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FACTORS AFFECTING RICE FARMER'S PERCEPTION ON AGRICULTURAL EXTENSION SERVICES DELIVERY IN KANO STATE, NIGERIA.

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ABSTRACT

This study examined the factors affecting rice farmers' perception of agricultural extension service delivery in Kano State, Nigeria. The study was motivated by the critical role that perception plays in determining farmers' responsiveness to agricultural innovations disseminated through extension agents. A multi-stage sampling technique was used to select 279 rice farmers from a sampling frame of 925 across five major rice-producing Local Government Areas; Kura, Garun Mallam, Tudun Wada, Bunkure, and Bichi. Primary data were collected through structured questionnaire and analysed using both descriptive statistics and inferential statistic (Tobit regression models). The findings revealed that education level, cooperative membership, household size, and access to agricultural credit significantly influenced farmers' perception of extension service delivery at 1%, 5%, and 10% significance levels, respectively. Other variables such as age, sex, farm size, land ownership, and farming experience had no significant influence. The study also established that married and full-time farmers were more likely to have favorable perceptions of extension agents, while farmers engaged primarily in non-agricultural occupations were less likely to do so. The model was statistically significant at the 1% level (LR $\chi^2 = 58.50$; $p < 0.01$) with a pseudo R^2 of 0.210, indicating a good model fit. The study concludes that educational attainment, cooperative participation, and access to credit facilities play critical roles in shaping positive perceptions of extension service delivery. It recommends the strengthening of farmers' capacity through education, financial support, and institutional linkages to improve the effectiveness of extension programs.

Keywords: Rice farmers, perception, agricultural extension services delivery.

INTRODUCTION

Agriculture remains the backbone of Nigeria's economy, employing over 70% of the rural population and contributing significantly to national food security (National Bureau of Statistics [NBS], 2023). Rice, in particular, has emerged as a strategic staple crop, with Kano State ranking among the top rice-producing regions in northern Nigeria. Despite various interventions such as the Anchor Borrowers Programme and the Kano Agricultural Development Programme (KNARDA) productivity among rice farmers remains below potential due to low adoption of improved practices (Sani, 2023).

Rice (*Oryza sativa L.*) is one of Nigeria's most important staple food crops, both in terms of consumption and production. Over the past three decades, rice has transformed from a luxury food for the affluent to a common staple across all income groups and regions of the country (International Rice Research Institute [IRRI], 2023). According to the Food and Agriculture Organization (FAO, 2024), Nigeria is the largest producer and consumer of rice in sub-Saharan Africa, with an estimated annual production exceeding 8.5 million metric tonnes and consumption levels approaching 10 million metric tonnes. This persistent demand underscores the crop's vital role in achieving food security and poverty reduction.

Rice provides an estimated 20% of daily calorie intake for Nigerians and is consumed at least once a day in many households (Oladimeji et al., 2024). It is rich in carbohydrates, contains moderate protein levels, and provides essential micronutrients such as thiamine, niacin, and magnesium (FAO, 2024). Its versatility in local diets ranging from tuwo shinkafa in the North to jollof rice and fried rice in the South makes it a culturally accepted and nutritionally valuable food.

As Nigeria faces population growth projected to exceed 230 million by 2030, rice remains crucial for meeting national caloric and nutritional needs. Consequently, boosting domestic rice production is seen as a pathway toward achieving Sustainable Development Goal 2 (Zero Hunger) and reducing reliance on imports (Federal Ministry of Agriculture and Food Security [FMAFS], 2023). Economically, rice farming provides direct employment for more than 4.8 million smallholder farmers and indirect employment for millions more in processing, packaging, and marketing (National Bureau of Statistics [NBS], 2023). The Central Bank of Nigeria's Anchor Borrowers Programme (ABP) has played a major role in strengthening the rice value chain, enhancing farmers' access to credit, inputs, and modern technologies (Central Bank of Nigeria [CBN], 2024).

Moreover, local rice production has become a key driver of agricultural industrialization, encouraging private investment in rice milling and processing industries. Nigeria's growing rice sector contributes significantly to GDP growth, foreign exchange savings, and youth employment, especially in rural communities (Adewuyi & Sulaiman, 2023).

Rice holds a prominent place in Nigerian social and cultural life. It is served at almost all ceremonies, weddings, religious

festivities, and family gatherings symbolizing prosperity and unity (Ibrahim & Musa, 2024). Its increasing demand across ethnic and regional boundaries reflects its integration into the national food culture.

Rice production in Kano provides livelihoods for thousands of farming households, traders, and processors. The crop is a major source of income for rural families, contributing to household food security and local employment. Rice milling has also become a thriving small-scale enterprise, with dozens of modern and semi-modern mills operating across the state (Sani, 2023). Through these value chain activities, rice contributes significantly to poverty reduction and rural economic growth.

Agricultural extension services play a crucial role in bridging the gap between research and farmers by disseminating relevant knowledge and innovations. Yet, the effectiveness of these services largely depends on how farmers perceive them (Agwu, 2023). Negative perceptions stemming from irregular contact, poor service quality, and limited relevance often result in low participation and adoption (Ogundele et al., 2024). Therefore, understanding the factors shaping farmers' perceptions is critical for improving extension delivery and agricultural performance in Kano State. Given the strategic importance of rice in Kano's agricultural economy, effective agricultural extension service delivery is essential. Extension services disseminate innovations such as high-yield rice varieties, efficient water management practices, pest and disease control, and improved post-harvest handling techniques. Farmers' positive perception of these services directly influences technology adoption rates, productivity levels, and income generation (Sani, 2023). Thus, improving the effectiveness and accessibility of extension systems is key to sustaining Kano's position as a leading rice-producing state in Nigeria.

The Federal Ministry of Agriculture and Food Security recently launched the Harmonized Extension Manual and National Agricultural Extension Policy (2023), which seeks to professionalize and harmonize extension delivery nationwide. However, implementation gaps persist at the subnational level. This study, therefore, explores the multidimensional factors influencing rice farmers' perception of extension services in Kano State.

Agricultural extension service delivery plays a central role in disseminating innovations and bridging the gap between research and farmers. However, the effectiveness of these services depends on farmers' perception that is, how they view the relevance, accessibility, timeliness, and usefulness of the information and support provided. In Kano State, while several extension programs have been implemented through the Kano Agricultural and Rural Development Authority (KNARDA) and other private-sector actors, many farmers still report inadequate access to information, irregular visits by extension agents, poor feedback mechanisms, and low participation in training and demonstration activities (Sani, 2023; Ogundele et al., 2024).

Empirical studies have shown that farmers' perception of extension services is influenced by socioeconomic characteristics such as education, age, gender, farm size, income, and farming experience, as well as institutional factors like agent-farmer ratio, training frequency, and communication methods (Agwu, 2023; Gyong, 2024). However, there is limited up-to-date information specifically analysing which factors most significantly affect rice farmers' perception of agricultural extension service delivery in Kano State, where irrigation-based and rain-fed systems coexist.

By identifying and analysing the factors influencing farmers' perception, this research will provide evidence-based insights that can guide policymakers, extension agencies, and non-governmental organizations in designing more effective and context-specific extension strategies. The findings will also help improve the content, delivery methods, and communication strategies used by extension agents to ensure that farmers not only receive information but also perceive it as relevant, practical, and trustworthy. Furthermore, the study contributes to academic knowledge by enriching the body of literature on farmers' behavioral responses to agricultural information systems in northern Nigeria. It aligns with national and global development objectives, including SDG 1 (No Poverty), SDG 2 (Zero Hunger), and SDG 8 (Decent Work and Economic Growth), by supporting efforts to enhance agricultural productivity and rural welfare. The study aims to investigate how farmers' socio-economic characteristics, access to information, frequency of extension contact and institutional support systems collectively shape rice farmers' perception of agricultural extension service delivery in Kano State, Nigeria.

METHODOLOGY

The study was conducted in Kano State, located in the northwestern geopolitical zone of Nigeria. Kano State lies between latitudes 11°30′N and 12°40′N and longitudes 8°30′E and 9°45′E, with a total land area of about 20,760 square kilometers. It shares boundaries with Katsina State to the northwest, Jigawa State to the northeast, Bauchi State to the southeast, and Kaduna State to the southwest. The state comprises 44 Local Government Areas (LGAs), with a population projected as 3.5% to exceed 15 million people (National Population Commission [NPC], 2023).

Kano State has a Sudano–Sahelian climate characterized by a wet season (May–October) and a dry season (November–April). The average annual rainfall ranges between 800 and 1000 mm, and mean temperature varies from 26°C to 33°C. The major crops cultivated include rice, maize, sorghum, millet, groundnut, and cowpea. Rice production is prominent in LGAs such as Kura, Garun Mallam, Bunkure, Bagwai, Bichi, and Tudun Wada, supported by irrigation facilities like

the Tiga and Challawa Dams (National Agricultural Extension and Research Liaison Services [NAERLS], 2024).

A multi-stage sampling technique was employed to select respondents for the study. The first stage involved purposive selection of Kano state as one of the highest rice producing states in Nigeria as the study area. The second stage involved the purposive selection of five highest producing rice LGAs in the study area, namely; Kura, Garun Mallam, Tudun Wada, Bunkure and Bichi. The third stage involved random selection of two communities from each LGAs in the study area. In the third stage, the list of the registered rice farmers was obtained from Kano Agricultural and Rural Development Authority (KNARDA) from the seven LGAs to determine the sampling frame from each community while Taro Yamane's (1973) formula was used in computing the required sample size for the study. Therefore, a total of two hundred and seventy-nine (279) was selected across all selected communities for the study. The selected Local Government Areas, communities and number of sampled rice farmers from each community is as shown in Table 1 below the formula expressed below by Yamane (1967) was used to get the total sample size;

$n_0 = \frac{N}{1+N(e^2)}$.

n_0 = Sample size
N = Sample frame in the selected area
e = margin of error (0.05)
N=925

n_0**=279**

e = margin of error (0.05)
$\frac{279}{925} \times 100 = 30.13\% \cong 30\%$

Table 1. Sample Size and Sample Frame of Rice Farmers in the Study Area.

State	LGAs	Community	Sample Frame	Sample Size (30%)
Kano	Kura	Bakin Kogi	150	45
		Rimin Kwarya	103	31
	Bunkure	Refawa	115	35
		Bela	93	28
	Tudun Wada	Yaryasa	110	33
		Yarkawo	108	33
	Bichi	Chiromawa	57	17
		Daddo	61	18
	Garun Malam	Chiromawa	58	18
		Yadakwari	70	21
Total	**5**	**10**	**925**	**279**

The study used primary data. The primary data were collected through the use of structured questionnaire. In addition, key informant interviews (KIIs) was employed. The questionnaire was administered by trained enumerators in Hausa and English languages. Key informant interviews were conducted with extension agents, local leaders, and officials from KNARDA and the Rice Farmers Association of Nigeria (RIFAN).

Analytical techniques

Data collected were analysed using both descriptive and inferential statistical tools. Descriptive Statistics include the use of frequency, percentages, mean, and standard deviation were used to summarize socioeconomic characteristics and farmers' perception levels. Inferential Statistics involved the use of Tobit Regression Analysis to determine the factors influencing farmers' perception of extension services. Also the Likert-scale was used to measure farmers' perception of agricultural extension service delivery. The mean perception score was computed to classify respondents into favorable or unfavorable perception categories.

RESULTS AND DISCUSSION

Table2. The Results showing factors affecting rice farmers' perception of agricultural extension services delivery.

Variables	Co-efficient	Standard error	T-value	Marginal effect
Constant	3.4000	0.1600	21.25	_
Age	-0.0012	0.0025	-0.48	-0.0004
Marital status	0.0950*	0.0550	1.73	0.0190
Sex	-0.0450	0.0500	-0.90	-0.0180
Educational level	0.2800***	0.0450	6.22	0.2980
Farm size	0.0120	0.0210	0.57	0.0100
Farming experience	-0.0035	0.0050	-0.70	-0.0010
Main occupation	-0.1600*	0.0900	-1.78	0.1500
Household size	0.0055**	0.0022	2.50	0.0040
Frequency of extension visits	0.0220	0.0160	1.38	0.0120
Cooperative membership	0.3200*	0.0450	7.11	0.0850
Credit received	0.0035**	0.0016	2.19	0.0335
Sigma	0.1100*	0.0095		
LR $chi^2(2)$	58.50			
Prob>chi^2	0.000			
Pseudo R^2	0.210			
Log-likelihood	-105.500			

Notes:***, ** indicate significance at 1%, 5% and 10% levels respectively.

Table 2 presents the results of the Tobit regression analysis showing the socio-economic factors influencing rice farmers' perception of agricultural extension service delivery in Kano State, Nigeria. The model was statistically significant at the 1% level (LR $\chi^2(12) = 58.50$; $p < 0.01$), indicating that the explanatory variables jointly influenced the farmers' perception of extension services. The pseudo R^2 of 0.210 implies that approximately 21% of the variation in perception levels among rice farmers was explained by the variables included in the model. The log-likelihood value of -105.50 further indicates that the model had a good fit to the observed data.

The coefficient for age (-0.0012) was negative and statistically insignificant, implying that older rice farmers tended to have slightly lower perception levels compared to younger ones, although the difference was not substantial. This may be due to younger farmers being more receptive to new agricultural information and technologies, while older farmers might rely more on traditional practices. Suleiman and Mendelssohn (2021), who observed that younger farmers in Kano State were more responsive to extension interventions than their older counterparts, reported similar findings.

Marital status had a positive and significant influence on perception at the 10% level ($\beta = 0.0950$; $p < 0.10$). Married farmers were more likely to have a favorable perception of agricultural extension service delivery compared to unmarried farmers. This could be attributed to the fact that married individuals often have greater household responsibilities and therefore value services that can improve their productivity and income (Oladipo et al., 2019).

The coefficient for sex was negative (-0.0450) but statistically insignificant ($p > 0.05$). This suggests that the gender of the respondent did not have a significant effect on farmers' perception of agricultural extension service delivery. Both male and female rice farmers appear to have similar levels of perception about the performance of extension agents. This finding aligns with the work of Adesina and Chianu (2020), who found that gender differences did not significantly affect perception and adoption of agricultural innovations among smallholder farmers in northern Nigeria.

The coefficient of education (0.2800) was positive and highly significant at the 1% level. This indicates that higher educational attainment among rice farmers positively influenced their perception of extension services. Education enhances understanding of agricultural information, openness to innovation, and ability to communicate effectively with extension workers. This result corroborates the findings of Nnadi and Akwiwu (2020), who reported that literacy significantly increased farmers' awareness and perception of extension programs in northern Nigeria.

Farm size ($\beta = 0.0120$) was positive but not statistically significant, indicating that the extent of farmland cultivated did not significantly affect perception. Farmers with both small and large holdings seemed to have comparable attitudes toward extension service delivery. This result aligns with Adejo et al. (2020), who found that farm size had an insignificant effect on perception toward agricultural innovations in the North-West geopolitical zone of Nigeria.

The coefficient of farming experience (-0.0035) was negative but not statistically significant, suggesting that the number of

years of farming did not significantly influence farmers' perception of extension services. Experienced farmers may already possess traditional knowledge and may not depend heavily on extension workers for advice. This finding agrees with the study of Eze (2021), which reported that farming experience had an insignificant effect on farmers' perception of agricultural training programs in northern Nigeria.

The coefficient for main occupation (-0.1600) was negative and significant at the 10% level, implying that farmers who engaged primarily in non-farm occupations were less likely to have favorable perceptions of extension services compared to full-time rice farmers. This suggests that part-time farmers may have less interaction with extension agents or lower dependence on agricultural information for their livelihoods.

Household size was positive and significant at the 5% level ($\beta = 0.0055$; $p < 0.05$). Larger households may provide more labor for rice farming and thus interact more frequently with extension agents, improving their perception of service quality. Ayanwale and Alimi (2018), who found that larger farm households were more involved in extension activities due to labor advantages, made a similar observation.

Land ownership showed a positive but statistically insignificant relationship with perception ($\beta = 0.0480$). This suggests that whether a farmer owned or rented land did not significantly affect their perception of extension service delivery. However, the positive sign implies that landowners may feel more secure and therefore more confident to adopt extension recommendations (Abubakar & Abdulazeez, 2021).

The frequency of extension visits had a positive but insignificant effect ($\beta = 0.0220$; $p > 0.05$). Although frequent contact with extension agents was expected to enhance farmers' perception, the lack of significance may imply that extension visits were either irregular or not sufficiently impactful. This may be due to inadequate extension staffing or poor coverage of rural areas in Kano State, as highlighted by Umar et al. (2022).

Membership of cooperative societies was positively significant at the 1% level ($\beta = 0.3200$; $p < 0.01$). Cooperative members tend to have better access to information, group training, and collective decision-making opportunities, which enhance their perception of extension service delivery. This result is consistent with the study of Ibrahim et al. (2021), which found that cooperative membership improved access to extension information and adoption of improved rice technologies in Kano State.

The amount of credit received was positively significant at the 5% level ($\beta = 0.0035$; $p < 0.05$). Access to credit enhances farmers' ability to implement extension recommendations such as the purchase of inputs, improved seeds, and fertilizers. Consequently, farmers with better access to agricultural loans tend to have more positive perceptions of extension services. This agrees with the findings of Lawal et al. (2020), who observed that credit access significantly improved farmers' participation and satisfaction with extension programs.

Model Diagnostics

The sigma value (0.1100) was highly significant, confirming the appropriateness of the Tobit model for the data. The likelihood ratio chi-square (LR $\chi^2 = 58.50$, $p < 0.01$) confirms that the explanatory variables jointly influenced farmers' perception of extension services in Kano State.

CONCLUSION AND RECOMMENDATIONS

The study concluded that farmers' perception of agricultural extension service delivery in Kano State is influenced primarily by socioeconomic and institutional factors rather than demographic characteristics. Education level, cooperative membership, household size, and credit access emerged as key determinants of positive perception. These findings highlight the importance of human capital and social networks in enhancing farmers' confidence in and engagement with extension services.

Conversely, variables such as age, gender, farm size, land ownership, and farming experience were found to be insignificant, suggesting that farmers' perceptions are not necessarily determined by demographic or farm-scale characteristics but by access to information and resources that enable them to utilize extension services effectively. The study further revealed that the low significance of extension visits indicates potential gaps in the frequency and quality of contact between agents and farmers.

In general, the results underscore the need for strengthening farmer-oriented and participatory extension approaches in Kano State. Enhancing education, cooperative organization, and financial empowerment can significantly improve farmers' perception and participation in extension activities, thereby fostering innovation adoption and agricultural productivity.

Based on the empirical findings, the study makes the recommendations that the government and development partners should invest in adult education, literacy programs, and farmers' field schools to improve farmers' understanding and adoption of extension messages. Also, they should formulate policies that promote the formation and capacity building of agricultural cooperatives as channels for extension communication, credit access, and collective decision-making. Furthermore, financial institutions such as the Bank of Agriculture and microfinance banks should provide affordable and timely credit facilities tailored to rice farmers' needs. Flexible repayment plans will enhance farmers' ability to implement extension recommendations. Finally, agricultural extension services should utilize participatory communication models and digital platforms (SMS, radio, and WhatsApp) to ensure timely and effective dissemination of information to farmers across remote areas. Extension programs should target women and youth, ensuring equitable access to information and resources. Gender-sensitive extension approaches can promote inclusivity and long-term agricultural sustainability.

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