

Drivers of Market Outlet Choice: Evidence from Smallholder Rice Producers in Northwest Ethiopia

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Abstract: The out-datedness of existing research outputs targeting the study area, the availability of recommendation to have a new study on the thematic area, and above all, the compliance of smallholder farmers in getting fair benefit from rice marketing, that emanates from poor service quality in rice processing, as it has a direct influence on rice output market, motivate the authors to have further study. Therefore, this study intends to identify drivers of market outlet choice by smallholder rice producers in Fogera district using primary and secondary data collected from 212 sampled households in 2020. Data were analyzed using descriptive statistics and a multivariate probit model. Accordingly, 69.81% of sampled households preferred processors market outlet choice while 21.23% chose retailers market outlet choice. The results from the econometric model showed that rice market outlet choice was significantly influenced by sex, rice farming experience, distance from the nearest road, market information, and distance from the nearest market at various levels of significance. Wholesaler market outlet choice was negatively influenced by sex and rice farming experience at 5% and 10% significance levels, and positively influenced by access to market information at 10% significance level. Processor market outlet choice was positively influenced by rice farming experience and access to market information at 10% and 1% significance levels, and negatively influenced by distance to the nearest road at 5% significance level. Retailor market outlet was negatively influenced by sex and access to information at 5% significance level. Collector market outlet was negatively influenced by cooperative membership and distance from the nearest market at 10% and 5% significance levels, and positively influenced by access to market information at 5% significance level. As the majority of rice producers have chosen processor market outlet, in a situation where there is compliance on rice processing quality, organizing rice producers-based processing cooperative, working on trust building between producers and processors, and promoting paddy marketing were forwarded as recommendations for rice sector to maximize producers' probability to reap what they sow.

Keywords: Fogera, Market Outlet, Multivariate Probit, Rice

1. Introduction

Smallholder farmers which account 500 million globally are foothold to the livelihoods of more than 2 billion people [1]. They produce about 80 percent of the food consumed in Asia and sub-Saharan Africa and 95 percent of main crops in Ethiopia [2, 3]. Currently, a lot has been expected from them to meet the future global food demand, which is expected to increase in between 59 percent and 95 percent by 2050 [4]. The big question here is with all of their significant contributions and expectation from them, are smallholder

farmers reaping what they sowing? The answer is definitely no; because literature confirms that smallholder farmers earn only 6 cents for every dollar of food they produce [5].

In Ethiopia, promoting smallholder farmers-based commercialization of agriculture is considered as a cornerstone of the rural development and poverty reduction strategies [6]. Following the strategies, crop development has been implemented through considerable government and donors' budget supports. As part of a policy to turn millions of poor farmers into surplus producers for local and export markets, the government has been setting aside a sizable portion of its national budget 17% in 2015 to agriculture. It is

by far higher than the proportion of budget that African governments committed to allocate to agriculture under the Maputo declaration of 2003, which is 10 percent [7].

In line with above mentioned facts, Government of Ethiopia (GoE) has selected rice as a millennium crop of Ethiopia and considered it as one of the major crops used to tackle food insecurity and poverty challenges of a nation. Accordingly, despite rice is recently introduced crop into Ethiopia, considerable success has been registered mainly from the production aspect of the rice value chain, mainly progress in rice area harvested, production amount, yield and number of smallholder farmers. For instance, in 2009, the area harvested was 47,739 hectares, with a yield of 2.16 tons per hectare and production amount of 103,128 tons. Rice area harvested, production and yield increased to 57,576 hectares, 170,630 tons and 2.96 tons per hectare, in 2019, representing a 20.6, 65.4 and 37 percent increment in area harvested, production and yield respectively within a decade [8, 9].

As the nature of a crop, rice has a lot of actors involved along its value chain. With respect to output marketing, rice growing farmers, supply their produce to the market in different outlet choices including processors, retailers, wholesalers, and collectors. Most of the rice producers marketing rice in a milled form that paddy. Owing to the absences of appropriate rice polishing machines, their obsolescence and polishers' intentional quality deterioration action, farmers in Fogera plain, are complaining about the quality of milled rice. Based on the survey done in Fogera plain, which contributes about 58 percent of the national rice supply, about 87 percent of the rice processing machines were obsolete and primarily fixed for milling other crops [10]. Consequently, farmers have complained about the poor rice polishing service delivered by processors, who are one of rice market outlet choices of the smallholder rice producers.

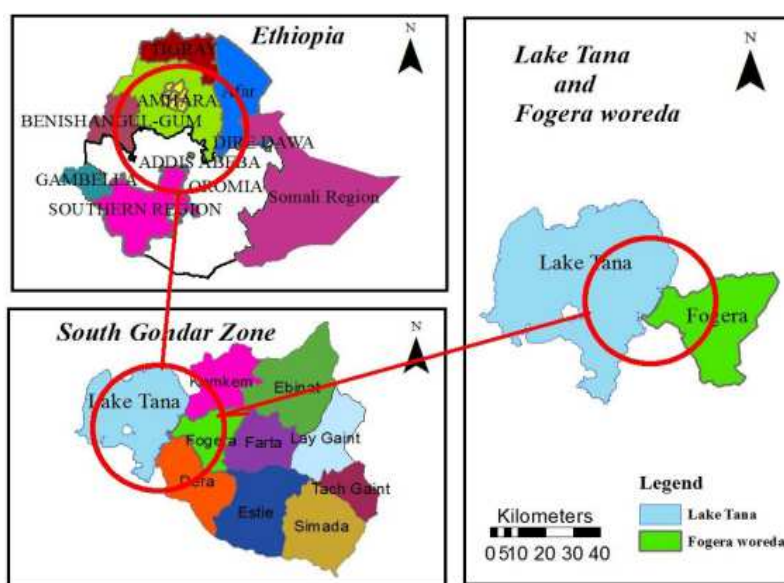
It is assumed that maximizing the potential of study area in supplying large volume of rice producing by smallholder

farmers requires working on creating relatively fair benefit among actors of the value chain. Each stage of the value chain has to be addressed to have fair benefit among actors of rice value chain. Hence, in the marketing aspect, identifying the market outlet choices of rice producers and analyzing its drivers is pertinent input to address compliance of majority of the rice producers. Therefore, this study was conducted with the primary objective of identifying drivers of market outlet choice by the smallholder rice producers in Northwest Ethiopia.

2. Methodology

2.1. Description of the Study Area

Fogera district is located in South Gondar zone of the Amhara national, regional state in Northwest Ethiopia. It is located near Lake Tana in the West direction [11]. Its altitude ranges from 1774 to 2410 meters above sea level with mean annual rainfall of 1216 mm and mean annual temperature of 19°C. The farming system is mixed provided that the rice cultivation takes the lions. Currently, rice is one of the major food and income-generating crops grown by the majority of farmers in the district. It shares 58% of rice produce in the Amhara region and 28% of Ethiopian rice production [12]. Tomato and onion are dominantly being produced in the dry season using irrigation. For this, Rib and Gumara rivers, which cross many of rice producing areas, have economic importance to the areas. Agro-ecologically, the district is characterized as majorly mid and high land. Topographically, the flat area accounts for 76%, mountain and hills 11% and the valley bottom area 13%. The total area of the district is 117, 414 hectares. The land use pattern of the district is characterized by 59.03% cultivated land, 22.73% grazing land, 18.24% water bodies and the rest for others (Fogera district agriculture office, 2019). The major crops grown in the study area are rice, maize, and finger millet [11].



Source: Ethio Geospatial data

Figure 1. Location map of the study area.

2.2. Sampling Procedures and Sample Size Determination

A three stage sampling technique was employed to draw sample respondents from rice producing farmers in Fogera district. Accordingly, from a total of 33 rural kebeles, 16 kebeles were identified as potential for rice production. Using simple random sampling technique, three Kebeles were selected. Then, systematic random sampling technique was used to select samples. The reasons for using this technique were the homogenous nature of the population in terms of socio-economic characteristics and the availability of sampling frame (List of the household heads) at each kebele. Yamane's formula was used to determine the minimum sample size [13]. To do so, there is known sampling frame and precision level.

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

Where n is sample size, N is population size (rice producer farmers in the production year 2020) which is 3554 and e is the precision level which was 0.07. Based on the above formula, 193 sample respondents were selected. To make the sample size more representative, additional 19 respondents were added to calculated sample size, which is 193. Hence, the total sample size became 212.

2.3. Types, Sources and Methods of Data Collection

Data were collected from many units at a specified time. Both primary and secondary types of data were collected. Primary data were collected from sample rice producers. However, secondary data were collected from published and unpublished documents. The data collection methods used were key informant interview, semi structured questionnaire, interview, and focus group discussion (FGD). Key informant interview was used to collect general information from key rice farmers and development agents. Semi structured questionnaire based interview was used to collect primary data from rice producing farmers. FGD with selected members of sample rice producers were undertaken in all sample kebeles. On the other hand, critical review was a method to synthesis secondary data. The questionnaire was designed with Cspiro software version 7.2.

2.4. Methods of Data Analysis

2.4.1. Descriptive Analysis

Frequency, mean, and percentages were used to describe households' socio-economic and institutional characteristics of rice producing farmers.

2.4.2. Econometric Analysis

Random utility model was used to analyze the market

outlet choice determinants. It is appropriate for modeling discrete choice decisions. It is assumed that farmers are rational decision makers that their choice of market depend on the profit maximization. This rational objective of farmers may lead their decision to choose more than one market outlet to address their multiple needs. farmers are more likely to choose more than one market outlets simultaneously [14-16]. It works with the assumption that selection of different market outlets depends on producers' willingness to maximize their profit and conditional to socioeconomic, institutional and production related factors. multivariate probit model was used to identify drivers of market outlet choice of tomato and pepper producers [14, 17]. Multinomial logit model to analyze drivers of market outlet choices [16]. Additionally, the study by used multinomial logit model to analyze market outlet choices in the context of changing demand for fresh meat in Vietnam [18]. Multivariate probit/logit, multivariate probit/logit and conditional logit are options to analyze drivers of market outlet choice. Choosing multiple market outlets, does mean farmers have relationships with more than one market outlet. In this case the multivariate probit model is appropriate. However, for producers who decided to sell their output to specific outlet choice, the multinomial probit model is appropriate. For this study, the multivariate probit model is appropriate and it is specified as follows:

$$Y_{ti} = B_{xi} + \epsilon_{ti}$$

where Y is 1 if $Y_i > 0$ and 0 otherwise, t_i is the market outlet choices available, x_i is the vector of explanatory variables, b is the vector of parameters to be estimated and ϵ_i is the error term distributed normally with mean zero and constant variance. For this study, there are four market outlet choices which leads to have four system of equations which are described below.

$$Y_1 = B_1 X_1 + \epsilon_1$$

Where $Y_1 = 1$ if $Y_1 > 0$, $Y_1 = 0$ otherwise.

$$Y_2 = B_2 X_2 + \epsilon_2$$

Where $Y_2 = 1$ if $Y_2 > 0$, $Y_1 = 0$ otherwise.

$$Y_3 = B_3 X_3 + \epsilon_3$$

Where $Y_3 = 1$ if $Y_3 > 0$, $Y_1 = 0$ otherwise.

$$Y_4 = B_4 X_4 + \epsilon_4$$

Where $Y_4 = 1$ if $Y_4 > 0$, $Y_1 = 0$ otherwise.

Table 1. Hypotheses of Variables.

Variables	Definitions	Type	Expected sign			
			Processor	Retailor	wholesaler	collector
Age	Age of the household head in completed years	Continuous	+	+	-	+
Sex	Sex of the household head (1 for male and 0 for female)	Dummy	+/-	+/-	-	-
Farming experience	Rice farm experience of the household in completed years	Continuous	+	+	+	+

Variables	Definitions	Type	Expected sign			
			Processor	Retailor	wholesaler	collector
Marketing experience	Market experience of the household in completed years	Continuous	+	+	+	+
Distance to the road	Distance from the nearest road in kilometres	Continuous	+	-	-	+
Credit use	1 for credit use and 0 otherwise	Dummy	+	-	+	+
Household size	Number of persons in the household	Dummy	+	-	-	-
Education status	Education status of the household head in completed years	Continuous	+	-	+	-
Distance to the nearest market	Distance from the nearest market in kilometers	Continuous	+	-	-	+
Access to market information	1 for having access to market information and 0 otherwise	Dummy	+	-	+	-
Cooperative membership	1 for members and 0 otherwise	Dummy	+	-	+	-

3. Results and Discussion

3.1. Socio Economic Characteristics of Households

The descriptive statistics analysis of rice producers was analyzed using frequency, mean, t test and chi-square. The mean age of rice producers selling their produce to collectors

was 41 years. In terms of age, there is a significant difference between farmers selling their rice to collectors. This means that farmers who are selling their rice to collectors are younger. The average amounts of rice sold to processors were greater than by farmers to wholesalers, retailers, and collectors. This is because most farmers are selling their rice in milled form, than in paddy form.

Table 2. Socio-economic Characteristics of rice farmers.

Variables	Wholesaler		Processor		Retailor		Collector	
	Mean/percent	T/Ch2	Mean/proportion	T/Ch2	Mean/proportion	T/Ch2	Mean/proportion	T/Ch2
Age	45.7	-0.2	45	0.05	45	0	41	1.95*
Experience rice	9.6	1.85*	13.4	-2.85***	11.2	1.5	12.5	0
Education status	2	0.4	2.40	-0.8	2.2	0.3	2	0.55
Quantity of rice sold	22	3.2***	32.0	-1.75*	29.5	0.8	31	-0.6
Market Info	8.02	0.56	69.81	3.45	21.23	7.89***	13.21	6.5**

Source: Survey data, 2020.

As shown in table 3, majority of rice producers (69.81%) choose processor outlet followed by retailer and collector outlets. While the least chosen outlet was found to be wholesaler outlet.

Table 3. Market outlet choices of rice producers.

Outlet choices	Wholesaler		Processor		Retailor		Collector	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Yes	17	8.02	148	69.81	45	21.23	28	13.21
No	195	91.98	64	30.19	167	78.77	184	86.79

Source: Survey data, 2020.

3.2. Econometrics Analysis on Determinants of Market Outlet Choice of the Smallholder Rice Producers

The Multivariate probit model fitness was reasonably good and explanatory power of the independent variables in the model is satisfactory as indicated by Wald test (χ^2 (44) = 82.77, $p = 0.0004$) that is significant at the 1%. The model is significant because the null hypothesis that market outlet choice decision of the four market outlets is independent was rejected at 10% significance level. The likelihood ratio test in the model (LR χ^2 (6) = 81.8106, $\chi^2 > p = 0.0000$) indicates the null hypothesis that the independence between market outlet choice decision ($\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$) is rejected at 1% significance level and there are significant joint correlations for four estimated coefficients across the equations in the models. This verifies that separate estimation of choice decision of these outlets is biased, and the decisions to choose the four

rice marketing outlets are interdependent for household decisions. Accordingly, out of nine explanatory variables included in multivariate probit model, three and two variables significantly affected wholesaler, processor and collector and retailer market outlet respectively (table 4). Sex of the household head was found to have a negative and significant relation with the likelihood of choosing wholesaler and retailer market outlet at 5% significance level. It indicated, female farmers are selling their produce to wholesalers and retailers than male. This may be due to the fact that female farmers have a tendency of producing small volume of rice. This result is consistent with the findings of [18]. The farming experience was found to have a negative and significant relation with the likelihood of choosing wholesaler while a positive and significant relation with the likelihood of choosing processor outlet at 10% significance level. The result revealed, when rice farming experience increase by one year, the probability of

farmers to sell their produce to the wholesaler and processor outlet is decreased by 4.2% and 3%, respectively. It indicated, the number of wholesalers in Fogera district are not more than three. Due to this fact, the price setting character of wholesalers is discouraging rice producers. Hence, the experienced farmers choose processors because these farmers have established a long-term customer ship with processors and trust has built. This reduces intentional rice breakage during processing. It confirms the finding of [19]. Distance to road was found to have negatively and significantly related with the likelihood of household heads choosing processor outlet at 5% significance level. It indicated, as distance from road increase by one kilometer, the probability of choosing processor outlet is decreased by 8.5%. This indicated, those farmers who are near to the road are selling their rice to processors in the main market, while farmers' opinion during the focus group discussion revealed that rice farm households' who are a big far from the road are selling their produce to collectors in paddy form at lower price. Membership of rice producers in any

Cooperative was found to have negatively and significantly related with collector's outlet at 10% significance level. It showed, farmers who are not members of the cooperatives are selling their produce to collectors. It might be due to the fact that non-members have low chance to aggregate their produce at better price. This result is in line with the findings of [17]. Access to market information was found to have a positive and significant relationship with wholesaler, processor, and collector outlets at 10%, 1% and 5% significant level, respectively. However, it has a negative and significant relation with retailer outlet at 5% significance level. It indicated, farmers who did not have access to market information sell their produce to the retailers. This may be due to the fact that those who have market information haven't preferred retailer outlet because retailers have assumed high profit margin. Marketing distance was found to have a positive and significant relation with collector outlet. It revealed, the increase in market distance increases the probability of choosing to sell for collectors to reduce transaction cost.

Table 4. Multivariate probit model result.

Variables	Wholesaler	Processor	Retailer	Collector
Sex	-0.694** (0.334)	0.188 (0.264)	-0.543** (0.261)	0.2 (0.348)
Age	0.004 (0.011)	-0.002 (0.008)	-0.003 (0.009)	-0.013 (0.01)
Education	-0.059 (0.048)	0.023 (0.033)	-0.009 (0.035)	-0.029 (0.042)
Farming experience rice	-0.042* (0.024)	0.030* (0.016)	0.003 (0.016)	0.015 (0.018)
Household size	-0.107 (0.077)	0.039 (0.052)	-0.05 (0.054)	0.035 (0.062)
Distance road	-0.036 (0.087)	-0.085** (0.026)	-0.016 (0.06)	0.035 (0.069)
Cooperative	-0.407 (0.291)	0.111 (0.209)	0.284 (0.223)	-0.474* (0.248)
Credit use	0.038 (0.403)	0.141 (0.266)	-0.329 (0.30)	-0.438 (0.358)
Information	0.603* (0.355)	0.131*** (0.024)	-0.519** (0.225)	0.665** (0.311)
Cultivated rice land	-0.211 (0.555)	0.379 (0.386)	-0.321 (0.404)	-0.244 (0.49)
Marketing distance	0.013 (0.026)	0.006 (0.019)	0.023 (0.02)	0.047** (0.023)
Constant	0.148 (1.053)	-0.173 (0.742)	0.278 (0.778)	-0.225 (0.915)
Log likelihood -304.75027				
Wald chi 2 (44) 82.77***				
Likelihood ratio test of rho 81.8106***				
Observation 212				

Source: Survey data, 2020.

4. Conclusion and Recommendations

Due to the nature of the crop, there is a continuous and reasonable compliance from producer side in rice output marketing process. Addressing their compliance at first hand requires mapping the market outlet choices and identifying drivers for respective choices. Therefore, this study aimed to identify drivers of rice market outlet choices of smallholder rice producers in northwest Ethiopia. Wholesaler outlet was negatively and significantly affected by sex and farm experience and positively and significantly affected by access to market information. Processor outlet was positively and significantly influenced by farm experience and access to market information while it is negatively and significantly influenced by distance to the road. Retailer outlet was negatively and significantly influenced by sex and access to market information. Whereas collector's outlet was positively

and negatively influenced by access to market information and cooperative membership and market distance, respectively. Therefore, referring findings of the study, organizing farmers marketing group to enhance their bargaining power, in line with formulating rice producers-based processing cooperative, promoting paddy marketing, and improving road infrastructure were forwarded as recommendations for the rice sector to minimize the producers' compliance on the issue of getting fair benefit in the process of output marketing.

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