

Enhancing Rural Economic Development in Enugu State through Sustainable Agricultural Extension Services

Agbo, Constance Chichebem

Abstract

Agricultural extension services remain a key driver of rural development, particularly in agrarian communities where productivity and income are constrained by limited access to modern farming knowledge. This study assessed the impact of agricultural extension services on rural economic development in Enugu State, Nigeria. A cross-sectional survey design was adopted, and primary data were collected from 300 rural farming households across Nsukka, Udi, and Nkanu East Local Government Areas using structured questionnaires. Descriptive statistics and multiple regression analysis were employed to analyze the data. The descriptive results showed that 50% of respondents received extension services, while 70% reported irregular contact with extension agents. Only 40% had access to ICT-based extension services. The majority of respondents rated extension service quality as fair (33.3%) or good (26.7%). Key constraints identified included inadequate extension personnel (26.7%) and poor rural infrastructure (23.3%). The regression analysis revealed that agricultural extension services significantly influenced rural economic development. Extension access ($\beta = 0.42, p < 0.001$), frequency of contact ($\beta = 0.35, p = 0.001$), service quality ($\beta = 0.48, p < 0.001$), and ICT usage ($\beta = 0.31, p = 0.001$) all had positive and statistically significant effects on rural income and productivity. The model explained 62% of the variation in rural economic outcomes ($R^2 = 0.62$; Adjusted $R^2 = 0.60$; $F = 45.32, p < 0.001$), indicating strong explanatory power. The study concludes that agricultural extension services significantly enhance rural economic development in Enugu State, with service quality emerging as the strongest determinant. Strengthening extension coverage, improving service delivery quality, and expanding ICT-based advisory systems are recommended to enhance rural livelihoods and agricultural productivity.

Keywords: *Agricultural extension services; Rural economic development; Extension service quality; ICT-based extension; Rural livelihoods; Agricultural productivity; Extension access; Nigeria.*

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Authors

Affiliation

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Department of Agricultural Extension and Management, Enugu State Polytechnic (ESPoly), Iwollo, Enugu State, Nigeria.

Introduction

Agricultural extension services play a critical role in agricultural development by linking research institutions with farming communities through the dissemination of knowledge, innovations, and improved practices. These services enhance farmers' access to information on modern production techniques, climate-smart agriculture, pest and disease management, input utilization, post-harvest handling, and market opportunities.

Sustainable agricultural extension emphasizes not only productivity enhancement but also environmental conservation and social equity. It promotes farming systems that are economically viable while ensuring long-term soil fertility, biodiversity conservation, and resilience to climate variability. In this regard, extension services serve as a key mechanism for achieving sustainable rural development outcomes.

In Nigeria, agriculture remains a dominant economic activity in rural areas, particularly in states such as Enugu, where a large proportion of the population depends on smallholder farming. Despite this dependence, agricultural productivity remains low due to traditional farming practices, limited access to modern inputs, weak market integration, and inadequate technical support systems.

Empirical studies have demonstrated the positive impact of agricultural extension services on productivity and income. For instance, Oladele (2011) reported that access to extension services significantly increases the adoption of improved agricultural practices and enhances crop yields in Nigeria. Similarly, Benin et al. (2011) found that effective extension systems contribute to poverty reduction and improved agricultural productivity across several African countries. Furthermore, Pattanayak et al. (2003) highlight that sustainable agricultural practices promoted through extension can improve long-term resilience and productivity.

Despite these documented benefits, the effectiveness of agricultural extension services in Enugu State remains insufficiently evaluated, particularly in terms of their contribution to measurable rural economic development outcomes. This study therefore seeks to address this gap by assessing how agricultural extension services influence productivity, income levels, employment, and rural livelihoods in selected communities of Enugu State.

Statement of the Problem

Despite the potential of agriculture to drive rural economic development in Enugu State, the sector continues to face significant constraints, including low productivity, inadequate market access, environmental degradation, and vulnerability to climate change. Agricultural extension services, which are expected to address these challenges, remain weak in coverage, quality, and effectiveness.

Many rural farmers lack access to up-to-date agricultural information, improved technologies, and market intelligence necessary for enhancing productivity and competitiveness. This has created a persistent gap between agricultural research outputs and actual farming practices at the grassroots level.

More importantly, there is limited empirical evidence on the extent to which existing extension services contribute to tangible economic outcomes such as increased income, employment generation, and improved rural livelihoods in Enugu State. This lack of evidence limits the ability of policymakers to design effective, context-specific extension strategies that can enhance agricultural productivity while ensuring sustainability.

This study therefore seeks to fill this gap by providing empirical evidence on the effectiveness of agricultural extension services in driving rural economic development and identifying institutional and operational constraints limiting their impact.

Objectives of the Study

The main objective of the study is on enhancing rural economic development in Enugu State through sustainable agricultural extension services. The specific objectives of the study are to:

- i. Examine the accessibility and quality of agricultural extension services in selected rural communities in Enugu State.
- ii. Assess the impact of agricultural extension services on agricultural productivity and household income.
- iii. Evaluate the contribution of extension services to employment creation and rural entrepreneurship.
- iv. Identify the key constraints and gaps affecting effective extension service delivery in the study area.

Review of Related Literature

Agricultural Extension Services

Agricultural extension services refer to systems through which agricultural knowledge, technologies, and innovations are transferred to farmers using educational and advisory methods (Birner et al., 2009). The primary objective of extension is to improve agricultural productivity, enhance farmers' decision-making capacity, and promote sustainable rural development (Mwangi & Kariuki, 2015).

Extension systems function as a bridge between agricultural research institutions and farming communities, ensuring that innovations generated in research settings are effectively communicated and adopted at the grassroots level. In developing countries, extension services remain a key instrument for addressing food insecurity, low productivity, and rural poverty (Aker, 2011).

Sustainable Agricultural Extension

Agricultural extension services refer to the organized system of transferring agricultural knowledge, technologies, and management practices to farmers through educational and communication strategies (Birner et al., 2009). The primary objective of extension systems is to enhance farmers' decision-making capacity, improve productivity, and promote sustainable agricultural development (Mwangi & Kariuki, 2015). Extension therefore functions as a critical interface between agricultural research institutions and farming communities, facilitating the diffusion and adoption of innovations at the grassroots level.

In developing countries, agricultural extension plays a central role in addressing food insecurity, rural poverty, and low agricultural productivity (Aker, 2011). In Nigeria, where agriculture remains a major livelihood source, extension services are particularly important for improving production efficiency and promoting rural transformation.

Sustainable agricultural extension (SAE) extends the traditional mandate of extension by integrating environmental sustainability, economic viability, and social inclusiveness. SAE promotes farming systems that preserve natural resources while improving long-term productivity and resilience. Unlike conventional extension systems that focus primarily on yield maximization, SAE emphasizes ecological balance and climate-smart practices.

A key feature of sustainable agricultural extension is its participatory approach. This model shifts from the traditional top-down dissemination of information to a more interactive process that involves co-learning between extension agents and farmers (Enwelu & Iyere-Freedom, 2023). This participatory framework ensures that extension content is context-specific, culturally relevant, and responsive to local needs.

Despite its advantages, the integration of indigenous knowledge into formal extension systems remains limited. Indigenous knowledge systems, which encompass traditional farming practices and ecological understanding, are often undervalued in formal agricultural development programs. However, scholars argue that combining scientific and indigenous knowledge systems enhances the effectiveness and sustainability of extension services (Radcliffe et al., 2020).

Constraints to Sustainable Extension Delivery

The effectiveness of sustainable agricultural extension in Nigeria is constrained by several structural and institutional factors. Extension services have historically prioritized high-input, productivity-driven agriculture, often at the expense of agroecological and organic farming systems (Emeana et al., 2018). This bias reflects broader national agricultural policies that emphasize short-term output gains over long-term sustainability.

In addition, extension systems in Nigeria face persistent challenges including inadequate funding, limited field personnel, weak research-extension-farmer linkages, and poor infrastructure. These constraints significantly reduce the reach and quality of extension services, particularly in rural areas where agricultural dependence is highest (Emeana et al., 2018).

Recent developments in information and communication technologies (ICTs) have introduced e-extension platforms as a complementary delivery mechanism. E-extension enables rapid dissemination of agricultural information through mobile phones and digital platforms. While mobile phone penetration in rural Nigeria has increased, the effectiveness of e-extension is limited by low digital literacy, poor internet infrastructure, and uneven access to technology (Hamma & Idrisa, 2022).

Institutional and Policy Dimensions

The sustainability of agricultural extension services is strongly influenced by institutional arrangements and policy frameworks. In Nigeria, Agricultural Development Programmes (ADPs) and universities play complementary roles in extension delivery. While ADPs are more field-oriented, universities provide research and training support. Strengthening collaboration between these institutions has been identified as critical for improving extension effectiveness and sustainability (Eze, 2001).

Globally, evidence suggests that well-functioning extension systems can increase agricultural productivity by 15–30% (Anderson & Feder, 2007). However, outcomes vary significantly depending on institutional quality, funding levels, and farmer access. In Nigeria, empirical studies report inconsistent impacts due to weak institutional capacity and limited coverage of rural farmers.

Theoretical Framework

This study is anchored on the Diffusion of Innovations.

The Diffusion of Innovation Theory explains how new ideas, technologies, and practices spread within a social system over time through specific communication channels. The theory posits that adoption of innovations is influenced by factors such as awareness, perceived usefulness, ease of application, and interaction among members of a social system.

In the context of agricultural extension, extension agents serve as key channels for disseminating agricultural innovations to farmers. These innovations may include improved farming techniques, pest control methods,

climate-smart practices, and market information. Farmers move through stages of awareness, interest, evaluation, trial, and eventual adoption of these innovations.

The theory further emphasizes that adoption is not uniform among farmers. Some adopt innovations quickly (early adopters), while others delay adoption due to constraints such as limited access to information, low education levels, or lack of trust in extension services. This variation explains differences in productivity and income among rural farmers.

In this study, agricultural extension services are conceptualized as the primary mechanism through which innovations are introduced and diffused to rural farmers in Enugu State. The effectiveness of extension services—measured in terms of access, frequency of contact, service quality, and ICT integration—directly influences the rate of adoption of improved agricultural practices.

Higher adoption levels are expected to lead to improved agricultural productivity, increased household income, and enhanced rural economic development. Conversely, weak extension systems slow down the diffusion process, resulting in low adoption rates and poor economic outcomes.

Thus, the Diffusion of Innovation Theory provides a suitable framework for explaining how agricultural extension services influence farmers' behavior and contribute to rural economic development in Enugu State.

Empirical Review

Empirical studies on agricultural extension services and rural development generally show positive but varied outcomes across different contexts.

Anderson and Feder (2007) reported that well-functioning extension systems can increase agricultural productivity by 15–30%, particularly when supported by effective institutional frameworks. In developing countries, extension services play a crucial role in facilitating the adoption of improved agricultural technologies.

In Nigeria, Mwangi and Kariuki (2015) found that access to extension services significantly increases the adoption of improved farming practices among smallholder farmers. Their study highlights the importance of information dissemination in enhancing agricultural productivity.

More recent studies provide additional evidence on the role of extension services. Amankwah (2023) found that access to agricultural information and advisory services significantly improves technology adoption and crop productivity among rural farmers. Similarly, Fadairo et al. (2023) reported that participation in extension-supported programs leads to improved farm management practices and higher yields.

In South Africa, Maake and Antwi (2022) observed that the effectiveness of public extension services significantly influences farm income and household food security. However, their findings also indicate that the impact of extension services depends largely on service quality, farmer participation, and institutional efficiency.

In Nigeria, Adekunle and Aregbeshola (2025) emphasized the importance of complementary support systems such as access to credit and policy support in enhancing agricultural productivity. Likewise, Inakefe et al. (2025), in their evaluation of an agro-processing and livelihood improvement program in Nigeria, reported that extension-related interventions contributed to increased rural income, improved value addition, and enhanced livelihood outcomes among beneficiaries. The study concluded that integrated extension and support programs are essential for achieving sustainable rural development.

Despite these positive outcomes, several studies report persistent challenges affecting extension systems. Issa et al. (2025) noted that agricultural extension services in Nigeria are constrained by inadequate funding, insufficient personnel, and weak institutional coordination, which limit their overall effectiveness.

Gap in Literature

Despite the substantial body of empirical literature on agricultural extension services, several important gaps remain.

First, many existing studies focus primarily on technology adoption and productivity, with limited attention to broader rural economic development outcomes such as income generation, employment, and livelihood diversification.

Second, while recent studies have examined extension effectiveness at national or regional levels, there is a paucity of location-specific empirical evidence for Enugu State. Given the socio-economic and institutional variations across regions, findings from other parts of Nigeria or Africa may not adequately reflect the realities in Enugu State.

Third, existing studies often examine extension services in isolation, without adequately accounting for key service dimensions such as frequency of contact, service quality, and ICT-based extension, which are critical determinants of effectiveness.

Finally, there is limited integration of quantitative analysis linking extension services directly to measurable economic outcomes using household-level data.

This study therefore seeks to fill these gaps by providing a comprehensive empirical analysis of how agricultural extension services measured in terms of access, frequency, quality and ICT usage, affect rural economic development in Enugu State.

Methodology

Research Design

This study adopted a cross-sectional descriptive survey design supported by quantitative analysis of primary data. The design is appropriate because it enables the collection of data from a representative sample of farmers at a single point in time in order to examine the relationship between agricultural extension services and rural economic outcomes in Enugu State. The study relied exclusively on primary data obtained through structured questionnaires, ensuring first-hand information from rural farming households.

Study Area

The study was conducted in Enugu State, South-East Nigeria. Enugu State is predominantly rural, with agriculture serving as the major source of livelihood for most households. Three Local Government Areas (LGAs) were purposively selected to ensure geographical representation across the senatorial zones: Nsukka LGA (Enugu North), Udi LGA (Enugu West) and Nkanu East LGA (Enugu East). These areas were selected based on their strong agricultural activities and dependence on smallholder farming systems.

Population of the Study

The population of the study comprises all farming households in the selected LGAs of Enugu State who are engaged in crop and/or livestock production. The study focused on smallholder farmers because they constitute the majority of rural agricultural producers and are the primary beneficiaries of agricultural extension services.

Sample Size and Sampling Technique

A total of 300 respondents were selected for the study.

Sampling Procedure:

A **multistage sampling technique** was employed:

- i. **Stage One:** Selection of three LGAs (Nsukka, Udi, Nkanu East)
- ii. **Stage Two:** Selection of communities within each LGA
- iii. **Stage Three:** Selection of farming households

Allocation:

- i. 100 respondents per LGA
- ii. Total = 300 respondents

Sampling Method:

A simple random sampling technique was used to select farming households within each community to ensure equal probability of selection.

Source of Data

The study relied solely on primary data obtained directly from respondents using structured questionnaires.

Instrument of Data Collection

Data were collected using a structured questionnaire divided into four sections: Socio-demographic characteristics, Farming and income profile, Agricultural extension service exposure and Challenges and recommendations. The questionnaire included both: closed-ended questions (Likert scale, multiple choice) and a few open-ended questions for qualitative insight.

Validity and Reliability of Instrument

Validity

The instrument was subjected to **face and content validation** by experts in Agricultural Extension and Rural Development to ensure clarity, relevance, and coverage of research objectives.

Reliability

A pilot test was conducted on a small sample of farmers outside the study area. The internal consistency of the instrument was tested using **Cronbach's Alpha**, with a reliability coefficient of ≥ 0.70 considered acceptable.

Method of Data Collection

Data were collected through **field administration of questionnaires** by trained research assistants.

The researchers ensured: direct engagement with respondents, clarification of questions where necessary and complete retrieval of usable questionnaires.

Method of Data Analysis

Data collected were analyzed using both descriptive and inferential statistics.

(a) Descriptive Analysis include Frequencies, Percentages, Mean scores and Likert scale interpretation. These were used to describe the socio-economic characteristics, access to extension services, perceived quality of services and constraints faced by farmers.

(b) Inferential Analysis was adopted to examine relationships between variables, the study employed: Multiple Linear Regression Analysis. This was used to determine the effect of agricultural extension services on rural economic development indicators such as income and productivity.

The model is specified as:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon \dots\dots\dots(i)$$

Where:

- Y = Rural Economic Outcome (Income/Productivity)
- X₁ = Access to Extension Services
- X₂ = Frequency of Extension Contact
- X₃ = Quality of Extension Services
- X₄ = ICT-based Extension Use
- ε = error term

Justification of Regression Use

Regression analysis is appropriate because the study seeks to: determine the magnitude and direction of influence, analyze multiple explanatory variables simultaneously and test hypotheses on the effect of extension services on rural economic outcomes

Results and Discussion

This section presents the analysis of data collected from 300 rural farming households in Enugu State. The results are organized into socio-demographic characteristics, access to agricultural extension services, ICT usage, constraints, and regression analysis of the relationship between extension services and rural economic development.

Socio-Demographic Characteristics of Respondents

Table 1: Gender Distribution of Respondents

<i>Gender</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>Male</i>	180	60.0
<i>Female</i>	120	40.0
Total	300	100.0

Source: Field Survey, 2026

The table shows that male respondents constitute 60% of the sample, indicating male dominance in farming activities in the study area.

Table 2: Age Distribution of Respondents

<i>Age Group</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>Below 25</i>	20	6.7
<i>25–34</i>	55	18.3
<i>35–44</i>	90	30.0
<i>45–54</i>	85	28.3
<i>55 and above</i>	50	16.7
Total	300	100.0

Source: Field Survey, 2026

Most respondents (58.3%) are within the active working age of 35–54 years, showing that farming is dominated by economically active adults.

Table 3: Educational Level of Respondents

<i>Education Level</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>No formal education</i>	40	13.3
<i>Primary</i>	80	26.7
<i>Secondary</i>	110	36.7
<i>Tertiary</i>	50	16.7
<i>Vocational/Adult Literacy</i>	20	6.6
Total	300	100.0

Source: Field Survey, 2026

The majority (63.4%) have at least secondary education, which may enhance their ability to adopt agricultural innovations.

Farming Characteristics

Table 4: Farm Size of Respondents

<i>Farm Size</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>< 1 hectare</i>	120	40.0
<i>1–2 hectares</i>	100	33.3
<i>2–5 hectares</i>	60	20.0
<i>> 5 hectares</i>	20	6.7
Total	300	100.0

Source: Field Survey, 2026

Most farmers (73.3%) operate on less than 2 hectares, confirming dominance of smallholder farming.

Table 5: Monthly Farm Income

<i>Income Level</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>Below ₦10,000</i>	70	23.3
<i>₦10,000–₦30,000</i>	90	30.0
<i>₦30,001–₦50,000</i>	80	26.7
<i>₦50,001–₦100,000</i>	40	13.3
<i>Above ₦100,000</i>	20	6.7
Total	300	100.0

Source: Field Survey, 2026

The majority earn below ₦50,000 monthly, indicating low farm income levels in the study area.

Access to Agricultural Extension Services

Table 6: Awareness and Access to Extension Services

<i>Variable</i>	<i>Yes (%)</i>	<i>No (%)</i>
<i>Awareness of extension services</i>	240 (80.0)	60 (20.0)
<i>Received extension support</i>	150 (50.0)	150 (50.0)

Source: Field Survey, 2026

While awareness is high (80%), only half of respondents actually receive extension services, indicating weak service delivery coverage.

Table 7: Frequency of Extension Contact

<i>Frequency</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>Weekly</i>	30	10.0
<i>Monthly</i>	60	20.0
<i>Occasionally</i>	90	30.0
<i>Rarely</i>	120	40.0
Total	300	100.0

Source: Field Survey, 2026

Most farmers (70%) experience irregular contact with extension agents.

Quality of Extension Services

Table 8: Perceived Quality of Extension Services

<i>Rating</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>Very poor</i>	40	13.3
<i>Poor</i>	60	20.0
<i>Fair</i>	100	33.3
<i>Good</i>	80	26.7
<i>Excellent</i>	20	6.7
Total	300	100.0

Source: Field Survey, 2026

Most respondents (60%) rated extension services as fair or below, indicating moderate service effectiveness.

ICT-Based Extension Services

Table 9: Use of ICT-Based Extension Services

<i>Response</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>Yes</i>	120	40.0
<i>No</i>	180	60.0
Total	300	100.0

Source: Field Survey, 2026

ICT adoption remains low, with only 40% using digital extension tools.

Table 10: Perceived Usefulness of ICT Extension

<i>Usefulness Level</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>Not useful</i>	20	16.7
<i>Slightly useful</i>	30	25.0
<i>Moderately useful</i>	40	33.3
<i>Very useful</i>	20	16.7
<i>Extremely useful</i>	10	8.3
Total	120	100.0

Source: Field Survey, 2026

Among ICT users, most perceive moderate usefulness, indicating growing but limited impact.

Constraints to Extension Services

Table 11: Major Constraints Faced by Farmers

<i>Constraint</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>Lack of extension agents</i>	80	26.7
<i>Poor road network</i>	70	23.3
<i>Irregular contact</i>	60	20.0
<i>Cost barriers</i>	30	10.0
<i>Language barrier</i>	20	6.7
<i>Lack of trust</i>	40	13.3
Total	300	100.0

Source: Field Survey, 2026

The major constraint is shortage of extension agents and poor infrastructure.

Regression Analysis

Table 12: Regression Results on Rural Economic Development

<i>Variable</i>	<i>Coefficient (β)</i>	<i>Std. Error</i>	<i>t-value</i>	<i>Sig. (p)</i>
<i>Constant</i>	1.25	0.30	4.17	0.000
<i>Extension Access</i>	0.42	0.10	4.20	0.000
<i>Frequency of Contact</i>	0.35	0.09	3.89	0.001
<i>Service Quality</i>	0.48	0.11	4.36	0.000
<i>ICT Use</i>	0.31	0.08	3.88	0.001
<i>Farm Size</i>	0.28	0.07	4.00	0.000
<i>Education</i>	0.22	0.06	3.67	0.001

R² = 0.62

Adjusted R² = 0.60

F-statistic = 45.32 (p < 0.001)

The regression results show that agricultural extension services significantly influence rural economic development in Enugu State. All key variables: extension access, frequency of contact, service quality, and ICT use, have positive and statistically significant effects (p < 0.05).

Service quality has the strongest effect ($\beta = 0.48$), indicating that the effectiveness of extension services depends more on quality than mere access.

The model explains 62% of variation in rural economic outcomes, indicating strong explanatory power.

Discussion of Findings

The findings confirm that agricultural extension services significantly improve rural income and productivity. This supports Anderson and Feder (2007), who found that extension systems can increase productivity by up to 30%.

The importance of service quality aligns with Mwangi and Kariuki (2015), who emphasized that effectiveness depends on relevance and frequency of contact. ICT adoption findings support Aker (2011), who identified digital platforms as key drivers of modern agricultural extension. Institutional constraints identified are consistent with Emeana et al. (2018), who reported similar challenges in Nigeria.

Summary, Conclusion and Recommendations

This section presents the summary of major findings, conclusions drawn from the study, and policy recommendations based on the analysis of agricultural extension services and rural economic development in Enugu State.

Summary of Findings

The study examined the role of agricultural extension services in enhancing rural economic development in Enugu State using data obtained from 300 rural farming households. The key findings are summarized as follows:

a. Descriptive Statistics:

- i. The majority of respondents were male, within the economically active age group (35–54 years), and engaged in small-scale farming activities. Most respondents operated farms below 2 hectares and earned relatively low monthly incomes, indicating subsistence-level agriculture in the study area.
- ii. Although awareness of agricultural extension services was high, actual access was moderate. Only about half of the respondents reported receiving extension support in the past 12 months, indicating gaps in service coverage.
- iii. The study found that most farmers had irregular contact with extension agents. The perceived quality of services was largely rated as fair, suggesting that extension delivery is functional but not optimal.
- iv. The use of ICT-based agricultural extension tools was relatively low. However, respondents who used ICT platforms reported moderate to high usefulness in improving farming practices. Major constraints identified include inadequate extension personnel, poor infrastructure (especially rural roads), irregular contact with farmers and limited trust in extension services.

b. Regression results

The econometric analysis revealed that agricultural extension services have a statistically significant positive effect on rural economic development. Variables such as access to extension services, frequency of contact, service quality, and ICT usage all significantly influenced income and productivity. Service quality had the strongest effect among all variables.

Conclusion

Based on the findings of the study, it is concluded that agricultural extension services play a significant role in enhancing rural economic development in Enugu State. However, the effectiveness of these services is constrained by poor coverage, irregular contact with farmers, inadequate institutional capacity, and limited integration of ICT-based solutions. The study further concludes that improving the quality and accessibility of extension services is more impactful than merely increasing awareness or nominal access. Strengthening extension systems has the potential to significantly improve agricultural productivity, household income, and rural livelihoods.

Recommendations

Based on the findings, the following recommendations are made:

- i. Government should increase investment in agricultural extension systems to improve the ratio of extension agents to farmers and ensure wider rural coverage.
- ii. Training and capacity-building programs should be regularly organized for extension workers to improve the quality, relevance, and effectiveness of advisory services.
- iii. There is a need to expand digital agricultural extension platforms such as SMS-based advisory services, mobile applications, and radio programs to improve information dissemination, especially in hard-to-reach rural areas.
- iv. Improving rural infrastructure, especially road networks, will enhance the mobility of extension agents and improve farmer access to services. There is need to also encourage farmers' cooperatives so as to improve collective access to extension services, input supply, and agricultural information. More so, there should be stronger coordination between Agricultural Development Programmes (ADPs), research institutions, and universities to ensure efficient extension service delivery.

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