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Determinants of Rural Household Participation in the Cashew Nut Value Chain in Kwara State, Nigeria

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Abstract

This study assessed rural households' participation in the cashew nut value chain in Kwara State, Nigeria. A multi-stage sampling procedure was employed to select 297 rural households across two senatorial districts. Frequency counts, percentages, and multivariate probit multiple linear regression were used to analyse the data. Results showed overall medium participation ($\bar{x}$= 3.12), with high participation in production ($\bar{x}$= 4.32) but medium participation in processing ($\bar{x}$= 2.18) and marketing ($\bar{x}$= 2.87). Households held favourable attitudes ($\bar{x}$= 3.59), particularly recognising income potential ($\bar{x}$= 4.15) and growth opportunities ($\bar{x}$= 3.65). Severe constraints such as pests and diseases ($\bar{x}$= 2.46), poor transportation/storage ($\bar{x}$= 2.28), expensive energy costs ($\bar{x}$= 2.24), seasonal income fluctuations ($\bar{x}$= 2.24), and high input costs ($\bar{x}$= 2.23) were identified. Regression analysis revealed that monthly income (β = 0.00001), extension contact (β = 0.121), farming experience (β = 0.002), and cooperative membership (β = 0.039) positively influenced participation. The study recommends strengthened pest management, infrastructure investment, affordable energy provision, expanded extension services, cooperative strengthening, and reform of government programmes.

Keywords: Cashew value chain; rural household, participation

Introduction

Cashew nut (*Anacardium occidentale* L.) production is a critical component of agricultural development and rural livelihoods in Nigeria and West Africa (Ogunwolu et al, 2024). West Africa has emerged as a major hub in the global cashew industry, producing over 45% of the world's raw cashew nuts in 2020, with production continuing to grow substantially (Nigerian Export Promotion Council, 2020). Nigeria currently ranks as Africa's fifth-largest cashew producer, recording 220,000 metric tons of raw cashew nuts in 2023. The sector has contributed over $400 million in export earnings in recent years, significantly boosting Nigeria's non-oil revenue (Nigerian Export Promotion Council, 2020). Despite this economic potential, the industry faces persistent challenges, including limited local processing capacity, poor infrastructure, inadequate access to credit, and weak market linkages that constrain

smallholder farmers' full participation in the value chain (Peprah et al., 2025; Anayochukwu, 2022).

Kwara State is recognised as one of the major production centres, yet the literature on rural household participation in its cashew value chain remains scarce. While studies have examined cashew value chains in neighbouring Kogi State and cassava processing in both Kwara and Kogi States (Iyaji et al, 2022; Adedoyin et al, 2025), there is limited empirical evidence specifically addressing determinants of household participation in Kwara's cashew sector.

There remains a critical knowledge gap regarding the specific determinants of rural household participation in cashew value chains in Kwara State, leaving Kwara's cashew sector underexplored. Understanding the socio-economic factors, attitudes, and constraints influencing household participation is essential for designing effective agricultural extension programs, policies, and interventions that can enhance value chain performance, improve rural livelihoods, and contribute to food security in the state.

Specifically, the study

(i) determined the level of participation of rural households in the cashew value chain;
(ii) examined rural households' attitude toward involvement in the cashew value chain; and
(iii) determined the constraints faced by rural households in participating in the cashew value chain.

H_{01}: There is no significant relationship between respondents' socio-economic characteristics and their level of participation in the cashew value chain in Kwara State.

Methodology

This research was conducted in Kwara State, Nigeria, one of the country's largest cashew-producing states. The state is located in the North Central geopolitical region of Nigeria, also known as the Middle Belt. Geographically, Kwara State lies between latitudes 7°45′ and 9°30′ North and longitudes 2°30′ and 6°35′ East. Kwara State covers a total area of 36,825 square kilometres and comprises sixteen Local Government Areas (LGAs): Asa, Baruten, Edu, Ekiti, Ifelodun, Ilorin East, Ilorin West, Ilorin South, Irepodun, Kaiama, Moro, Offa, Oyun, Isin, Oke Ero, and Patigi (Kwara State Government, 2026).

The state is predominantly agricultural-based, with agriculture serving as the main source of livelihood for more than 70% of the population (Ogunfolaju et al, 2025). Fertile soil, favourable climate, and abundant water supply make Kwara State suitable for growing both cash crops (cocoa, cashew, oil palm) and food crops such as cassava, yam, maize, and rice (Ogunfolaju et al, 2026). Fisheries and livestock farming are also significant components of the state's agricultural sector. Cashew is one of the major economic activities among the various crops grown, generating income and employment for thousands of rural families. It remains among the most significant participants in the local economy and is extensively cultivated by both large-scale producers and smallholder farmers, reinforcing its position as a development-driven crop in the region (Olabanji et al, 2025).

A multi-stage sampling procedure was employed to select 297 rural households for this study. In Stage 1, two senatorial districts (Kwara South and Kwara Central) were purposively selected due to their high cashew activity; Kwara South was chosen for being primarily rural and leading in cashew production, while Kwara Central was selected as semi-urban and linking rural producers to markets and processing plants in Ilorin. In Stage 2, half of the LGAs in each selected district were randomly chosen to minimise selection bias and enhance generalisability across geographic, socioeconomic, and demographic variations. In Stage 3, communities were randomly selected within each sampled LGA to reflect diversity in size, location, and socioeconomic status, balancing representation from remote villages to accessible settlements. In Stage 4, 10% of rural households from each of the 10 sampled communities were selected using systematic random sampling from a community sampling frame, yielding a total sample size of 297 households.
Primary data were collected using a structured questionnaire administered to the sampled rural households.

The level of rural households' participation in the cashew value chain was assessed using a five-point Likert-type scale. Respondents chose the option that best aligned with their actual level of participation across the different value chain stages (production, processing, and marketing). A total mean ($\bar{x}$) of 3.00 was generated as the benchmark for interpretation. The decision rule for classifying participation levels was as follows:

0.00 – 2.00 Mean: Low Level of Participation

2.01 – 4.00 Mean: Medium Level of Participation

> 4.00 Mean: High Level of Participation

Rural households' attitudes toward involvement in the cashew value chain were assessed using a Likert-type scale measuring farmers' perceptions, perceptions of benefits, risk assessments, and willingness to participate. Attitude statements were rated on a 5-point scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). Mean scores were computed to determine the overall attitude level, with higher scores indicating more favourable attitudes.

Constraints faced by rural households in participating in the cashew value chain were identified using a structured checklist covering production, financial, institutional, and marketing-related constraints. Respondents rated each constraint based on its severity using a 5-point Likert scale (1 = Not a Constraint to 5 = Severe Constraint). A Constraint Index (CI) was computed for each item, and constraints were ranked in order of severity.

The multivariate probit regression model was employed to determine the socio-economic characteristics affecting participation in the cashew value chain
It was assumed that participation (Y) is a function of age, sex, household size, education, years of experience, training, monthly income from the cashew value chain, frequency of contact with Extension Agents, and membership of cooperative society. The explicit form of the function is specified as follows:

$$Y=\alpha+\beta1X1+\beta2X2+\beta3X3+\beta4X4+\beta5X5+\beta6X6+\beta7X7+\beta8X8+\beta9X9+et(1) Y=\alpha+\beta1X1+\beta2X2+\beta3X3+\beta4X4+\beta5X5+\beta6X6+\beta7X7+\beta8X8+\beta9X9+et(1)$$

Where:
Y =Level of participation in the cashew value chain (Production, Processing, Marketing)
X_1 =Age (years)
X_2 =Sex (male = 1, female = 0)
X_3 =Household size (number of people)
X_4 =Education (years of formal schooling)
X_5 =Years of experience in cashew value chain (years)
X_6 =Training in cashew value chain (Trained = 1, Untrained = 0)
X_7 =Monthly income from cashew value chain (Naira)
X_8 =Extension contact (number of contacts with extension agents)
X_9 =Membership of cooperative society (Yes = 1, No = 0)
β_1 =Regression coefficients of $X_1 – X_9$ to be estimated
–
β_9
α =Constant (intercept)
e_t =Error term

Results and Discussion

Level of Participation In Cashew Value Chain

The level of rural household participation in the cashew value chain varied across different stages, as shown in Table 1. Production had the highest participation *($\bar{x}$*= 4.32), followed by marketing *($\bar{x}$* = 2.87), while processing had the lowest participation *($\bar{x}$* = 2.18). The high participation in production aligns with findings from Iyaji et al. (2022), who reported that farmers are more involved in production when compared to other stages across the value chain. The medium participation in marketing *($\bar{x}$* = 2.87), higher than processing but lower than production, indicates that households engage in selling cashew nuts but primarily through informal channels and at farmgate levels. Iyaji et al. (2022) found that majority of cashew producers sell directly to agents/wholesalers on the farm site, limiting profit margins and market power. The finding that overall participation is medium *($\bar{x}$*= 3.12) corroborates broader trends in Nigeria's cashew sector development. According to the National Cashew Association of Nigeria (2026), despite Nigeria's capacity to scale production to two million metric tonnes within five years, the sector lacks reliable statistical frameworks and value chain integration, resulting in suboptimal participation across the chain.

The disproportionate participation levels across value chain stages have significant implications. High production participation without commensurate processing and marketing participation means households miss opportunities to capture value-added benefits. The simulated development analysis by Kehinde et al (2021) demonstrated that transforming export structures from unprocessed raw products to processed-finalised products could result in significant growth in export incomes and stimulate economic transformation.

Table 1: Cashew value chain participation

Value Chain Stage	Mean **(x̄)**	Participation Level
Production	4.32	High
Processing	2.18	Medium
Marketing	2.87	Medium

Decision Rule: 0.00–2.00 = Low; 2.01–4.00 = Medium; >4.00 = High.
Source: Field Survey, 2024

Attitude toward Involvement in the Cashew Value Chain

Table 2 presents rural households' attitudes toward participation in the cashew value chain. Rural households demonstrated favourable attitudes ($\bar{x}$ = 3.59), particularly regarding income generation ($\bar{x}$ = 4.15) and willingness to expand production ($\bar{x}$ = 3.78). This positive attitude supports potential for value chain expansion and intergenerational knowledge transfer.

The strong perception that cashew farming provides good income ($\bar{x}$ = 4.15) aligns with findings on cashew's economic significance in Nigeria. This high-income perception corroborates the findings of Okereke & Apeh (2021), which found cashew production to be central to rural economies and a significant contributor to household livelihoods. The perception of good income potential is critical for motivating continued and expanded participation in the value chain. (Salami et al., 2024),

The willingness to expand cashew production ($\bar{x}$ = 3.78) reflects optimism about the sector's growth potential. This finding supports TechnoServe's (2024) assessment that cashew farming generates direct income-generating opportunities for farmers and farmhands, enabling rural households to fulfil educational aspirations for their children and fostering self-reliance (NCAN, 2026; TechnoServe, 2024)

The positive perception that the cashew value chain offers growth opportunities ($\bar{x}$ = 3.65) indicates that rural households recognize pathways for advancement beyond primary production. This perception is crucial for value chain development, as studies have shown that activities along the cashew nut value chain are expected to generate employment opportunities for Nigerian youth across multiple segments, including production, processing, transportation, marketing, and value addition (Kehinde et al, 2021). The moderate agreement on recommending cashew farming to youth ($\bar{x}$ = 3.42) is more nuanced than other attitude measures. The moderate attitude may reflect the lower youth participation, suggesting that while farmers perceive cashew positively, they may recognize challenges that make it less attractive to younger generations, such as long establishment periods for cashew trees, climate variability, or limited profitability at current participation levels (Ayinde et al, 2024).

Table 2: Attitude toward involvement in the cashew value chain

Attitude Statement	Mean ($\bar{x}$)
Cashew farming provides a good income	4.15
I am willing to expand cashew production	3.78
Cashew value chain offers growth opportunities	3.65
I am satisfied with my current participation level	2.94
I would recommend cashew farming to the youth	3.42

Source: Field Survey, 2024

Constraints Faced by Rural Households

Table 3 ranks the constraints facing rural households in the cashew value chain.

Pests and diseases emerged as the most severe constraint ($\bar{x}$ = 2.46), with nearly every respondent identifying it as a major threat. The severity of pest constraints highlights that crop health remains the primary concern for rural families, with infestations directly impacting yields and decreasing nut quality (Ogunwolu et al, 2020).

Poor transportation and storage facilities ranked second ($\bar{x}$= 2.28), indicating critical infrastructure deficits that inhibit working capital holding and post-harvest quality maintenance. This finding aligns with Egwuonwu & Ndukauba (2025), which identified storage facilities as major post-harvest constraints. Limited access to cheap energy for processing ($\bar{x}$ = 2.24) ranked third, reflecting what TechnoServe (2024) described as higher processing costs that make it difficult for African processors to compete with established players from Europe. Energy costs are particularly critical for cashew processing, which requires significant thermal energy for boiling nuts to facilitate shell removal. These infrastructural constraints increase transaction costs and decrease farmers' market competitiveness (TechnoServe, 2024).

High input costs ($\bar{x}$ = 2.23), ranked as the fifth most severe constraint. Seasonal production and income fluctuations ($\bar{x}$= 2.24) ranked fourth, indicating that cashew farming's dependence on seasonal production cycles exposes households to income instability. Seasonality also affects climate variability, which has led to increased unpredictability in cashew production and intensified challenges in maintaining quality during post-harvest stages (Olabanji et al, 2025). Poor post-harvest management ($\bar{x}$ = 2.11) ranked sixth, with climate change effects ($\bar{x}$ = 2.08) ranked seventh. This finding corroborates Anayochukwu (2022), who identified unfavourable climatic and weather conditions as the major challenge impeding cashew nuts' post-harvest management practices. Lack of knowledge on modern processing methods ($\bar{x}$ = 2.01) ranked eighth, and lack of processing equipment ($\bar{x}$ = 1.91) ranked ninth. These findings align Egwuonwu, H. A., & Ndukauba, C. M. (2025), who found that exports of non-value-added products (raw nuts) and low exports of value-added products (kernels) constitute major constraints to value chain development, resulting in poor foreign exchange earnings and loss of job opportunities. Poor market access

($\bar{x}$ = 1.80), weak policy support ($\bar{x}$ = 1.85), and poor extension services ($\bar{x}$ = 1.68) were all ranked as moderate institutional constraints. Institutional voids, including a lack of government subsidies and limited extension coverage, mean rural farmers cannot afford to implement production and processing at scale (Anayochukwu, 2022).

Gender inequality ($\bar{x}$ = 0.63), low youth participation ($\bar{x}$ = 0.14), and lack of coordination ($\bar{x}$ = 0.01) ranked lowest, suggesting these issues are less recognized by rural households themselves. Youth migration from rural areas reduces the agricultural labour force, which may undermine future cashew production if left unchecked.

Table 3: Constraints faced by rural households in participating in cashew value chain

Constraint	Mean Score	Rank	Severity
Outbreaks of pests and diseases	2.46	1	Severe
Poor transportation/storage facilities	2.28	2	Severe
Limited access to cheap energy for processing	2.24	3	Severe
Seasonal production/income fluctuations	2.24	4	Severe
High cost of inputs	2.23	5	Severe
Poor post-harvest management	2.11	6	Moderate
Climate change effects	2.08	7	Moderate
Lack of knowledge on modern processing	2.01	8	Moderate
Lack of processing equipment	1.91	9	Moderate
Poor market access	1.80	10	Moderate
Weak policy support	1.85	11	Moderate
Poor extension services	1.68	12	Moderate
Gender inequality	0.63	13	Low
Low youth participation	0.14	14	Low
Lack of coordination	0.01	15	Low

Field Survey, 2024.

Determinants of Participation in Cashew Value Chain Activities

Table 4 presents the multivariate probit regression results for determinants of participation across three value chain activities. Monthly income significantly and positively influenced participation in all three activities ($p < 0.01$), confirming that wealthier households can invest in inputs and technologies enhancing value chain involvement. Older farmers engaged more in production ($\beta = -0.00132$, $p < 0.01$), while farming experience increased participation in processing ($\beta = 0.00170$, $p < 0.10$) and marketing ($\beta = 0.00148$, $p < 0.01$). This aligns with Alabi et al. (2024) that experienced farmers generate higher net farm income through superior decision-making.

Extension contacts significantly increased processing ($\beta = 0.12144$, $p < 0.01$) and marketing ($\beta = 0.09068$, $p < 0.01$) participation, underscoring extension's critical role in teaching value-added activities. This supports findings that extension agents promote value chain development through training and technology dissemination (Mairabo et al, 2025). Cooperative membership enhanced marketing participation (β

= 0.03973), reflecting cooperatives' role in market access and collective bargaining. Government support and access to credit negatively affected both processing and marketing participation (β = -0.08477), suggesting poor targeting or ineffective delivery. This corroborates literature noting that top-down promotion policies often fail to address smallholder priority needs (Olomu et al., 2020)

Farm size negatively influenced production (β = -0.00621) and marketing (β = -0.01371), indicating that smallholders are more focused on cashew than larger, diversified farms. Households with cashew as a major income source significantly increased processing (β = 0.49424, p < 0.01) and marketing (β = 0.45924, p < 0.01), confirming that income dependence drives the value chain.

Table 4: Determinants of level of participation in cashew value chain Activities

Variable	Production (β)	Processing (β)	Marketing (β)
Monthly Income	0.00001***	0.00001***	0.00001***
	(0.00001)	(0.00001)	(0.00001)
Education Status	-0.00015	-0.00108	-0.00071
	(0.000304)	(0.000789)	(0.000553)
Sex	-0.00216	-0.00831	-0.00984
	(0.003804)	(0.009895)	(0.006933)
Age	-0.00132***	-0.00029	0.00028
	(0.000368)	(0.000956)	(0.00067)
Farm Size	-0.00621***	-0.00418	-0.01371***
	(0.002246)	(0.005841)	(0.004093)
Extension Contact	0.00693	0.12144***	0.09068***
	(0.009134)	(0.023755)	(0.016644)
Cooperative Membership	-0.00112	0.01396	0.03973*
	(0.012164)	(0.031636)	(0.022166)
Household Size	0.00001	-0.00033	-0.00030
	(0.000456)	(0.001187)	(0.000832)
Government Support	-0.00764	-0.08477***	-0.07183***
	(0.008368)	(0.021764)	(0.015249)
Farming Experience	0.00005	0.00170*	0.00148***
	(0.00035)	(0.000909)	(0.000637)
Satisfied with Market Price	0.00016	0.01004	0.01753***
	(0.003588)	(0.009333)	(0.006533)
Major Income Source	-0.04106***	0.49424***	0.45924***
	(0.006813)	(0.017719)	(0.012415)
Credit Access	0.00373	-0.06244***	-0.05875***
	(0.006599)	(0.017162)	(0.012025)
Input Access	-0.00058	0.01851	0.00889
	(0.006075)	(0.015800)	(0.011070)
R-squared	0.329	0.084	0.912
N	234	234	234

Source: Field Survey, 2024

Conclusions and Recommendations

This study observed that rural households in Kwara State are moderately engaged in the cashew value chain, with high production participation but medium processing and marketing participation. Households hold favourable attitudes but face severe constraints: pests and high input costs. Income, extension contact, farming experience, and cooperative membership enhance participation, while poorly targeted government support and credit constrain it**.**

Government and NGOs should implement integrated pest management programmes and establish farmer field schools focused on cashew health management. The government should invest in rural road networks and storage facilities to reduce post-harvest losses and improve market access. Cooperative societies can be leveraged for collective investment in community-level storage infrastructure. Government and development organisations should develop energy subsidy programmes or provide renewable energy solutions (solar dryers, efficient boilers) specifically for small-scale cashew processors to reduce the cost barrier to downstream participation.

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