

# Factors Influencing Cashew Farmers' Marketing System Choice Between Contract Farming and Warehouse Receipt Systems in Mkuranga District, Tanzania

Ezekiel Isidor Lyimo<sup>\*</sup>, Joseph Hella<sup>\*\*</sup>, Silver Hokororo<sup>\*\*\*</sup>

ARTICLE INFO	ABSTRACT
<p><i>Article history:</i>            Received: February 24, 2026            Accepted: March 28, 2026            Published: March 31, 2026</p> <p><i>JEL Classification:</i>            Q13, Q12, O13</p> <p><i>Keywords:</i>            Cashew farmers, Contract farming, Warehouse receipt system, Marketing system choice, Transaction costs, Tanzania</p>	<p>This study examines the underlying drivers behind smallholder cashew farmers' choice between contract farming (CF) and warehouse receipt system (WRS) arrangements in Mkuranga District of Tanzania. Using cross-sectional survey data from 354 farmers during the 2023/2024 production season, a binary logit approach was applied to estimate the probability for choosing CF relative to WRS, with marginal effects computed for interpretation. The results show that transport cost is the most influential factor, substantially increasing the likelihood of CF participation, while distance to market also exerts a significant positive effect. Having access to reliable information on markets shows a weaker but positive influence. In contrast, socio demographic attributes such as sex and age, educational attainment, and landholding size do not significantly shape marketing system choice. These findings suggest that farmers' decisions are driven primarily by transaction related and spatial constraints rather than personal characteristics. The study concludes that improving rural transport infrastructure and strengthening market information dissemination within the WRS framework are critical for enhancing its effectiveness and promoting balanced participation. By highlighting the dominance of transaction costs and information asymmetries over demographic factors, the study contributes empirical evidence to debates on institutional marketing arrangements in Tanzania's cashew sector and informs broader discussions on agricultural commercialization in developing economies.</p>

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## 1. Introduction

Cashew (*Anacardium occidentale*) represents one of Tanzania's most important export commodities, making a major contribution towards rural livelihoods and foreign currency earnings. In 2025, the country produced more than 600,000 tons of raw cashew nuts, generating about Sh1.52 trillion in export revenue (Cashew Board of Tanzania [CBT], 2025; Kasiga et al., 2025).

Yet strong national performance does not automatically translate into better outcomes for farmers. Many smallholders continue to face low farm-gate prices, high transport and transaction costs, weak bargaining power, limited access to resources, and delayed payments. These challenges reduce effective market participation and limit the extent to which commercialization improves household incomes (Mwenda, 2023; Kimaro & Nnko, 2024 & Peprah et al., 2025).

<sup>\*</sup>, <sup>\*\*</sup> Department of Agricultural Economics and Agribusiness, Sokoine University of Agriculture, Morogoro, Tanzania, <sup>\*\*\*</sup> Department of Business Management, Sokoine University of Agriculture, Morogoro, Tanzania. E-mail addresses: [elyimo2011@gmail.com](mailto:elyimo2011@gmail.com) (Corresponding author — E. I. Lyimo), [jhella@sua.ac.tz](mailto:jhella@sua.ac.tz) (J. Hella), [silverhoko@sua.ac.tz](mailto:silverhoko@sua.ac.tz) (S. Hokororo).

To address these constraints, the government introduced institutional reforms designed to improve price realization and market access. Two systems now operate in parallel: the Warehouse Receipt System (WRS) and Contract Farming (CF). Under WRS, farmers store produce in certified warehouses and sell through cooperative-led auctions intended to enhance transparency and price discovery (Mhando & Mashalla, 2023). CF, by contrast, links farmers directly to buyers through formal agreements that may include guaranteed markets, input provision, and pre-agreed pricing, thereby reducing uncertainty (Mwangakala et al., 2023). Although both aim to improve marketing performance, they differ in structure, risk allocation, and participation requirements.

In Mkuranga District, farmers voluntarily choose between CF and WRS depending on their circumstances. Studies suggest that participation is shaped by socioeconomic characteristics, resource endowments, access to information, and institutional support (Mwatawala et al., 2025; Dzanku et al., 2024; Claude et al., 2025; Magakwe et al., 2025). Farmers with larger farms, stronger land rights, and better access to advisory or financial services are more likely to join structured systems. Engagement in contract arrangements may also depend on prior experience and the ability to meet quality and delivery standards (Anh, 2025).

Because participation determines access to price premiums, risk-sharing, and complementary services, unequal participation can translate into unequal welfare outcomes. Evidence from Sub-Saharan Africa shows that well-functioning cash crop markets can reduce poverty and strengthen resilience, provided institutional arrangements align with farmers' capacities (Waje et al., 2025; Peprah et al., 2025). Understanding the determinants of marketing channel choice is therefore critical for designing policies that enhance inclusion and efficiency.

Guided by Transaction Cost Economics and Random Utility Theory, the study builds on the expected utility principle, whereby farmers compare anticipated benefits and costs of alternative marketing channels and select the option that maximizes net utility (Mdoda et al., 2024; Munyati et al., 2025). Beyond household and farm characteristics, participation is shaped by transaction frictions such as search and information costs, negotiation and enforcement challenges, and weak market infrastructure. Evidence from Sub-Saharan Africa shows that these institutional constraints strongly influence farmers' marketing choices, underscoring the role of transaction costs in shaping outcomes (Hlatshwayo et al., 2021). Thus, farmers' decisions between CF and WRS reflect structured responses to measurable constraints rather than random participation.

Despite growing literature on farmers' choice between formal institutions, evidence for Tanzania's cashew sector remains limited. Most studies examine participation in a single system rather than comparative choices within the same commodity chain (Gelata & Han, 2024).

Since CF and WRS have coexisted under the Warehouse Receipts Act of 2005, research has focused mainly on WRS performance or general constraints, neglecting the determinants of binary choice. This study addresses that gap by analyzing how farmers in Mkuranga select between CF and WRS. Guided by Random Utility Theory and Transaction Cost Economics, it explores how demographic and socioeconomic characteristics, resource endowments, institutional ties, and market access conditions shape participation decisions, contributing to policy debates on inclusive cashew marketing.

## 2. Literature review

Transaction Cost Economics (TCE) explains how farmers adopt institutional arrangements that reduce the costs of searching, negotiating, and enforcing agreements, while Random Utility Theory (RUT) provides a framework for modeling discrete choices under uncertainty, accounting for both observable and unobservable influences (Coulter et al., 1999; Jagwe et al., 2010). These perspectives clarify why farmers weigh transaction costs and risk preferences when deciding between CF, which offers pre arranged terms and price certainty, and WRS, which provide collective auctions and credit access under the Warehouse Receipts Act of 2005.

Evidence across Sub-Saharan Africa shows that socioeconomic and transaction related factors strongly shape participation in formal systems. Studies highlight education, household size, credit access, farm size, and cooperative membership as important drivers of CF engagement (Gelata & Han, 2024; Kimaro & Nnko, 2024; A meta analysis confirms the role of education, asset endowments, market information, and institutional membership (Abreham et al., 2024). Yet barriers remain: limited infrastructure, long distances, and weak coordination often push farmers toward informal channels, as seen in South Africa (Magakwe et al., 2025). Similar challenges in Tanzania transport costs and poor access to information restrict WRS participation (Temba & Njau, 2025; Leo et al., 2025).

Research on WRS in Tanzania has examined market facilities, price stability, and institutional support (Cashew Board of Tanzania (CBT), 2025). However, comparative analysis of CF and WRS is lacking, despite their coexistence in districts such as Mkuranga. This study addresses that gap by analyzing how demographic, socioeconomic, and informational attributes including sex, age, educational attainment, landholding size and market proximity, transport cost, data quality, as well as extension contact shape farmers' system selection, thereby informing inclusive marketing policy design.

## 3. Methodology

The study was conducted in Mkuranga District, Tanzania, a major cashew producing area where smallholder farmers market their produce through contract farming (CF) and the warehouse receipt system (WRS). A cross sectional research design was employed, and information was gathered during the 2023/2024 production season. Sampling followed a multistage procedure. Mkuranga District was purposively selected for its importance in cashew production. Wards were stratified according to the dominant marketing arrangement, villages were randomly chosen within each stratum, and farmers were then randomly drawn from lists provided by cooperative societies and district agricultural offices. In total, 354 smallholder cashew farmers were surveyed. Primary information was obtained through in person interviews using a structured questionnaire that captured household characteristics, farm attributes, institutional participation, access to services, and marketing factors. Secondary data from district offices and cooperative records provided contextual background. Farmers' choice of marketing arrangement was modeled as a binary outcome, with CF coded as one and WRS as zero. Explanatory variables reflected four dimensions: demographic factors (age, gender, education), resource endowments (farm size), market access conditions (distance to market, transport cost, information quality), and institutional support (extension services). The variables were identified on the basis of theoretical foundations, prior observed findings and their relevance to the specific local context. For example, education was expected to enhance farmers' ability to engage in contractual arrangements, while farm size served as a proxy for production capacity. Distance and transport costs captured

transaction cost considerations, and extension services reflected the role of institutional support. Descriptive statistics were first used to summarize farmer characteristics.

Binary logistic regression was then applied to analyze determinants of marketing choice, with marginal effects computed to interpret changes in the probability of selecting CF relative to WRS. Multicollinearity was assessed using variance inflation factors to ensure reliability of estimates. All procedures complied with ethical standards, with clearance obtained through the Regional Administration and Local Government Authority (PO-RALG). Participation was voluntary, while participants' confidentiality was guaranteed.

#### 4. Results

Table 1 reports the estimated logit coefficients and corresponding marginal effects. The likelihood ratio test is highly significant (LR  $\chi^2 = 167.14$ ,  $p < 0.001$ ), and the pseudo- $R^2$  value of 0.34 indicates that the set of included variables account for a substantial share of variation for a cross sectional choice model. Model diagnostics confirm adequacy: the Pearson fit assessment did not reject the null hypothesis of proper specification ( $p = 0.55$ ), and variance inflation factors (range 3.35–8.16, mean 5.57) suggest no serious multicollinearity. Transport cost emerges as the strongest determinant of marketing system choice. A single unit rise in transport cost raises the probability of selecting contract farming (CF) by 43 percentage points ( $p < 0.001$ ). Distance to market also exerts a positive and statistically significant influence, increasing the estimated probability for CF engagement by 8.6 percentage points ( $p = 0.047$ ). Information quality shows a marginal effect of nearly 5 percentage points ( $p = 0.052$ ), suggesting a weaker but potentially meaningful role. By contrast, gender, age, education, farm size, and extension contact do not exert statistically significant effects on marketing system choice.

**Table 1. Binary logistic regression estimates and marginal effects for farmers' marketing system choice**

Marketing_type	Coefficient	SE associated with coefficient	Marginal effects (dy/dx)	SE associated with Marginal effects	z	P>z
Gender	-0.2503104	0.3142943	-0.0620701	0.07737	-0.80	0.426
Age	-0.1522767	0.1291828	-0.0379558	0.03221	-1.18	0.238
Education	0.0784573	0.1078320	0.0195559	0.02689	0.73	0.467
Farm size	-0.0759632	0.1284861	-0.0189342	0.03203	-0.59	0.554
Distance to market	0.3454079	0.1738847	0.0860949	0.04338	1.99	0.047
Transport cost	1.7294110	0.1819476	0.4310655	0.04504	9.50	0.000
Information quality	0.1912575	0.0982926	0.0476720	0.02450	1.95	0.052
Contact to extension	0.1470608	0.1045934	0.0366557	0.02607	1.41	0.160
_cons	-4.684664	0.9888210			-4.74	0.000
Number of observations = 354						
Likelihood ratio $\chi^2(8) = 167.14$						
Prob > $\chi^2 = 0.0000$						
Log likelihood -161.80455						
Pseudo $R^2 = 0.3406$						

Source: Survey data (2024)

## 5. Discussion

The results highlight the dominance of transaction related factors over demographic characteristics in shaping farmers' marketing decisions. Transport cost is the most influential variable: farmers facing higher marketing expenses are far more likely to adopt CF, consistent with Transaction Cost Economics and evidence from Changalima & Ismail (2022). This reflects the appeal of contracts in reducing uncertainty and minimizing costs associated with centralized auctions. Distance to market also inclines farmers toward CF, underscoring the burden of remoteness and the advantage of arrangements where buyers collect produce closer to farms.

Information quality, though only marginally significant, suggests that reliable market information may encourage contract participation. Contractors often provide price communication, input guidance, and coordination services, which can reduce information asymmetries. This finding aligns with Kwingwa et al. (2023), who observed that having availability of dependable data enhances smallholders' ability to undertake well-grounded marketing choices.

In contrast, socio demographic attributes including sex, age, schooling attainment, and farm size do not significantly affect marketing system choice in this context. While theory often expects these variables to matter, their insignificance here reflects the stronger role of structural and transaction related constraints. This is consistent with Jimaima et al. (2025), who found that demographic variables were statistically insignificant once transaction costs and production factors were considered. Together, these findings emphasize that systemic barriers such as transport costs, distance, and information asymmetries are more decisive than individual demographic traits.

Overall, the study underscores the need for interventions that reduce transport burdens and improve information flows. Policies targeting these systemic constraints are likely to be more effective in promoting inclusive participation in cashew marketing systems than demographic based approaches.

## 6. Conclusions

This study examined the determinants influencing smallholder cashew farmers' choice between contract farming (CF) and the warehouse receipt system (WRS). The results show that transport costs, distance to market, and information quality significantly increase the likelihood of CF participation, while demographic attributes such as age, gender, and educational level are not decisive. The findings underscore the central role of transaction related constraints alongside information access in shaping institutional marketing choices, consistent with Transaction Cost Economics and Random Utility Theory. By emphasizing structural rather than demographic drivers, the study contributes to debates on how marketing institutions can be designed to improve efficiency and inclusiveness in agricultural value chains.

The study's scope is limited to cross sectional data from a single district, which may restrict generalizability. Future research could employ panel data or comparative regional analysis to capture dynamic behavioral responses and institutional variations across Tanzania's cashew sector.

## 7. Recommendations

Based on these findings, three policy priorities should be pursued:

**First, rural transport infrastructure should be improved.** Investments in feeder roads and local aggregation points should be prioritized to reduce transaction costs and enhance participation in centralized systems such as the warehouse receipt system (WRS).

**Second, market information dissemination should be strengthened.** Transparency in pricing, auction procedures, and quality grading within the WRS framework should be enhanced to reduce information asymmetries and build farmers' confidence in the system.

**Finally, structural and institutional interventions should be prioritized over demographic targeting.** Since participation is driven by transaction costs and information rather than farmer characteristics, policies should focus on systemic improvements in infrastructure and institutions rather than demographic attributes.

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