Smallholders commercialization of maize production in Guangua district, northwestern Ethiopia

Yallew Mazengia

Pawe Agricultural Research Center, Ethiopian Institute of Agricultural Research, Pawe, Ethiopia

E-mail address: meetyalew@gmail.com

ABSTRACT

In the urge for transforming the subsistence-oriented production system, the government of Ethiopia has developed and implemented different policies under the umbrella of the countries' policy Agricultural Development Led Industrialization (ADLI). This study is intended to support the government's decision-making in transforming market-oriented agricultural development through provision of current and specific information on the level of farmers' participation in maize output market and determinants of farmers' participation in maize output market in Guangua district of Amhara National Regional State. Primary data was collected from 160 randomly selected smallholder farm households from four randomly selected kebeles in the district. The survey data was analyzed using descriptive statistics and double-hurdle model. From the descriptive statistics it was found that the level of commercialization of maize in the district was 44%. Results of the double-hurdle model analysis showed that in the first hurdle, educational status of the household head, price perception and land holding size played positive and significant role in households' decision to participate in maize output sales; whereas, distance from extension office was found to affect participation in maize sales negatively and significantly. In the second hurdle; gender of the household head, household size and land holding size have positive and significant role in the volume of maize sold; while distance to the market was found to have negative significant role. Land holding was found to affect both households' decisions to participate and intensity of participation in maize sales. Based on the findings it is recommended that the government have to strengthen the rural education system, its effort in expanding agricultural extension centers, enhance participation of female headed households, strengthen the family planning program and help the farmers improve land productivity, where possible, by promoting intensification and increasing provision of inputs so as to generate surplus maize output and boost sales.

1. INTRODUCTION

Background of the Study

Agriculture continues to be strategic sector in most of the developing countries. It employs more than 40% of the active labor force globally (Benjamin *et al*., 2014). In East African countries, including Kenya, Ethiopia, Uganda and Tanzania smallholder farming accounts for about 75 percent of agricultural production (Salami *et al*., 2010). In Ethiopia, approximately 95 percent of the total area is cultivated by smallholder farmers and 90 percent 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).

According to Ministry of Finance and Economic Development MoFED (2006), the Ethiopian government has prioritized commercialization of farming as a policy agenda since 2005 when Poverty Reduction Strategy Paper (PRSP) was prepared. This paper which is also known as the Plan for Accelerated and Sustainable Development to End Poverty (PASDEP), is established up on eight pillars; among which the second pillar intends to achieve growth and thereby improve people's livelihoods and reduce poverty. In this plan there are two directions aimed to achieve the aforementioned objectives: commercialization of agriculture and accelerating the development of private sector, both within and outside agriculture.

The strategy plan depends mainly on transforming the agricultural sector through major efforts to support the intensification of marketable farm products - both for domestic and export markets, and by both small and large farmers. The strategy includes a shift to higher-valued crops, promoting high-value export crops, focusing on selected high-potential areas, facilitating the commercialization of agriculture, supporting the development of large-scale commercial agriculture where it is feasible, and better integrating farmers with markets (both local and global). The strategy puts that the private sector, which includes the millions of small farmers should drive these efforts (Samuel and Key, 2007).

Looking into maize sector, Ethiopia is a significant maize producer in Africa, and this could be further enhanced through proper application of recommended inputs. Currently, Ethiopia is the fourth largest maize producing country in Africa, and first in the East African region. It is also significant that Ethiopia produces non-genetically modified (GMO) white maize, the preferred type of maize in neighboring markets. This strategy envisions exports markets being a significant part of the demand sink for Ethiopian maize. despite the fact that it is Ethiopia's leading cereal crop, in terms of production, with 6.2 million tons produced in 2013 by 9.3 million farmers across 2 million hectares of land. Over half of small holder Ethiopian farmers grow it mostly for subsistence, with 75% of all maize output consumed by farming households (IFPRI, 2010). Given the large production and the potential to produce large surpluses, maize commercialization is still low. Studies are very limited regarding identifying determinants of commercialization of smallholder maize production.

Therefore, this study was designed to identify the factors affecting participation and intensity of maize output market and to estimate the level of commercialization maize crop in smallholder farmers in Guangua district.

2. OBJECTIVES OF THE STUDY

The general objective of the study was to identify the degree of commercialization of maize and to identify determinants of smallholder farmers' maize output market participation and maize sales volume in Guangua district with the following specific objectives:

1. To measure the degree of commercialization of maize crop in the study area;
2. To identify factors that influence smallholder maize farmers' participation decision and intensity of maize sales in the study area.

3. RESEARCH METHODOLOG

3. 1. Description of the Study Area

Table 1. Area coverage and total production of main crops in Guangua district in 2011/12 production year.

Crops produced	Area coverage (hectares)	Total production	% area coverage from all cultivated land in the District
Finger millet	10,985	335,522	37
Maize	6,583	362,065	22
Teff	6,401	136,597	21
Niger seed	3,753	23,634	12
Wheat	624	20,866	2
Sorghum	356	13,625	1

Source: GDAO, (2013)

The study was conducted in Guangua district of Awi Zone. Awi zone is among the eleven administrative zones found in Amhara National Regional State. It is bordered with Oromia region in the south, Benishangul Gumuz region in the west, North Gonder in the north and West Gojam in the east. Enijibara is the administrative town of the zone which is 430 km far away from Addis Ababa in the north-west direction. It has a mean annual rainfall of 1,750 mm and a mean monthly temperature that ranges from 17 °C to 27 °C (EMA, 2008). Awi Zone is inhabited by a population of 1,165,512, of which 582,787 are males and 582,725 are females (CSA, 2013).

Guangua District is located at about 52 km and 513 km away from Enijibara and Addis Ababa respectively. The total area of the District is about 106,914 hectares among this 29 percent of the land is cultivated during the main season and 12 percent of the land is cultivated using irrigation. The area receives an annual rainfall ranging from 1300 to 1800 mm and the mean maximum and minimum daily temperature are 27 and 15 ^{0}c respectively. The altitude ranges from 1600 to 1710 m.a.s.l. The total population of the District is estimated to be 223,066 of which 49.8 and 50.2 percent are males and females, respectively and the household size is 11,936 (GDAO, 2011).
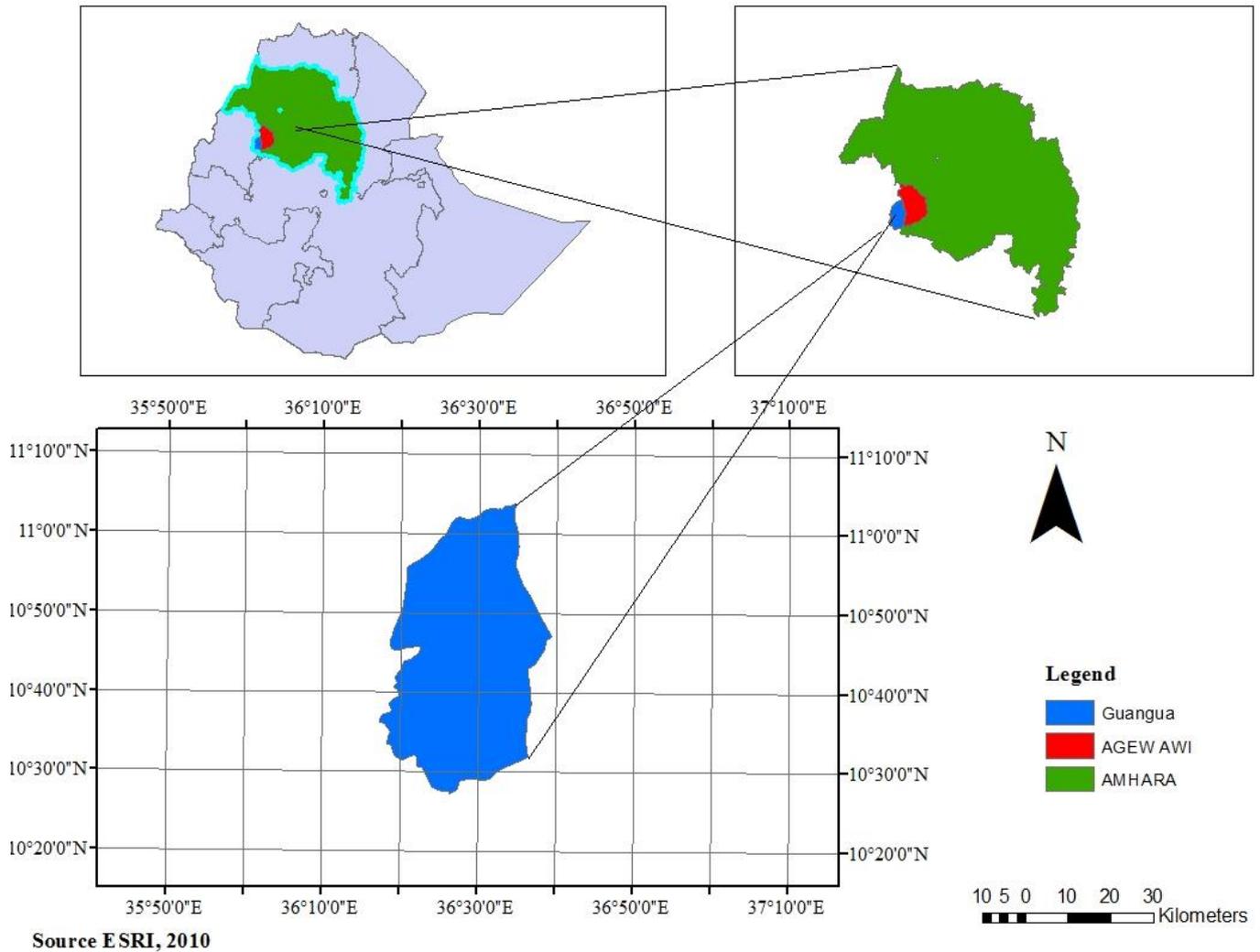

Figure 1. Geographical location of Guangua district

The district comprises 16 rural kebele administrations (RKAs) which are mainly dependent on agriculture. The main crops cultivated on main season in the district are finger millet, maize, *teff*, niger seed, wheat and sorghum respectively in their order of importance.

Table 1. depicts that maize production ranks first among all the crops produced and it ranks second in area coverage of cultivation next to finger millet and is followed by *teff*. In 2011/12 among the cultivated 31,357 hectares of land 6,583 hectares (22%) was cultivated with maize from which 362,065 (40% of all crops production) quintals was harvested. The main market is located in the district's main town Chagni.

3. 2. Data Type, Source and Methods of Data Collection

In the study both secondary and primary data were used. Secondary data was collected from relevant district offices of agriculture and rural development, agricultural research centers, CSA and other relevant published and unpublished documents. And Primary data was collected from sampled farmers using structured questionnaires.

3. 3. Sampling Technique and Sample Size Determination

A Multistage sampling procedure was followed to select sample households. In the first stage maize growing kebeles were identified in collaboration with the District's Agricultural Office from which four kebeles were selected randomly. These were Addisalem, Mota, Tirubirihan and Bizrakani. Then from the selected four kebeles 160 households were selected randomly based on probability proportionate to size of the kebeles' number of households as shown in Table 2. The number of sample households was determined using Yamane's formula

The formula used for sample size determination is

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

3. 4. Method of Data Analysis

Descriptive, and econometric methods were applied to analyze the data collected from smallholder household heads using structured questionnaire.

3. 4. 1. Descriptive analysis

Descriptive methods such as measures of central tendency, and percentages were used to describe and analyze the household level characteristics, including the state of resource ownership, production, marketing, social capital, non-farm activities and demographic characteristics of the sample households.

3. 4. 2. Econometric analysis

A Double-hurdle model was chosen over Heckman model because there was no sample selection problem in the data. The Double-hurdle model, originally formulated by Cragg (1971), assumes that households make two decisions separately regarding their decision to sell their product and the volume of sale, each of which is determined by a different set of explanatory variables. In order to observe a positive level of marketed output, two separate hurdles must be passed. A different latent variable is used to model each decision process, with a probit model to determine participation and a truncated regression model to determine the level of intensity of volume of sale.

The double- hurdle model was specified and used as follows.

$y_{i1}^* = \beta W_i' + V_i$ (Participation decision equation)
$y_{i2}^* = \delta x'_i + u_i$ (Level of participation equation)
$y_i = x'_i + u_i$ if $y_{i1}^* > 0$ and $y_{i2}^* > 0$
$y_i = 0$ otherwise

where, $\mathbf{y_{i1}^*}$ = is a latent variable describing the household's decision to participate in the output market,

$\boldsymbol{y_{i2}^*}$ = is a latent variable describing household level of participation in the crop output market.

$\mathbf{y_i}$ = is the observed dependent variable (level of participation of the households in maize marketing),

w_i = is a vector of variables explaining the participation decision,
xi   = is a vector of variables explaining the level of participation decision,
v_i and u_i = are respective error terms assumed to be independent and distributed
β & δ = Parameters of the models as $v_i \sim N(0, 1)$ and $u_i \sim N(0, \sigma^2)$

The model was estimated using maximum likelihood estimation procedures.

Table 2. Definitions of variables.

Variable	Description	Expected sign
PART	Market participation decision (Dependent variable)	
VMS	Volume of maize sales (Dependent variable)	
SEX	Sex of the HH head (0 = female, 1 = male)	+
AGE1	Age of the HH head in years	+
EDU	Educational status of the HH head (0 = illiterate, 1 = literate)	+
DISTNVMRKT	Distance to the nearest village market in minutes of walking time	-
DISTNEXT	Distance to the nearest extension service center in minutes of walking time	-
TMAIZEPRODUCED	Total maize produced by the HH in quintals	+
OFFICIAL	The status of the HH head in institutions (0 = non-official, 1 = official)	+
COOPS	Membership in cooperatives (0=not member, 1=member)	+
VMCASHCROPS	Total income from sale of major cash crops in birr.	+

FAMSIZE	Family size of the HH in numbers	-
OFFNONINC	The income generated from off/non-farm activities through the year in birr	+/-
PRICEPP	Perception of the HH head about the price of the previous year (0=Bad, 1=Good	+
LHOLDING	Total land size owned by the HH in hectare	+
CREDIT	Access of the HH head to credit services (0=no, 1=yes)	+
TLU	Tropical Livestock Unit	+/-

4. RESULTS AND DISCUSSION

This section presents the results and findings of the study. A detailed description of sample households' demographic, socioeconomic and market characteristics is presented. Further, econometric results on determinants of participation and intensity of participation in the maize output market are presented.

4. 1. Descriptive Statistics

4. 1. 1 Demographic characteristics of the households

Among 160 sample respondents 125 of them were maize market participants whereas the rest 35 respondents were non participants. Age of the total sample households ranges from 22 to 70 years with mean of 44.01 years and standard deviation of 11.93. The average age of the maize market participants was 42.84 years, while that of non-participants was 48.20 years. There was a statistically significant mean difference between age of household who participated in maize market and those who did not with t value of 2.38 and at 5% level of significance.

Family size of the total sample respondents ranged from 2 to 11 persons, with an average family size of 5.43 and a standard deviation of 1.75. The statistical analysis showed that there was a significant mean difference between family size of those who participated in maize output market and those who did not at 1% significance level.

Farming experience of the total sample households ranges, from 2 to 45 years with mean of 19.91 years and standard deviation of 7.92. The mean of the farming experience of market participants was 19.44 years with standard deviation of 8.23, while that of non-participants was 21.6 years with standard deviation 6.5. The statistical analysis showed that absence of significant mean difference between farming experiences of market participant household heads and their counterparts.

Among the sample households, 78.7% of them were male headed whereas the rest 21.3% were female headed households. The statistical analysis showed significant percentage difference in sex of those who participated in maize output market and those who did not at 1% significance level.

Regarding educational status 53.12% of household heads in the sample were literate while the rest 46.87% were illiterate (unable to read and write). Among the market

participants 59.2% of them were literate while among the non-participants only 31.42% were literate. The statistical analysis showed that there was a significant percentage difference between educational status of those who participated in maize output market and those who did not at 1% significance level.

4. 1. 2. Socioeconomic and institutional characteristics of the households

Among the sample farm households majority of them (87.5%) reported that they were members of agricultural farmers' cooperatives while the rest were not members. From the total of 125 maize market participant households 88% and from the total of 35 non-participants 85.72 % reported that they were members in agricultural farmers' cooperatives. Statistical analysis showed that absence of significant mean difference between membership in agricultural farmers' cooperatives and participation of farmers in maize market

The result also showed that about 76% of the total sample households had access to credit. Among the maize output market participants 78.4% and from the non-participants 68.57% had access to credit. But statistical analysis showed that there was no significant mean difference among the two groups in terms of access to credit.

The result showed that from the sample households 72% of them replied that the price of maize in the previous year was good while 28% of them replied it was bad. Among the participants 80% and from the non-participants 20% of them thought the previous year price of maize was good. The statistical analysis showed a significant percentage difference between those who participated in maize output market and those who didn't participated regarding their perception of the previous year maize output price at 1 % significance level.

For the sample households the average time to the nearest village market in minutes of walking time was 29.94 minutes with standard deviation of 16.47. As shown in table 7 for the market participants the distance to the nearest village market takes an average of 27.77 minutes with standard deviation of 16.53 while for the non-participants it took 37.71 minutes with standard deviation of 13.8. The result showed a statistically significant mean difference between distance to the nearest village market travelled by those who participated in maize output market and who did not (t = 3.25, at 1% level).

Regarding distance to Agricultural extension service center, the sample households travels an average of 41.93 minutes with standard deviation of 37.14. For the market participants the distance to the nearest extension service center takes an average of 27.62 minutes with standard deviation of 23.37; while for the non-participants it takes 93.0 minutes with standard deviation of 31.97. There was a statistically significant mean difference between distance to the nearest agricultural extension center travelled by those who participated in maize output market and did not participate in maize market in favour of the latter (t = 11.28, at 1% level).

The land holding size of the total sample households ranges from 0.75 to 5.25 ha with a mean of 2.09 hectare and standard deviation of 0.93. The maize market participants average land holding size was 2.2 ha with a standard deviation of 0.96 from this on average 0.75 ha land with standard deviation of 0.32 was allocated for maize. The non-participants average land holding size was 1.7 ha with standard deviation of 0.68. From this 0.54 ha of land with standard deviation of 0.27 was allocated for maize. There was a statistically significant mean difference between landholding owned by maize market participants and non-participants at t value of 3.5 and siginificance level of 1 % level (t = 3.5, at 1% level).

Livestock is the most important asset for rural households in most parts of Ethiopia.

Based on Storck *et al.* (1991) standard conversion factors, the livestock population number was converted into Tropical Livestock Unit (TLU), in order to make comparison easy.

The livestock holding of the total sample households ranges from 0 to 18.61 TLU with a mean of 7.53 TLU and standard deviation 4.04. From this the participants and non-participants average livestock holding was 7.47 and 7.77 TLU and standard deviation of 4.22 and 3.34, respectively. Statistical analysis showed absence of significant mean difference between livestock holding owned by output maize market participants and non-participants.

Table 3. Conversion factor of tropical livestock unit (TLU)

Livestock Category	TLU
Ox and Cow	1
Heifer	0.75
Young Bull (*Woyefen*)	0.34
Calf	0.25
Sheep and Goat (Young)	0.06
Sheep and Goat (Adult)	0.13
Hen	0.013
Donkey (Young)	0.35
Donkey(Adult)	0.70
Horse and Mule	1.1

Source: Storck, *et al.* (1991).

The average income from non/off farm activities of the sample households is 2947 birr per year with standard deviation of 4505. And out of this the average non/off farm income of the participants and non-participants were 2847 and 3304 birr per year with standard deviation of 4372 and 5003, respectively. Statistical analysis showed absence of significant relationship in terms of non/off farm income between maize output market participants and non-participants in the sample households.

4. 1. 3. Maize production and marketing characteristics of the households

The mean production of maize for Market participants and non-participants was 16.68 and 7.17 quintals with standard deviation of 12.12 and 4.37, respectively. The result showed that significant mean difference between maize produced by market participants and non-participants at t value of 7.24 and 1% significance level.

The result showed that among maize market participants only 15.2% of females have participated in sale of maize without accompanied by their male counterpart. Whereas 36% of

males have participated in sale of maize without accompanied by their female counterpart. About 49% of respondents report that both males and females participated in sale of maize.

It was also found that from the sample households about 70% of the participants sold their maize product at the nearby market while the rest 30% sold their product at the main market. Majority (65.6%) of maize market participants used donkey for transporting their product. Next to donkey 22.4% of the participants took their product to market by carrying it by themselves. Very few participants used mule/cart and truck as a means of transportation to market.

4. 1. 4. Level of commercialization of maize in the district

The result showed that among the produced maize by the sample farm households on average 44.42% of it was sold on market while the rest 55.6% utilized at home as food and seed source. From this it can be seen that the degree of commercialization in the district is much higher than the national average which is about 25% as stated in IFPRI, (2010). The possible reason can be the households in the area consider maize relatively as cash crop while they mainly use finger millet and *teff* at home for consumption. As it was presented in the area description, in the district finger millet takes the first place in area coverage and second in amount production next to maize.

According to Samuel and Key, (2007) farmers who sells at least 50% of their product could be considered as commercialized. Benjamin *et al*., (2014) categorize smallholders as low commercial farmers if they sell only up to 25% of their product, medium commercial farmers if the farm households sell 26-50% of their product and considered as high commercial farmers if the farm households sell 50% and more of their product. Based on this categorization the degree of commercialization of maize product in the area is under the category of medium commercialization level.

4. 2. Econometric Results

Prior to running the Double Hurdle model the hypothesized independent variables were tested for possible existence of multicollinearity problem that is the situation where the explanatory variables are highly correlated among themselves. In order to check the association between continuous and discrete variables Variance Inflation Factor (VIF) and contingency coefficients tests were used and no problem was observed (Tables 2 and 3). Mean replacement was done for some outlier issues in the variables. Whereas in order to check for the possible existence of heteroskedasticity problem a Breusch-Pagan test was applied and showed the absence of the problem. Therefore, all the model outputs were estimated using robust standard errors to correct for heteroskedasticity Results of the analyses are presented and discussed in the following sections.

Table 4. VIF test for continuous variables.

. vif		
Variable	VIF	1/VIF
HHSIZE	1.32	0.755212

LHOLDING	1.27	0.788688
distnextn	1.23	0.812673
distnvmrkt	1.20	0.836454
AGE1	1.18	0.844433
NOINCOME	1.12	0.896604
VMCASHCROPS	1.10	0.906556
TLU	1.02	0.977398
Mean VIF	1.18	

Table 5. Contingency coefficients test for discrete variables

	EDU	GENDER	COOPS	PPERCPT	CREDIT	OFFICIAL
EDU	1.0000					
GENDER	0.0787	1.0000				
COOPS	0.0615	0.0976	1.0000			
PPERCPT	-0.0305	0.1519	0.0158	1.0000		
CREDIT	0.0938	-0.0379	0.0999	0.0429	1.0000	
OFFICIAL	0.0392	-0.0624	0.1796	-0.1686	0.0448	1.0000

Determinants of maize output market participation

Results of the first hurdle showed that, the households' decision to participate in the maize output market significantly determined by four out of the 14 variables included in the analysis. These are educational status of the household head, perception of the household head on lagged price of maize, distance to agricultural extension service center and the land holding size of the household.

Educational status

Educational status of the household head was expected to affect the decision of the household to participate in output market. It was hypothesized that if the household head becomes literate the probability of participation in market will increase.

As it was hypothesized the econometric result showed positive and significant relationship between the educational status of the household head and the decision to participate in maize output market at 5% significance level. It was revealed that as the household head becomes literate the probability of participating in maize output market will

increase by 4.52 %. This may be due to educated household head having better market networking and bargaining power and good managerial skill of enterprises. It is also evident that educated farmers tendency to accept different agricultural technologies is high, so that they can produce more surplus for market. The result is in conformity with the findings of Aman *et al*. (2014) that states education increases the ability of farmers to get and analyze relevant market information which would improve the managerial ability of the farmers in terms of better formulation and execution of farm plans, and acquiring better information to improve their marketing performance. It is also in conformity with Enete and Igbokwe (2009) who argued that education will endow the household with better production and managerial skills which could lead to increased participation in the market.

Distance to the nearest agricultural extension service center

Proximity of agricultural extension service center was assumed to affect the households' participation in maize output market. As it was hypothesized the result showed that there was a negative and significant relationship between distance to agricultural extension service center and households' decision to participate in maize output market at 1% significant level. It was revealed that an extra minute in walking time to the extension center will decrease the probability of the household's participation in maize market by 0.18%.

This indicates that as the distance to extension service centers increase the frequency of contact with the agents decrease, so that they will lack knowledge on production and will face shortage of inputs. So, that they couldn't produce market surplus. It is also in agreement with the findings of Johann *et al.* (2013) that agricultural support services are essential in order to make it possible for smallholder farmers to become able to enter lucrative agricultural commercial markets. Apart from the pre-existing socio-economic characteristics of rural producers in Ethiopia such as deep entrenched poverty, the lack of access to agricultural support services which happens mostly due to long distances to extension centers is a key obstacle to successful and inclusive commercialization of smallholder agriculture.

Perception on lagged market Price

Households' perception towards previous year maize price has influenced the households' decision to participate in maize output market positively and significantly at 1 % significance level. If they perceive previous year's maize market price as good, they decide to produce more and participate in sales of maize.

The result shows that as the household perceives previous year price was good the decision to participate will increase by 12.64%. The finding is consistent with the expectation and is in line with the finding of Benjamin *et al*. (2014) and Martey *et al.* (2012) which states that output price is an incentive for farm households to participate more on supply market. It is also inconformity with Shewaye (2014) who founds lagged market price affects households' decision to participate in market. She noted that as households who perceived the lagged market price was good, farmers would be interested to produce and supply more than those who did not perceived the lagged market price as good. Therefore, price has positive relation with volume of crop sold and this in turn confirms the economic theory that output price is an incentive for farm household to produce more marketable surplus.

Land holding

Being the most valuable asset in the rural household land holding was hypothesized to affect the decision of the household to participate in output market. As hypothesized the result depicts positive and significant relationship between households' land holding size and households' decision to participate in maize output market at 5% significance level. As the land holding size increases by a hectare the probability of household's decision to participate in maize market will increase by 2.28 %. This indicates that the farmers with relatively higher land holding have more space to produce both food crops (in this district case finger millet) and cash crops (in this district case it includes maize that serve as both as food and cash crop). So that, the households can produces more maize for the market. This finding is consistent with the findings of Boughton *et al.* (2007), Olwande and Mathenge, (2012) and Benjamin *et al*. (2014). Which states shortage of land is one of the binding factors for the rural households' inability to produce marketable surplus; since they have to first sustain their food self-sufficiency.

Table 6. Factors affecting maize sales decision

Maize market Participation	Coef.	Robust Std. Err.	z	Marginal effects
SEX	0.07	0.4824	0.15	0.0031
AGE	-0.01	0.0193	-0.55	-0.0004
DSTNVMRKT	-0.01	0.0132	-1.07	-0.0005
NOINC	-0.03	0.0477	-0.60	-0.0011
EDU	0.95**	0.3739	2.54	0.0452044
VMCASHCROPS	-0.14	0.098	-1.40	-0.0054
PPERCPT	1.43***	0.4159	3.45	0.1265
CREDIT	0.38	0.3849	0.99	0.0189
COOPS	-0.08	0.4873	-0.16	-0.0029
OFFICIAL	-0.46	0.4401	-1.04	-0.0189
FAMSIZE	-0.17	0.1368	-1.26	-0.0068
DISTNEXT	0.05***	0.0096	-4.84	-0.0018

TLU	0.01	0.0645	0.19	0.0005
LHOLDING	0.58*	0.3330	1.73	0.0228
_cons	3.23	1.3299	2.43	

***, ** and * implies statistically significance at 1, 5, and 10% level respectively.
Source: Model output

4. 2. 1. Determinants of Volume of Maize Sales

Similarly the intensity of participation of the households in maize output market was significantly determined by four variables out of 14 variables included in the analysis. These are sex of the household head, distance to the nearest village market, size of the household and the land holding size. From both hurdles, one variable which is land holding of the household is a crosscutting variable that determines both the decision and intensity of maize market participation.

Sex of the household head

As it was hypothesized, the econometric result showed that there was a positive and significant relationship between the gender of the household head and the volume of maize marketed at 10% significance level. On average, male headed households sell about 6.58 quintals of more maize as compared to female headed households. This shows that in the study area females are not in the position to produce more for market due to lack of awareness lack of basic assets and production materials. Another reason could be most of the time female household heads are more concerned about feeding their families rather than taking their production out to the market. The result is consistent with the findings of Aman *et al*. (2014), Benjamin *et al.* (2014) and Olwande and Mathenge (2012). They argued that males are more accessible to land and are able to cultivate large plots of land as compared to their female counterparts. Also, males often receive more support on their farms more than the females do. Moreover, most of the female headed households widowed with less economic and physical power to farm intensively.

Distance to the nearest market

The time taken in minutes of walking time to the nearest village market had negatively and significantly influenced the amount of maize sold in the market at 1% significance level. The result showed that as the distance to the nearby market increases by one minute the household will decrease the amount of maize marketed by 0.17 quintal. The result is in conformity with the findings of Aman *et al*. (2014) and Solomon *et al* (2010), which found that being closer to the market will enhance market participation. This is because the farmers' awareness about the benefit of marketing increases and they will have adequate price information. It also confirms the finding of Benjamin *et al.* (2014) that states as the longer the distance of the market it is more costly and time consuming to travel holding more output especially if there is no transportation facility. In the same way Goitom (2009) states that although the households have some of the needed assets to produce surplus for the market; the

remoteness of a household from markets often hindered them from selling high volume of a product in a market due to high transport costs and market inaccessibility.

But it is in contradiction with the work of Shewaye (2014) who founds, farmers in the distant areas were better in selling in the market and argued that those farmers who live distant from the market have no alternative to generate income and thus their dependence on farming activities is much greater than those who live near to the market and have a lot of alternatives opportunities like non farming activities in addition to farming activities. she also argued that farmers farther away from market place have large size of farmland, thus produce more and their marketed surplus also larger than those near to the market.

Table 7. Results of truncated regression for the level of commercialization of maize (in qt).

Volume of maize sales	Coefficient	Robust Std. Err.	Z
SEX	6.59*	3.9630	1.66
AGE1	-0.01	0.0565	-0.12
DISTNVMRKT	-0.17***	0.0523	-3.26
NOINC	-0.07	0.1513	-0.44
EDU	1.02	1.4835	0.69
VMCASHCROPS	-0.95	0.6123	-1.55
PPERCEPT	1.51	2.2127	0.68
CREDIT	-0.16	1.3818	-0.12
COOPS	-0.19	2.2806	-0.08
OFFICIAL	0.77	1.4026	0.55
FAMSIZE	-2.49***	0.5083	-4.91
DISTNEXT	-0.02	0.0313	-0.66
TLU	0.18	0.1483	1.20
LHOLDING	3.81***	0.8472	4.50
_cons	8.14	5.0579	1.61
Sigma			
_cons	6.22***	0.7062	8.81

***, ** and * implies statistically significance at 1, 5, and 10% level respectively.
Source: Model output

Household size

As it was hypothesized, the econometric result showed that household size affects households' level of participation in maize marketing negatively and significantly at 1% significance level. It was revealed that as the household member increase by one the household retain an additional 2.5 quintals of maize for consumption which otherwise would be marketed. This indicates that household size of the households significantly matters in the proportion of maize to be marketed once after the household decides to sell their maize. The higher the family size the lower will be the amount of maize marketed. Hence low market share. This happens because households with more members will consume more of the product. So they will be left with smaller amount of maize for market compared to households with lower members. The result is consistent with the hypothesized expectation and confirms the result of Benjamin *et al*. (2014) that households with large family sizes need to feed their family first and take the remaining small portion surplus to the market especially if the crop is consumable at home.

Land holding size

The result showed that land holding size significantly determines both the decision and intensity of maize output market participation. This makes land holding size a cross cutting variable in both stages. As hypothesized the result depicts that there was positive and significant relationship between households' land holding size and intensity of maize output market participation at 1% significance level. As the land holding size increases by a hectare the household will sell additional 3.8 quintals of maize. This indicates that the farmers with relatively higher land holding have more space to produce both food crops (in this district case finger millet) and cash crops (in this district case it includes maize that serve as both as food and cash crop). So that, the households can produces more maize for the market. The result is in conformity the findings of Benjamin *et al.* (2014) and Boughton *et al.* (2007), which states shortage of land is one of the binding factors for the rural households' inability to produce marketable surplus; since they have to first sustain their food self-sufficiency. It was also in conformity with Shewaye (2014) who noted that the larger the total farm size, the larger the area allocated to the crop production thereby increasing the quantity of produce available for sale and thus the per unit transaction costs will be lower due to the economics of scale.

5. CONCLUSIONS AND RECOMMENDATIONS

The result showed that, regardless of being an alternative crop for food self-sufficiency in Guangua district, about 44% of maize produced was supplied to the market. Even though this figure is a bit higher than the national average of 25%, still it falls in the medium commercialization level. From the study it was found that different demographic, socioeconomic and institutional factors played a vital role in determining the smallholder farmers participation in maize marketing. So an integrated approach, which involves various development partners and stakeholders, should be considered to participate in alleviating the small holder farmers' problems in the district and enhance their ability to commercialize their maize product which is getting higher local and international demand.

The study showed that, educational status of the household head positively and

significantly affected households' decision to participate in maize marketing. This showed that education is a key to the farmers' commercialization since in increases the awareness and managerial skill of the farmers. So the government should increase its focus and intensity in strengthening the rural education system. The other negative and significant factor was longer distances to agricultural extension service.

So even though there are many efforts in expanding agricultural extension system, there is a need to strengthen the service like by increasing the number of FTCs and strengthening their facilities so that the farmers can easily get inputs and informations without travelling longer distances. This will help the farmers to easily reach the centers for consultation.

Another significant factor was households' perception on lagged price of maize. This may show that in the areas where the households perceive the price of maize was not satisfactory, there might exist price fluctuation and excessive illegal middlemen. So it is good if the government involve in this situation like by strengthening the farmers' cooperatives and unions and also by eliminating illegal middlemen and encouraging the legal ones.

In the second hurdle, sex of the household head was one of significant factors. That shows male households have sold large proportion of their maize produced compared to female household heads. Therefore it will be good if policies strengthen the support being given to the female headed households using different methods like by increasing their awareness through affirmative actions, by increasing their participation in different institutions and support them to engage in cooperatives. Longer distances to the market center was also found to be another inhibiting factor for taking bigger amount of the maize output to the market. So, it would be better if the government considers expanding construction of facilities like road so that transportation will be easy to the market.

Households with high family size were also not able to sell more of their maize product in the market since the consumption will take most of it. So policy makers may need to strengthen the family planning program which is being given in the area; so that the families will have planned family size and will be able to produce more surpluses for market.

The land holding size was a crosscutting variable which affects both the decision and intensity of maize marketing in the district. It will be difficult for policy makers to increase the land holding of the household; but the policies need to strengthen more in intensifying the farm practices through provision of sustainable and timely availability of inputs, increasing the farmers' awareness on production packages like agronomic practices and proper application of inputs. This will enable the farmer to produce more from the same plot of land so that increased participation and intensity of maize market participation will be achieved.

References

[1]   Aman Tufa., Adam Bekele., Lemma Zemedu. 2014. Determinants of Smallholder Commercialization of Horticultural Crops in Gemechis District, West Hararghe Zone, Ethiopia. *African Journal of Agricultural Research,* 9(3): 310-319.

[2]   Benjamin, A., Yaw Bonsu, O., Seini, W. 2014. Market Participation of Smallholder Maize Farmers in the Upper West Region of Ghana. *African Journal of Agricultural Research,* 9(31): 2427-2435.

[3]   Boughton, D., Mather, D., Barrett, C., Benfica, B., Abdula, R., Tschirley, D. and Cunguara. B.2007. Market Participation by Rural Households in a Low Income Country: An Asset-Based Approach Applied to Mozambique. Faith and Economics, 50(1): 64-101.

[4]   Cragg, J. 1971. Some Statistical Models for Limited Dependent Variables with Application to the Demand for Durable Goods. *Econometrica*, 39(5): 829-844.

[5]   CSA (Central Statistics Authority), 2013. The Federal Democratic Republic of Ethiopia.

[6]   EMA (Ethiopian Mapping Agency). 2008. Top sheet NC37-1 and NC-37-5.

[7]   Enete, A. and Igbokwe, E. 2009. Cassava Market Participation Decisions of Producing Households in Africa. *Tropicultura*, 27(3): 129-136.

[8]   GDAO (Guangua District Agricultural Office), 2011. Guangua District Agricultural Office Annual Activity Report. Unpublished Document. 2011.

[9]   Goitom Abera. 2009. Commercialization of Smallholder Farming: Determinants and Welfare Outcomes a Cross-sectional Study in Enderta District, Tigrai, Ethiopia. An MSc Thesis Presented to the University of Agder, Kristiansand, Norway.

[10]   IFPRI (International Food Policy Research Institute).2010. Maize Value Chain Potential in Ethiopia, working paper. Addis Ababa, Ethiopia.

[11]   Johann, K., Mariam, M., Julius, O. and Sourovi, D. 2013. Managing Agricultural Commercialization for Inclusive Growth in Sub-Saharan Africa. Global Development Network, working paper serious, No60.

[12]   MoARD (Ministry of Agriculture and Rural Development), 2010. Ethiopia's Agricultural and Sector Policy and Investment Framework (PIF): 2010-2020, Addis Ababa, Ethiopia.

[13]   MoFED (Ministry of Finance and Economic Development), 2006. A plan for Accelerated and Sustained Development to End Poverty (PASDEP). Addis Ababa.

[14]   Martey, E., Al-Hassan, R. and Kuwornu, J. 2012. Commercialization of Smallholder Agriculture in Ghana a Tobit Regression Analysis. *African Journal of Agricultural Research*, *7*(14): 2131-2141.

[15]   Olwande, J. and Mathenge, M. 2012. Market Participation among Poor Rural Households in Kenya. In Paper Presented at the International Association of Agricultural Economists Triennial Conference, Brazil. August 18-24.

[16]   Salami, A., Kamara, B. and Brixiova, Z. 2010. Smallholder Agriculture in East Africa: Trends, Constraints and Opportunities. African Development Bank Group, Working Paper Series No. 105.

[17]   Samuel Gebreselassie and Key, S. 2007. Commercialization of Smallholder Agriculture in Major *Teff*-growing Areas of Ethiopia. Paper Presented at the Fifth International Conference on the Ethiopian Economy, EEA, June 2007, Addis Ababa. (URL www.futureagricultures.org)

[18]   Solomon A, Bekele S and Franklin, S. 2010. Does Technology Adoption Promote Commercialization? Evidence from Chickpea Technologies in Ethiopia.

[19] Shewaye Abera. 2014. Determinants of Haricot bean Commercialization: The Case of East Badawacho District, South Nations Nationalities and Peoples Regional State, Ethiopia. An MSc Thesis Presented to the Haramaya University, Haramaya, Ethiopia.