

COMPARATIVE ANALYSIS OF CASHEW FARMERS' PERCEPTIONS OF INSTITUTIONAL PERFORMANCE UNDER CONTRACT FARMING AND WAREHOUSE RECEIPT SYSTEMS IN MKURANGA DISTRICT, TANZANIA

Ezekiel Isidor Lyimo elyimo2011@gmail.comJoseph Hella Silver Hokororo 

Sokoine University of Agriculture, Tanzania

Abstract. Cashew farming is a vital source of rural livelihoods and export earnings in Tanzania, yet smallholder farmers continue to face challenges such as delayed payments, limited access to market information, and weak institutional support. This study compares farmers' perceptions of institutional performance under contract farming (CF) and the warehouse receipt system (WRS) in Mkuranga District. A cross-sectional survey of 354 farmers (177 CF and 177 WRS) was conducted using structured questionnaires that captured perceptions of trust in buyers, information access, training opportunities, and timeliness of payment. Data analysis combined descriptive statistics with non-parametric tests and ordered logistic regression, complemented by marginal effects. The results show that CF participants reported higher trust in buyers and greater satisfaction with payment timeliness compared to WRS participants, while differences in information and training satisfaction were negligible. Farming experience was positively associated with trust in buyers. The study concludes that institutional arrangements influence specific aspects of marketing efficiency rather than producing uniform outcomes. Strengthening transparency and payment systems in WRS and improving service delivery in CF could enhance farmer welfare and support more effective structured marketing in Tanzania.

Keywords: contract farming; warehouse receipt system; marketing efficiency; farmer perceptions; Tanzania

INTRODUCTION

Cashew production is central to Tanzania's agricultural economy, contributing to export earnings and rural livelihoods, particularly in coastal districts such as Mkuranga. Yet smallholder farmers face persistent challenges including delayed payments, limited access to reliable information, weak trust in buyers, and inadequate training opportunities. These constraints reduce marketing efficiency and limit income gains, a pattern observed across Sub-Saharan Africa, where institutional

weaknesses constrain market participation (Akyoo and Mpenda, 2014).

Institutional arrangements such as contract farming (CF) and the warehouse receipt system (WRS) have been promoted to strengthen farmer–market coordination. CF involves agreements with buyers that may include inputs, extension services, and assured markets (Eaton and Shepherd, 2001). WRS enables farmers to store produce in certified warehouses and sell collectively, improving transparency, price discovery, and credit access (Byedileclara and Mhando, 2023).

Accepted: 30.06.2026

Published: 30.06.2026

Cite as: Lyimo, E.I., Hella, J., Hokororo, S. (2026). Comparative analysis of cashew farmers' perceptions of institutional performance under contract farming and warehouse receipt systems in Mkuranga district, Tanzania. *J. Agribus. Rural. Dev.*, 2(80), 237–244. <http://dx.doi.org/10.17306/J.JARD.2026.2.00020R1>



© 2026. The Author(s). Published by Uniwersytet Przyrodniczy w Poznaniu, 2026.
Open Access article, distributed under the terms of the Creative Commons license (CC BY 4.0)

Evidence remains mixed: CF can improve technical knowledge and stabilize incomes, though outcomes depend on enforcement and bargaining power, while WRS improves transparency and payment reliability, though transaction costs and delays remain concerns (Arouna et al., 2021; Mpita, 2013; Safo et al., 2023).

Most studies emphasize aggregate outcomes such as income or productivity, with limited attention to farmers' perceptions of institutional performance (Martin and Mwaseba, 2015). Yet perceptions are critical, shaping trust, participation, and long-term engagement (Belay, 2020). Recent work calls for multidimensional assessments that extend beyond economic indicators to include trust, information access, and service delivery (Souissi et al., 2024). In Tanzania's cashew sector, however, comparative evidence on perceptions of CF and WRS remains scarce.

This study addresses that gap by comparing farmers' perceptions of four institutional indicators—trust in buyers, access to information, training opportunities, and timeliness of payment under CF and WRS in Mkuranga District. Guided by Transaction Cost Economics (Williamson, 1981), which highlights how institutions reduce uncertainty and coordination costs, and Random Utility Theory (McFadden, 1974), which explains how individuals evaluate alternatives based on perceived benefits, the analysis of farmers' perceptions advances the understanding of how institutional arrangements shape farmer perceptions beyond economic outcomes.

MATERIALS AND METHODS

Study area

The research was conducted in Mkuranga District, Coastal Region of Tanzania, a major cashew producing area dominated by smallholder farmers. The district was purposively selected because both contract farming (CF) and the warehouse receipt system (WRS) are actively practised, allowing direct comparison of the two institutional arrangements within the same context. The presence of organized farmer groups and established marketing structures was a key factor in selecting Mkuranga District as the study area.

Research design and sampling procedure

A cross-sectional survey design was adopted to capture farmers' perceptions at a single point in time. A multistage sampling procedure was used. First, Mkuranga

District was purposively chosen due to its prominence in cashew production and the coexistence of CF and WRS. Wards were then stratified by dominant marketing system and villages were randomly selected from each stratum. Finally, farmers were randomly selected from lists provided by cooperatives and district agricultural offices, ensuring that each eligible farmer had a fair chance of inclusion. The final sample comprised 354 farmers, equally divided between CF and WRS (177 each), thereby ensuring a balance for comparative analysis.

Data collection

Primary data were collected through structured questionnaires administered in face-to-face interviews. This approach improved clarity and accuracy given varying literacy levels among respondents. The questionnaire was pre-tested with cashew farmers in Mkuranga District to ensure relevance and construct validity.

Perceptions of institutional performance were measured using four Likert scale items adapted from prior studies. Respondents rated their satisfaction on a five-point scale (1 = very dissatisfied to 5 = very satisfied). The items captured satisfaction with: (i) access to marketing information, (ii) training opportunities, (iii) timeliness of payment, and (iv) trust in buyers during transactions.

Table 1 summarizes the measurement items used to operationalize institutional indicators.

Secondary data were obtained from district agricultural offices, cooperative records, and relevant reports to provide contextual background and triangulate findings.

Socio-demographic and farm characteristics were collected to serve as control variables in regression models. This included gender, education, household size, farming experience, and farm size. A descriptive profile of respondents by marketing system is presented in Table 2 in the Results section.

Analytical procedures

Data Analysis combined descriptive and inferential techniques. Frequencies and medians summarized perceptions across indicators. Differences between CF and WRS participants were tested using the Mann-Whitney U test, suitable for ordinal data. To examine the determinants of satisfaction, ordered logistic regression models were estimated for each indicator. This approach accounts for the ordinal nature of Likert responses and

Table 1. Measurement items for Institutional perceptions (Likert scale)

Institutional indicator	Questionnaire item	Response scale
Information access	How satisfied were you with the access to marketing information provided to you?	1 = Very dissatisfied 5 = Very satisfied
Training opportunities	How satisfied were you with the training opportunities you received related to cashew marketing?	1 = Very dissatisfied 5 = Very satisfied
Timeliness of payment	How satisfied were you with the timeliness of payment after selling your cashew nuts?	1 = Very dissatisfied 5 = Very satisfied
Trust in buyers	How satisfied were you with the level of trust you had in your buyers during marketing transactions?	1 = Very dissatisfied 5 = Very satisfied

Source: own elaboration.

allows probabilities of reporting higher satisfaction categories to be estimated. Marginal effects were computed to aid interpretation.

Model specification

The ordered logit model assumes an underlying latent variable representing farmers' satisfaction, reflected through ordered categories. The general form is:

$$\text{logit}[P(Y_i \leq j)] = \alpha_j + \beta_1 \text{MarketingType}_i + \sum_{k=2}^K \beta_k X_{ik} \quad (1)$$

where:

- Y_i – ordered response category for farmer
- j – threshold cutpoints between categories (estimated by the model)
- α_j – estimated threshold parameters
- β_1 – coefficient for marketing arrangement (CF vs WRS)
- β_k – coefficients of explanatory variables
- X_{ik} – vector of explanatory variables.

Four separate ordered logistic regression models were estimated, each corresponding to one institutional indicator of marketing efficiency: trust in buyers, information satisfaction, training satisfaction, and timeliness of payment. In every model, the indicator served as the dependent variable, while socio-economic and farm characteristics (gender, education, household size, farming experience, farm size, distance to market, cooperative membership, access to credit, quantity sold, and transport costs) were included as controls. This specification captures heterogeneity in farmer characteristics and market engagement, consistent with the transaction cost literature (Greene, 2012).

Estimation procedure and diagnostics

Models were estimated using maximum likelihood. The proportional odds assumption was tested with both the Brant test and the model logit diagnostic in Stata, which assess the consistency of relationships across outcome thresholds. Additional checks included variance inflation factors to detect multicollinearity and robustness tests to confirm model stability.

Interpretation strategy

Coefficient estimates were interpreted in terms of direction and statistical significance, while marginal effects were computed to provide substantive insights into changes in probabilities predicted across satisfaction levels. This dual approach ensured that statistical results could be translated into meaningful implications for farmer perceptions.

RESULTS

Socio-demographic characteristics of respondents

Cashew farmers in both the warehouse receipt system (WRS) and contract farming (CF) showed broadly similar household and farm characteristics, with no significant differences in gender, age, education, household size, farming experience, farm size, or credit access (all $p > 0.05$). This indicates the two groups are largely homogeneous in basic socio-economic attributes.

Two variables differed significantly: more CF farmers lived over 10 km from markets (57.3% vs. 42.7%, $p = 0.004$), while cooperative membership was higher among WRS participants (51.6% vs. 48.4%, $p = 0.001$).

Table 2. Socio-demographic characteristics of respondents by marketing system ($n = 354$)

Variable	WRS % ($n = 177$)	CF % ($n = 177$)	χ^2 pvalue
Gender (male)	51.8	48.2	0.284
Age (35–51 years majority)	49.5	50.5	0.383
Education (primary majority)	45.7	54.3	0.259
Household size (6–8 members majority)	50.5	49.5	0.359
Farming experience (4–7 years majority)	55.8	44.2	0.391
Farm size (6–8 acres majority)	52.4	47.6	0.738
Distance to market (> 10 km)	42.7*	57.3	0.004
Cooperative membership	51.6*	48.4	0.001
Credit access	49.6	50.5	0.518

Source: own elaboration.

Table 3. Frequency distribution (%) of institutional indicators ($N = 354$)

Variable	Very low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)	Median
Trust in buyers	14.69	16.10	20.06	27.12	22.03	3
Information satisfaction	18.93	17.23	11.58	20.90	31.36	4
Training satisfaction	12.99	20.06	22.88	24.01	20.06	3
Timeliness of payment	15.54	18.64	19.77	26.27	19.77	3

Source: field survey, 2024.

These results highlight CF's orientation toward farmers farther from markets and WRS's stronger link to cooperative structures.

Descriptive statistics

Farmers' responses across the four institutional indicators clustered around moderate satisfaction. Median values were 3 for trust in buyers, training satisfaction, and timeliness of payment, and 4 for information satisfaction. Table 3 shows the frequency distribution across the five-point Likert scale, which complements the medians by illustrating whether perceptions were concentrated at the extremes or spread more evenly.

Median comparison

Median scores differed between the two arrangements. Contract farming (CF) participants reported a median of 4 for trust in buyers and timeliness of payment, while

warehouse receipt system (WRS) participants reported a median of 3 for both. For information satisfaction, WRS participants reported a median of 4 compared to 3 for CF. Training satisfaction was equal across systems, with a median of 3 (Table 4).

Table 4. Median comparison by marketing arrangement

Variable	Contract farming	Warehouse receipt system	Total
Trust in buyers	4	3	3
Information satisfaction	3	4	3
Timeliness of payment	4	3	3
Training satisfaction	3	3	3

Source: field survey, 2024.

Table 5. Mann-Whitney U test results (CF vs WRS)

Variable	<i>z</i> -value	<i>p</i> -value	Significance	Direction of difference
Trust in buyers	−4.405	0.0000	***	CF > WRS
Information satisfaction	1.590	0.1119	n.s.	No significant difference
Timeliness of payment	−3.232	0.0012	***	CF > WRS
Training satisfaction	0.022	0.9826	n.s.	No significant difference

Source: field survey, 2024.

Mann-Whitney U test

The Mann-Whitney U test confirmed statistically significant differences in trust in buyers ($z = -4.405$, $p < 0.01$) and timeliness of payment ($z = -3.232$, $p < 0.01$), both favouring CF. No significant differences were observed for information satisfaction ($p = 0.112$) or training satisfaction ($p = 0.983$) (Table 5).

Ordered logistic regression

Marketing type (CF = 1) significantly increased trust in buyers ($\beta = 0.793$, $p < 0.01$) but reduced information satisfaction ($\beta = -0.471$, $p < 0.10$). Effects on timeliness of payment were positive but not significant, and

training satisfaction was unaffected. Other significant predictors included household size and farming experience (positive for training), access to credit (positive for information), and quantity sold (positive for trust and timeliness). Transport cost showed a weak positive effect on timeliness ($p < 0.10$), while negotiation confidence was negatively associated with trust and timeliness ($p < 0.01$).

Marginal effects analysis

Marginal effects are reported in Table 7. Participation in CF increased the probability of higher satisfaction with trust in buyers ($dy/dx = 0.142$, $p < 0.01$) and timeliness

Table 6. Ordered logistic regression results for institutional indicators of marketing efficiency

Variable	Trust in buyers	Information satisfaction	Timeliness of payment	Training satisfaction
Marketing type (CF=1)	0.793*** (0.249)	−0.471* (0.243)	0.354 (0.246)	0.069 (0.237)
Gender	−0.171 (0.218)	−0.079 (0.215)	−0.157 (0.217)	−0.177 (0.219)
Education	−0.054 (0.079)	0.027 (0.079)	−0.064 (0.080)	−0.041 (0.078)
Household size	−0.069 (0.088)	0.135 (0.088)	−0.030 (0.087)	0.157* (0.087)
Farm experience	−0.014 (0.107)	−0.138 (0.106)	−0.020 (0.106)	0.236** (0.108)
Farm size	−0.033 (0.088)	−0.142 (0.088)	−0.009 (0.087)	−0.008 (0.087)
Distance to market	0.053 (0.115)	−0.044 (0.115)	0.018 (0.114)	0.003 (0.117)
Cooperative membership	0.308 (0.447)	−0.137 (0.431)	0.255 (0.441)	−0.139 (0.427)
Access to credit	−0.450 (0.441)	0.833* (0.434)	−0.010 (0.436)	−0.502 (0.426)
Quantity sold	0.641*** (0.166)	0.148 (0.154)	0.435*** (0.163)	0.171 (0.162)
Transport cost	0.074 (0.111)	0.041 (0.109)	0.196* (0.111)	−0.011 (0.113)
Negotiation confidence	−0.723*** (0.186)	−0.044 (0.174)	−0.495*** (0.184)	−0.206 (0.177)
Transaction transparency	0.114 (0.072)	−0.011 (0.073)	0.067 (0.072)	−0.096 (0.071)

*** $p < 0.01$, ** $p < 0.00$, * $p < 0.10$.

Source: field survey, 2024.

Table 7. Marginal effects from ordered logistic regression

Dependent variable	dy/dx (CF = 1)	Std. error	z-value	p-value
Trust in buyers (trust_sat)	0.1419	0.0324	4.37	0.000
Information satisfaction (info_sat)	−0.0648	0.0405	−1.60	0.109
Timeliness of payment (paytime_sat)	0.0964	0.0303	3.18	0.001
Training satisfaction (train_sat)	−0.0007	0.0302	−0.02	0.983

Source: field survey, 2024.

of payment ($dy/dx = 0.096$, $p < 0.01$). Effects on information satisfaction ($dy/dx = -0.065$, $p = 0.109$) and training satisfaction ($dy/dx = -0.001$, $p = 0.983$) were not statistically significant.

Model diagnostics

Results across all four institutional indicators showed no statistically significant evidence against the proportional odds assumption (all $p > 0.05$). Specifically, the likelihood ratio tests yielded $p = 0.688$ for trust in buyers, $p = 0.535$ for information satisfaction, $p = 0.998$ for training satisfaction, and $p = 0.768$ for timeliness of payment. These findings indicate that the proportional odds assumption was satisfied, and the ordered logit models are appropriate for analysing institutional performance.

DISCUSSION

Farmers reported moderate satisfaction with both contract farming (CF) and the warehouse receipt system (WRS), reflecting broader inefficiencies in commodity markets (FAO, 2024). CF participants expressed greater trust in buyers and more satisfaction with timely payments, consistent with evidence that contracts reduce uncertainty (Pato et al., 2024; Koshuma et al., 2023). In contrast, both systems offered similar levels of information and training, underscoring persistent weaknesses in extension services (Mosha and Daud, 2024; Waje et al., 2025). Regression results showed that household size and farming experience improved training satisfaction, credit access enhanced information satisfaction, and larger sales volumes increased trust and timeliness. Notably, negotiation confidence was negatively associated with trust and timeliness, a counterintuitive outcome consistent with Transaction Cost Economics: farmers with strong bargaining confidence may undervalue institutional safeguards, weakening trust and heightening

sensitivity to delays. In WRS, collective mechanisms substitute for individual bargaining, making negotiation confidence less relevant and sometimes reducing satisfaction (Erick and Manda, 2022).

A limitation of the study is potential selection bias, since farmers who chose CF or WRS may differ in unobservable traits such as risk tolerance, social capital, or proximity to buyers. While observable controls were included, unobserved heterogeneity may still affect interpretation. Overall, the findings support Transaction Cost Economics (Williamson, 1981) and Random Utility Theory (McFadden, 1974): CF reduces uncertainty through relational contracts, while WRS stabilizes prices via collective procedures but does not necessarily build trust or improve perceptions of training and information services. The negative link between negotiation confidence and satisfaction highlights how institutional design reshapes farmers' perceptions of performance.

CONCLUSIONS

This study examined farmers' perceptions of institutional performance in cashew marketing under CF and WRS. Overall satisfaction was moderate, with CF showing stronger results in trust and payment timeliness, while both systems performed similarly in information and training, highlighting weaknesses in extension services. The inclusion of negotiation confidence revealed a negative link with trust and timeliness, suggesting that reliance on individual bargaining may reduce satisfaction with institutional safeguards, whereas collective systems like WRS lessen the relevance of negotiation skills.

Policy measures should reinforce payment and transparency in CF and strengthen advisory services in WRS. Despite potential selection bias, the findings show that institutional performance is shaped by both service delivery and empowerment constructs. CF and

WRS should be viewed as complementary systems that together reduce uncertainty and improve market organization in Tanzania's cashew sector.

LIMITATIONS AND FUTURE RESEARCH

This study relied on cross sectional data, limiting analysis of changes over time. Its focus on Mkuranga District restricts generalizability, and reliance on self-reported perceptions may introduce bias. Selection bias is also possible, as farmers choosing CF or WRS may differ in unobservable traits, and the analysis covered only four indicators, excluding dimensions such as price stability, grading transparency, and dispute resolution.

Future research should employ longitudinal designs, integrate qualitative methods, and extend analysis to other crops and regions. Advanced approaches such as propensity score matching, instrumental variables, or panel data could help separate institutional effects from self selection dynamics.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the support of the Africa Economic Research Consortium (AERC) for funding data collection and analysis. Appreciation is also extended to field staff, enumerators, and local extension officers in Mkuranga District for their assistance during the survey.

SOURCE OF FINANCING

This research was financially supported by the Africa Economic Research Consortium (AERC). The views expressed are solely those of the authors and do not represent the official position of AERC.

REFERENCES

- Akyoo, A., Mpenda, Z. (2014). NAF International Working Paper Series 14/3. Policy imperatives for control of market exchange failure in the cashew nut industry. Retrieved from: https://www.anapri.net/wp-content/uploads/2021/11/AKYOO_CashewNut_2014.pdf
- Arouna, A., Michler, J.D., Lokossou, J.C. (2021). Contract farming and rural transformation: Evidence from a field experiment in Benin. *J. Dev. Econ.*, 151. <https://doi.org/10.1016/j.jdeveco.2021.102626>
- Belay, D. (2020). The effect of trust on farmers' milk market participation in dairy cooperatives in West Shoa, Ethiopia. *Agrekon*, 59(3), 287–302. <https://doi.org/10.1080/03031853.2020.1734036>
- Byedileclara, M.C., Mhando, D.G. (2023). Open Access Access to Finance from Financial Institutions among the Smallholder's Cashew Nut Producers in Tandahimba District – Tanzania. *Am. J. Hum. Soc. Sci. Res.*, 7(10), 50–59. Retrieved from: https://www.academia.edu/108808508/Access_to_Finance_from_Financial_Institutions_among_the_Smallholders_Cashew_Nut_Producers_in_Tandahimba_District_Tanzania
- Eaton, C., Shepherd, A. (2001). Contract farming. Partnerships for growth. *FAO Agric. Serv. Bull.*, 145. Retrieved from: <https://www.fao.org/4/y0937e/y0937e00.pdf>
- Erick, M., Manda, J. (2022). Do youth farmers benefit from participating in contract farming? Evidence from French beans youth farmers in Arusha, Tanzania. *Agrekon*, 61(4), 379–398. <https://doi.org/10.1080/03031853.2022.2099917>
- FAO (2024). The State of Agricultural Commodity Markets 2024FAO. <https://doi.org/10.4060/cd2144en>
- Greene, W.H. (2012). *Econometric Analysis* (7th edition). Pearson Education, Inc..
- Koshuma, J.A., Machimu, G.M., Panga, F. (2023). Socio-economic determinants of smallholder sugarcane farmers' participation in contract farming through Agricultural Marketing Co-operative Societies in Kilombero Valley, Tanzania. *J. Coop. Bus. Stud.*, 7(1), 4–19. Retrieved from: <https://repository.mocu.ac.tz/bitstream/handle/123456789/454/Socio-economic%20determinants%20of%20smallholder%20sugarcane%20farmers%E2%80%99%20participation%20in%20contract%20farming%20through%20agricultural%20marketing%20co-operative%20societies%20in%20Kilombero%20valley%2C%20Tanzania.pdf?sequence=1&isAllowed=y>
- Martin, R., Mwaseba, D.L. (2015). Farmers' perceptions of contract farming in Tanzania: A case study of Mtibwa Out-grower Sugar Cane Scheme in Morogoro Region. *J. Cont. Edu. Exten.*, 6(1), 789–805. Retrieved from: <https://www.suaire.sua.ac.tz/server/api/core/bitstreams/02d193cc-f5cc-428f-8adb-0e349b18b5bd/content>
- McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In: P. Zarembka (Ed.), *Analysis of qualitative choice behavior* (pp. 105–142). Academic Press. Retrieved from: <https://eml.berkeley.edu/reprints/mcfadden/zarembka.pdf>
- Mosha, S.S., Daud, J.M. (2024). Performance of Agriculture Extension Services under Local Government Authorities in Tanzania: A Review. *Sumer. J. Agric. Vet.*, (73), 30–36. <https://doi.org/10.47752/sjav.73.30.36>

- Mpita, H.A. (2013). The impact of warehouse receipt system on income poverty reduction of cashewnut farmers in Newala district. Retrieved from: <https://scholar.mzumbe.ac.tz/server/api/core/bitstreams/d2035f27-b30b-4559-b2a1-cc3ea2ecc14b/content>
- Pato, I.D., Osewe, M., Han, J. (2024). Effects of perceived effectiveness in contract farming on adoption of best crop management practices among sugarcane farmers in Tanzania. *Front. Sustain. Food Syst.*, 8. <https://doi.org/10.3389/fsufs.2024.1442301>
- Safo, N.K., Al-Hassan, R.M., Somuah, H.A., Boakye, A.A., Egyir, I.S. (2023). Warehouse receipt system: A shift to improve maize marketing in Ghana. *Ghana J. Agric. Sci.*, 58(1), 60–76. <https://doi.org/10.4314/gjas.v58i1.6>
- Souissi, A., Dhehibi, B., Oumer, A.M., Mejri, R., Frija, A., Zlaoui, M., Dhraief, M.Z. (2024). Linking farmers' perceptions and management decision toward sustainable agro-ecological transition: evidence from rural Tunisia. *Front. Nutr.*, 11. <https://doi.org/10.3389/fnut.2024.1389007>
- Waje, S.S., Shano, B.K., Walelign, S.Z. (2025). Unpacking cassava market dynamics: exploring the determinants affecting market participation and channel choices in South Ethiopia. *Discov. Sustain.*, 6(1). <https://doi.org/10.1007/s43621-025-01108-w>
- Williamson, O.E. (1981). The Economics of Organization: The Transaction Cost Approach'. *Am. J. Soc.*, 87(3), 548–577. <https://doi.org/10.1086/227496>