

*Full Length Research Paper*

# **Determinants of intensity of market participation of smallholder rice producers: The case of Shebe Sombo District, Southwest Ethiopia.**

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Accepted 17 August, 2018

**The study aimed at identifying factors affecting intensity of market participation of smallholder rice producers in Shebe Sombo district, Southwest Ethiopia. Multi-stage sampling procedure was employed to draw a sample of 148 rice producers from four kebeles (Urban dwellers' associations). Both qualitative and quantitative types of data were collected from primary and secondary sources by using a structured and semi- structured questionnaire; focus group discussion and key informant interview were conducted by using checklist. Tobit model was used to identify factors affecting intensity of market participation. The result obtained from Tobit regression indicated that variables such as family size, non-farm income, livestock holding and distance to the nearest market determined intensity of market participation negatively while variables such as education of households, farming experience, land allocated for rice, value adding activities, number of extension contacts, amount of credit used, membership in cooperative and access to market information determined intensity of market participation positively at different significance level. Therefore, promoting family planning, create reliable market information, provide good transport facilities for farmers through development of infrastructure, strong extension intervention, strengthening education and credit used are quite important for promoting intensive involvement of the farmers in the market.**

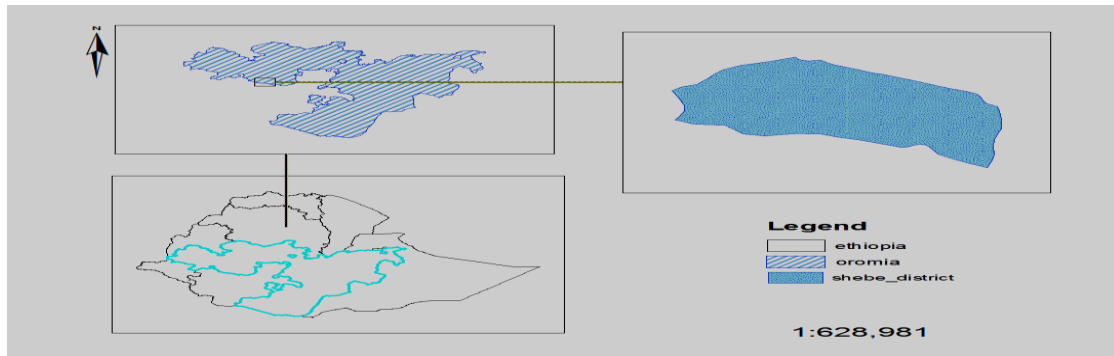
**Key words:** Market participation, rice, Tobit model

## **INTRODUCTION**

Agriculture continues to be a strategic sector in most of the developing countries. It employs more than 40% of the active labor force globally (Musah et al., 2014). In East African countries, including Kenya, Ethiopia, Uganda and Tanzania, smallholder farming accounts for about 75 % of agricultural production (Salami et al., 2010). In Ethiopia, approximately 95 % of the total area is cultivated by smallholder farmers and 90 % of the total agricultural output comes out of them. This confirms the dominant contribution of smallholder farmers to the overall agricultural growth in the country. In short, the overall economy of Ethiopia depends on agricultural sector development; the entire movement of the agriculture sector depends on what is happening in smallholder sub-sector (MoARD 2010)

Recently, the governments of Ethiopia have sought to promote diversification of production and exports away from the traditional commodities in order to accelerate economic growth, expand employment opportunities, and reduce rural poverty. Among the target commodities which have received due attention to accelerate economic growth and reduce rural poverty, rice is the one considered as the “millennium crop” expected to be one of the potential strategic commodity crops that can assure food security and poverty reduction in Ethiopia (Zenna et al., 2008). Rice production has brought a

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**Figure 1.** Map of the study area in Shebe Sombo district of Jimma zone, Southwest of Ethiopia

significant change in the livelihood of many farmers and created job opportunities for a number of citizens in different areas of the country. The country has vast suitable ecologies for rice production along with the possibility of growing it where other food crops do not do well. The potential rice production area in Ethiopia is estimated to be about thirty million hectares (Kirub et al., 2011). The government of Ethiopia is given due attention for promotion of rice development and marketing including value addition. The vision of the government is to see the existing limited area and subsistence dominated rice subsector transformed progressively in to commercially profitable and viable production system (Negussie and Alemu, 2011).

However, rice marketing chain is poorly organized in Ethiopia, farmers sell their rice product at nearby local markets to collectors, to rice processors as paddy (unhulled rice) or sell to traders coming at farm gate. There is no systematically developed marketing means and market linkage except the traditional system, which runs by individuals (Shiratori et al., 2014). Despite the significance of rice in the livelihood of many farmers and income generating crop in Ethiopia, the supply is constrained by different factors. These are knowledge of grading, market information, lack of group marketing options (coop/unions), use of storage as marketing strategy (Berhe, 2003). Understanding the factors affecting market participation decisions as well as extent of participation and how the bottlenecks associated with these factors can be alleviated is fundamental in improving marketing and the wellbeing of emerging small holder livelihood (Omiti et al., 2009). Thus, the question of smallholder participation and level of participation in Agricultural Value Chains (AVCs) is of great importance to policymakers seeking to stimulate rural economic growth and poverty reduction (Barrett, 2008). Although, studies conducted earlier on rice sub-sector in Ethiopia (Takele, 2010, Kassa, 2010, Abebe, 2016) did not touch factors affecting participation and intensity of market of small scale rice producers in spite of the fact that it is indispensable for the agricultural development

programs. Rice is one of the potential crops produced in Shebe Sombo District, Southwest Ethiopia, which has a significant contribution to the income of the household as well as ensuring food security. But, market participation and level of participation of smallholder rice producers is subject to combined effect of socio-economic, demographic and institutional factors in the study area. Although rice production in Shebe Sombo Woreda in Southwest Ethiopia is high, information related with the determinants of smallholder farmers' participation and intensity of participation in rice market is lacking. Therefore, this study was conducted with the main purpose of identifying factors affecting intensity of market participation of smallholder rice producers in the area.

## METHODOLOGY

### Description of the study area

The study was conducted in Shebe Sombo district of Jimma zone, Southwest of Ethiopia (Figure 1). The district is one of the 18 districts of Jimma zone which is located 395 km Southwest of Addis Ababa and 50 km South of Jimma town. The district covers an area of 1191 km<sup>2</sup> and it has 20 rural and 2 urban kebeles (Urban dwellers' associations). The total population of the district was estimated to be 141,037 from which male and female account 71,150 and 69,887, respectively CSA (2013). The area has potential cultivable land of 29,668 ha and 16,805 ha of uncultivable land. There are, 17,346.0 ha of coffee land, 22,509.9 ha of forestland and 596.0 ha of grassland. Besides, there are 2798.0 ha of waterlogged areas found in the District. The District has diverse agro-ecological zones, from the total area, highland (15%), midland (49%), and lowland (36%). The District is characterized by subsistence mixed farming system in which production of both crops and livestock is a common economic activity.

### Types, sources and methods of data collection

To conduct this study, both qualitative and quantitative

**Table 1.** Sample size determination of rice producers in Shebe Sombo district of Jimma zone, Southwest of Ethiopia

Kebeles	Number of households	Proportion	Sample households
Machi	568	0.208	31
Gasara	823	0.302	45
Kishe	906	0.33	49
Angecha	432	0.16	23
Total	2729	1	148

**Source.** Agricultural Bureau of Shebe Sombo (own computation)

types of data were collected from both primary and secondary sources of data. Primary data was collected from sample rice producers, District agricultural offices, Cooperative offices and Trade market development office. Document review such as journals, books, Central Statistics Agency (CSA), national policies, District reports, different relevant published and unpublished reports, bulletins and websites were consulted to generate relevant secondary data on rice products and market participation. To capture adequate data for the study, both structured and semi-structured questionnaire were prepared. The enumerators who have college diploma and working as development agents, were selected and trained on data collection procedures and interview techniques in order to simplify the complexity of data collection. On top of conducting individual interviews, focus group discussion and key informant interview were held by using checklists. The reliability and validity of the questioner were tested through Cronbach Alpha formula.

### Sampling techniques and sample size determination

Shebe Sombo District was selected purposively as the study area based on the extent of rice production and participation of farmers in rice marketing. There are 20 rural kebele administrations in the Shebe Sombo District. From these rural kebele administrations, 12 kebeles are producing rice. Four kebele administrations were randomly selected from 12 rice producing kebeles. Hence, due to financial and time constraints, the formal survey narrowed its scope to 4 rural kebele administrations which were selected randomly from the total of 12 kebeles. Finally, based on the sampling frame drawn from each kebele administration, simple random sampling technique was applied to select 148 rice producing farmers. Simplified formula provided by (Yamane, 1973) was used to calculate the sample size of rice producers. Accordingly, the required sample size at 95% confidence level with degree of variability of 5% and

level of precision equal to 8% were used to obtain a sample size required, which represent a true population (Table 1).

$$n = \frac{N}{1+N(e)^2} = \frac{2729}{1+2729(0.08)^2} = 147.8 \approx 148 \quad (1)$$

Where, n = sample size, N = population size (sampling frame) and e = the desired level of precision (in this case 8% considered).

### Method of data analysis

#### Descriptive analysis

Descriptive statistics such as frequency, mean and percentage were used in the process of comparing socio-economic, demographic and institutional characteristics of households.

#### Econometric analysis

Majority of the rice producers in the study area practiced rice production both for food and as a source of income. A large proportion of the rice producers therefore participated in rice marketing, however, the degree of participation varies among households. This situation disqualified the two step procedures like Heckman or Double Hurdle model in analysis of the data, because of a fewer number of non-participants in rice market. Because of the predetermined selection of households based on production and marketing of rice in the study area, the data collected did not allow the use of selectivity models. Tobit interprets all the zero observations as corner solutions where the household is assumed to be a rice seller with zero sales. The aim of the study was to look at factors that increase the level of farmers' participation in the rice market. Ideally, the Ordinary Least Square (OLS) model is applicable when all households participate in the market but in this study not

**Table 2.** Hypothesized variables with expected sign in the study of rice producers in Shebe Sombo district of Jimma zone, Southwest of Ethiopia

Variables	Representation	Measurement	Expected effect
Family size	HFS	Number of person	±
Age of the household	AGE	Years	±
Sex of the household	SEX	1=Male,0=Female	±
Education of household head	EDU	Years of schooling	+
Rice farming experience	RFE	Number of years	+
Non-Farm income	NFI	ETB birr	+
Livestock holding	TLU	Tropical unit	+
Total land holding	TLH	Ha	+
Land allocated to rice	LSIZE	Hectare	+
Quantity of rice production	QRP	Quintal	+
Value Adding activities	VA	1=yes,0=otherwise	+
Amount of credit used	CRU	ETB birr	+
Membership in cooperative	MCOOP	1=Yes,0=otherwise	+
Distance to nearest market	DMRKT	Kilometer	-
Access to market information	MINFO	1=Yes,0=otherwise	+
Perception on current prices	PCPRICE	1= attractive, 0=otherwise	+
Number of extension contact	NEXT	Number	+

all households participate in the rice market. If the OLS regression is estimated excluding the non-participants from the analysis, a sample selectivity bias is introduced into the model. Therefore, Tobit model was used to identify determinants of smallholder farmers' intensity of participation in rice market. The model assumes that the decision to sell and the actual sales level were simultaneously determined by the same variables such that the variables that increased the probability of selling also increase the total amount of output sold. This study purposively analyzed the intensity of market participation in order to trace factors that influence the degree of market participation among households in the study area. The observed amount of rice output  $Y_i$  that is actually sold in the market was used as a relevant proxy for intensity of market participation. The focus on intensity of participation would enable the identification of variations among the household specific rice output sale. The decision to participate in rice market and the intensity of participation were thus jointly determined (Sindi, 2008). The model assumes normal distribution with constant variance (Greene, 2003) and was specified as shown in

equations below.

$$y_i^* = \beta_0 + \sum_{i=1}^m \beta_i x_i + \varepsilon_i \quad (2)$$

$$y_i = \begin{cases} y_i^* = \beta_0 + \sum_{i=1}^m \beta_i x_i + \varepsilon_i, & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \quad (3)$$

Where:

$y_i$  is intensity of participation (dependent variable);  $y_i^*$  is the latent variable which is not observable;  $\beta_0$  is an intercept;  $\beta_i$  is coefficient of the  $i^{\text{th}}$  independent variable;  $x_i$  is vector of independent variables determining intensity of participation (Table 2); and  $i$  is 1, 2, 3,.....,  $m$ ; and  $\varepsilon_i$  are the error/disturbance term that are independently and normally distributed with mean zero and a common variance  $\sigma^2$ . Interpreting the coefficients of a Tobit model is not in the same way as one interprets coefficients in an uncensored linear model (Johnston and Dinardo, 1997). Hence, it was sensible to compute the derivatives of the estimated Tobit model to predict the marginal effects of changes in the explanatory variables. A change in explanatory variables has two

**Table 3.** Description of variables by market participation status of rice producers in Shebe Sombo district of Jimma zone, Southwest of Ethiopia.

Continuous variables	Non-participant (n=29)	Participant (n=119)	Overall (n=148)	t value
	Mean	Mean	Mean	
Age of the household (years)	48.4	44.8	45.5	1.80*
Education of the household (years)	0.1	2.3	1.8	3.27***
Family size (Number)	12.3	10.2	10.5	-3.98***
Rice farming experience (years)	14.3	16.3	15.9	2.42**
Non-farm income (000)' (ETB birr)	6.111	2.3	3.051	-3.90***
Livestock holding (TLU)	11.9	6.6	7.6	-5.40***
Total land holding (Ha)	1.20	2.40	2.15	5.06***
Land allocated to rice (Ha)	0.50	1.10	0.95	4.30***
Amount of credit used (000)' (ETB birr)	0.095	1.885	1.533	3.06***
Distance to nearest market (Km)	11.5	7.2	8.1	-6.70***
Number of Extension contact (Number)	1.7	1.8	1.8	0.64
Rice production (quintal)	15.60	40.14	35.30	4.70***
Dummy Variables (yes, %)	(%)	(%)	(%)	$\chi^2$ value
Sex (male)	93.3	89.9	90.5	0.23
Access to market information (yes, %)	24.1	54.6	48.6	8.67***
Perception on current prices (Attractive, %)	34.5	68.1	61.5	11.12***
Membership in cooperative (yes, %)	20.7	42.9	38.5	4.84**
Value adding activities (yes, %)	34.5	62.2	56.8	7.30***

\*\*\*, \*\* and \* represents significance at 0.01, 0.05 and 0.10 probability levels, respectively

effects. It affects the conditional mean of  $Y_i^*$  in the positive part of the distribution, and it affects the probability that the observation will fall in that part of the distribution.

1) The marginal effect of an explanatory variable on the expected value of the dependent variable is:

$$\frac{\partial E(y_i)}{\partial x_i} = F(z)\beta_i \tag{4}$$

Where, z represents  $\frac{\beta_i x_i}{\sigma}$  (Maddala, 1997)

2) The change in intensity of market participation with respect to a change in an explanatory variable among participants of market is:

$$\frac{\partial E(y_i/Y_i > 0)}{\partial x_i} = \beta_i \left[ 1 - z \frac{f(z)}{F(z)} - \left( \frac{f(z)}{F(z)} \right)^2 \right] \tag{5}$$

Where, F(z) is the cumulative normal distribution of Z, f(z) is the value of the derivative of the normal curve at a given point (that is, unit normal density), Z is the z-score for the area under normal curve,  $\beta$  is a vector of Tobit maximum likelihood estimates and  $\sigma$  is the standard error of the error term.

**Definition of variables and hypothesis**

**Dependent variables**

**Market participation decision and intensity of participation:** For the sample households who do not participate in

rice market it takes a value of 0, and for those who participated in rice market it takes the amount of rice actually supplied to the market and sold by the household in 2015/16.

## RESULTS AND DISCUSSION

From the survey, total households of about 80% of the sample rice producers participated in rice market. The participation of households in rice market is subject to the interactive effect of demographic, socio-economic, institutional factors. To examine the critical factors causing variation among market participants and non-participants, both t-test and chi-square test have been used for continuous and dummy variables, respectively (table 3).

Accordingly, the mean age of the sample households was 44.8 and 48.4 years for rice market participants and non-participants, respectively. The mean age of non-participants is greater than that of the participants. There is statistically significant difference between mean age of household participate and non-participate in rice market at 10% level of significance. This implies that market participation decreases when age is increasing. The mean production experience of non-participants and participants is 14.3 and 16.3 year, respectively, which is statistically significant at 5% level of significance. The mean production experience of rice market participants is greater than that of non-participant. This implies that when farmers are getting more experienced in farming, their level of understanding on benefit of participating in rice market is increasing. The mean family size of non-participants and participants in rice market is 12.3 and 10.2, respectively, which is statistically significant at 1% level of significance. The mean family size of non-participant is greater than that of participant. This implies that family size affects rice marketing, as the family size increases consumption may increase which decrease marketed surplus of rice. To assess the livestock holding of each household, the tropical livestock unit (TLU) per household was calculated. The mean livestock holding of the total sample of households was 7.6 TLU. From this the participants and non-participant average livestock holding was 6.6 and 11.9 TLU, respectively. The analysis of independent t-test revealed that there is significant difference in livestock holding at 1% significance level between rice market participant and non-participants. Non participants have large number of livestock than participants; this showed that livestock holding have negative sign on intensity of market participation. However, an increase in size of livestock affected the decision of rice market participation negatively, farmers who have low production of rice may need to specialize in livestock production and hence it has negative impacts on marketed participation.

Education enhances access to information processing for technological uptake and higher farm productivity (Tufa et al., 2014). On average, the educational level of the sample household by schooling years was 1.8 years, and it was 2.3 and 0.1 years for rice market participants and non-participants, respectively. Households that attended formal schooling has participated more in rice market than households that did not attend formal schooling. The independent sample t-test indicates that there is a significant difference between rice market participants and non-participants at 1% significance level in their education. This implies that being educated increases the probability of involving in rice market by fostering their ability of obtaining new ideas and innovations related with the market. The average total land holding size by sample respondents was 2.15 hectares per household. The participants and non-participant mean total land holding size was 2.40 and 1.20 ha, respectively. The average land allocated for rice production in the year 2015/16 by sample respondents was 0.95 ha per household. The participants and non-participant mean land allocated for rice production was 1.10 and 0.50 hectares, respectively. The analysis of independent t-test revealed that there is significant difference in total land holding size and land allocation for rice production at 1% significance level between market participants and non-participants in the study area. This implies that land is a scarce resource and it is more likely that those with larger quantities of land resort to cultivation of more crops, and any increase of the size of land allocated to rice production leads to an increase of rice produced and hence positively affects the volume of rice sold in the market.

The result of the survey shows that, on average, the amount of credit received by sample household was 1533 ET birr. The participants and non-participant average amount of credit received was 1885 and 91.3 ET birr, respectively. Based on the independent t-test there is statistically significant difference between market participant and non-participant in terms of credit received at 1% significance level. This implies that market participant farmers had more credit than non-participant farmers. Hence, using credit enables farmers to purchase improved inputs as well as owning of transportation means which improve their production and marketing system and eventually leads to farmers' participation in formal market. The average income from non-farm activities of the sample households was 3,051 ET birr per year and it was 2,305 and 6,111 ET birr for participants and non-participants, respectively. The t-test result indicated that there is a significant mean difference between rice market participants and non-participants at 1% significant level. Non-participant households had higher non-farm income level than market participating households. This may be explained by the fact that

farmers who have better non-farm income will not tend to generate cash from sell of rice product (agricultural commodities) rather from their non-farm income.

The mean production of rice by sample household was 35.30 quintals and it was 40.14 and 15.60 quintals for participants and non-participants, respectively. Households with larger quantity of rice produced had higher marketed surplus than households with small quantity of rice produced. The analysis of independent t-test revealed that there was significant difference in total production of rice at 1% significance level between market participants and non-participants. This indicates that the total quantity of output produced per season determines the market participation of farmers. On average, the distance to nearest market by sample household was 8.1 kilometers and it was 7.2 and 11.5 kilometers for market participants and non-participants respectively. This indicated non-participant farmers were far away from the market which is difficult to access buyers who offer better payment. The t-test result also indicated that, there is a significance mean differences between market participants and non-participants at 1% significance level in terms of distance to nearest market. The chi-square test of dummy variables indicated that there was statistically significant difference between participants and non-participants in terms of access to market information, membership in cooperative, perception of price on rice and participate in value adding activities (at 1, 1, 5 and 1% significance level, respectively). The percentage of participants is greater than that of non-participant for these four variables. Accordingly, variables such as sex and number of extension contact are not significant indicating that there is no significant difference in the variables across market participation.

#### **Factors affecting intensity of participation in rice market**

The results of Tobit model for factors affecting farmers' intensity of participation in rice market are displayed in Table 4. The overall goodness of fit Tobit model, parameter estimates is assessed based on the likelihood ratio test. The null hypothesis for the likelihood ratio test revealed that all the coefficients are jointly zero. The model chi-square test applying appropriate degrees of freedom indicate that the overall goodness of fit for the model is statistically significant at a probability of less than 1%. This implied that jointly the independent variables included in the model explain the intensity of market participation. The reliability and validity of the data were also tested through Cronbach Alpha method. Accordingly, the reliability coefficient is 0.771 while the index of reliability is 0.878. The index of reliability implies that the test measures true ability of the subjects to the

extent of 88%.

Family size affected the probability and intensity of market participation negatively at 1% level of significance as depicted in Table 4. A one-unit increase in family size decreases the probability and intensity of participation of rice producers by 0.06 and 88.3%, respectively, keeping other variables constant. The actual quantity of rice supply is conditional on the decision to participate in the market also decreases by 87.6% if the family size increases by a unit. This implies that as family size increases, consumption of rice at household level increases and increased consumption of rice may lead to decrease in quantity of rice supplied to the market. These results are consistent with the finding of Mazengia (2016) that household size is negatively associated with the intensity of market participation in the case of Northwestern Ethiopia.

Education of the households was positively correlated with the probability and intensity of participation in rice market at 1% level of significance. A one-unit increase in education status, increase the probability and intensity of participation in rice market by 0.03 and 42.8%, respectively, holding other variables constant. The amount of rice sales is conditional on the decision to participate in market also increases by 42.5% when the farmer is getting educated. This implies that educated farmers possibly have a good ability of analyzing market condition and better exposure to the new ideas emerging from market. The result is in conformity with the findings of (Tufa et al., 2014) that states education increases intensity of market participation by improving farmers marketing performance.

Rice farming experience was positively correlated with the probability and intensity of participation in rice market at 1% level of significance. It was revealed that, a one-year increase in rice farming experience, leads to an increase in the probability and intensity of rice market participation by 0.02 and 25.6%, respectively, holding other variables constant. The amount of rice sales is conditional on the decision to participate in market also increases by 25.4% when the farmer is more experienced. This result is consistent with the results of (Agwu et al., 2012) who found that farming experience was significant and positive sign with the level of commercialization among small holder farmers in Nigeria

Non-farm income influences the probability and intensity of participation in rice market negatively at 1% level of significance. The result revealed that, each additional percent increase in non-farm income would significantly decrease the probability and intensity of participation in rice market by 0.01 and 17.8%, respectively, holding other variables constant. The amount of rice sales is conditional on the decision to participate in market also decrease by 17.7%. This implies that earning better income from non-farm activities like trading discourages farmers' intensity of

**Table 4.** Maximum likelihood estimates of Tobit model in the study of market participation of rice producers in Shebe Sombo district of Jimma zone, Southwest of Ethiopia.

MS	Coefficient	Standard. Error	Marginal effect	Marginal effect	Change in probability
Education	0.4284605***	0.1197997	0.428	0.425	0.0003
Family size	-0.883385***	0.1864471	-0.883	-0.876	-0.0006
Rice farming experience	0.2563311***	0.0948431	0.256	0.254	0.0002
Non-Farm income	-0.1782289***	0.0680083	-0.178	-0.177	-0.0001
Livestock holding (TLU)	-0.260245***	0.0874365	-0.260	-0.258	-0.0002
Land allocated for rice	3.829615***	0.4874883	3.827	3.799	0.0027
Value addition activities	1.408743*	0.7308688	1.408	1.398	0.0010
Number of Extension contact	2.208898***	0.7196628	2.207	2.191	0.0015
Amount of credit used	0.5368767***	0.129593	0.536	0.533	0.0004
Membership in cooperative	1.492264*	0.8687397	1.491	1.480	0.0010
Distance to nearest market	-1.060153***	0.1450325	-1.059	-1.052	-0.0007
Market information perception on Current price	1.680907**	0.7082252	1.680	1.667	0.0012
Constant	14.22313***	3.420349			
/sigma	3.80479	0.251192			
Log likelihood = -346.47828	Number of observations	148	Left censored observations	Uncensored observations	Right-censored observations
Pseudo R <sup>2</sup> = 31.8%			29	119	0
LR chi2(13) = 323.50					

participation in rice market because of the diversion of attention to better income generating activities. The finding is in line with that of Fengying and Chen (2014) who found that negative relationship between non-farm income and extent of rice market participation in Tanzania.

Livestock holding (TLU) negatively and significantly influences the probability and intensity of market participation at 1% significance level. As the number of livestock increased by one tropical unit, will result in decrease in the probability and intensity of market participation by 0.02 and 26.0% respectively, holding other variables constant. The amount of rice sales conditional on decision to participate in market also increases by 25.8%. This is mainly due to the fact that farmers with more TLU tend to specialize in livestock production reducing the importance of rice production as means of cash generation and hence it has negative impacts on the probability and intensity of market participation. The result is in line with that of Mussema (2006) that total tropical livestock unit has a negatively and significantly affected quantity of pepper sales.

Land allocated for rice positively and significantly influences the probability and intensity of market

participation at 1% significance level. As the land allocated for rice production increases by one hectare the probability and intensity of market participation increases by 0.27 and 382.7%, respectively, holding other variables constant. The amount of rice sales is conditional on decision to participate in market also increases by 379.9%. A farmer who relatively has the larger farm size would have more volume of rice both as food and cash crop. The finding is compatible with that of (Fengying and Chen 2014) who found that the size of land cultivated by the household have a positive significant effect on rice sales in Tanzania.

Value adding activities positively and significantly affects the probability and intensity of rice market participation at 10% significance level. Value adding activities increase the probability and intensity of rice market participation by 0.1% and 140.8%, respectively, holding other variables constant. The amount of rice sales conditional on decision to participate in market also increases by 139.8%. As farmer performing value adding activities, the productivities and qualities of rice increases, which in turn increase the marketed surplus of rice.

Number of extension contact affects positively and significantly the probability and intensity of rice market



participation at 1% significance level. The result shows that an increase in number of extension contacts resulted in an increase in the probability and intensity of market participation by 0.15% and 220.7%, respectively, holding other variables constant. The amount of rice sales conditional on decision to participate in market also increases by 219.1%. The result is in line with the study of Kuma (2012) who revealed that negative livestock extension services decreased milk value addition.

Amount of credit used was positively and significantly related with probability and intensity of market participation at 1% significant level. A one percent increase in amount of credit used would result an increase in the probability and intensity of rice market participation by 0.04% and 53.6% respectively, holding other variables constant. The amount of rice sales conditional on decision to participate in market also increases by 53.3%. From this result, it can be stated that those farmers who have used more credit, are more probable to supply rice than those who have not used credit/used less amount of credit. The result is in line with that of (Abera et al., 2016) who found that use of credit was significantly and positively associated with the level of market participation.

Membership in cooperative positively and significantly influences the probability and intensity of market participation at 10% significance level. Being a membership of a cooperative increases the probability and intensity of market participation by 0.1% and 149.1%, respectively, holding other variables constant. The amount of rice sales conditional on decision to participate in market also increases by 148.0%. The implication is that membership in cooperative could have better access of market information, inputs, extension services and credit facilities that is important to production and marketing decisions. The result is in line with the findings of (Abera et al., 2016) and (Adeoti et al., 2014) who found that being a member of cooperative motivate farmers to participate in the market through networking and provision of up-to-date information to members.

Distance to the nearest market negatively and significantly influences the probability and intensity of marketed participation at 1% significant level. When the household is located extra one kilometer away from the market, the probability and intensity of rice market participation would decrease by 0.07% and 105.9%, respectively, holding other variables constant. The amount of rice sales conditional on decision to participate in market also decrease by 105.2%. This implies that farmer households located far from market facing high transportation costs and thereby leading to decide not to participate. The finding agrees with that of Achandi and Mujawamariya (2016) who found that distance to the market have a negative and significant effect on both the farmer's decision to participate and the extent of farmer participation in the market.

Access to market information significantly and positively influence the probability and intensity of market participation at 5% significant level. The result shows that household who had access to market information increases the probability and intensity of participation by 0.12% and 168.0%, respectively, all other factors being unchanged. The amount of rice sales conditional on decision to participate in market also increases by 166.7%. Market information is a vital instrument during marketing because it informs the farmers about marketing conditions. The finding is consistent with the results of (Musah et al., 2014) who found that the existence of positive relationship between market information and the quantity of maize sold.

## CONCLUSION AND RECOMMENDATION

The result obtained from Tobit regression indicated that variables such as family size, non-farm income, livestock holding and distance to the nearest market determined intensity of market participation negatively while variables such as education of households, farming experience, land allocated for rice, value adding activities, number of extension contact, amount of credit used, membership in cooperative and access to market information determined intensity of market participation positively at different significance level. Based on the findings of this study, the following recommendations are necessary to develop sustainable production and marketing of rice and to increase competitiveness of smallholder rice producers. It is very important to empower farmers to get the best practices through training and information; reliable market information should be available to all participants in the chain. To enhance borrowing and use of credit educational programs should be formulating to educate farmers on credit achievement and use. Infrastructural development should be improved; this will lower the rate of transaction cost. In addition, promoting family planning program is quite important for the intensive involvement of farmers in the market. Encouraging farmers to form cooperatives/farmers organization or join existing ones will be a step in the right direction, through which can take advantages of bargain power in the input and output market. Building education capacity of rural farmers through arranging consecutive trainings and experience sharing sessions among smallholder farmers or arranging other formal way of education such as adult education should be designed to increase rice marketed surplus.

## REFERENCES

- Abebe M (2016). The Contributions and Challenges of Rice Value Chain Development on the Livelihood of Small Holder Rice Farmers.
- Abera S, Alemu D, Zemedu L (2016). Determinants of Haricot Bean Market Participation in Misrak

- Badawacho District, Hadiya zone, Southern Nations Nationalities and Peoples Regional State, Ethiopia. *Ethiopian J. Agric. Sci.*, 26(2), 69-81.
- Achandi EL, Mujawamariya G (2016). Market participation by smallholder rice farmers in Tanzania: a double hurdle analysis. *Stud. Agric. Econ.*, 118(2), 112-115.
- Adeoti AI, Oluwatayo IB, Soliu RO (2014). Determinants of market participation among maize producers in Oyo state, Nigeria. *Br. J. Econ. Manage. Trade*, 4(7), 1115-1127.
- Agwu NM, Anyanwu CI, Mendie EI (2012). Socio-economic determinants of commercialization among smallholder farmers in Abia State, Nigeria. *Greener J. Agric. Sci.*, 2(8), 392-397.
- Barrett CB (2008). Smallholder market participation: Concepts and evidence from eastern and southern Africa. *Food policy*, 33(4), 299-317.
- Berhe T (2003). Rice: A high potential emergency and food security crop for Ethiopia. SG2000
- CSA E (2013). Population projection of Ethiopia for all regions at wereda level from 2014–2017. Central Statistical Agency of Ethiopia.
- Johnston J, Dinardo J (1997). *Econometric methods*. (Fourth Edition) McGraw-Hill Companies, Inc, 204-326.
- Fengying NSBN, Chen F (2014). An Analysis of Factors Affecting Smallholder Rice Farmers' Level of Sales and Market Participation in Tanzania; Evidence from National Panel Survey Data 2010-2011.
- Greene WH (2003). *Econometric Analysis* (Prentice Hall, New Jersey).
- Kassa B. (2010). Rice value chain in Metema District, North Gondar, Ethiopia: Challenges and opportunities for innovation (Doctoral dissertation, Addis Ababa University).
- Kirub A, Alemu D, Shiratori K, Assefa K (2011). Challenges and Opportunities of Rice in Ethiopian Agricultural Development
- Kuma B (2012). Market access and value chain analysis of dairy industry in Ethiopia: The case of Wolaita Zone (Doctoral dissertation, Haramaya University).
- Maddala GS (1992). *Limited Dependent and Qualitative Variables in Econometrics*. Cambridge University press, Cambridge. pp. 175-181
- Mazengia Y (2016). Smallholders commercialization of maize production in Guangua district, northwestern Ethiopia. *World Scientific News*, 58, 65-83.
- Ministry of Agriculture and Rural Development (MoARD) (2010). Ethiopia's Agricultural and Sector Policy and Investment Framework (PIF): 2010-2020, Addis Ababa, Ethiopia
- Musah AB, Bonsu OAY, Seini W (2014). Market participation of smallholder maize farmers in the upper west region of Ghana. *Afri. J Agric. Res.*, 9(31), 2427-2435.
- Mussema R (2006). Analysis of red pepper marketing: the case of Alaba and Siltie in SNNPRS of Ethiopia (Doctoral dissertation, Haramaya University).
- Negussie T, Alemu D (2011). An Overview of the National Rice Research and Development Strategy and its Implementation. Challenges and Opportunities of Rice in Ethiopian Agricultural Development, 1-16.
- Omiti J, Otieno D, Nyanamba T, McCullough E (2009). Factors influencing the intensity of market participation by smallholder farmers: A case study of rural and peri-urban areas of Kenya. *Afri. J. Agric. Res. Econ.*, 3(1), 57-82.
- Salami A, Kamara B, Brixiova Z (2010). Smallholder Agriculture in East Africa: Trends, Constraints and Opportunities. African Development Bank Group, Working Paper Series No. 105.
- Shiratori K, Alemu D, Kelemu F (2014). Rice Mechanization.
- Sindi JK (2008). Kenya's Domestic Horticulture Subsector: What Drives Commercialization Decisions by Rural Households? Michigan State University. Department of Agricultural Economics.
- Takele A (2010). Analysis of rice profitability and marketing chain: The case of Fogera Woreda, South Gondar Zone, Amhara national regional state, Ethiopia (Doctoral dissertation, Haramaya University).
- Tufa A, Bekele A, Zemedu L (2014). Determinants of smallholder commercialization of horticultural crops in Gemechis District, West Hararghe Zone, Ethiopia. *Afri. J. Agric. Res.*, 9(3), 310-319.
- Yamane T (1973). *Statistics: An introductory analysis*.
- Zenna NS, Gebre-Tsadik Z, Berhe T (2008). Moving up in Ethiopia. *Rice today*. 24-25.