Determinants of Smallholder Rice Farmers' Market Outlet Selection in Mbarali and Mvomero Districts, Tanzania

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Abstract

Understanding smallholder farmers' market outlets have the potential to improve the productivity and incomes of smallholder farmers engaged in rice farming. Tanzania rice farmers select market outlets from a diverse spectrum. There is a scarcity of empirical information on the drivers of farmers' decision-making associated with market outlets in the context of Agricultural Marketing Co-operative Societies' marketing initiatives. This paper explores the smallholder rice farmers' drivers for the selection of market outlets. A cross-sectional research design was used. A sample of 382 smallholder rice farmers was selected from three co-operative societies selected from two districts in Morogoro and Mbeya Regions. Multivariate Probit regression was applied to examine the determinants of market outlet selection decisions. It was found that the market outlets were wholesale, retail, millers, middlemen and private buyer. The majority (65.7%) of farmers sold to more than one outlet. The quantity of paddy sold, access to market information, smartphone ownership, access to credit, the amount of rice sold and frequency of extension visits were the important determinants of the selection of market outlets ($p<0.05$). It is concluded that the majority of farmers have access to multiple market outlets which contributes to livelihood improvement. To promote livelihood through agricultural transformation in Tanzania, policymakers should prioritize increasing smallholder rice farmers' access to market outlets through initiatives such as building rural infrastructures, improving market information systems, and promoting public-private partnerships.

Keywords: Market outlets, smallholder farmers, decisions, co-operative societies

Introduction

Like many nations in Sub-Saharan Africa, agriculture is a primary source of livelihood and income for over 70% of Tanzania's citizens, particularly those living in rural areas and peri-urban zones (REPOA, 2021). Rice is the second most cultivated food and commercial crop in Tanzania after maize, and about 90% of rice produced in Tanzania is under a smallholder system with sizes of rice farms ranging from 0.9 to 3 ha, with an average farm size of 1.3 ha (URT, 2019; Rugumamu, 2014). There are vast market opportunities for rice; yet, smallholder farmers' access to these markets remains a great challenge and their participation remains low in African countries, including Tanzania (Donkor *et al.,* 2021). Smallholder farmers' access to market outlets improves productivity and profitability and their participation is subject to the available markets that farmers can choose (Kangile *et al.,* 2020). However, the majority of smallholder rice farmers in the country are located in remote areas with numerous market challenges such as poor road infrastructures and limited market information as a result, they often fail to access markets (Mgale & Yunxian, 2020). A market outlet is an organization that facilitates the flow of goods and services from producers to consumers (FAO, 2018). They include wholesalers, retailers, middlemen, processors, co-operative associations, and other marketing

agents who ensure that agricultural products get to the final consumer (Donkor *et al.,* 2021). Customers can get time and location of utilities from such outlets.

Mmbando *et al.* (2015) amongst others contends that, the commercialization of agriculture in developing countries such as Tanzania has the potential to promote economic growth and development of smallholder farmers' participation in markets. Hence, it is necessary to comprehend the various rice marketing channels' features and improve farmers' skills to choose marketing channels wisely and correctly. It is therefore crucial to understand the variables that affect the selection of marketing outlets since the use of such techniques can raise rice production and smallholder rice farmers' incomes. The information could also be used to design ways to lessen the impact of specific elements, improving smallholder rice farmers' access to markets and raising their chances of operating profitably. For smallholder farmers, choosing a market outlet can be a complicated decision and influenced by variety of factors that should be taken into account such as the quantity of their outputs, their location, information, the nature of their commodity, and the prices offered (Tarekegn *et al.,* 2017; Kangile *et al.,* 2020). According to Dlamini-mazibuko *et al.* (2019), understanding the relationships between the marketing channels and the factors that determine the use of each market channel is beneficial to policymakers and smallholder producers who aim to access such market outlets.

Several studies have been carried out to characterize factors influencing farmers' choice of marketing outlets in Africa and other parts of the world (Adams *et al.,* 2019; Anthony *et al.,* 2021; Chekol & Mazengia, 2022; Degaga & Alamerie, 2020; Dlamini-mazibuko *et al.,* 2019; Donkor *et al.,* 2021; Geoffrey *et al.,* 2014; Jebesa, 2019; Thamthanakoon *et al.,* 2022; Yalew, 2022). Factors related to socio-demographics, access to credit, access to information, and asset ownership have been found to have significant effects on farmers' market channel decisions. For instance, Anthony *et al.,* (2021) found that socio-demographic characteristics, price information, market information and form of produce have a significant effect on market channel choice among smallholder rice farmers in Nigeria. Also, Chekol & Mazengia, (2022); Dlamini-mazibuko et al., (2019) revealed that, asset ownership, transaction costs, selling price, market attributes, and profit obtained were significant determinants of market channel choice by smallholder farmers in Ethiopia and Swaziland, respectively. Farmers with more education tend to be good negotiators and risk-averse (Mgale & Yunxian, 2021). Similar studies conducted in Ethiopia, Ghana and Kenya found that transport ownership, access to information, quantity sold, cost of labour, group marketing and contract farming can influence smallholder farmers' market outlet choice decisions (Adams *et al.,* 2019; Degaga & Alamerie, 2020; Geoffrey *et al.,* 2014).

Specifically, a study by Kangile *et al.* (2020) on sesame farming conducted in Mtwara and Lindi found that agricultural production services such as education and training, agricultural inputs, and access to credit were the factors driving farmers to choose a particular market to sell their produce. Similarly, a study by Mhagama & Mmasa, (2022) on the choice of marketing outlets among smallholder farmers in staple foods in Dodoma (Chamwino District) and Morogoro (Kilosa District) identified factors related to age, education, membership in organizations, access to credit, contractual arrangements, and distance to markets as significant factors driving farmers to choose a particular market to sell their produce. Despite the extensive literature on smallholder farmers' market outlet choice decisions, there is a gap in understanding the determinants of smallholder farmers' market outlets in the context of Agricultural Marketing Co-operative Societies' (AMCOS) marketing initiatives in Tanzania. This paper addresses this research gap by assessing the existing marketing outlets and examining the drivers of smallholder farmers' market outlet selection in the context of AMCOS in Mvomero and Mbarali districts, Tanzania. This study intends to assess the determinants of smallholder rice farmers' choice of a particular market outlet for their competitiveness in rice farming.

Methodology

The study was conducted in the Morogoro and Mbeya regions, which are among the major rice-producing regions in Tanzania. A purposive sampling technique was used to select two districts, namely Mvomero and Mbarali, from Morogoro and Mbeya regions respectively. These districts were purposively selected because they contribute a larger proportion to the total rice output of the regions (URT, 2017). Based on their functioning and the length of time they have been involved in rice farming activities, three AMCOS were purposively selected from the two districts namely UWAWAKUDA, Kapunga, and Madibira. The target population for the study encompasses all smallholder rice farmers who are members of the three AMCOS.

The study employed a cross-sectional research design. A sample of 369 respondents from the three registered co-operative societies was estimated using Yamane (2001) formula.

$$n = \frac{N}{1 + N(e^2)} \quad \text{.....(1)}$$

Where; n = sample size
N = population size = 4749
e = level of precision (Sampling error) = 5% or 0.05

A proportionate sampling technique was used to select farmers from the three co-operatives giving a sample size of 369 respondents. A simple random sampling procedure was engaged to select respondents from a list of smallholder rice farmers obtained from the AMCOS offices. The method used to collect data was household surveys. Quantitative and qualitative data were collected by using a pre-structured questionnaire with both open and close-ended questions to solicit relevant information from the respondents.

Descriptive statistical analysis such as mean, frequency and percentages were computed to describe socio-demographic information of respondents and their participation in different market outlets. A Multivariate Probit regression model (MVP) was used to examine the factors influencing smallholder rice farmers' market outlet choices in the study area. This model was used because it accounts for the potential correlations between unobserved disturbances as well as the relationship between market outlet selections while simultaneously illustrating the impact of a collection of explanatory variables on market outlet choice (Belderbos *et al.,* 2004). A Multivariate Probit model was appropriate and used to capture farmers' variation in market outlet selection and estimate multiple binary outcomes jointly due to the possibility of contemporaneous outlet selection and the potential correlations among these market outlet selection decisions.

The analysis was executed using the STATA software. The Multivariate Probit regression model was used to assess factors influencing market outlet choice among smallholder rice producers. The model was applied due to its ability to handle non-mutual exclusive events, as smallholder rice farmers may choose more than one market outlet. The model was specified as follows;

$$Y_{ij} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta 8_i \quad \text{.....(2)}$$

Where;
Y_{ij} is a dependent variable called market outlet choice (binary outcome)
i = 1,2,3……..382 observations
j represent market outlet (Wholesale(Y_{i1}), Retail(Y_{i2}), Miller(Y_{i3}), Middlemen(Y_{i4}) and Private buyers(Y_{i5}))
β_0-β_8 Represent parameter estimates/ slope coefficients
X_1-X_8 Represent independent variables selected for this study
ε_i Represent other factors that were held constant (residuals)

The main equation 1 above can be categorized into simultaneous equations as follows;

$$Y_{i1} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_8 X_8 + \varepsilon_i \quad \text{.....(3)}$$
$$Y_{i2} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_8 X_8 + \varepsilon_i \quad \text{.....(4)}$$
$$Y_{i3} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_8 X_8 + \varepsilon_i \quad \text{.....(5)}$$
$$Y_{i4} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_8 X_8 + \varepsilon_i \quad \text{.....(6)}$$
$$Y_{i5} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_8 X_8 + \varepsilon_i \quad \text{.....(7)}$$

Key variables that were subjected to the Multivariate probit regression model are specified in Table 1.

Table 1: Summary of variables that were used in the MVP model

Variable(unit)	Measurement	Expected hypothesis on market outlets				
		Wholes	Ret	Mil	Middlemen	P/buyer
Experience in rice farming	Continuous (In years)	-	+	+	-	+
Owning a smartphone	Dummy (1=owned smartphone, 0=otherwise)	+	+	+	+	+
Access to credit	Dummy (1=accessed credit, 0=otherwise)	+	+	+	-	-
Access to training	Dummy (1=accessed training, 0=otherwise)	+	+	+	-	+
Quantity of paddy sold (kg)	Continuous (In kg per smallholder farmer)	+	-	+	-	+
Quantity of rice sold (kg)	Continuous (In kg per smallholder farmer)	+	-	-	-	+
Marketing information	Dummy (1=accessed mark information, 0=otherwise)	+	+	+	-	+
Frequency of Extension Contact	Categorical (0=rarely, 1=on event, 2=frequently)	+	+	-	+	+

Results and Discussion

Socio-demographic Characteristics

Out of 382 smallholder rice farmers interviewed, the majority (73.6%) had at least a primary education as shown in Table 2. While educated farmers find it simpler to understand information about production and marketing, the degree of education is projected to be a significant element that would affect the choice of market outlet in the rice farming industry. Also, the study reveal that, Majority (70.7%) of the respondents were males which infers male dominance in rice production in the study area. The findings in Table 2 show that 11.5% of farmers in all co-operatives engaged in rice growing as their sole source of income and had no other economic activity in the area. As rice cultivation takes up the majority of their time and resources, it may reduce their ability to select appropriate market outlets. The study also establish that the mean household size was 5 members. The average number of years respondents were associated with the AMCOS were 14 years. Mean years of membership were found highest in Madibira (15) and lowest in Kapunga (11). This denotes that Madibira has extra experience in dealing with rice farmers and is perhaps able to deal with members pressing issues compared to Kapunga and UWAWAKUDA. Farmers had 18 average years in rice farming, therefore with this experience, farmers are more likely to choose wholesale trading companies and less likely to sell to middlemen and village collectors as they may have more market connections (Mgale & Yunxian, 2020).

Smallholder Rice Farmers Market outlets.

Rice farmers reported that different rice market outlets were used to sell their produce in the form of paddy and milled rice. These rice market outlets include wholesale, retailers, millers, middlemen and private buyers. The outlets are typically selected in combination with one another. Table 3 shows the different rice market outlets used by smallholder farmers when selling their produce.

The results show that, the commonly used market outlet for both paddy and milled rice was multiple outlets followed by private buyers and middlemen (15.2%) for paddy and both wholesale and retail for milled rice as shown in Table 3. This finding suggests that about two-thirds of the farmers depend on multiple market

Table 2: Socio-demographic Characteristics of the sampled respondents in the study area (n=382)

Variable	Classes	AMCOS (%)			Overall statistics (%) n=382
		Kapunga n=(62)	Madibira n=234	UWAWAKUDA n=86	
Sex	Male	17.0	63.0	20.0	70.7
	Female	14.3	57.1	28.6	29.3
Marital status	Single	18.4	63.2	18.4	9.9
	Married	16.0	61.0	23.0	90.1
Education level	Not educated	6.7	60.0	33.3	3.9
	Primary	15.3	59.4	25.3	73.6
	Secondary	5.6	83.3	11.1	14.1
	Tertiary	46.9	40.6	12.5	8.4
Economic activities	Farming (Other crops)	17.4	69.4	13.2	37.7
	Livestock	0.0	60.0	40.0	1.3
	Business	0.0	60.0	40.0	13.1
	Farming, livestock& business	20.9	58.3	20.9	36.4
	None	18.2	45.5	36.4	11.5
Household size	Mean	5.5	5.5	5.4	5.4
	Max	9	14	15	15
	Min	2	1	1	1
Experience in rice farming	Mean	21.2	17.7	16.4	18.0
	Max	50	41	50	50
	Min	3	2	3	2
Years in AMCOS	Mean	11.8	15.2	12.4	14.0
	Max	22	33	19	33
	Min	2	2	3	2

outlets to perform their marketing functions. By selling to multiple outlets, farmers can spread their risks, compare offers and negotiate for better prices or terms. Also, smallholder farmers may sell to multiple outlets to diversify their customer base and maintain good relationships with different buyers so that they can avoid becoming too reliant on a single buyer or market, which can be risky if that market suddenly declines or disappears.

As for rice, the majority of smallholder farmers sold rice through multiple outlets (75.8%) followed by 18.2% selling to private buyers with the remaining selling outlets (wholesale and retail) accounting for only a small proportion. Similar results on small proportions of farmers selling to wholesale have also been reported by Mgale and Yunxian (2020) in their study on the rice market channels in Tanzania. A small proportion of farmers sold to wholesale and retail markets because it requires more resources and infrastructures; also farmers may not have the expertise to negotiate with wholesalers and retailers who often demand high-quality products and consistent supply. However, there are opportunities for smallholder farmers to improve their access to these markets through targeted investments in

Table 3: Tabulation of Multiple responses on Produce sold and Market outlets

Produce sold	Selling outlets						
	Wholesale	Retail	Miller	Middlemen	Private buyer	Multiple	Total
Paddy	6(2.08)	5(1.73)	2(0.69)	44(15.22)	45(15.57)	187(64.71)	289(100.00)
Milledrice	1(3.03)	1(3.03)	0(0.00)	0(0.00)	6(18.18)	25(75.76)	33(100.00)
Both	0(0.00)	1(1.67)	4(6.67)	2(3.33)	14(23.33)	39(65.00)	60(100.00)
Total	7(1.83)	7(1.83)	6(1.57)	46(12.04)	65(17.02)	251(65.71)	382(100.00)

Pearson Chi² = 26.12 Prob = 0.0036. The first row has frequencies and the second row has row percentages

infrastructure, marketing, and capacity building. Overall, multiple outlets were found to be a dominant selling outlet for smallholder farmers accounting for 65.7% of sales, followed by private buyers (17.0%) and middlemen (12.0%). This suggests that multiple outlets and private buyers are important selling outlets for both types of produce, while wholesale and retail outlets are less commonly used. The results differ from those of Mgale and Yunxian (2020) who found that approximately 53.5% of farmers sold to middlemen, 28.6% to millers and nearly 17.9% to wholesale in Tanzania. The difference is because the previous study did not consider multiple outlets used by rice farmers in the study area. In addition, results in Table 3 show a statistically significant association between the type of produce and the selling outlet category ($p<0.01$).

Descriptive Statistics of Variables used in the Model (continuous and dummy variables).

The results in Table 4 suggest that the majority of smallholder rice farmers surveyed did not access credit (65.7%). Findings are similar to those of Dessie *et al.* (2018); Yalew (2022) who found majority of smallholder farmers had no access to credit in Ethiopia and differ from the findings of Apind (2015) who found majority of farmers with access to credit in rice farming in Kenya. Farmers' access to credit minimizes financial constraints and enhance their participation in direct market outlets and selection of market outlets (Donkor *et al.,* 2021;

Table 4: Descriptive Statistics of Variables Used in the Model (n=382)

Categorical Variables	Observation	Frequencies (n)	Percentage (%)
Owning a smartphone	No	318	83.25
	Yes	64	16.75
Access to credit	No	251	65.71
	Yes	131	34.29
Attended training	No	302	79.06
	Yes	80	20.94
Marketing information	No	95	24.87
	Yes	287	75.13
Frequency of Extension Contact from AMCOS	On event	215	56.28
	Frequently	162	42.41
	Rarely	5	1.31
Continuous Variables	Mean	Std. Dev.	
Experience in rice farming	18.016	9.434	
Quantity of paddy sold(kg)	7703.793	5334.369	
Quantity of rice sold(kg)	1008.068	2610.749	

Haile *et al.,* 2022; Mgale and Yunxian, 2020; Mmbando *et al.,* 2015; Yalew, 2022). Moreover, the majority (83.3%) of respondents did not own a smartphone. The fact that a good number of respondents do not own smartphones suggests that they may have limited access to information and technology. This can affect their ability to access market-related information, prices, weather forecasts, and other data that could influence their market outlet selection.

On the other hand, the fact that only 20.9% of respondents attended training suggests that there may be opportunities to increase access to training and capacity-building programs for smallholder farmers. The high percentage of respondents who did not attend training on rice farming indicates a significant gap in knowledge and skills among smallholder rice farmers which can have implications for their farming practices and, subsequently, their choices regarding market outlet selection. Most respondents were contacted by extension officers on events (56.3%). The findings are similar to those of Apind (2015) where 81.9% of rice farmers were contacted by extension staff in Kenya.

The findings in Table 4 show that, 75.13% of respondents received market information suggesting that there are already some outreach efforts in marketing. The findings support those of Yalew (2022) in Ethiopia but differ from those of Apind (2015) who found minority (33.7%) of rice farmers obtain market information in Kenya. It is through access to information that farmers can make informed market decisions (Dlamini-mazibuko *et al.,* 2019). The results also provide some insight into the quantity of rice and paddy sold by the farmers. The average quantity of paddy sold is 7703.793 kg, which is a significant amount, but the standard deviation of 5334.369 kg suggests a wide variation in sales volume. Similarly, the average quantity of rice sold is 1008.068 kg, with a large standard deviation of 2610.749 kg. This may suggest that the smallholder rice farmers have some difficulty in achieving consistent sales volumes, which could affect their incomes.

Determinants of Farmer Participation in Market outlet selection.

Presented in Table 5 are the determinants of rice farmers' decision to select a certain market outlet. The results show that some variables are significant at more than one market outlet while one variable is significant in only one market outlet. Out of eight expounding variables included in the MVP model, five variables significantly affected wholesale market outlet; three variables significantly affected retail outlet; four variables significantly influenced miller outlet; one variable significantly affected middlemen market outlet choice and two variables influenced private buyer outlet at different probability levels.

Results in Table 5 indicates that quantity of rice sold/supplied had positive significant correlation with all market outlets except middleman where it has strong negative significant correlation at < 5% (0.05) significant level. The implication is that smallholder farmers with large volumes of rice were more likely to sell to wholesale, miller and retailer compared to middlemen. This is because the wholesale can purchase a large quantity of rice and provide fair prices. The result compares well with those reported by Adams *et al.* (2019); Chekol & Mazengia (2022) for tomato and garlic farmers in Ghana and Northwest Ethiopia.

Concerning the frequency of extension contact from co-operative society; the variable has a positive and significant influence on wholesale, retail and miller outlet choice decisions at a 1% significance level. Extension services increase the ability of farmers to acquire important market information as well as enable the smallholder farmers to improve production methods, hence leading to more output which in turn increases producers' ability to choose the best market outlet for their product. Thus, households who were visited more by extension agents were more likely to deliver rice to wholesale, retail and miller. A similar finding has also been reported in the study by Chekol and Mazengia, (2022); Tarekegn *et al.* (2017) that confirms consistent contact with extension had a positive effect on the likelihood selection of retail and wholesale outlet by honey and garlic producers in Ethiopia respectively, and differ from the study by Degaga and Alamerie (2020) who found a negative influence on the choice of middlemen outlet by coffee producers

Table 5: Multivariate Probit Estimations for smallholder rice farmers market outlet selection

Variables	Wholesale	Retail Coeff(Se)	Miller Coeff(Se)	Middlemen Coeff(Se)	Private buyer Coeff(Se)
Experience in rice farming	-0.018*(0.010)	0.013*(0.007)	-0.011(0.01)	0.009(0.007)	0.001(0.007)
Owning a smartphone	0.587***(0.199)	-0.232(0.182)	-0.911**(0.382)	0.182(0.189)	-0.282(0.177)
Access to credit	0.826***(0.169)	0.100(0.145)	-0.828***(0.288)	-0.180(0.146)	-0.325**(0.144)
Access to training	-0.12(0.195)	0.031(0.17)	-0.286(0.27)	-0.168(0.167)	0.091(0.169)
Quantity of paddy sold(kg)	0.069***(0.017)	0.034**(0.014)	0.032(0.021)	-0.001(0.014)	-0.004(0.014)
Quantity of rice sold (kg)	0.188***(0.035)	0.068**(0.03)	0.175***(0.04)	-0.098***(0.032)	0.006(0.031)
Marketing information	-0.098(0.188)	0.083(0.154)	-0.027(0.238)	-0.188(0.157)	0.380**(0.154)
Frequency of Extension Contact	0.431***(0.165)	0.495***(0.125)	0.792***(0.185)	0.241*(0.126)	0.049(0.128)
Constant	-2.304***(0.38)	-1.358***(0.277)	-2.348***(0.441)	0.061(0.277)	0.17(0.27)
Predicted Probabilities:	0.204	0.497	0.115	0.602	0.643
Multivariate probit (SML, # draws = 5)					
Number of obs			382		
Wald $chi^2(40)$			178.50		
Log-likelihood			-953.25394		
Prob > chi^2			0.0000		
Correlation matrix (estimates)	Wholesale (ρ_1)	Retail (ρ_2)	Miller (ρ_3)	Middlemen (ρ_4)	Private buyer(ρ_5)
Wholesale (ρ_1)	1.000				
Retail (ρ_2)	0.003(0.959)	1.000			
Miller (ρ_3)	-0.101(0.048)	0.035(0.499)	1.000		
Middlemen (ρ_4)	-0.185(0.000)	0.135(0.008)	0.076(0.141)	1.000	
Private buyer(ρ_5)	-0.152(0.003)	0.007(0.891)	0.011(0.824)	-0.348(0.000)	1.000

Likelihood ratio test of rho21 = rho31 = rho41 = rho51 = rho32 = rho42 = rho52 = rho43 = rho53 = rho54 = 0: $chi^2(10)$ = 85.9303 Prob > chi^2 = 0.0000

Key: *** = significant at 1%, ** = significant at 5%

in Ethiopia.

A positive and significant relationship was found to occur between access to market information and the likelihood of choosing a private buyer at a 5% level of significance. Farmers that have access to financing are more likely to participate in the wholesale market channel, whereas middlemen and private buyer outlets are less likely to do so. Farmers that have access to market information are more likely to participate in the private buyer outlet. Market information makes it easier for farmers to communicate the pricing differences between their area and the adjacent main market, which enhances the likelihood that they will choose a private buyer outlet that gives a relatively higher price to farmers. The results differ from those of Tarekegn *et al.* (2017) who reported a positive association between this variable and the likelihood of choosing retailer and consumer outlets among honey producers in Ethiopia.

Access to credit also has a positive and negative impact on the likelihood of choosing a wholesale; and miller and private buyer outlet, with a < 5% level of significance respectively. Farmers that have access to finance are more likely to participate in the wholesale market channel, whereas it decreases for middlemen and private buyer outlets. Impliedly, farmers who accessed credit have a higher level of commercialization. Farmers can obtain the operating capital needed for intensive rice farming from credit. This shows the importance of credit in the rice commercialization process for agricultural transformation. The outcome is similar to the study by Chekol and Mazengia (2022) on garlic producers in Northwest Ethiopia, and differs from those of Mgale and Yunxian (2020) who reported a positive influence of access to credit in rice farming on miller outlet in Tanzania.

Ownership of a mobile phone has a positive significant effect on the wholesale outlet, it is statistically significant at 1% and negatively associated with the intensity of participation in the miller outlet at 5%. Ownership of communication resources upsurges the probability of smallholder farmers' market participation and increases access to information and market participation (Mmbando *et al.,* 2015). This result implies ownership of a mobile phone decreases farmers' intensity of participation in the miller while it increases the capability of smallholder farmers to select a wholesale outlet. This is because whole selling requires consistent farmers who can be easily contacted and communicate easily with buyers. The results support those of Donkor *et al.* (2021) who found a negative and positive influence of mobile phone ownership by rice farmers and the likelihood of choosing a miller and a direct market outlet in Ghana respectively.

Conclusions and Recommendations

This study found that the existing market outlets in the study area are wholesale, retail, millers, middlemen and private buyers, however the majority of farmers chose to sell to multiple outlets. The most common produce sold in the study area is paddy. The smallholder rice farmers select multiple market outlets as an approach to safeguard their rice farm investment and maximize their profits in the long term. The choice of the selling outlets influences farmers' profitability and livelihood improvement, therefore when smallholder rice farmers have access to additional market outlets, they must choose the best mix to maximize their long-term earnings. The selection of market outlets of rice producers in the study area is associated with the quantity of paddy sold, market information, smartphone ownership, access to credit, the quantity of rice sold and frequency of extension services.

To promote livelihood through agricultural transformation in Tanzania, policymakers should prioritize increasing smallholder rice farmers' access to market outlets through initiatives such as building rural infrastructures, improving market information systems, and promoting public-private partnerships. The local government and AMCOS should ensure that technical and organizational assistance is provided to smallholder rice farmers; and that farmer choices are reinforced through access to market information, credit and extension services. This will help the smallholder farmers realize the benefits associated with rice marketing. It is also recommended that, the existing AMCOS should be capacitated

in market information; increase frequencies of extension contact to farmers, and organize more farmers into co-operatives since the two attributes influence farmers' market outlet choices. Further, the existing AMCOS should establish a Warehouse Receipt System (WHRS) so that it-self can be one of the market outlets in the study area to enhance value chain development. If well managed, they will be able to purchase large volumes of rice at reasonable prices, providing technical support and capacity building to their members. To enrich the existing literature, the study recommends further research to investigate the marketing and transaction costs associated with different market outlets.

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References

Adams, F., Wongnaa, C.A., & Coleman, E. (2019). Profitability and choice of marketing outlets : evidence from Ghana ' s tomato production. *Journal of Agribusiness in Developing and Emerging Economies* 2019: 1–14. https://doi.org/10.1108/JADEE-06-2019-0090

Anthony, L., Omotayo, A.O., Ebukiba, E., & Gamba, V. (2021). Factors Influencing Output of Rice Produced and Choice of Marketing Outlets Among Smallholder Farming Households, Abuja, *Nigeria. Sarhad Journal of Agriculture* 37(1): 262–277. https://doi.org/10.17582/journal.sja/2021/37.1.262.277

Apind, B.O. (2015). Determinants of Smallholder Farmers Market Participation; A case study of Rice Marketing in Ahero Irrigation Scheme in Kenya. A Thesis Submitted to Graduate School in Partial Fulfilment for the Requirement of the Award of Master of Science Degree in Agricultural and Applied Economics of Egerton University. 81pp.

Belderbos, R., Carree, M., Diederen, B., Lokshin, B., & Veugelers, R. (2004). Heterogeneity in R&D cooperation strategies. *International Journal of Industrial Organization,* 22(2004): 1237–1263. https://doi.org/10.1016/j.ijindorg.2004.08.001

Chekol, F., & Mazengia, T. (2022). Determinants of Garlic Producers Market Outlet Choices in Goncha Siso Enese District , Northwest Ethiopia: A Multivariate Probit Regression Analysis. Advances in Agriculture 2022: 1–12.

Degaga, J., & Alamerie, K. (2020). Determinants of Coffee Producer Market Outlet Choice in Gololcha District of Oromia Region , Ethiopia: A Multivariate Probit Regression Analysis. Studies in Agricultural Economics 122(2020): 104–113.

Dessie, A.B., Abate, T.M., & Mekie, T. M. (2018). Factors affecting market outlet choice of wheat producers in North Gondar Zone, Ethiopia. Agriculture and Food Security 7(1): 1–8. https://doi.org/10.1186/s40066-018-0241-x

Dlamini-mazibuko, B.P., Ferrer, S., & Ortmann, G. (2019). Factors affecting the choice of marketing outlet selection strategies by smallholder farmers in Swaziland. *African Journal of Science, Technology, Innovation and Development* 0(2019): 1–9. https://doi.org/10.1080/20421338.2018.1554323

Donkor, E.A., Garnevska, E., Siddique, M. I., & Donkor, E. (2021). Determinants of rice farmer participation in the direct marketing channel in Ghana. Sustainability (Switzerland) 13(9): 1–14. https://doi.org/10.3390/su13095047

Geoffrey, S.K., Hillary, K., Jonah, K., & Timothy, O. (2014). Factors Influencing the Choice of Marketing Outlets among Small-Scale Pineapple Farmers in Kericho County, Kenya. *International Journal of Regional Development* 1(5): 51–56.

Haile, K., Gebre, E., & Workye, A. (2022). Determinants of market participation among smallholder farmers in Southwest Ethiopia: double-hurdle model approach. Agriculture and Food Security 11(1): 1–13. https://doi.org/10.1186/s40066-022-00358-5

Jebesa, S.R. (2019). Determinants of Smallholder Farmers Market Participation and Outlet Choice Decision of Agricultural Output in Ethiopia: A Review. 7(4): 139–145. https://doi.org/10.11648/j.ajaf.20190704.13

Kangile, R.J., Mgeni, C.P., Mpenda, Z.T., & Sieber, S. (2020). The Determinants of Farmers' Choice of Markets for Staple Food Commodities in Dodoma and. Agriculture 10(2020): 1–12. https://doi.org/doi:10.3390/agriculture10050142

Mgale, Y.J., & Yunxian, Y. (2020). Marketing efficiency and determinants of marketing channel choice by rice farmers in rural Tanzania : Evidence from Mbeya region,. *Australian Journal of Agricultural and Resource Economics* 59(2020): 1–21. https://doi.org/10.1111/1467-8489.12380

Mgale, Y.J., & Yunxian, Y. (2021). Price risk perceptions and adoption of management strategies by smallholder rice farmers in Mbeya region , Tanzania Price risk perceptions and adoption of management strategies by smallholder rice farmers in Mbeya region, Tanzania. Cogent Food & Agriculture 7(1): 1-16. https://doi.org/10.1080/23311932.2021.1919370

Mhagama, J., & Mmasa, J.J. (2022). Agricultural Production Services and its Impact on Choice of Marketing Channels among Smallholder Sesame Farmers in Tanzania. *Tanzania Journal of Agricultural Sciences* 21(1): 77–89.

Mmbando, F.E., Wale, E.Z., & Baiyegunhi, L. J.S. (2015). Determinants of smallholder farmers ' participation in maize and pigeonpea markets in Tanzania. Agrekon 54(1): 96–119. https://doi.org/10.1080/03031853.2014.974630

REPOA. (2021). Enhancing Competitiveness of Rice Industry in Tanzania. Repoa Report. https://www.repoa.or.tz/wp-content/uploads/2021/08/13.-Rice-PB.pdf Accessed on 5/6/2023

Tarekegn, K., Haji, J., & Tegegne, B. (2017). Determinants of honey producer market outlet choice in Chena District , southern Ethiopia: a multivariate probit regression analysis. Agricultural and Food Economics 5(20): 1–14. https://doi.org/10.1186/s40100-017-0090-0

Thamthanakoon, N., Eastham, J., Manning, L., Ward, S., & Huang, Y. I. (2022). Factors driving Thailand rice farmer decision-making in the choice of marketing channel. *British Food Journal* 124(1): 331–349. https://doi.org/10.1108/BFJ-11-2020-1040

Yalew, W. (2022). Determinants of Market Outlet Choices by Smallholder Wheat Farmers in Farta District, South Gondar Zone, Amhara National Regional State, Ethiopia: A Multivariate Probit Approach. *Harla Journal of Sustainable Development in Business and Economics* 1(1): 1–18.