Determinants of maize smallholder farmers' choice to sell their maize to the National Food Reserve Agency (NFRA) in Kalambo District, Tanzania

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ABSTRACT

Maize farming represents one of the most valuable staple foods worldwide. However, smallholder maize farmers are constrained by many factors to effectively participate in the market activities. The study examines the factors influencing smallholder maize farmers' decision to sell their produce to NFRA in Kalambo District, Tanzania. The study employed a cross-sectional study design and used a questionnaire for gathering data. Quantitative data were collected from 395 respondents, while qualitative data were collected from 5 Focus Group Discussions (FGDs) and 10 Key Informant Interviews (KIIs). Quantitative data were entered into IBM-SPSS version 25 and thereafter analyzed descriptively and through a binary logistic regression model. Qualitative data were analyzed using thematic content analysis with a constant comparison. The research found that age, sex, land size, maize farming experience, and maize market information were significant determinants at the $p<0.05$ significance level. The study revealed that smallholder decisions to sell their maize to NFRA are significantly influenced by farmers' socio-economic characteristics and market factors. This supports the claim by transaction cost theory that socio-economic characteristics and market factors influence smallholder farmers' participation in the market. This implies that market access is not a neutral, automatic process but rather a complex outcome driven by a farmer's individual, household, and institutional constraints. It means that simply producing a crop does not guarantee participation, and that the ability to sell surplus is heavily determined by factors like education, land ownership, infrastructure, and access to information. The study recommends policy interventions addressing access to land for maize farming and improved maize market information. It is also recommended that gender-sensitive approaches should be used in order to increase female participation in maize market activities. The government and other interested parties should avail smallholder maize farmers with market information.

Keywords: Market Participation, Marketing Channel, National Food Reserve Agency, **S**mallholder Farmers

I. INTRODUCTION

Transformation of subsistence agriculture to commercial status is an indispensable pathway towards economic growth and development for many developing countries (Otekunrin *et al*., 2019). Market participation of smallholders contributes toward agricultural growth and development, thereby bringing about the much-anticipated structural transformation in the agricultural sector and a shift towards the mitigation of poverty and staggering food insecurity of agricultural households in Sub-Saharan Africa (Ketema & Lika, 2023).

Around 500 million smallholder farms worldwide produce 80% of the food consumed in Asia and Sub-Saharan Africa for self-consumption (Abdullah *et al*., 2019). The marketing of maize in smallholder farming is crucial for reducing rural poverty levels in low-income countries (Awotide et al., 2016). Farmers' market participation is primarily influenced by the volume of their produce, indicating the availability of surplus for sale (Gani & Hossain, 2015). Market participation is influenced by both the socio-economic factors of market participants and the market features they possess (Maponya *et al*., 2015). The market participation of farmers is positively influenced by production technology, contract farming, and collective actions, including agricultural market cooperative societies (Chalwe, 2011). Maize is one of the staple foods depended on by many households (Epule *et a*l., 2021). Maize is also crucial for families, providing half of their cash income, but smallholder families struggle with 1.4 hectares of traditional, low-productive land farming (Tugendhat, 2017).

The crop is produced by over 3 million farmers owning and depending on less than 0.5 hectares of land (Daly et al., 2016). Most farmers sell their surplus maize produce to millers for financial support, in addition to their consumption role (Chune, 2022). In Tanzania maize is primarily produced by small-scale farmers, with 20%-35% entering commercial channels (Wilson & Lewis, 2017). Around 85% of the country's maize production is primarily produced by small-scale farmers (Doyle, 2015). Smallholder farmers benefit from cooperative groups, accessing markets, financial support, and timely medical insurance, despite lacking skills before joining through World Food Programme support (Daly *et al*., 2016).

Despite the potential of maize production in reducing food insecurity, its production is stagnant, leading to a lack of surplus products and a failure to participate in the market (Gani & Hossain, 2015). Smallholder farmers struggle to increase farm incomes due to low value and perishable surpluses, hindered by high costs of goods and services exchange (Abraham & Pingali, 2020). Empirical evidence indicates that maize production and marketing face challenges due to low market prices, poor road infrastructure, inadequate transportation, and weather changes (Anang & Ayambila, 2020). Poor infrastructure leads to high transaction costs, significantly affecting production and market participation decisions (Mmbando *et al*., 2015).

The World Bank reports that in 2011, only 25% of total maize output was marketed, yet marketed maize sales accounted for 50% of rural cash income (Doyle, 2015). Smallholder farmers in Tanzania are primarily concentrated in village markets, with few gaining access to district and regional markets (Maziku, 2015). The study indicates that farmers' market participation is negatively impacted by maize consumption and market distance, suggesting that it will increase with higher maize prices and farm resource endowments (Maziku, 2015). In Rukwa, maize is the main cash crop and main dish, but farmers rely on NFRA for sales, despite NFRA purchasing 4,600 tons valued at over 2.3bn/- (Mmbando *et al*., 2015).

1.1 Statement of the Problem

The maize market is an indispensable path to boost economic growth and development of most developing countries, like Tanzania, but maize marketing has not been given due attention, which has affected potential production volume and marketability (Wilson & Lewis, 2017; Abraham & Pingali, 2020; Kangile *et al.*, 2020). Despite the potential of maize marketing, most of the studies conducted on the determinants of smallholders' market participation have methodological gaps of only capturing the revealed marketing decisions of households while they ignored the role of NFRA in ensuring maize marketing in Tanzania (Maziku, 2015; Mazengia, 2016; Rabbi et *al*., 2017; Regasa *et al*., 2020). In addition, previous studies' empirical evidence varies within and across countries due to the heterogeneity of factors faced by smallholder farmers; maize market participation decisions and factors hindering the volume of supply in the NFRA were not studied. There have been very limited studies regarding determinants of maize smallholder farmers' market participation and implications of their decision to NFRA volume of maize bought. In this regard, the current study attempted to contribute to redressing this gap of knowledge for market participation and its determinants in the study area. Therefore, the objective of the study was to assess the determinants of smallholder maize farmers' market decision to sell their maize to NFRA to figure out location-based analysis in Kalambo District, Rukwa Region, Tanzania.

1.2 Research Objectives

i. Identify household Socio-economic profile
ii. Assess determinants of smallholder maize farmers decision to sell their maize to NFRA in Kalambo District

II LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Transaction Cost Theory

The study was guided by transaction cost theory hinged on the fundamental study of Coase, who gave a distinction between the firm and a market (Coase, 1937 and Coase, 1960 as cited by Otekunrin *et al*., 2019). Transaction cost theory posits that the costs of searching, negotiating, and enforcing contracts determine market participation, often forcing actors to choose between using the market and internalizing activities within a firm to minimize expenses. High, fixed, and proportional transaction costs (e.g., transportation, fees, and information gaps) directly hinder participation in distant or competitive markets (Adenegan et al., 2013). The theory opined that smallholder farmers would not be encouraged to participate actively in the market if the transaction costs are not kept at the barest minimum level. According to the 'New Institutional Economics' approach, which revealed that institutions possess transaction cost-minimizing arrangements that may change and evolve with changes in the nature and sources of transaction costs (Adenegan et al., 2013). Transaction costs may be referred to as 'hidden costs,' which may be observable and/or non-observable costs linked with the exchange of goods and services. In the context of this study, transaction cost is assumed to affect smallholder farmers' decision to sell their maize to NFRA. When the cost of selling maize to NFRA increases, it reduces the chances of smallholder maize farmers selling their maize harvest to NFRA.

2.2 Empirical Review

The review reveals that demographic and socio-economic factors, institutional factors, market factors, technological factors, transaction cost, and risk were determinants of smallholder farmers' market participation decision

(Jebesa, 2019). On the other hand, the determinants of smallholder farmers' market outlet decisions are determined by household characteristics, transaction costs, product characteristics, household assets, and trust in buyers (Maziku, 2015).

Empirical studies by Moti and Gebremedhin (2012) and Osmani and Hossain (2015) indicate that market participation is determined by external and internal factors. The internal factors are barriers that relate to the failure by farmers to meet market expectations due to lack of physical assets, financial assets, and human assets. Factors like smallholder resource endowments, including land and other natural capital, labor, physical capital, human capital, and so on, are household specific and considered to be internal determinants (Moti & Gebremedhin, 2012). The external ones are factors beyond the smallholders' control, like technological change and development of new infrastructure. Previous studies also indicate that smallholder farmers also frequently lack commercial information, physical infrastructure is poor, causing high transaction costs, and remoteness increases costs and reduces competition (Ndlovu *et al*., 2021). The determinants of smallholder farmers' market participation decision include demographic and socio-economic factors, institutional factors, market factors, technological factors, transaction cost, and risk.

Apart from that, previous studies have indicated that demographic and socio-economic factors are factors that influence the social and economic well-being of an individual, which in turn determine smallholder market participation (Geoffrey, 2015). Demographic and socioeconomic factors include age, gender, education, experience, household size, land size, livestock ownership, and off-farm income. Tessema (2017) found that the market participation decision and intensity of participation at the farm level are influenced by the age of the household head, the number of livestock owned, and the area under cultivation.

Other factors influencing market participation include credit access, infrastructure, group membership, and extension services, as well as lack of storage facilities, poor communication, lack of financial services, lack of inputs and other agricultural technologies, and lack of knowledge and skills on new technology and the market (Esmail *et al*., 2016). Through this review, it is evident that participation of smallholder farmers in markets in most sub-Saharan African countries remains low due to a range of constraints as presented in the empirical review.

III METHODOLOGY

The study was conducted in Kalambo District due to the increasing number of smallholder farmers engaging in maize production (Wilson & Lewis, 2017). The district was also selected because it is among the four districts forming the Rukwa region that grow large quantities of maize and has a maize collection point for NFRA (Sitima & Kaduma, 2023). The study encompasses five wards, including Katazi, Mwimbi, Lyowa, Matai, and Kisumba, as well as ten villages, including Kafukula, Ninga, Kateka, Matai A, Singiwe, Chalaminwe, Majengo, Mwimbi, Kisumba, and Kasote.

A cross-sectional research design was adopted to collect data at once in a specified time. According to Labaree (2009), the design also allows collection for multiple variables from a representative sample with varied characteristics. A mixed exploratory sequential approach was used whereby qualitative data were first collected and analyzed, followed by collection and analysis of quantitative data in order to corroborate findings. According to Creswell (2014), the mixed methods approach is based on the combination of qualitative and quantitative approaches towards providing a complete understanding of a research problem.

Qualitative data were collected by the use of a checklist of questions to guide in-depth interviews in 5 FGDs with participants ranging from six to eight persons who were knowledgeable in maize production and aware of the marketing channel of maize and 10 KIIs purposively selected based on their knowledge of maize production and market participation. The KIIs include Ward Executive Officers (WEOs), six Village Executive Officers (VEOs), and the Kalambo District Council Agricultural, Irrigation, and Cooperative Officer (DAICO). Qualitative data was used to inform a quantitative survey to strengthen a study rationale by ensuring that the survey is grounded in the participant's actual experiences, context, and language.

The household survey was used to collect quantitative data on socio-economic characteristics of respondents, maize production and marketing, and factors influencing maize smallholder farmers to sell their maize to NFRA. A multistage sampling procedure was used to choose the study area. The Rukwa region was purposively selected from a list of maize-producing regions in Tanzania in the first stage. In the second stage, Kalambo District Council was chosen randomly from a list of maize-producing districts, while in the third stage, Katazi, Mwimbi, Lyowa, Matai, and Kisumba wards were purposively selected due to their ranks in terms of maize production in the district (Sitima & Kaduma, 2023). In the last stage, 395 maize smallholder farmers were selected from the 30,163 population of smallholder maize farmers in the villages of Kafukula, Ninga, Kateka, Matai, Singiwe, Chalaminwe, Majengo, Mwimbi, Kisumba, and Kasote. Proportionate sampling techniques were used to obtain a sample for the ten villages using a simplified formula by Yamane (1973) as cited by Israel (2013) as follows:

$$n = \mathrm{N}/(1 + (Ne^2)$$

Where, $\boldsymbol{n}$ = the sample size; $\boldsymbol{N}$ = the target population size and $\boldsymbol{e}$ = the level of precision.

Therefore, $n = 394.85 \approx \mathbf{395}\ maize\ smallholder\ farmers$

The sample size distribution of each ward was determined from the entire population per ward (7,228), population of subgroup Katazi-1717, Mwimbi-1463, Lyowa-1686, Matai-1492, and Kisumba-870 through 75% and 25% for farmers selling, and not selling maize produce to NFRA as a marketing channel choice respectively. The stratified random sampling formula (Latpate *et al*., 2021) was:

$$Stratified\ Random\ Sampling = \frac{Total\ Sample\ Size}{Entire\ Population}\ X\ Population\ of\ Subgroups$$

Finally, the sample size distribution as per ward was Katazi (71, 23), Mwimbi (60, 20), Lyowa (69, 23), Matai (62, 20), and Kisumba (35, 12) for farmers selling, and not selling maize produce to NFRA as a marketing channel choice respectively.

The study involved selecting respondents and obtaining their consent. Interviewers used pre-tested questionnaires in Kobo Collect software to gather data from both NFRA's maize sellers and non-sellers. Socio-economic determinants of smallholder maize farmers selling their maize to NRFA were analyzed using a binary logistic regression model because the dependent variable was dichotomous, that is, represented by 0 for carrot market non-participation and 1 for carrot market participation. The variables entered in the binary logistic regression model were based on a theoretical review and an empirical literature review. The binary logistics model was used to analyze the factor influencing smallholder farmers' specific choice of types of market accepted for use. Binary logistic regression is a statistical technique for predicting the association between independent and dependent variables, where the dependent variable is binary. The binary logistic regression method assists in estimating the probability of events as a function of a set of independent variables that are hypothesized to influence an outcome. When just one set of predictor variables is known, the logistic regression model is used to classify individuals into one or two groups and identify which features or qualities best predict choice making (Agresti & Kateri, 2017). However, with respect to the distribution of the predictor variables X, there are no assumptions made, and X variables may be continuous (Fernandez et al., 2019). In empirical research it is ideal to identify the characteristics that influence smallholder farmers' decision-making by employing the logistic regression model (Agresti & Kateri, 2017). In keeping with Fullerton and Xu (2016), let Ri represent a dichotomous variable that would be equal to 1 if smallholder farmers decide to adopt the marketing strategies and zero (0) otherwise. The binary logistic model selected was specified as follows:

$Logit\ (p_i) = log\ (p_i/1\text{-}p_i) = b_0 + b_1x_1 + b_2x_2 + \ldots + b_{12}x_{12} + \mu_i$(Agresti & Finlay, 2009)

Where:

Logit (pi) = ln (odds (event), that is the natural log of the odds of an event occurring

pi= prob (event), that is the probability that respondents will sell their maize to NRFAt.

$1\text{-}p_i$= prob (nonevent), that is the probability that the respondent will not sell their maize to NRFA.

b_0 = constant of the equation,

b_1 *to* b_{10} = coefficients of the independent (predictor, response) variables,

k = number of independent variables,

x_1 *to* x_{10}= independent variables entered in the model.

Table 1

Measurement of Variable entered in Binary Logistic Regression Model

Variable Definition	Unit of Measurement	Assumed Influence
X_1 = Age of the maize farmers	Years	+
X_2 = Sex of maize farmer	1 if male headed household, 0 if otherwise)	+
X_3 =Education of maize farmer	Years of schooling (measured in years)	+
X_4 = Land Size allocated for maize	Land size (measured in acres)	+
X_5 = Household size	Number of active people in the household	+
X_6= Market information access	1=access and 0 =no access	+
X_7 =maize farming experience	Number of years in maize farming	+
X_8 = Access to extension services	Number of visit by extension officer),	+
X_9 = Market distance	Distance from maize farm to the market	+
X_{10} =Maize price	Maize price per kg	+

IV FINDINGS & DISCUSSION

4.1 Socio-economic Characteristics

The findings on household socio-economic characteristics in Table 2 depict that the mean age was 44 years. This suggests that most of the maize farmers were young. The results suggest that maize marketing is an intensive activity that requires people with active age. As observed by Abate *et al*. (2019), the level of market access tends to increase with the optimum age group and starts to drop with an increase in age. The mean years of schooling was 7.0 years. The results suggest that most maize farmers were likely to access maize markets, as they were literate enough to attend training on maize market access introduced by NRFA. These results correspond to the previous studies as reported by Agholor *et al*. (2023), who found that education had a great contribution to the access of a new market by farmers.

Table 2

Household's Socio-eonomic Characteristics (n=395

Variable	Standard Deviation of the Means and Means
Age	44 (15.4)
Education	7.0 (2.4)
Household Size	5.2 (2.3)
Land Size	3.8 (3.7)
Frequency of extension officer visit	2.7(1.5)
Experience in maize farming	9.6 (7.8)
Total maize produced in (bags)	15 (4.9)

*The number in brackets are standard deviations of the means and the number out of brackets are the means

The mean household size was 4 household members. This implies that maize-farming households had enough family members to supply labor to enable them to transport maize to the market. Similar results were reported by Anang and Ayambila (2020) and Sitima and Kaduma (2023), who reported that a higher number of active family members was one of the predictors for maize market access by smallholder maize farmers. The mean land size was 3.8 ha. This suggests that smallholder farmers had enough land, and hence they are likely to adopt new innovations introduced by extension officers. The mean frequency of extension visits was 1.6 visits. This finding suggests that smallholder maize farmers had at least one contact with extension officers. Studies by Ketema and Like (2023); Muroyiwa and Rameno (2024); and Munyati *et al*. (2025) reported that households with more frequent contact with extension officers had more chances of adopting new innovations introduced by extension officers.

The mean number of years in maize farming was 11.7. Experience in maize farming is very important to smallholder farmers, as this implies that they have a wealth of experience in testing different marketing options brought by extension officers. Previous studies by Mukarumbwa *et al*. (2018), Nxumalo *et al*. (2019), and Kangile et al. (2020) reported that most of the farmers who accessed markets were those who had long experience in farming the respective crop.

Table 3

Demographic Characteristics of Respondents (n=395)

Characteristics		Frequency	Percent
Sex	Male	150	75
	Female	50	25
Access to market information	Access	126	63
	No access	74	25
Marital status	Married	144	72
	Single, Window, Separate	56	28

The results indicates that 85% of head of the household were male. This implies that most farmers who were selling maize to NRFA were male as in most cases marketing information is shared with male by extension officer. Most of respondents were members in tea association. The reasons for this is that most innovation brought by extension officers are channeled to farmers through their association. Similar results were reported in previous study by Arumugam *et a*l. (2022); Dlamini-Mazibuko *et al*., (2019); Tafesse *et al*. (2023) and Munyati *et al*. (2025).

The results further indicate that, 73% of smallholder maize farmers had access to credit. This implies that majority of maize farming community had access to credit which is crucial in financing input like new maize varieties and hence influence them to sell more maize to NRFA. This findings is consistence with previous studies reported by Mukarumbwa *et al*., (2018); Kangile *et al*. (2020); Dlamini-Mazibuko., (2019); Munyati *et al*. (2025)). On the other

hands, most of the maize farmer (81%) were aware of existence of NRFA while only few (19%) were not aware of existence NRFA.

4.2 Determinants of Smallholder Farmers' Choice to Sell Maize to NFRA

The study employed binary logistic regression model to assess the determinants of smallholder maize farmers' decision to sell their maize to NFRA, as indicated in Table 4. The binary logistic regression model indicates that, five variables out of the ten variables entered in the model, were significant predictors maize farmer's decision to sell their maize to NFRA ($p < 0.05$). The age was the highest predictor among these ten variables at ($p = 0.000$).

In addition to that, the results in Table 4 show that the Hosmer and Lemeshow Test had a Chi-Square statistic of 7.017 ($p = 0.451$). This suggests that the overall model effectively predicted the outcomes, as the Hosmer and Lemeshow test's Chi-square value was not statistically significant, as proposed by Field (2013). The Negelkerke pseudo R2 statistic, which represents the adjusted Cox and Snell Pseudo R2, was computed at 0.556. This implies that approximately 55.6% of the variability in smallholder maize farmers' decision to sell their maize to NFRA could be accounted for by the ten independent variables entered into the binary logistic model.

Moreover, the overall model exhibited good predictive power, as evidenced by the significant Omnibus Chi-Square statistic ($p = 0.000$). The Wald Statistic value for household age was among the variables entered into the model, registering a value of 17.367 and a significant statistical association at $p \leq 0.05$. Maize farming experience followed as the second most influential variable, with a Wald statistic of 9.782 and a significant statistical relationship at $p \leq 0.002$. These findings suggest that maize farming experience increases the likelihood of smallholder maize farmers' decision to sell their maize to NFRA.

Table 4

Determinants of Smallholder Farmers' Choice to Sell Maize to NFRA (n=395)

Variables	Coefficient (B)	S.E.	Wald	Sig.	Exp(B)
Constant	1.586				
Age of the respondents	0.078*	0.014	17.367	0.000	1.051
Sex of the respondents	0.382*	0.230	6.556	0.003	2.412
Respondents year of schooling	0.005	0.070	0.006	0.931	0.896
Land size	0.068**	0.432	0.658	0.001	1.351
Maize farming experience	1.255**	0.380	9.782	0.002	1.393
Market Distance	0.236	0.422	0.303	0.573	0.789
Household size	0.291	0.182	2.764	0.103	0.763
Frequency of extension contact	0.023	0.017	4.732	0.029	0.782
Access to credit	0.004	0.003	5.959	0.461	0.987
Market information	0.303**	0.103	9.694	0.004	1.326

Omnibus Tests of Model Coefficients (Chi-square = 155.312; sig. = 0.000); Cox & Snell R Square = 0.427; Hosmer and Lemeshow Test (Chi-square = 7.017; sig. = 0.451); Nagelkerke R Square = 0.5556, and * indicates levels of significance at 1% and 5%, respectively.

The results indicate that the age of the household head emerged as the most influential predictor affecting the likelihood of smallholder maize farmers selling their maize to NFRA. This finding held statistical significance at $p = 0.000$, with an Exp (B) value of 1.051. The Wald statistic of 17.367 implies the significant contribution of the age of smallholder maize farmers in predicting their decision to sell their maize to NFRA. The odds ratio indicates that, when the age of the household head of smallholder maize farmers increases by one year, the odds ratio becomes 1.051. This suggests that older smallholder maize farmers are 1.051 times more likely to sell their maize to NFRA. This result implies that adult smallholder maize farmers have a higher propensity to participate in the market, likely due to their accumulated experience in maize farming. Experienced smallholder maize farmers are more inclined to participate in the market, as they possess a deeper understanding of maize market channels. These results are similar to the previous findings as reported by Kangile *et al.* (2020); Mauki *et al*. (2023); Munyati *et al*. (2025); and Tafesse *et a*l. (2023), who noted a strong relationship between the age of farmers and their participation in the market of their produce. However, the results are inconsistent with the previous results as reported by Mukarumbwa et *al.* (2018) and Muroyiwa and Rameno (2024), who noted a negative statistically significant relationship between age and market participation.

The results presented in Table 4 showed the statistical significance of the sex of household heads ($p = 0.011$), indicating that sex serves as a significant predictor of household market participation. Specifically, the findings reveal that household heads of sex were 2.412 times more likely to participate in the maize market. This suggests that male household heads are more likely to sell their maize to NFRA as compared to female household heads. Similar results have been reported in other studies, such as those reported by Arumugan *et al.* (2022); Agholor *et al.* (2023); Ketema and Lika (2023); Tafesse et al. (2023); and Muroyiwa and Rameno *et a*l. (2024).

In addition to that, the results indicate that with every one-hectare increase in land size, the odds ratio also increases by 1.351. This implies that households with larger land holdings are 1.351 times more likely to participate in the maize market. This implies also that the level of market participation increases as the land allocated for maize production increases.

These results were supported by the results from the Focus Group Discussions (FGDs), which indicate that:

> *"…Most of the farmers who get access to maize buyers are those with many hectares as they produce many bags of maize which attract buyers within the District, Rukwa region and other regions like Katavi, Mbeya and even Dar es Salaam, ……"* (FGD in Kafukula Village, 24th November 2024).

The Key Informant Interviews (KIIs) conducted in Majengo and Kasote villages echoed the importance of land size as a contributing factor for bumper maize harvests, which attract buyers from various parts of Tanzania, including Dar es Salaam. This result is consistent with findings in the study as reported by Abate et al. (2019) and Tafesse *et al*. (2023), which highlighted the influences of both the decision to participate in the markets and the proportion of output sold by smallholder farmers.

The household head's maize farming experiences also emerged as a statistically significant positive effect on the likelihood of smallholder maize farmers' participation in the market. The odds ratio of 1.393 suggests that households with more experience in maize farming were 1.393 times more likely to sell their maize to NFRA. The transaction cost theory posits that farmers face various non-production costs, such as searching for buyers, negotiating contracts, and enforcing agreements, that hinder their participation in markets. Maize farming experience acts as a critical factor in reducing these transaction costs, as more experienced farmers possess better market information, stronger social networks, and enhanced bargaining skills.

These results were supported by the results from the Focus Group Discussions (FGDs), which indicate that:

> *"…Most of the farmers who get access to maize buyers are those with many years of experience in maize farming due to their social networks and bargaining power accumulated over years. Thus they are well informed when making decision on where to sell their maize, ……"* (FGD in Kafukula Village, 24th November 2024).

This quotation suggests that having more experience in selling maize over the years positively influences farmers' decisions about where to sell their maize. These results are consistent with previous findings as reported by Katema and Lika (2023) and Tafesse *et al*. (2023), who reported that a farmer's experience in production is positively and statistically significant in predicting the market participation of smallholder farmers. The results are further inconsistent with a previous study reported by Abate *et al*. (2019), who found a negative statistical significance of smallholder farmers' experience in influencing market participation.

Furthermore, access to market information had a statistically significant and positive influence on smallholder maize farmers' decision to sell their maize to NFRA. The results indicated that when household market information increased by one unit, the odds ratio became 1.326, implying that households with more members were 1.326 times more likely to sell their maize to NFRA. This suggests that households with information about markets were more inclined to participate in the markets because they had more information about the price of maize in different parts of the region and outside the region.

During FGDs it was reported that most maize farmers who have options to sell their maize to NFRA are those with information about the market.

> *"… Most of those maize farmers who have been bringing maize to NFRA are those with market information about the price of maize in different part of the Country..…"* (FGDs in Ninga Village 30th November, 2024).

The quotation above implies that the decision on where to sell agricultural produce is influenced by access to information about price in different parts of the country. The results align with the observations made by Kubwimana (2020), Mazengia (2016), Ndlovu et al. (2021), and Ndlovu et al. (2022), who noted that farmers who participate in markets were those who had access to market information.

As per transaction theory, the market distance was expected to have significant influence in market decisions. However, the variable was not significant. It was postulated that a strong negative correlation exists between distance to market and access to markets. When distance increases, market access decreases due to higher transport costs and lower farm-gate prices. Shorter distances (proximity) directly improve market access for farmers by enabling higher incomes and better selling prices. This deviation might be due to the fact that factors influencing market outlet decisions are context specific and vary from one area to another. These results are contrary to the previous studies as reported by Mukarumbwa et *al*. (2018), Agholor *et al*. (2023), and Ketema and Lika (2023).

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study was conducted to assess determinants of smallholder maize farmers to sell their maize to NFRA in Kalambo District Council. The study found that socio-economic characteristics and market factors significantly influence smallholders' decision to sell their maize to NFRA. This supports the claim by transaction cost theory that socio-economic characteristics and market factors influence smallholder farmers' participation in the market. However, the study findings did not support the claim by theory that technological and institutional factors also determine smallholder farmers' ability to participate in the market.

5.2 Recommendations

Since some findings had indications that males dominate productive resources unevenly, it is recommended that gender-sensitive approaches should be used to circumvent the biased practices in order to increase participation in maize market activities. The government and other interested parties should educate smallholder maize farmers about the advantages of selling their maize to NFRA. In addition to that, the government should develop and expand methods for farmers to easily access maize market information via easily accessible technologies such as mobile phones and local radio channels, and it is vital to invest in raising awareness and training, particularly in encouraging farmers to adopt new technology and developing the skills and knowledge of smallholder farmers so that they can easily trade maize.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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