery (Umar, 2023).

In developing countries such as Nigeria, agricultural extension services often experience certain challenges which include inadequate infrastructure, delayed information dissemination, limited manpower skills, and insufficient farmers' engagement (Boroh and Nwakanma, 2018). AI-powered platforms which include predictive analytics, automated advisory platforms have the capacity to address these limitation through enabling real-time interaction, personalised advisory services, and efficient knowledge management. When effectively deployed, AI-driven communication technologies can strengthen the interaction between extension workers and farmers, improve access to agricultural innovations, and enhance productivity outcomes (Vissarapu, 2025).

Despite these advantages that comes with utilisation of AI in digital communication for agricultural extension, the adoption and integration into agricultural extension systems remain unbalance. The implication is that certain

factors such as limited awareness, inadequate technical capacity, infrastructural deficits, and ethical concerns regarding data management may prevent effective utilisation (Ayoola, Bamidele, Oyediji, Olaitan, Eleke, Oluwamayowa, Abubakar, and Sennuga, 2025). Understanding staff awareness, perceptions, and readiness to integrate AI into extension communication is therefore essential for strengthening institutional capacity and policy direction.

This study, therefore, investigates how awareness, perceived benefits, and perceived challenges influence the potential adoption of AI-driven digital communication technologies in agricultural extension services.

Statement of the Problem

Agricultural extension services have long been recognised as a vital mechanism for linking agricultural institutions with farmers, particularly in the dissemination of innovations, improved farming techniques, and relevant information that enhances productivity. This is largely due to their capacity to translate research findings into practical knowledge that farmers can easily adopt, thereby improving agricultural outcomes and rural livelihoods.

In spite of this important role, agricultural extension services have been significantly constrained by several challenges. These include inadequate manpower, poor funding, limited logistical support, and weak communication infrastructure. Such limitations have slowed down the effectiveness and reach of extension service delivery, especially in developing regions where farmers often rely heavily on timely and accurate agricultural information. Consequently, many farmers remain disconnected from modern agricultural practices and innovations that could improve their productivity and resilience.

To address these challenges, stakeholders within the agricultural sector have increasingly advocated for the integration of artificial intelligence (AI) into extension services. This is based on the premise that AI-driven digital communication tools can enhance information dissemination and has the potential to bridge communication gaps, personalise information delivery, and support decision-making processes in agriculture.

However, despite the growing interest in the application of AI in agriculture, there remains a gap in understanding the extent to which AI can effectively enhance digital communication within agricultural extension services, particularly among institutional stakeholders. Issues such as awareness levels, accessibility, technical capacity, and the practical challenges of implementation continue to raise concerns.

Based on this premise, there is no doubt that artificial intelligence possesses the capacity to transform agricultural extension services, the critical question remains: what role can artificial intelligence in digital communication play to enhance the effectiveness of agricultural extension services among staff of Michael Okpara University of Agriculture, Umudike? Addressing this question forms the central focus of this study.

Research Objectives

This study was guided by the following objectives to

i. assess the level of awareness of AI and its application in digital communication among MOUAU staff;
ii. evaluate their opinions on the benefits, relevance, and challenges of using AI in agricultural extension;
iii. examine their views on strategies for overcoming identified challenges.

Review of Literature

Conceptualisation

Artificial Intelligence (AI)

Artificial Intelligence (AI) this is a branch of computer science that deals with with the development of systems that can perform tasks that normally require human intelligence. These tasks include learning from experience, reasoning, understanding language, recognising patterns, and making decisions. AI systems are designed to simulate human thinking processes using algorithms and large volumes of data (Patra, n.d).

It is deployed in technologies such as chatbots, virtual assistants, and automated decision-making systems. These tools are capable of processing vast amounts of information quickly and generating meaningful outputs that assist human users

(Golec, Hatay, Gill, and Buyya 2025). For instance, it be deplored in areas such as agriculture to collate data such as rainfall patterns or soil conditions essential for farmers (Akintuyi, 2024).

What this means is that AI is gradually being utilised to boost productivity and in turn efficiency. It provides room precision farming by assisting farmers with helpful information to enable them make informed decision invaluable farm management such as planting, pest control, irrigation etc. through this AI reduces the uncertainty that comes with farming practices and in turn contributes to improved farming system (Akintuyi, 2024).

Digital Communication

When it comes to digital communication, it is the exchange of information through electronic and internet-based platforms. It involves the use of devices such as smartphones, computers, and tablets, as well as platforms like social media, email, websites, and messaging applications (Sadiku, Chukwu, Ajayi-Majebi and Musa, 2022).

One key feature of digital communication is its speed and accessibility. Information can be transmitted instantly across long distances, allowing individuals and organisations to stay connected in real time. It also supports interactive communication, where users can respond immediately, share feedback, and engage in discussions regardless of location (Sarangam, 2019).

In agriculture, digital communication equally plays an important role especially in connecting farmers with extension agents, researchers, and markets. It enables the rapid dissemination of agricultural information such as weather updates, pest alerts, and best farming practices. This improves decision-making among farmers and reduces delays in accessing critical agricultural knowledge (Sanchi, Alhassan, and Sabo, 2023)

Agricultural Extension

Agricultural extension is a system designed to transfer knowledge, skills, and innovations from research institutions to farmers. It serves as a link between agricultural researchers and rural farming communities, ensuring that scientific discoveries are translated into practical farming solutions.

Traditionally, agricultural extension involved face-to-face interactions, farm visits, demonstrations, and group training sessions conducted by extension officers. These methods focused on educating farmers about improved farming techniques, modern inputs, and sustainable agricultural practices to enhance productivity.

In modern times, agricultural extension has evolved to incorporate digital tools and technologies, including mobile applications, AI-driven platforms, and online communication systems. This transformation has expanded the reach of extension services, making agricultural information more accessible, timely, and tailored to the specific needs of farmers, thereby improving overall agricultural development.

The Role of Artificial Intelligence in Digital Communication for Enhancing Agricultural Extension Services

Artificial Intelligence (AI) is increasingly reshaping digital communication systems across various sectors, and agricultural extension services are no exception. Traditionally, agricultural extension relied heavily on physical contact between extension officers and farmers, which often limited the speed, reach, and consistency of information dissemination. However, with the emergence of AI-driven digital communication tools, there is a gradual shift towards more efficient, responsive, and data-informed extension systems.

Awareness of Artificial Intelligence plays a critical role in determining its level of adoption in agricultural extension services. In many developing contexts, including academic and agricultural communities, awareness of AI remains uneven. While some staff and stakeholders are familiar with tools such as chatbots, virtual assistants, and predictive analytics, others still have limited understanding of how AI functions or how it can be applied in agricultural communication. This gap in awareness often influences how individuals perceive the usefulness of AI, thereby affecting their willingness to engage with it. Where awareness is high, there is usually a greater openness to experimentation and adoption (Hasan and Harande, 2025)

The benefits of AI in digital communication for agricultural extension are both wide-ranging and significant. One of the key advantages is improved speed and efficiency in information dissemination. AI-powered platforms can process large

volumes of agricultural data and deliver tailored recommendations to farmers almost instantly. This includes advice on weather conditions, pest control, soil management, and market trends. Additionally, AI enhances personalisation, ensuring that farmers receive information that is specific to their location, crop type, and farming practices. This targeted communication improves decision-making and ultimately boosts productivity and food security (Hasan and Harande, 2025).

Another important benefit is the expansion of access to agricultural knowledge. Through mobile applications, chatbots, and automated messaging systems, farmers in remote areas can now access extension services without necessarily meeting an extension officer physically. This is particularly valuable in regions with limited manpower or difficult terrain. AI also supports multilingual communication, enabling farmers to receive information in their preferred local languages, which improves comprehension and usability (Hasan and Harande, 2025)

Despite these advantages, the use of Artificial Intelligence in agricultural extension services is not without challenges. One major challenge is the lack of adequate technical skills among both extension agents and farmers. Many users may not fully understand how to operate AI-driven platforms, which limits effective utilisation. Another significant issue is poor internet connectivity, especially in rural farming communities where agricultural activities are most concentrated. Without stable internet access to AI platforms will be unstable and unreliable. High implementation costs and inadequate infrastructure further compound these difficulties (Onyekachi, Ofoegbu and Efido, 2025).

Resistance to change is also a notable barrier to AI adoption. Some farmers and extension personnel may be hesitant to move away from traditional methods of communication due to trust issues or unfamiliarity with digital systems. Additionally, concerns surrounding data privacy and security may discourage users from fully embracing AI tools. There is often uncertainty about how personal or farm-related data is collected, stored, and used by digital (Onyekachi, Ofoegbu and Efido, 2025)

To address these challenges, several strategies can be adopted to boost the integration of AI in agricultural extension services. One key approach is continuous training and capacity building for both extension workers and farmers. This will help improve digital literacy and build confidence in using AI tools. Training programmes should be practical and context-specific, focusing on real-life agricultural applications rather than abstract concepts. Extension institutions and universities also have a role to play in incorporating AI literacy into their curricula and professional development programmes (Nnanguma, 2025).

Improving ICT infrastructure is another crucial strategy. Governments and relevant stakeholders must invest in expanding internet coverage, particularly in rural areas where agricultural activities are concentrated. Affordable access to digital devices and reliable connectivity will significantly enhance the effectiveness of AI-based communication systems. In addition, collaboration between public institutions, private technology companies, and agricultural organisations can help in developing user-friendly AI platforms tailored to the needs of farmers (Nnanguma, 2025)

Policy support is equally important in promoting AI adoption in agricultural extension. Clear guidelines and regulatory frameworks should be established to govern the use of AI technologies, particularly in relation to data protection and ethical usage. Government incentives, such as subsidies for digital tools or funding for innovation in agriculture, can also encourage wider adoption. Awareness campaigns should be intensified to educate stakeholders on the benefits and practical uses of AI, thereby reducing fear and resistance (Nnanguma, 2025).

In conclusion, Artificial Intelligence holds significant potential for transforming digital communication in agricultural extension services. Its ability to enhance awareness, improve benefits such as efficiency and accessibility, and address complex agricultural challenges makes it a valuable tool for modern agriculture. However, the successful integration of AI depends on overcoming challenges related to skills, infrastructure, cost, and acceptance. Through targeted strategies such as training, infrastructure development, policy support, and awareness creation, AI can be effectively adopted to strengthen agricultural extension systems and ultimately improve agricultural productivity and rural livelihoods.

Theoretical Framework

The Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) Theory were selected for this study.

The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was developed by Fred Davis and focuses on individual users' acceptance of technology. It argues that two main factors determine whether a person will adopt a new technology: perceived usefulness (the extent to which someone believes the technology will improve their performance or life) and perceived ease of use (how simple and effortless the technology is to use). If users find a system both useful and easy to operate, they are more likely to develop a positive attitude towards it, which then leads to actual usage. TAM is often applied in studies involving digital tools, mobile apps, and information systems.

Diffusion of Innovation (DOI) Theory

On the other hand, the Diffusion of Innovation (DOI) Theory, proposed by Everett Rogers, explains how new ideas, practices, or technologies spread within a society or social system over time. It identifies different categories of adopters such as innovators, early adopters, early majority, late majority, and laggards. The theory also highlights key factors that influence adoption, including relative advantage (is it better than what exists?), compatibility* (does it fit existing values and needs?), complexity (is it difficult to understand?), trialability (can it be tested?), and observability (are the results visible to others). DOI is especially useful in understanding how innovations spread across communities, organisations, or entire populations.

The Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) Theory together explain how Artificial Intelligence (AI) can be successfully used in digital communication to enhance agricultural extension services. TAM, developed by Fred Davis, focuses on individual users, suggesting that farmers and extension agents will adopt AI tools such as chatbots or mobile advisory platforms if they perceive them as useful (e.g. improving yield or providing timely information) and easy to use. In contrast, DOI, proposed by Everett Rogers, explains how these AI innovations spread across farming communities over time,

starting with early adopters and gradually influencing others based on factors like relative advantage, compatibility, and observability. In relation to the topic, TAM highlights why individuals accept AI-driven communication tools, while DOI shows how these tools gain wider acceptance and usage within agricultural systems, making both theories essential for understanding the adoption and expansion of AI in agricultural extension services.

Research Methodology

The descriptive survey design was used to obtain information from the respondents. The sample focused on the Role of Artificial Intelligence in Digital Communication for Enhancing Agricultural Extension Services among Michael Okpara University of Agriculture, Umudike Staff. The population of the study was comprised of staff of Michael Okpara University of Agriculture, Umudike. According to the information from the school management, it has a population size of 6,000. Based on this figure, a sample size of 357 was gotten using Taro Yemane. The multi-stage sampling technique was employed by this study to draw out respondents from across the university. This study employed questionnaire as a suitable research instrument for data collection. Collected data were interpreted using tables and simple percentages.

Results Presentation and Analysis

Questionnaire

Respondents level Awareness of Artificial Intelligence (AI)

Table 1: Respondents' level of awareness of Artificial Intelligence (AI) on digital communication technologies

Options	No. of Respondents	Percentage
Very high	103	29
High	228	64
Low	27	7
Very low		
None		
Total	**357**	**100**

Source: field data (2026).

Data presented in Table 1, show that the respondents' level of awareness of Artificial Intelligence on digital communication technologies were high. This is represented with a percentage score of 64%.

Table 2: Which among these AI apps or platforms have you used?

Options	No. of Respondents	Percentage
ChatGPT	121	34
Gemini	77	22
MetaAi	121	34
Claude	38	10
Others		
Total	**357**	**100**

Source: Field data (2026).

As shown in Table 2, respondents' most preferred AI apps or platforms are ChatGPT and MetaAi. This is justified by the percentage score of 34% each for both apps.

Table 3: How relevant do you consider AI to communication within agricultural extension services?

Options	No. of Respondents	Percentage
Very relevant	279	78
Somewhat relevant	78	22
Not relevant		
Total	**357**	**100**

Source: Field data (2026).

The data collated as contained in Table 3 indicate that AI is relevant to communication within agricultural extension service. This is justified by a percentage score of 78%

Respondents' Feedback on Benefits, Relevance, and Challenges of AI in Agricultural Extension

4. Feedback on benefits do you think AI provides in agricultural extension services.

Options	No. of Respondents	Percentage
Faster communication	130	37
Improved decision-making	129	36
Personalised information delivery	50	14
Wider reach to farmers	48	13
Others		
Total	**357**	**100**

Source: Field data (2026).

In Table 4, the outcome indicates that majority of the respondents think there are certain benefits provided by AI in agricultural extension services. This is represented with a percentage score of 37%.

5. Feedback on how AI can improve communication between extension agents and farmers.

Options	No. of Respondents	Percentage
Real-time feedback	82	23
Timely dissemination of Information	50	14
Enhanced interaction and engagement	125	35
Access to up-to-date data	100	28
Total	**357**	**100**

Source: Field data (2026).

As shown in Table 5, more of the respondents thinks AI improves communication between extension agents and farmers through enhanced interaction and engagement. This is represented with a percentage score of 35%

Table 6: Feedback on the options posing as a great challenge to the use of Artificial Intelligence (AI) in agricultural extension services.

Options	No. of Respondents	Percentage
Lack of technical skills	124	35
Poor internet connectivity	150	42
High cost of implementation		
Resistance to change	83	23
Inadequate infrastructure		
Security and privacy concern		
Others		
Total	**357**	**100**

Source: Field data (2026).

In table 6, the study indicates that for the majority of the respondents, poor internet connectivity pose as a great challenge to the use of artificial intelligence in agriculture extension service. This is justified by the percentage score of 42%.

Section C: Strategies for Improving AI Integration in Agricultural Extension

7. Respondents opinion on the strategies to address the challenges of using AI in agricultural extension services.

Options	No. of Respondents	Percentage
Training and capacity building for users	124	35
Improved internet and ICT infrastructure	100	28
Government and institutional support	33	9
Awareness and sensitisation programmes	100	28
Others		
Total	**357**	**100**

Source: Field data (2026).

The data in Table 7 indicated that training and capacity building for users remains the best was to address the challenges of using AI in agricultural extension services. This is indicated by the percentage score of 35%.

Table 8: Respondents feedback on how AI-driven communication technologies can better be integrated into agricultural extension services in your institution.

Options	No. of Respondents	Percentage
Inclusion in extension training programmes	207	58
Collaboration with technology providers	100	28
Development of user-friendly AI platforms	25	7
Institutional policy support	25	7
Others		
Total	**357**	**100**

Source: Field data (2026).

As shown in Table 8, the data collated show that the majority of the respondents selected inclusion in extension training programmes as the best way AI can be integrated into agricultural extension services in various institutions.

Discussion of Findings

The result of this study shows that the level of awareness artificial intelligence among staff of Michael Okpara University of Agriculture, Umudike is high. This is evident in Table 1 which was aimed at ascertaining the respondents' level of awareness on Artificial Intelligence (AI) in digital communication technologies. This finding is justified by (Hasan and Harande, 2025) that Awareness of Artificial Intelligence plays a critical role in determining its level of adoption in agricultural extension services.

This study also shows that there are benefits that comes with using artificial intelligence in digital communication for agriculture extension service. This is evident in Table 4, where the outcome indicates majority of the respondents (37%) believe that there are certain benefits provided by AI in digital communication for agriculture extension services. The benefits of AI in digital communication for agricultural extension are both wide-ranging and significant. One of the key advantages is improved speed and efficiency in information dissemination (Nnanguma, 2025).

On whether there are challenges that affect the adoption of artificial intelligence in agriculture extension service, the outcome indicates that there is. This contained in table 6, where the majority of the respondents agreed that poor internet connectivity pose as a great challenge to the use of artificial intelligence in agriculture extension service. This is justified by the percentage score of 42%. This outcome is supported by (Onyekachi, Ofoegbu and Efido, 2025) where he pointed out that… one significant issue affecting the adoption of artificial intelligence is poor internet connectivity, especially in rural farming communities where agricultural activities are most concentrated. Without stable connectivity, access to AI-based services becomes inconsistent and unreliable. High implementation costs and inadequate infrastructure further compound these difficulties

The study in Table 7 indicates that there are strategies to integrate artificial intelligence in digital communication to enhance agricultural extension. This is justified in the Table with a percentage score of 35%. The outcome shows that training and capacity building for users remains the best way to address the challenges of using AI in agricultural extension services. This is indicated by the percentage score of 35%.

Conclusion

In conclusion, artificial intelligence is gradually changing how agricultural information is shared by making communication faster, more direct, and easier to understand. It helps extension services reach people more efficiently and provide advice that is more relevant to their needs. However, for it to truly make a difference, there must be proper access to technology, adequate training, and the right support systems in place. When these are available, AI can make agricultural extension services more practical, responsive, and useful to those who depend on them.

Recommendations

1. Create more awareness of artificial intelligence in digital communication through targeted trailing, workshops, and sensitisation programmes for extension stakeholders.

2. Maximise the benefits of AI while addressing its challenges by improving infrastructure, reducing cost barriers, and enhancing digital literacy among users.
3. Promote the adoption of AI by developing practical strategies such as continuous capacity building, user-friendly technologies, and supportive policies that encourage its effective use in agricultural extension services.

References

Abdalla, S. M. S. O. (2025). AI and its impact on communication. (2025). *Journal of English Language Teaching and Applied Linguistics*, 7(2), 88-94.

Akintuyi, O. B. (2024). AI in agriculture: a comparative review of developments in the USA and Africa. *Open Access Research Journal of Science and Technology*, 10(2), 060-070

Ayoola, F., Bamidele, J., Oyediji, I. B., Olaitan, M. E., Eleke, U. P., Oluwamayowa, J.J., Abubakar, T. T and Sennuga, O. S. (2025). Barriers and opportunities of artificial intelligence (AI) adoption in agricultural extension in Abuja, Nigeria. *African Journal of Agriculture and Allied Sciences,* 5(1), 1-11

Boroh, S. and Nwakanma, E. (2018). Crisis of infrastructure and agricultural development in Africa: the case of Nigeria. *Journal of Sociological Studies,* 5(3):236-256.

Golec, M., Hatay, E.S., Gill, S.S and Buyya R. (2025). Artificial intelligence (AI): foundation, trends and future directions. Telematics and Informatics Report. 20(1), 1-9

Hassan, A. O. S., and Haruna, F. O. (2025). Awareness and utilisation of artificial intelligence among undergraduate students for academic activities in Northwestern University, Kano. Journal of Information Literacy and Nigerbiblios, 35(1), 19–30.

Jamal, A., Raza, H., Erdenetsogt, T., Singh. A., Farooq, M., MohsinKabeer, M, Aslam, M. S. (2025). AI and data analytics for precision agriculture: current progress and future directions. *Journal of Appropriate Technology for Agriculture, Environment and Development*. 2(2), 36-46

Jha, A., & Sharma, R. (2019). Precision agriculture through AI: A case study of crop monitoring and resource optimization. Agricultural Systems, 176, 102673.

Nnanguma, K.A. (2025). Integrating artificial intelligence for climate smart agriculture and sustainable food systems. ASEAN Journal of Agriculture and Food Engineering. 4(2), 71-80.

Onyekachi, R., Raphael, F. O., Ojo, S. O., and Ezeh, R. E. (2025). Awareness and utilisation of artificial intelligence tools among undergraduate students with disabilities in Federal University in South East, Nigeria. AJSTME, 11(2), 72–80.

Patra, P. K. (n.d). Lecture notes on artificial intelligence. https//www.cet.edu.in

Sadiku, M. N. O., Chukwu, U. C., Ajayi-Majebi, A. and Musa, S. M. (2022). Digital communication: an overview. *International Journal of Trend in Scientific Research and Development* (IJTRD), 6(6), 2072-2076

Sanchi, I. D. Alhassan, Y. J. Sabo, A. Y. (2023). Social media usage and agricultural extension service delivery. implications for effectiveness in Northwest Nigeria. *Discoveries in Agriculture and Food Sciences*, 10 (5), 1-15

Sarangam, A. (2019). Accessibility features of digital communication apps, advancements, challengs and accessibility solutions. *International Journal of Core Engineering and Management,* 6(3), 81-87

Umar, I. (2023). Artificial intelligence in agricultural extension for sustainable development. *International Journal of Applied and Scientific Research (IJASR)*, 1 (3), 259-268

Vissarapu, S. (2025). AI in Agriculture: Cloud-Powered Precision Farming with Real-Time Data Analytics. *Journal of Computer Science and Technology Studies*, 7(5), 298-306