

# Determinants of Smallholder Farmers' Vegetable Crop Commercialization in East Hararghe Zone, Oromia Regional State, Ethiopia

Solomon Ayele, Kibret Ketema, Hussein Abro

Socio-Economics Research Team, Fedis Agricultural Research Center,  
Oromia Agricultural Research Institute, Harar, Ethiopia

## ABSTRACT

Transforming the subsistence-oriented production system into a market-oriented production system as a way to increase the smallholder farmer's income and reduce rural poverty has been in the policy spotlight of many developing countries, including Ethiopia, particularly in the East Hararghe Zone. The objective of this study was to identify determinants of household-level output side commercialization of vegetable crops in the East Hararghe Zone. A multi-stage sampling procedure was used to select 230 sample vegetable producers by using probability proportional to population size. Descriptive statistics and econometric models were used to analyze data. The findings further revealed that the mean household vegetable commercialization index (HCI) was 89.21%. The results from the Tobit regression model revealed that commercialization of vegetable crops was determined by the distances to the nearest market center, access to market information, livestock ownership, cooperative membership, and the area allocated under vegetable production. This study recommended that improving market access, organizing farmers into groups to have better access to agricultural inputs, providing market information through networking and institutions, and clustering and intensification of vegetable crop production are therefore crucial in enhancing the commercialization and level of vegetable commercialization in the study area.

**KEYWORDS:** Commercialization, East Hararghe, Smallholder farmers, Tobit model, Vegetable crop

## 1. INTRODUCTION

Commercialization in agriculture refers to the progressive shift from household production for auto-consumption to production for sale in the market. This shift entails that production and input decisions are based on profit maximization, reinforcing vertical linkages between input and output markets [1]. Historically, this has typically been a lengthy process of transformation from subsistence to semi-commercial farming, and then to fully commercialized agriculture [2]. Increasing the extent of commercialization among Sub-Saharan Africa's generally semi-subsistence, low-input, low-productivity smallholder farmers is seen as playing a crucial role in poverty alleviation [1].

Recently, the governments of developing countries have sought to promote diversification of production

and exports away from traditional commodities to accelerate economic growth, expand employment opportunities, and reduce rural poverty [3]. Market-oriented production can allow households to increase their income by producing output with higher returns to land and labor and using the income generated from sales to purchase goods for consumption [4]. Similarly, the Ethiopian government, in its two-consecutive five-year Growth and Transformation Plan (GTP-I and GTP-II), has given much emphasis on agricultural commercialization, among which the second pillar intends to achieve growth and thereby improve people's livelihoods and reduce poverty. Commercialization of smallholder farmers has been viewed by the government as the major source of agricultural growth in Ethiopia. The government of

**How to cite this paper:** Solomon Ayele | Kibret Ketema | Hussein Abro "Determinants of Smallholder Farmers' Vegetable Crop Commercialization in East Hararghe Zone, Oromia Regional State, Ethiopia" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-7 | Issue-6, December 2023, pp.341-350, URL: [www.ijtsrd.com/papers/ijtsrd59881.pdf](http://www.ijtsrd.com/papers/ijtsrd59881.pdf)



IJTSRD59881

Copyright © 2023 by author (s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



Ethiopia implemented agricultural commercialization clusters with the primary goal of commercialization of smallholders' agriculture and agro-industrial development, offering a strategic entry point for private sector engagement [5].

Vegetable production plays an important role in poverty alleviation through employment generation, improving the feeding behavior of the people, and creating new opportunities for poor farmers. Since the labor-to-land ratio of vegetable cultivation is high, vegetable products are bulky and perishable, and vegetable has continuous demand in the market, its production and marketing allows high productive employment. Increasing horticultural production and marketing thus contribute to the commercialization of the rural economy and create many off-farm jobs [6]. Most of the vegetables and fruit produced in the eastern region are exported to Djibouti and small amounts of fruit and vegetables are also exported to Europe, Pakistan, Saudi Arabia, and Yemen [7]. Small-scale production is concentrated in Hararghe (eastern highland parts) and the central highlands, whilst large commercialized cultivations are widely spread in the low land zones, mainly following the Awash and Gibe/Omo rivers [6]. According to the Ethiopian Export Promotion Agency, the eastern parts of the country like Haramaya, Kombolcha, Dire Dawa, and Harari region are well known for the production and supply of vegetable crops.

Although there is a wealth of literature on smallholder commercialization in Ethiopia, it is mainly on grain crops and livestock and livestock products however market participation of the smallholder vegetable crop producers in the country is still limited. Accordingly, various empirical studies pointed out that, in Ethiopia, smallholder commercialization is determined by institutional factors, infrastructural and market-related factors, household resource endowments, and household-specific characteristics [8]; [9]; [10]; [11]; [12]; [13]. Eastern Hararghe zones have good potential in vegetable crop production for which smallholder farming has diversified from staple food subsistence production into more market-oriented and higher-value commodities. However, there is an apparent knowledge gap as regards factors influencing the degree of commercialization of vegetable crops in Ethiopia in general and in particular to the East Hararghe zone because most of the literature on Ethiopia has been largely crop-specific (focusing on a single crop in most cases) and based on narrow samples drawn from one or two districts that do not allow generalization. Moreover, there are issues related to how commercialization is conceptually defined and measured. [14]; [15]

conducted factors that determined the degree of commercialization of potato production in the Kombolcha district which was focused on a single crop.

Even though, in the study areas, the extent to which farmers have commercialized major vegetable crop production was not known. There was no research conducted on the commercialization of major vegetable crops in the study areas. In addition, in the study area, the purpose of vegetable production (family consumption and/or for sale) varies from situation to situation and person to person. As such, there are tremendous factors, which influence the level of commercialization in vegetable production. Therefore, this study was mainly devised to find the level of major vegetables (potato, onion, tomato, and cabbage) commercialization (measured from the output side more prevalent way than that of the input side), and identification of factors determining the proportion of vegetable marketed at the households level in the selected districts of the East Hararghe Zone.

## 2. METHODOLOGY

### 2.1. Descriptions of the Study Areas

This study was conducted in vegetable-producing districts of East Hararghe Zone namely Kombolcha, Haramaya, and Kersa because of their medium for both export and domestic vegetable marketing centers and production potentials.

**Kombolcha District:** Kombolcha district is one of the nineteen districts of East Hararghe Zone of Oromia Regional State. It is located about 17 km north of Harar town and 542 km east of Addis Ababa, the nation's capital city. The altitude of the district ranges from 1200-2460 meters above sea level. Agro-climatically, the district ranges from *Woina-dega* (*mid-altitude*) to Kola (lowlands). The annual rainfall ranges from 600mm to 900mm with a bimodal and erratic pattern. The mean annual temperature of the area ranges between 16-25°C.

Different types of vegetables and cereals are grown in the district. The most commonly grown vegetables are potato, cabbage, onion, and carrot, and among the cereals sorghum and maize are dominant. Chat is also one of the intensively grown crops in the area. The district is also one of the potato trading centers in the country from which potato is sold for export and domestic market.

**Haramaya District:** Haramaya district is one of the nineteen districts of the East Hararghe Zone of Oromia Regional State. It is located about 12 km west of Harar town and 524 km east of Addis Ababa, the nation's capital city. The altitude of the district ranges

from 1214-2066 meters above sea level. Agro-climatically, the district ranges from *Woina-dega (mid-altitude)* to Kola (lowlands). The annual rainfall ranges from 600mm to 900mm with a bimodal and erratic pattern. The mean annual temperature of the area ranges between 16-25°C.

Farming practices of the district are under rain-fed, and irrigation for crop production. The major crops cultivated under rainfed was sorghum, maize, some pulse crop, and dual season crop production practiced i.e. both under rainfed, and irrigation were some vegetables (potato, lettuce, onion, and khat dominantly cultivated in the area. The common cash crops produced under irrigation in the area were potatoes, head cabbage, leaf cabbage, lettuce, small pod, hot pepper, carrot, beat root, and shallot (baro) are important crops following khat.

**Kersa District:** Kersa district is one of the nineteen districts of the East Hararghe Zone of Oromia Regional State. It is located about 51 km west of Harar town and 475 km east of Addis Ababa, the nation's capital city. The altitude of the district ranges from 1400 -3200 meters above sea level. The agroclimatic of the district is Highland, Midland, and Lowland. The mean annual rainfall of the district is 1500mm with a bimodal and erratic pattern. The mean annual temperature of the area ranges between 18-22°C.

Farming practices of the district are under rain-fed, and irrigation for crop production. The major crops grown in the area are wheat, maize, sorghum, haricot bean, Feba bean, chickpea, lentil, linseed, potato, cabbage, onion, and beetroot.

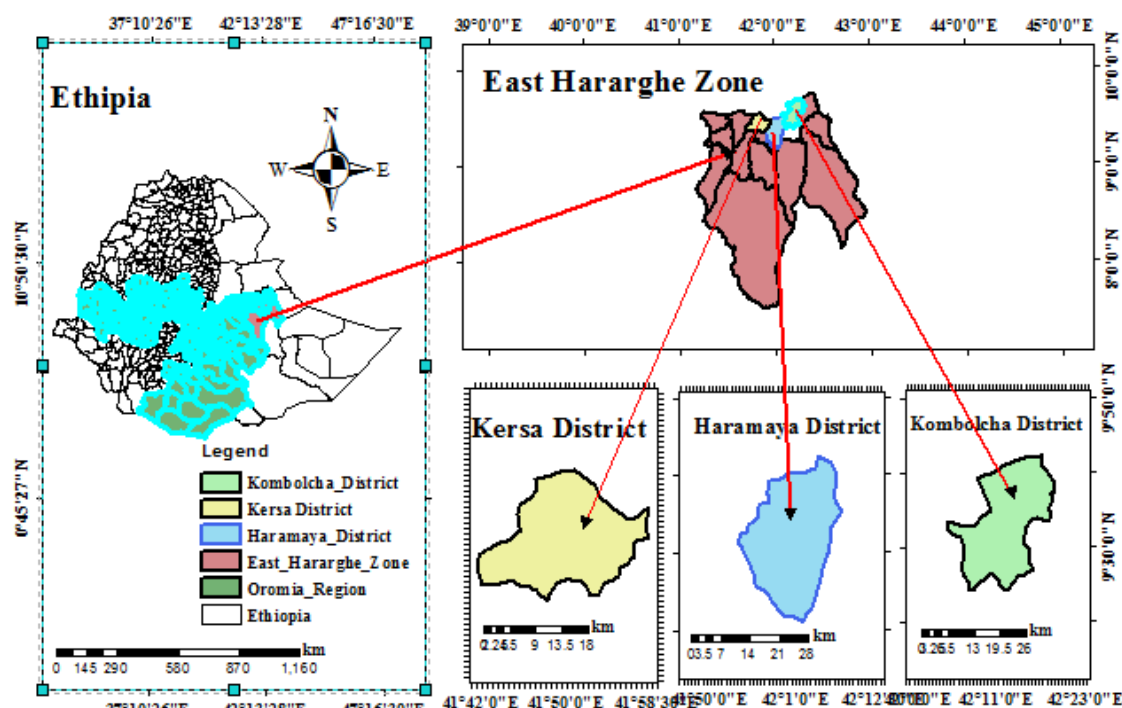


Figure 1. Map of study areas

## 2.2. Types, Sources of data, and Methods of data collection

Both qualitative and quantitative data were collected from secondary and primary sources. Primary data were collected from sampled household interviews who were randomly selected from the selected *kebeles* using structured and semi-structured questionnaires. Secondary data were collected from secondary sources (published and unpublished materials), the District's Office of Agriculture, and other sources.

## 2.3. Sampling procedure and Sample size determination

A multi-stage sampling procedure was employed to select sample households. In the first stage, vegetable crop-growing potential districts were identified in collaboration with the zonal office of agriculture and accordingly, four districts were selected purposively. In the second stage, vegetable crops growing *kebeles* were listed based on their production potential and accessible roads with districts' agricultural office experts. Accordingly, three *kebeles* were randomly selected in each district. In the third stage, sampled households growing vegetable crops were randomly selected from the sampled *kebeles*.

## 2.4. Methods of data analysis

Both descriptive statistics and econometric models were used to analyze the collected data. The statistical value of the mean, standard deviation, percentages, and ratios was used to examine and understand the socio-economic

characteristics of sampled households. Commercial Index (HCI) was used to analyze the level of vegetable crop commercialization. The Tobit econometric model was used to analyze the determinants of commercialization of smallholder farmers' vegetable crops in the study area.

#### 2.4.1. Analysis of the level of major vegetable commercialization

Different approaches and indicators have been used for measuring the level of agriculture commercialization [16] three types of indices for measuring commercialization at the household level. These are the (i) output and input side commercialization type indices which measure the proportion of agricultural output sold to the market and input acquired from the market to the total value of agricultural production, (ii) commercialization of the rural economy index is defined as the ratio of the value of goods and services acquired through market transactions to total household income. Here, there is an assumption that some transactions may take place in-kind such as payments with food commodities for land use, and (iii) the degree of a household's integration into the cash economy which is measured as the ratio of the value of goods and services acquired by cash transaction to the total household income [17].

[17] and [18] on the other hand used a household commercialization index (HCI) to measure the extent of commercialization at the household level. The HCI is a ratio of the gross value of all crop sales per household per year to the gross value of all crop production. It thus measures the degree to which a household sells its output to the market. The advantage of HCI is that it provides a level of commercialization for every household separately. A majority of studies measure the level of smallholder commercialization in terms of the proportion of output sold in markets [16]. This study was used to measure agricultural commercialization in terms of scale adapted from [17]; [18] and [20]. It is an index measured as the proportion of the total amount sold to the total output produced at the farm level as given in equation (1):

$$HCI_i = \frac{\text{Gross value of vegetable sales}}{\text{Gross value of all vegetable produced}} * 100 \quad (1)$$

The gross value of vegetables sold =  $S_{ki}$ , the Gross value of all vegetables produced =  $Q_{ki}$ ,

Then;

$$HCI_i = \frac{\sum_{k=1}^n S_{ki}}{\sum_{k=1}^n Q_{ki}} * 100 \quad (2)$$

Where,  $HCI_i$  refers to the level of households' commercialization index growing vegetable crop "k" which is ( $0 \leq HCI_i \leq 100$ ),  $S_{ki}$  is the value of vegetable crop sold in monetary terms of crop k, and  $Q_{ki}$  is the monetary value of the total vegetable crop k where k ranges from 1, 2...k. The vegetable crops considered will be potato, onion, tomato, and cabbage which are produced for home consumption as well as for market purposes. The larger the index the higher the degree of commercialization and a value of zero showing a subsistence-oriented household. Following the works by [3] and [4] the farm households involved in greater sales of crop output with an index value of fifty or more ( $HCI \geq 50$ ) are commercial-oriented while those with lesser or no sales ( $HCI < 50$ ) are subsistence-oriented.

#### 2.4.2. Determinants of smallholder farmers' vegetable commercialization

The dependent variable used to measure the commercialization of vegetable-producing sample households was the commercialization index. HCI is the ratio of the gross value of all vegetable sales to the gross value of all vegetable production by a household. The commercialization index is censored because some of its values cluster at the limit (i.e., 0 for subsistence producers and 1 for fully commercialized). Hence, the censored regression model is the option for handling this limited dependent variable. Therefore, this study used a Tobit regression model. The Tobit regression model was chosen because it allows for the estimation of linear relationships between variables when there is either left- or right-censoring in the dependent variable (also known as censoring from below and above, respectively [21]). The structural equation of the Tobit model is given as:

$$Y_i^* = X_i \beta' + \varepsilon_i \quad (3)$$

Denoting  $Y_i$  as the observed dependent (censored) variable

$$Y_i = \begin{cases} 0 & \text{if } y_i^* \leq 0 \\ y_i^* & \text{if } 0 < y_i^* < 1 \\ 1 & \text{if } y_i^* \geq 1 \end{cases} \quad (4)$$

Where:

$Y_i$  = the observed dependent variable, in this case, commercialization

$y_i^*$  = the latent variable (unobserved for values smaller than 0 and greater than 1)

$X_i$  = is a vector of independent variables hypothesized to influence commercialization.

$\beta_i$  = are parameters associated with the independent variables to be estimated.

$\varepsilon_i$  = Residuals that are independently and identically normally distributed with mean zero and common variance.

$i = 1, 2, \dots, n$ , ( $n$  is the number of observations).

$\beta$  = a vector of parameters to be estimated

$U$  = disturbance term

**Table 1. Summary of dependent and independent variables used in the econometric model**

Variables	Definition	Measurement	Expected sign
<b>Dependent variable</b>			
HCI	Household Commercialization Index	The gross value of the crop sold to the gross value of the crop produced	
<b>Independent variables</b>			
AgeHH	Age of household head	Year of household head	+/-
EduHH	Education level of household head	Level of education	+
GenderHH	Gender of household head	1= male, 0= female	+/-
FamSize	The total active labor force in the household	Man equivalent	+
FarmExper	Farming experience of household head	Number of years since started farm activity	+
TLU	Total livestock owned by household	Tropical Livestock Unit	+/-
AccMktInf	Access to market information	1 if access to information, 0= otherwise	+
AccCred	Access to credit	1 if access to loan, 0= otherwise	+
AccIrrig	Access to Irrigation	1 if the access to irrigation and 0 otherwise	+
DistMkt	Distance to the nearest market	Kilometers/walking hours	-
Off/NonFam	Off/non-farm activities	Birr/year	-
ExtCont	Access to extension services	1 if access to extension services and 0 otherwise	+
FarmSize	Total land allocated for vegetable production	Hector	+

### 3. RESULTS AND DISCUSSION

#### 3.1. Descriptive Statistics Results

##### 3.1.1. Socio-Economic Characteristics of the Sample Households

The descriptive statistics results of the socioeconomic characteristics of the sample households in the selected districts are presented in Tables 3 and 4. As shown in Table 3, the majority (about 92%) of the respondents were male-headed households. While Table 4 shows that, the average age of the sample household heads is about 34 years and the household heads have about 9 years of vegetable production experience. The survey results show that 36.5% of the vegetable producers were illiterate while the remaining sample respondents were literate.

**Table 2. Summary statistics of sample households (dummy variables)**

Variable	Category	Freq.	Percentage
Sex of household head	Male	213	92.61
	Female	17	7.39
Education of household head	Literate	146	63.48
	Illiterate	84	36.52
Access to irrigation	Yes	163	70.87
	No	67	29.13
Access to market price information	Yes	190	82.61
	No	40	17.39

Access to credit services	Yes	22	9.57
	No	208	90.43
Access to Extension services	Yes	104	45.22
	No	126	54.78
Membership to cooperatives	Yes	51	22.17
	No	179	77.83
Access to improved seed/s	Yes	117	50.87
	No	113	49.13

**Source:** Computed from survey data result, 2022

The survey indicated that 70.82% of those respondents use irrigation for vegetable production. Most of the farmers rely on boreholes and ponds for irrigation. In the study areas, a water-pumping motor (owned or exchanged with labor service for fieldwork or just mutual assistance of the neighbors) plays a great role in undertaking the irrigation. According to the survey result, 9.57% of the sample vegetable-producing households had access to credit.

Access to timely and accurate vegetable market information is the basic element for producers to decide how much to produce and supply to market at what possible prices. (Table 3) revealed that 82.61% of the total sample households had access to vegetable market information.

**Table 3. Summary statistics of sample households (continuous variables)**

Variable	Mean	Std. Dev	Min	Max
Age of household head (year)	34.88	10.129	20	70
Household size (no.)	7	2.71	1	13
Total own landholding (ha)	0.331	0.196	0	1
Livestock owned (TLU)	2.23	1.56	0	8.02
Farm experience in vegetable production (year)	9.42	6.28	1	30
Distance to the nearest marketplace (Minutes)	54.76	24.92	10	120
Annual non/off-farm income (Birr)	1094.35	310.85	0	40000

**Source:** Computed from survey data result, 2022

Despite the huge and extensive investment in promoting extension services in the country, the survey shows that only 45.22% of the total sample respondents had been contacted or visited by developmental agents on vegetable production (Table 2). Concerning the distance to the nearest market, according to the survey, the respondent farmers are expected to travel an average distance of about 54.76 minutes to access the nearest market. The mean total land holding for the sample vegetable producers is 0.331 hectares. The average number of livestock for the sample households is 2.23 tropical livestock units (Table 3).

### 3.1.2. Types of Vegetables Produced in the Study Areas

Different types of vegetables are grown in the study area with different intensities in terms of land and other input allocation, purpose of production, and marketability. The most commonly grown vegetables in terms of the number of growers are Irish potato, onion, beetroot, cabbage, and carrot (Table 4).

**Table 4. The proportion of households producing vegetables (2021/2022 production year)**

S.No.	Crops	Frequency	Percentage
1	Irish potato	225	97.82
2	Cabbage	37	16.08
3	Beetroot	42	18.26
4	Carrot	22	9.57
5	Onion	43	18.69

**Source:** Computed from survey data result, 2022

### 3.1.3. Commercialization of vegetables Producers

The vegetable is the most commonly grown crop in the study areas in three production cycles. Cycle I (February to April) and Cycle III (November to January) were produced using irrigation while Cycle II (May to October) was produced using rainfall. The production may primarily mean for consumption or the market. Some farmers usually produce certain crops for home consumption and some specific crops for sale [20]. In this case, the commercial orientation of farmers should be measured regarding a specific crop rather than the farmer, in

general. Thus, this study judged the commercialization behavior of smallholder farmers in vegetable production using the commercialization index. The index was constructed based on production at the household level.

The overall findings of this study showed that the commercialization index for sample vegetable producers was 89.21%. This implies that, on average, 89.21% of all vegetables produced were sold. While the remaining output was either consumed or stored as seed tubers for the next season. According to [20] and [18] a crop commercialization index greater than 50% signifies a commercial-oriented farmer for a crop under consideration. Therefore, vegetable crops produced in the study areas were market-oriented and highly commercialized.

Table 5 shows the mean production and cash income from sales of vegetables by sample households. From the total production of vegetables, 89% were sold while the remaining 10% was consumed. For certain vegetables, the seeds needed for the next production cycle are provided from their production. In the case of potatoes, for example, 85% was sold, 4% consumed and 11% used for seed whereas 97% of the onions were sold and 3% was used for consumption.

**Table 5. Household Commercialization Index (HCI) of vegetable crops**

Vegetables	The area allocated (ha)	The amount produced (qt)	Amount sold (qt)	Commercialization Index (HCI)
Onion	0.02	3.8	3.7	97.80
Irish Potato	0.13	25.94	22.6	85.37
Cabbage	0.014	6.85	6.52	97.55
Beetroot	0.016	2.39	2.2	92.24
Carrot	0.01	1.86	1.8	96.77
All vegetables	0.19	40.89	36.82	89.21

**Source:** Computed from survey data result, 2022

### 3.2. Determinants of smallholder farmers' vegetable commercialization

The commercial behavior of vegetable producers was measured by the commercialization index, which is the ratio of the value of vegetables sold to the value of all vegetables produced in the study areas in the given production year. Different determinants were determining the commercialization behavior of smallholder farmers in vegetable production. These determinants were analyzed using the Tobit regression model. The results of the regression are given in (Table 6).

**Distance to nearest market:** Distance to market was seen to be significant at a 10 percent probability level with a contrary to expectation positive sign. By implication, it means that the nearer the distance to the market center, the more likely the farmer's orientation toward vegetable commercialization and level of commercialization. Households further away from marketplaces have lower market participation and thus market orientation. This result is in line with previous studies [22]; [23].

**Access to market information:** Information access is also another factor, which positively affects the proportion of vegetables sold at a 5% significance level. This result suggested that the proportion of vegetables marketed increases in response to access to vegetable market information. Access to information is expected to enhance the skills and knowledge of farmers, link farmers with modern technology, and ease liquidity and input supply constraints [24]. Therefore, this study showed that as the smallholder vegetable farmers had access to market information, more they were likely to be market-oriented towards vegetable commercialization and level of commercialization.

**Livestock ownership:** As expected livestock ownership was found to positively and significantly affect at less than 5 percent of the significance level of vegetable commercialization and level of commercialization in the study areas. Income obtained from livestock can be used to acquire crop production resources to boost productivity and, hence, commercialization. Also, access to assets such as ownership of livestock provides households with leverage to invest in market-oriented production [25].

**Cooperative membership:** The coefficient of farmers' membership to a cooperative was positive and significantly related to vegetable commercialization and level of commercialization at a 10 percent probability level. This means that farmers' membership in cooperatives increases vegetable commercialization. Membership in cooperatives and groups possesses the potential of increased access to information important to production and marketing decisions. Given this, the result is plausible. It is also in line with previous findings [1].

**Land allocated under vegetable crops:** Land allocated under vegetable crops was positively and significantly associated with the commercialization and level of commercialization at a 1% significance level. This is expected since land is a critical production asset having a direct bearing on the production of surplus due to economies of scale. An additional *timad* (0.125 ha) of the household-allocated vegetable crops would increase the proportion of output sold by 135 quintals. Consistent with the findings of [12] an increase in cultivated land size may have boosted the production of horticultural crops and also consistent with the government's massive push to promote and deliver technology packages to smallholders.

**Table 6. Tobit estimation results for vegetable commercialization**

Explanatory variables	Coef.	Robust Std. Err	P-value
Sex of household head	-1.3001	8.856	0.883
Age of household head	-0.0038	0.00356	0.274
Education level of household head	7.1014	5.1182	0.167
Family size of household head	-0.07966	0.8201	0.923
Distance to the nearest market	0.2061*	0.1236	0.097
Access to market information	9.683**	4.5081	0.033
Access to credit services	-11.708	7.7942	0.135
Access to extension services	0.20645	0.8673	0.812
Farm experience in vegetable production	0.36701	0.3658	0.317
Livestock ownership (TLU)	3.1082***	1.1617	0.008
Non/off-farm activities	-5e-05	2.7e04	0.852
Access to irrigation	4.2801	4.0837	0.296
Access to improved seed	6.496	4.668	0.166
Cooperative membership	12.565*	7.126	0.079
The area allocated to vegetable	135.3518***	32.8001	0.000
Constant	-20.54186	16.4654	0.214
/sigma	31.05665	3.5755	

The number of observations =130,  $F(15, 215) = 5.21$ ,  $\text{Prob} > \chi^2 = 0.0000$  Log likelihood = -1105.8719, Pseudo  $R^2 = 0.9112$ , Note: \*\*\*, \*\* and \* indicate significance at 1%, 5%, and 10% levels, respectively. Source: model output based on survey data, 2022

#### 4. CONCLUSION AND RECOMMENDATIONS

Transforming the subsistence-oriented production system into a market-oriented production system as a way to increase the smallholder farmer's income and reduce rural poverty has been in the policy spotlight of many developing countries, including Ethiopia. There is a need to deliberately improve the smallholder commercialization decision as well as the level of commercialization to facilitate stable incomes and sustainable livelihoods. This study was aimed at analyzing smallholder vegetable commercialization status in the East Hararghe Zone, Oromia National Regional State, Ethiopia with the specific objectives to estimate the household level of output side vegetable crops commercialization, determinants of commercialization, and the level of commercialization. The average household commercialization index for smallholder farmers engaged in vegetable production was 89.21%, which shows that households producing vegetables sell most of their farm produce to the market which indicates that vegetable commercialization is a highly commercialized crop in the study area. However, it

was noted that the commercialization of vegetable crops was determined by access to the market, resource ownership, and institutional factors. The study found that commercialization was significantly influenced by the distances to the nearest market center, access to market information, livestock ownership, cooperative membership, and the area allocated under vegetable production.

The recommendations or policy implications to be drawn from this study are based on the significant variables from the analysis of the empirical study. Thus, some relevant policy implications can be drawn from the findings of this study that can help to design appropriate intervention mechanisms to improve the smallholder commercialization of vegetable crops at the farm level in the study districts.

The fact that distance to the marketplaces has become an important determinant of the commercialization of vegetable crops suggests the role of policies geared towards improving physical access to marketplaces could yield positive results in improving the commercialization of smallholder farmers of vegetable crops. As a result, improving rural



infrastructure in developing market infrastructure in the form of establishing produce collection points across rural areas would assist poor farmers in faster delivery of farm produce especially perishable commodities of vegetable crops.

The size of land allocated for vegetable crops affected the smallholders' commercialization of vegetable crops positively and significantly. It will be difficult for policymakers to increase the land holding of the household; but the policies need to strengthen more in intensifying the farm practices through the 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 smallholder farmers' commercialization and level of commercialization of vegetable crops will be achieved.

Livestock possession is also an important determinant of the commercialization of vegetable crops which calls for enhancing the livestock assets of the household as it provides manures for the farm, means of transportation of their products to the market, and financial liquidity for the farmers. Therefore, the study suggested strengthening the existing crop-livestock production system is crucial.

Cooperative membership is also an important determinant of vegetable commercialization. However, most of the vegetable farmers are unorganized or not cooperative members in the study districts. This needs strong government intervention and the effort should also be made to strengthen farmers' cooperatives and encourage collective action of farmers to lower transaction costs and access to inputs. It is important to promote the formation of farmer's organizations or cooperatives in pre-urban and urban areas.

The concerned institutions like the district's office of agriculture/extension services experts should provide market information about prices, market places information, time of production, consumers' preference, and other related information that serves as a base for planned production.

## 5. REFERENCES

- [1] Olwande, J., Smale, M., Mathenge, M. K., Place, F. and Mithofer, D. 2015. Agricultural marketing by smallholders in Kenya: A comparison of maize, kale, and dairy. *Food Policy*.
- [2] Pingali, L.P. and Rosegrant, M.W. 1995. *Agricultural commercialization and diversification: Process and policies*. Food Policy.
- [3] Solomon A, Bekele S, Franklin S. 2010. Does technology adoption promote commercialization? Evidence from Chickpea Technologies in Ethiopia.
- [4] Schneider K, Gugerty MK. 2010. The impact of export-driven cash crops on smallholder households. Evans School of Public Affairs, University of Washington. August 17, 2010, EPAR Brief P. 94.
- [5] MoFED (Ministry of Finance and Economic Development). 2015. Growth and Transformational Plan (GTP 2015-2020). Addis Ababa, Ethiopia.
- [6] Weinberger, K. and A. Lumpkin, 2005. Horticulture for poverty alleviation: The unfunded revolution: The World Vegetable Centre, AVRDC Publication No. 05-613, Shanhua, Taiwan.
- [7] Bezabih, E., Hadera, G. 2007. Constraints and Opportunities of Horticulture Production and Marketing in Eastern Ethiopia. Drylands Coordination Group Report No. 46.
- [8] Pender, J. and Dawit Alemu. 2007. Determinants of Smallholder Commercialization of Food Crops: Theory and evidence from Ethiopia. Discussion Paper No. 745. Washington D.C., International Food Policy Research Institute (IFPRI).
- [9] Berhanu, G., Moti, J. 2010. Commercialization of Smallholders: Is Market Participation Enough? Contributed Paper presented at the Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa, September p. 19-23.
- [10] Goitom A. 2009. Commercialization of smallholder farming in Tigray, Ethiopia: Determinants and welfare outcomes. MSc. Thesis, the University of Agder, Kristiansand, Norway.
- [11] Adam B, Belay K, Belaineh L, Tesfaye L. 2010. Effect of crop commercial orientation on the productivity of smallholder farmers in drought-prone areas of the Central Rift Valley of Ethiopia. *J. Rural Dev.* 33(4):105-128.
- [12] Aman Tufa, Adam Bekele and 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.
- [13] Abafita, J., Atkinson, J. and Kim, C.S. 2016. Smallholder Commercialization in Ethiopia: Market Orientation and Participation *International Food Research Journal* 23(4): 1797-1807.
- [14] Chanyalew Seyoum, Tesfaye Lemma, Ranjan S. Karippai, 2011. Factors Determining the Degree of Commercialization of Smallholder Agriculture: The Case of Potato Growers in Kombolcha District, East Hararghe, Ethiopia
- [15] Kumilachew Alamerie. 2016. Commercial behavior of smallholder potato producers: the case of Kombolcha woreda, Eastern part of Ethiopia: *Economics of Agriculture Review* article.
- [16] Von Braun, J., and E. Kennedy, 1994. Conclusions for Agricultural Commercialization Policy. In *Agricultural commercialization, economic development, and nutrition*.
- [17] Govereh, J., Jayne, T.S., Nyoro, J. (1999): Smallholder commercialization, interlinked markets, and food crop productivity: Cross-country evidence in eastern and southern Africa, available at: [http://www.aec.msu.edu/fs2/ag\\_transformation/atw\\_govereh.PDF](http://www.aec.msu.edu/fs2/ag_transformation/atw_govereh.PDF).
- [18] Strasberg, P.J., Jayne, T.S., Yamano, T., Nyoro, J., Karanja, D., Strauss, J. (1999): Effects of Agricultural Commercialization on Food Crop Input Use and Productivity in Kenya. Office of Sustainable Development; Policy Synthesis for USAID-Africa Bureau, pp. 41.
- [19] Gebremedhin, B., M. Jaleta, and D. Hoekstra. 2009. Smallholders, Institutional Services, and Commercial Transformation in Ethiopia. *Agricultural Economics* 40 (S1):773–787.
- [20] Bekele, A., Belay, K., Legesse, B., Lemma, T. 2011. Effects of Crop Commercial Orientation on Productivity of Smallholder Farmers in Drought-Prone Areas of the Central Rift Valley of Ethiopia. *Journal of Rural Development* Vol. 33, No. 4, pp. 105- 128.
- [21] Maddala, G.S. 1992. *Introduction to Econometrics* Second Edition. Macmillan Publishing Company, New York.
- [22] Barrett, C. 2007. “Smallholder Market Participation: Concepts and Evidence from Eastern and Southern Africa,” *Food Policy*, volume 33, number 4 (August 2008) pp. 299-317.
- [23] Omiti, J. M., Otieno, D. J., Nyanamba, T. O., McCullough, E. 2009. Factors Influencing the Intensity of Market Participation by Smallholder Farmers: A Case Study of Rural and Peri-Urban Areas of Kenya, *African Journal of Agricultural and Rural Economics*, vol. 3, pp. 57-82.
- [24] Lerman, Z., 2004. Policies and Institutions for Commercialization of Subsistence Farms in Transition Countries. *Journal of Asian Economics* 15, pp 461-479, ELSEVIER.
- [25] Randela, R., Alemu, Z. G. and Groenewald, J. A. 2017. ‘Factors enhancing market participation by small-scale cotton farmers’, *Agrekon*, 47(4), pp. 451–469.