*Adept Journal of Agricultural and Environmental Sciences (AJAES)*
*Vol. 2, No. 1 (2026)*
*https://journals.unizik.edu.ng/index.php/ajaes*

# EFFECTIVENESS OF AGRICULTURAL EXTENSION SERVICES IN PROMOTING AGRICULTURAL DIVERSIFICATION AND SUSTAINABLE RURAL DEVELOPMENT IN ARDO-KOLA AND ZING LGAs, TARABA STATE, NIGERIA

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***DOI:***
*https://doi.org/10.5281/zenodo.23137107*

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**ABSTRACT:** *This study assessed the effectiveness of agricultural extension services in promoting agricultural diversification and sustainable rural development among smallholder farmers in Ardo-Kola and Zing Local Government Areas of Taraba State, Nigeria. Specifically, the study described the socio-economic characteristics of farmers, examined farmers' perceptions regarding the effectiveness of extension services in promoting agricultural diversification, assessed their contribution to sustainable rural development and identified constraints affecting access to extension services. A multi-stage sampling procedure was used to select respondents. Although 168 questionnaires were targeted, 161 properly completed questionnaires were retrieved and used for analysis. Descriptive statistics were used to analyze the data. A five-point Likert scale with a mean decision threshold of 3.0 was used to assess farmers' perceptions. The findings showed that respondents were predominantly male (55%), with a mean age of 45 years, mean educational attainment of eight years, mean household size of seven persons, mean farming experience of 17 years and mean farm size of 2.96 hectares. Extension services were perceived as timely (mean = 4.025), relevant (mean = 4.081), accessible (mean = 3.988), useful for improving productivity through training (mean = 4.093), and effective in promoting agricultural diversification (mean = 3.988). Extension services were also perceived to contribute to food security (mean = 4.143), rural infrastructure (mean = 4.099), rural livelihoods (mean = 3.932) and community cooperation (mean = 3.919). Major constraints were poor access to extension agents, inadequate funding, lack of training programmes and distance to extension centres. The study concludes that extension services constitute an important institutional mechanism for supporting agricultural diversification and rural development, although institutional and operational constraints need to be addressed to improve their effectiveness.*

***KEYWORDS:*** *Agricultural extension, agricultural diversification, rural development, smallholder farmers, food security, Taraba State.*

## Introduction

Agricultural diversification is increasingly recognized as an important strategy for strengthening the resilience of smallholder farming households and improving rural livelihood outcomes. It involves the combination of different agricultural enterprises and livelihood activities, including crop production, livestock production, aquaculture, agroforestry, processing and other income-generating activities. Evidence from sub-Saharan Africa indicates that multiple livelihood activities constitute an important component of rural household strategies, particularly where households face production and income risks associated with dependence on agriculture (De la O Campos *et al*., 2023; FAO, 2023). For smallholder farmers in developing economies, diversification is particularly important because agricultural households are exposed to climatic variability, pest and disease outbreaks, market fluctuations and changes in input prices. Evidence from Nigeria indicates that changes in temperature and precipitation can adversely affect agricultural productivity and household income sources, while farmers may respond by modifying crop combinations and input-use decisions (Amare *et al*., 2023). Diversification can therefore provide households with an opportunity to spread production risks and strengthen their capacity to cope with agricultural and economic shocks.

Agricultural extension services occupy a strategic position in supporting agricultural diversification and rural livelihood development. Extension systems provide a link between farmers, agricultural research institutions, technology providers, markets and other development actors. Through advisory services, demonstrations, training and dissemination of agricultural information, extension personnel can improve farmers' knowledge and technical capacity and facilitate the use of improved agricultural practices. The Federal Government of Nigeria has also emphasized the importance of demand-driven and market-oriented extension and advisory services for improving access to agricultural technologies and strengthening linkages among farmers, research institutions, input suppliers and markets (Federal Ministry of Information and National Orientation, 2023). Despite this potential, agricultural extension delivery in Nigeria continues to face constraints. A recent study of extension agents in North-Central Nigeria found that insufficient numbers of extension workers, inadequate transportation and inadequate training programmes were among the major constraints affecting the dissemination of climate-smart agricultural practices (Ojo *et al*., 2024). Similarly, recent evidence from Nigeria identifies inadequate funding,

poor infrastructure, transportation and communication limitations as continuing challenges to effective extension delivery (Nwauba, 2024). Improving the frequency, accessibility and practical usefulness of extension services is important for translating agricultural information into improved farm and livelihood outcomes.

Although agricultural extension has been widely discussed as an instrument for improving agricultural productivity and technology use, there remains a need for location-specific evidence on how farmers perceive the effectiveness of extension services in promoting agricultural diversification and broader rural development outcomes. In particular, limited attention has been given to the combined contribution of extension services to food security, rural infrastructure, livelihood improvement and community cooperation among smallholder farmers in Ardo-Kola and Zing LGAs. This study therefore examines the effectiveness of agricultural extension services in promoting agricultural diversification and sustainable rural development among smallholder farmers in the two Local Government Areas of Taraba State, Nigeria.

Despite the agricultural potential of Taraba State, rural households continue to face challenges associated with low productivity, limited income, food insecurity and livelihood vulnerability. Agricultural diversification provides an opportunity to address some of these challenges by enabling households to combine different enterprises and income sources. However, diversification requires knowledge, technical skills, access to information, improved inputs and institutional support. Although previous studies have examined agricultural extension, technology adoption and agricultural productivity, relatively limited empirical attention has been given to the effectiveness of extension services in simultaneously promoting agricultural diversification and broader rural development outcomes in the two LGAs. The study therefore examined farmers' experiences and perceptions of extension services and their perceived contributions to food security, infrastructure, livelihoods and community cooperation.

The broad objective was to assess the effectiveness of agricultural extension services in promoting agricultural diversification and sustainable rural development among smallholder farmers in Ardo-Kola and Zing LGAs of Taraba State. The specific objectives were to:

i. describe the socio-economic characteristics of smallholder farmers in the study area;

ii. examine farmers' perceptions regarding the effectiveness of extension services in promoting agricultural diversification and
iii. identify the major constraints affecting farmers' access to and utilization of agricultural extension services for diversification.

**Methodology**

The study was conducted in Ardo-Kola and Zing LGAs of Taraba State, Nigeria. Both LGAs are agricultural areas characterized by Guinea Savannah vegetation and seasonal rainfall. Crop production and livestock rearing constitute important economic activities. The areas were selected because of their agricultural intensity and participation in extension programmes implemented through the Taraba State Agricultural Development Programme and complementary development projects. A multi-stage sampling technique was employed to select the respondents for this study. This method was chosen to ensure that the sample was representative of the diverse farming populations in the study area and to minimize selection bias. The selection process followed three distinct stages.

- ***Stage 1:*** Purposive Selection of Local Government Areas (LGAs) Ardo-Kola and Zing Local Government Areas were purposively selected due to their high concentration of smallholder farmers and their strategic roles in the agricultural production zones of Taraba State. These LGAs represent distinct agro-ecological variations that are conducive to both crop and livestock diversification.
- ***Stage 2:*** Selection of Wards From the ten (10) administrative wards in each Local Government Area, four (4) wards were selected from each LGA, making a total of eight (8) wards for the study. The selection was done using a Simple Random Sampling technique (balloting method) to ensure that every ward had an equal and independent chance of being included in the research.
- ***Stage 3:*** Selection of communities/villages Within each of the eight selected wards, prominent farming communities were purposively identified based on their active involvement in extension-led programs and agricultural activities.

The total sample size was determined using the Taro Yamane (1967) formula. To ensure a balanced geographical representation and to facilitate a comparative analysis across the study area, an Equal

Allocation method was adopted. Consequently, the target sample was set at 168 respondents, divided equally among the eight (8) selected wards. However, out of the 168 copies distributed 161 were successfully retrieved and found usable.

**Table 1: Distribution of Respondents by Local Government Area and Wards**

| Local Government | Selected Wards | No. of Respondents |
|---|---|---|
| Ardo-Kola | Alin Gora | 21 |
| | Sunkani | 21 |
| | Mayo Ranewo | 21 |
| | Iware | 21 |
| Zing | Monkin | 21 |
| | Zing | 21 |
| | Bitako | 21 |
| | Lamma | 14 |
| Total | 8 Wards | 161 |

**Source: Field Survey (2025)**

Primary data were collected using structured questionnaires. Frequencies and percentages were used to describe socio-economic characteristics, while means and standard deviations were used to assess farmers' perceptions. A five-point Likert scale was used, ranging from 1 = strongly disagree to 5 = strongly agree. A mean score of 3.0 was adopted as the decision threshold; values of 3.0 and above indicated agreement/effectiveness.

## Results and Discussion

### Socioeconomic Characteristics of Respondents

The socioeconomic characteristics of the respondents presented in Table 1 provide important insights into the demographic, institutional, and production attributes of farmers in Ardo-Kola and Zing Local Government Areas of Taraba State. These characteristics are important because they influence farmers' access to extension services, adoption of agricultural innovations, participation in diversification activities, and overall rural livelihood outcomes. The result revealed that male respondents constituted 55% of the sampled farmers, while females accounted for 45%. This indicates that although males dominated farming activities in the study area, female participation in agriculture was also substantial. The high involvement of women suggests that agricultural diversification and extension programmes are increasingly becoming gender inclusive within the study area. Women's participation is particularly important because they contribute significantly

to household food production, processing, and marketing activities. This finding agrees with Okonkwo (2024), who reported that women farmers play critical roles in agricultural production and are increasingly benefiting from agricultural extension programmes in rural Nigeria.

The age distribution showed that 26% of the respondents were between 31 and 40 years, 24% were between 41 and 50 years, while 24% fell within the 51–60 years category. The mean age was 45 years, indicating that most respondents were within their economically active and productive years. Farmers within this age bracket are generally energetic, experienced, and more capable of adopting improved agricultural technologies and diversification strategies promoted by extension agents. Younger and middle-aged farmers are often more receptive to innovation and willing to take production risks compared to older farmers. This finding is consistent with Amusan and Adeleke (2023), who found that economically active farmers were more willing to adopt improved agricultural technologies and diversified farming systems when exposed to extension services.

Educational attainment among respondents revealed that 39% attained secondary education, 26% had primary education, 24% attained tertiary education, while only 12% had no formal education. The mean years of schooling was eight years, suggesting moderate literacy among the respondents. Education plays a vital role in enhancing farmers' ability to access, understand, and utilize extension information effectively. Literate farmers are generally better positioned to interpret technical recommendations, adopt improved farming practices, and participate in diversified agricultural enterprises. This finding supports the report of Sulaiman *et al*. (2024), who established that educational attainment significantly influenced farmers' understanding and utilization of extension services in Nigeria.

The household size distribution indicated that 53.4% of the respondents had household sizes ranging from 6–10 persons, while 35% had between 1–5 persons. The mean household size was seven persons. Large household sizes may provide family labour necessary for diversified farming activities such as mixed cropping, livestock management, processing, and marketing. However, larger households may also increase pressure on household resources, thereby making livelihood diversification an important strategy for improving food security and household welfare. This finding agrees with Bello *et al*. (2022), who reported that household labour availability

significantly influences agricultural diversification among rural farming households in Northern Nigeria.

The findings further showed that respondents possessed substantial farming experience. About 24% had farming experience ranging between 16–20 years, 21% had between 11–15 years, while 19% had between 21–25 years. The mean farming experience was 17 years, indicating that the respondents had acquired considerable practical farming knowledge over time. Farmers with long years of farming experience are more likely to understand environmental and market uncertainties and therefore adopt diversified farming systems to minimize production risks and stabilize household income. This finding is in line with Jimoh *et al*. (2023), who observed that farming experience positively influences farmers' willingness to diversify agricultural enterprises in Nigeria.

The farm size distribution revealed that 45% of respondents cultivated between 2.1 and 4.0 hectares, while 34% cultivated between 0.1 and 2.0 hectares. The mean farm size was 2.96 hectares, indicating that the majority of respondents were smallholder farmers. Smallholder farmers often adopt diversification strategies to reduce production risk, improve household food security, and increase income sources. The predominance of small-scale farming in the study area suggests the need for effective extension support to enhance productivity and diversification opportunities. This finding corroborates the report of FAO (2023), which emphasized that smallholder farmers in developing countries increasingly rely on diversification strategies for livelihood sustainability and resilience.

The study also revealed that 61% of respondents belonged to cooperative societies, while 39% did not belong to any cooperative organization. Cooperative membership is important because it facilitates farmers' access to agricultural information, credit facilities, extension programmes, inputs, and market opportunities. Farmers who belong to cooperatives are often more exposed to innovations and collective learning opportunities that enhance agricultural diversification. This finding agrees with Bello *et al*. (2022), who found that cooperative participation significantly improved farmers' access to extension services and agricultural innovations in Northern Nigeria.

Access to credit was relatively moderate, as 55% of respondents reported having access to credit facilities, while 45% lacked access to formal or informal credit sources. Credit access is an important factor in agricultural diversification because it enables farmers to purchase improved inputs, invest in livestock enterprises, acquire farm equipment, and expand production activities. Farmers with access to credit are generally more capable of adopting innovations and participating in income-generating agricultural activities. This finding supports the study of Adegbite and Machethe (2023), who reported that access to credit positively influenced farmers' adoption of improved agricultural technologies and livelihood diversification strategies.

Furthermore, the findings showed that 67% of respondents had contact with extension agents, while 33% had no extension contact. The relatively high proportion of farmers with extension contact suggests that extension services were fairly active within the study area. Regular interaction with extension personnel exposes farmers to improved agricultural technologies, diversification opportunities, production management practices, and livelihood improvement strategies. Extension contact is therefore expected to enhance farmers' adoption of diversified farming systems and contribute positively to rural development outcomes. This finding aligns with Nwankwo *et al*. (2024), who found that frequent extension contact significantly improved productivity, diversification, and livelihood outcomes among rural farmers in Nigeria.

**Table 2: Socio-Economic Characteristics of Respondents**

| Variables | Frequency | Percentage (%) | Mean |
|---|---|---|---|
| **Sex** | | | |
| Male (1) | 88 | 55 | |
| Female (0) | 73 | 45 | |
| | | | |
| **Age (Years)** | | | 45 |
| 21–30 | 26 | 16 | |
| 31–40 | 42 | 26 | |
| 41–50 | 39 | 24 | |
| 51–60 | 38 | 24 | |
| 61 and above | 16 | 10 | |
| | | | |
| **Educational Level** | | | 8 |
| No Formal Education (0) | 19 | 12 | |
| Primary Education (1–6 yrs) | 41 | 26 | |
| Secondary Education (7–12 yrs) | 63 | 39 | |
| Tertiary Education (13–15 yrs) | 38 | 24 | |
| | | | |
| **Household Size** | | | 7 |
| 1–5 | 57 | 35 | |
| 6–10 | 86 | 53 | |
| 11–15 | 18 | 11 | |
| | | | |
| **Farming Experience (Years)** | | | 17 |
| 1–5 | 16 | 10 | |
| 6–10 | 23 | 14 | |
| 11–15 | 34 | 21 | |
| 16–20 | 38 | 24 | |
| 21–25 | 31 | 19 | |
| 26–30 | 19 | 12 | |
| | | | |
| **Farm Size (Ha)** | | | 2.96 |
| 0.1–2.0 | 54 | 34 | |
| 2.1–4.0 | 73 | 45 | |
| Above 4.0 | 34 | 21 | |
| | | | |
| **Cooperative Membership** | | | |
| Yes | 98 | 61 | |
| No | 63 | 39 | |
| | | | |
| **Access to Credit** | | | |
| Yes | 89 | 55 | |
| No | 72 | 45 | |
| | | | |
| **Extension Contact** | | | |
| Yes | 107 | 67 | |
| No | 54 | 34 | |

**Source: Field Survey Data, 2026.**

**Farmers' Perceptions and Experiences Regarding the Effectiveness of Extension Services in Promoting Agricultural Diversification**

The findings presented in Table 2 reveal that farmers generally held positive perceptions regarding the effectiveness of extension services in promoting agricultural diversification in Ardo-Kola and Zing Local Government Areas of Taraba State. All the measured indicators recorded mean scores above 3.0, indicating agreement that extension services were functional and beneficial in the study area. The result shows that respondents agreed that extension services are timely, with a mean score of 4.0248. This implies that extension agents provide information at appropriate periods of the farming calendar, which is critical for decision-making in agricultural production. Timely extension delivery enhances farmers' ability to adopt recommended practices such as improved cropping systems, livestock management, and input application. This finding is consistent with Sulaiman *et al*. (2024), who reported that timeliness of extension delivery significantly influences farmers' adoption of agricultural innovations and diversification practices in Nigeria.

Similarly, respondents strongly agreed that the information provided by extension agents is relevant, with a mean score of 4.0807. This indicates that extension messages are aligned with farmers' needs and local production realities. Relevant information increases farmers' trust in extension systems and enhances their willingness to adopt recommended technologies. This finding agrees with Adebayo *et al*. (2023), who found that relevance of extension information significantly determines farmers' adoption behaviour and engagement in diversified farming systems. The study also revealed that farmers agreed that extension agents are accessible, with a mean score of 3.9876. This suggests that extension personnel are relatively available and can be contacted by farmers when needed. Accessibility of extension agents is a key factor in effective agricultural advisory services because it facilitates continuous interaction, problem-solving, and technical support. This finding supports Nwankwo *et al*. (2024), who reported that accessibility of extension officers enhances farmers' productivity and livelihood outcomes through improved communication and technical assistance.

Furthermore, respondents agreed that training provided by extension agents improves productivity, with the highest mean score of 4.0932. This indicates that extension-led training programmes have a strong positive impact on farmers' production capacity and diversification efforts. Training

exposes farmers to improved technologies, best agronomic practices, livestock management skills, and agribusiness opportunities. This finding is consistent with FAO (2023), which emphasized that farmer training is a key driver of agricultural productivity growth and rural livelihood diversification in developing economies.

Finally, respondents agreed that extension services promote agricultural diversification, with a mean score of 3.9876. This implies that extension programmes encourage farmers to engage in multiple agricultural enterprises such as crop diversification, livestock integration, and mixed farming systems. Diversification reduces production risks and enhances income stability among rural households. This finding aligns with Jimoh *et al*. (2023), who reported that agricultural extension services significantly contribute to farmers' adoption of diversified farming systems and improved livelihood resilience.

**Table 3: Perceptions and experiences of farmers regarding the effectiveness of extension services in promoting agricultural diversification**

| Farmers' Perception | SA | A | N | Mean | Std. Dev |
|---|---|---|---|---|---|
| Extension services are timely | 53 (32.9) | 59 (36.6) | 49 (30.4) | 4.0248 | 0.79805 |
| Information provided is relevant | 61 (39.1) | 52 (32.3) | 48 (29.8) | 4.0807 | 0.82139 |
| Extension agents are accessible | 48 (29.8) | 63 (39.1) | 50 (31.1) | 3.9876 | 0.78252 |
| Training provided improves productivity | 66 (41.0) | 44 (27.3) | 51 (31.7) | 4.0932 | 0.85001 |
| Extension promotes diversification | 47 (29.2) | 65 (40.4) | 49 (30.4) | 3.9876 | 0.77450 |

**Source: Field Survey (2026)**

## Constraints Faced by Farmers in Accessing and Utilizing Extension Services for Agricultural Diversification

The results presented in Table 3 reveal several constraints limiting farmers' access to and effective utilization of extension services for agricultural diversification in Ardo-Kola and Zing Local Government Areas. The identified challenges range from institutional and infrastructural limitations to communication and capacity-related issues. The most severe constraint reported by respondents was poor access to extension agents, with a mean score of 4.0248. A large proportion of farmers indicated that extension personnel are either insufficient or not frequently available in their communities. This limitation reduces farmers' exposure to technical guidance, improved farming practices, and diversification opportunities. This finding agrees with Auta *et al*. (2023),

who reported that inadequate extension coverage and low extension-to-farmer ratios significantly constrain agricultural development in rural Nigeria.

Inadequate funding was also identified as a major constraint, with a mean score of 3.9006. Respondents indicated that insufficient financial support limits the ability of extension services to organize training programmes, demonstrations, and field visits. Financial constraints also affect the mobility of extension agents and the availability of teaching materials. This finding is consistent with FAO (2023), which noted that underfunding of agricultural extension systems remains a major barrier to effective service delivery in developing countries. Lack of training programmes recorded a mean score of 3.5342, indicating that farmers experience limited access to structured capacity-building activities. Training is essential for equipping farmers with skills required for adopting diversified farming systems, improving productivity, and managing agricultural enterprises effectively. The absence of regular training reduces farmers' ability to respond to modern agricultural challenges. This finding supports Nwankwo *et al*. (2024), who observed that limited extension training reduces farmers' adoption of improved agricultural technologies and livelihood diversification strategies.

Poor communication was also identified as a constraint, with a mean score of 2.9503. This suggests moderate severity, but it still represents a significant barrier to effective extension service delivery. Communication gaps may arise from language barriers, low literacy levels, inadequate ICT infrastructure, or poor interaction between extension agents and farmers. This finding agrees with Sulaiman *et al*. (2024), who reported that weak communication channels reduce the effectiveness of extension services and limit farmers' understanding of agricultural innovations. Distance to extension centers recorded a mean score of 3.0062, indicating that physical access to extension offices remains a challenge for many farmers. Long distances discourage frequent visits, reduce participation in extension activities, and limit access to timely agricultural information. This finding aligns with Bello *et al*. (2022), who found that rural farmers often face accessibility challenges due to poor infrastructure and the uneven distribution of extension facilities.

**Table 4: Constraints faced by farmers in accessing and utilizing extension services for agricultural diversification**

| Constraint | Moderate (%) | Severe (%) | Very Severe (%) | Mean |
|---|---|---|---|---|
| Poor access to extension agents | 51 (31.7) | 55 (34.2) | 55 (34.2) | 4.0248 |
| Inadequate funding | 59 (36.6) | 59 (36.6) | 43 (26.7) | 3.9006 |
| Lack of training programs | 46 (28.6) | 36 (22.4) | 43 (26.7) | 3.5342 |
| Poor communication | 63 (39.1) | 45 (28.0) | - | 2.9503 |
| Distance to extension centers | 56 (34.8) | 53 (32.9) | - | 3.0062 |

**Source: Field Survey, 2026**

## Conclusion

The study demonstrates that agricultural extension services are perceived by farmers in Ardo-Kola and Zing LGAs as important for promoting agricultural diversification and rural development. Farmers reported positive experiences regarding the timeliness and relevance of extension information, accessibility of extension agents, usefulness of training and the contribution of extension to diversification. Extension services were also perceived to contribute to food security, rural infrastructure, household livelihoods and community cooperation. Nevertheless, poor access to extension agents, inadequate funding, insufficient training programmes and physical distance from extension centres remain important challenges. The evidence therefore indicates that strengthening the institutional capacity and coverage of agricultural extension services can improve their contribution to diversified agricultural production and rural development in the study area.

## Recommendations

Based on the findings, the following recommendations are proposed:

1. Government and agricultural development agencies should increase the number and geographical coverage of trained extension personnel.
2. Adequate funding should be provided for field visits, demonstrations, training and mobility of extension personnel.
3. Regular training programmes should focus on agricultural diversification, improved production practices and enterprise management.

4. Cooperative organizations should be used more extensively as platforms for extension delivery, collective learning, access to inputs and agricultural information.

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