

Research Article

Factors Affecting Market Participation Decision and Level of Commercialization Among *Teff* Producers in East Shewa Zone, Oromia Region, Ethiopia

Asfaw Negesse Senbeta* 

Agricultural Economics, Adami Tulu Agricultural Research Center, Oromia Agricultural Research Institute, Addis Ababa, Ethiopia

Abstract

The government of 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. This study was aimed to identify status *Teff* commercialization, factors influencing farmers' market participation decision and level of *Teff* commercialization in East Shewa Zone. A two-stage random sampling procedure was used to select 122 sample households *Teff* producer. Descriptive statistics and econometric model were used to analyze the data. The result revealed that about 69.67% sample households were market participant in *Teff* production. The average intensity *Teff* commercialization were 37.3%. The result of probit model indicated that experience of *Teff* production, lagged price of *Teff*, land allocated for *Teff* production and participation in social organization positively influenced household head *Teff* market participation decision. In the second hurdle truncated, the level of *Teff* commercialization significantly and positively influenced by education level, experience in *Teff* production and lagged price of *Teff* while distance to market center influenced it negatively. The study indicated that the government, stakeholders and concerned bodies need to focus on facilitating farmers to participate in social organization, improving farmers capacity development through practical training and improving farmers experience through arrangement experience sharing among farmers so as to improve *Teff* market participation decision and intensity of commercialization.

Keywords

Commercialization, Double-hurdle, Market Participation, East Shewa Zone

1. Introduction

1.1. Background of the Study

Agriculture is the dominant sector of Ethiopia's economy (Crop, Livestock & Fisheries, Natural Resources) which higher than the Sub-Saharan Africa which shares 24% of

Growth Domestic Product (GDP). In Ethiopia Agriculture shares 33% GDP, 66% employment opportunities and 76% exports. Ethiopian agriculture over the past 11 years, GDP grew by 8.9% while agriculture had 5.4% growth rate [1].

Agricultural commercialization brings about sustainable

*Corresponding author: bonsahu@gmail.com (Asfaw Negesse Senbeta)

Received: 25 January 2025; Accepted: 15 July 2025; Published: 4 August 2025



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food security and welfare and enhances vertical and horizontal market linkages [2, 3]. Commercialization of smallholder farmers has been viewed by the government as the major source of agricultural growth in Ethiopia. The government of 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 [4].

Cereals are the major food crops both in terms of the area they are planted and volume of production obtained. They are produced in larger volume compared with other crops because they are the principal staple crops. Out of the total grain crop area, 81.46% (10,478,218.03 hectares) was under cereals. *Teff*, maize, sorghum and wheat took up 24.11% (about 3,101,177.38 hectares), 17.68% (about 2,274,305.93 hectares), 14.21% (1,828,182.49 hectares) and 13.91% (1,789,372.23 hectares) of the grain crop area, respectively. Cereals contributed 88.52% (about 296,726,476.94 quintals) of the grain production. Maize, *Teff*, wheat and sorghum made up 28.75% (96,357,345.00 quintals), 17.11% (57,357,101.87 quintals), 15.86% (53,152,703.28 quintals) and 15.71% (52,655,800.59 quintals) of the grain production, in the same order. East Shewa produced about 414,951.77 hectares cereals which major crops produced were Maize, Wheat and *Teff* covers 93,269.96 hectares, 96,474.81 hectares and 215,641.23 hectares respectively [5].

1.2. Statement of the Problem

The commercialization of crops grown by small-scale, resource-poor farmers has the potential to increase household food security, reduce rural poverty, and contribute to agricultural development and economy wide growth. By encouraging the application of improved agricultural inputs and farming techniques, diversification out of low-yielding subsistence crops, and specialization in more tradable crops, commercialization can increase farming incomes, enhance purchasing power, and reduce vulnerability to food insecurity of smallholders [6].

In GDP -II period, agriculture will remain the main driver of the rapid and inclusive economic growth and development. It is also expected to be the main source of growth for the modern productive sectors. Therefore, besides promoting the productivity and quality of staple food crops production, special attention will also be given to high value crops, industrial inputs and export commodities. To this end, addressing constraints entrenched in the agricultural development and marketing systems will be given utmost emphasis and priority [7].

The commercialization of crops grown has the potential to increase Household food security, reduce rural poverty, and contribute to agricultural development and economy wide growth [6]. Commercialization can increase farming incomes, enhance purchasing power and reduce vulnerability to food

insecurity of smallholders [6]. Policymakers in Ethiopia and elsewhere view agricultural commercialization as an essential part of the process of agricultural modernization, Specialization, and structural transformation of the economy toward more rapid and sustainable growth. Increased incomes resulting from commercialization led to increased food consumption and improved nutrition [8].

In cases where incomes, food consumption, and nutrition did not improve factors such as insecure land tenure, gender biases, or policy biases against smallholders often contributed to adverse consequences [8]. At the local level, commercialization is affected by many factors agro-climatic conditions and risks; access to markets and infrastructure; community and household resource and asset endowments; development of local commodity, input, Factor markets; laws and institutions; cultural and social factors affecting consumption preferences, production, and market opportunities and constraints [9].

East Shewa Zone produced major crops produced were Maize, Wheat and *Teff*, which contribute for consumption and sale purposes. But government focus on commercialization by introducing agricultural commercialization clusters for maize, *Teff* and wheat in this zone. Commercialization can increase farming incomes, enhance purchasing power and reduce vulnerability to food insecurity of smallholders [6]. Therefore, identification of the determinants of smallholder farmers' *Teff* commercialization (output market-oriented production) and farmers' level of *Teff* commercialization are crucial to improve producers' income by improving their level commercialization and market participation decision.

1.3. Objectives of the Study

The specific objectives of the study were:

- 1) To assess the status of smallholder farmers *Teff* commercialization in the study area.
- 2) To identify factors affecting smallholder farmers *Teff* market participation decision.
- 3) To identify factors affecting smallholder farmers level of *Teff* commercialization in the study area.

2. Research Methodology

2.1. Description of the Study Area

This study was conducted in East Shewa zone of Oromia National Regional State, Ethiopia. The study area (East Shewa zone) is one of the administrative zones of Oromia Regional State. It is located in the south eastern part of Ethiopia. It extends between 70°33'50"N-90°8'56"N and 38°24'10"E-40°05'34"E. It has a total area of 10,241 square kilometer and population of 1,208,825 with population density of 118 persons per km square. The average farm land holding size of the zone is about 1.5 ha per household which is

relatively larger compared to the regional average of 1.0 ha per household [10]. The zone covers about 8% of the cultivated area in Oromia region [10].

2.2. Data Types, Sources and Methods of Data Collection

Both qualitative and quantitative types of data were used. Both primary and secondary sources of data were used for this study. Primary data was collected from household survey while secondary data was from East Shewa Zone office of agriculture, Central statistical agency and internet sources.

2.3. Sampling Procedure and Sample Size

A Multi-stage sampling procedure was used to identify sample households for data collection. In the first stage Lume

and Ada'a districts were selected based on potential *Teff* producers in East Shewa Zone. In second stage Potential Kebeles for *Teff* producers were purposively identified. The third stage, about 122 households was randomly selected by using [11] sample size determination.

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

Where: n = is the sample of *Teff* producer households in the Zone N = is the total *Teff* producer in the Zone and e = 0.09 is the level of precision defined to determine the required sample size at 9% level of precision because it is possible to use 5% to 10% level precision by considering data representative.

The total number of *teff* producer household is 152,341, so sample size is calculated as follows:

$$n = \frac{152,341}{1+152,341(0.09)^2} = \frac{152,341}{1,249} = 122$$

Table 1. Sampling frame and sample size.

Name of sampled kebeles	Total major crop producers' households (number)	Proportion sampled Households (%)	Number of samples household heads (number)
Ejere	20,603	24.6	30
Daka Bora	15,796	18.9	23
Dankaka	24,724	28.5	36
Kuftu	22,664	27	33
Total	83,787	100	122

Source: DOA and Own computation, 2023.

2.4. Method of Data Analysis

Descriptive statistics and econometric model were used for analyzing the data.

The household commercialization index (HCI) to determine household specific level of commercialization [12, 13]. The index measures the extent to which household crop production is oriented toward the market. A value of zero would signify a totally subsistence-oriented household and the closer the index is to 100, the higher the degree of commercialization. The index measures the ratio of the gross value of crop sales by household i in year j to the gross value of all crops produced by the same household i in the same year j expressed as a percentage.

$$HCI = \frac{\text{Gross value of crop sales hh i year j}}{\text{Gross value of all crop production hh i year j}} \times 100\%$$

The index measures the ratio of the gross value of crop sales by household i in year j to the gross value of all crop

production by the same household i in the same year j expressed as a percentage. In this study *Teff* produced in the study area used.

2.4.1. Model Specification and Test for Appropriateness

The Ramsey-reset test, and the result is insignificant (prob>F= 0.884 and 0.574 for *Teff* indicating that there was no problem of omitted variables in the model. Variance inflation factors (VIF) was computed multicollinearity test and the result shows VIF values of less than 10 indicating that no problem of multicollinearity (mean VIF=1.55). Robust method was also employed to correct the possible problem of heteroscedasticity. Outliers were checked using the box plot graph.

Selection bias was tested for by IMR (mills lambda 0.554) which was insignificant suggested that there was no sample selection bias.

Tests of model selection were performed using log likeli-

hood test and Akaike's Information Criteria (AIC). To select the model that best identifies using the joint decision criteria of log likelihood test and AIC. The test statistic for log likelihood ($\Gamma = 257.37$) was higher than the chi-square value (141.48) at 10 degrees of freedom for *Teff* at 10 degrees of freedom statistical significance at one percent level which is in favor of double hurdle model. The AIC for the double hurdle model for *Teff* 14.28 was lower than that of Tobit 16.13. Both tests reject the use of results from the simultaneous decision, i.e. Tobit model. Therefore, double hurdle model selected for analysis of this study.

2.4.2. Econometric Model Specification

Double hurdle model [14] involves two-step estimation procedure. In the first stage, probit model was used to identify factors affecting decision to market participate. Probit model takes values 1 and 0 that were assigned to represent the choice whether a farmer decides to sold *Teff* or not.

Probit model: The decision to market participates can be modeled as a probit regression following [14] can be given:

$$Y_i^* = x_i\beta + e_i \quad (1)$$

$$Y_i = \begin{cases} 1 & \text{if } Y_i^* > 0 \\ 0 & \text{if } Y_i^* \leq 0 \end{cases}$$

where e_i is independent of x_i which is a 1 by K vector of factors affecting the decision to participate for all households (i), β is a 1 by K vector of parameters, and $e_i \sim N(0,1)$.

Truncated regression excludes part of sample observation based on the value of the dependent variable [15]. That is, the truncated regression uses observations only from farming greater than zero. The intensity of *Teff* commercialization is modeled as a regression truncated at zero:

$$Z_i^* = x_i\beta + \mu_i, \mu_i \sim N(0, \delta^2) \quad (2)$$

$$Z_i = \begin{cases} Z_i^* & \text{if } Z_i^* > 0 \text{ and } Y_i = 1 \\ 0 & \text{otherwise} \end{cases}$$

Where Z_i is the intensification level of commercialization which depends on latent variable Z_i^* being greater than zero and conditional to the decision to participate Y_i .

2.4.3. Explanatory Variables and Its Descriptions

Table 2. Summary of variables description and hypothesis.

Dependent Variables	Unit/ type	Variables Description	
Market participation decision	Dummy	If households sold <i>Teff</i> value of 1 and 0 otherwise	
Level of Commercialization	Continuous	Household commercialization index in percent	
Explanatory Variables Description of variables			Exp sign
Land under production	Continuous, cultivated land in hectares		+
Dependency ratio	Continuous, ratio of less 15 and above 65 years to b/n 15 to 64 years		-
Crops farming experience	Continuous, experience of production in years		+
Education level	Continuous, education status years of schooling		+
Family size	Continuous, number of family members		+/-
Distance to market center	Continuous, in kilometers		-
Distance to all weather roads	Continuous, in kilometers		-
Access to market information	Categorical Yes=1, 0=No		+
Frequency of extension contact	Continuous, number of extensions contact		+
Access to credit service	Categorical, Yes=1, 0=No		+
Participation in farmer groups	Categorical, Yes=1, 0=No		+
Livestock owned	Continuous, tropical livestock unit		+/-
Lagged market prices of <i>Teff</i>	Continues, ETB Per Kg		+

3. Results and Discussion

3.1. Descriptive Statistical Results

3.1.1. Summary of Continues Variables

The average age of the sample respondents was found to be 44.49 years while average family size of the sample households was 5.45 persons per household, which is greater than the national average of 4.6 persons per household [16]. The average dependence ratio was 0.59. The average cultivated land holding size of the sample households was 1.47 hectares, which is greater than national average of 0.95 hectares [17]. The average areas covered by Teff during the year 2023 cropping season was 0.71 hectares, which accounts for about 47.62% of the average cultivated land. The average livestock holdings measured in terms of tropical livestock unit (TLU) were found to be 5.32. The mean education level of sample household was 4.31 years of schooling ranges from illiterate to fist degree. The mean farming experiences and Teff production experience were 20.10 and 18.37 years respectively.

The frequency of extension contact was 4.47 times in survey year which mostly provided by development agent. The average distance all-weather road from the study area was 2.31 kilometers while the average distances to travel from farm to the market center by sample farmers in the study area was 6.68 kilometers (Table 3).

There was not statistically significant difference between Teff market participants and non-participants in terms of age of household head, family size, dependency ratio and distance to all weather roads. Teff market participants and non-participants were statistically difference in terms of land allocated for Teff production, livestock holding, education level, experience of Teff production, frequency of extension contact, distance to market center and lagged price of Teff. Thus, the significant difference implied that market participant sample households allocate more land as compared to non-participant for Teff production and have more livestock than non-participants. The percentages of literate Teff market participant were higher than non-participant farmers.

Table 3. Summary of descriptive continuous variables.

Teff Market Participation Decision								
Variables	Participants (n=85)		Non-participants (n=37)		Over all (n=122)		t-value	Pr (T > t)
	Mean	St.Dev	Mean	St.Dev	Mean	St.Dev		
Age	44.61	12.50	43.19	12.62	44.49	12.73	-0.744	0.4581
Family size	5.86	2.38	5.70	2.00	5.45	2.25	0.816	0.4160
Dependency ratio	0.59	0.54	0.60	0.53	0.59	0.53	0.159	0.8737
Cultivated land (Ha)	1.59	1.16	1.18	1.02	1.47	1.14	-1.88	0.0619
Land for Teff (ha)	0.86	0.41	0.41	0.18	0.71	0.41	-6.392	0.0000
Livestock holding (TLU)	5.90	3.47	4.00	3.28	5.32	3.51	-2.806	0.0059
Education level	5.22	4.27	1.14	2.01	4.31	4.22	-4.962	0.0001
Farming experience	21.87	14.64	16.05	12.45	20.10	14.20	-2.11	0.0370
Teff production experience	21.12	8.22	12.05	4.50	18.37	8.77	-5.94	0.0000
Frequency of extension contact	6.51	4.54	1.71	1.64	4.47	4.31	-4.38	0.0000
Distance to all weather roads	2.10	2.25	2.81	2.35	2.31	2.29	1.596	0.1135
Distance to market center	5.45	4.05	9.49	5.32	6.68	4.83	3.21	0.0000
Lagged price of Teff	44.91	6.62	38.97	6.68	43.1	7.16	6.805	0.0000

Source: Own survey result, 2023

3.1.2. Summary of Dummy Variables

Out of the total households interviewed, only 29% participated in non and off-farm activities. The majority of households depend on farming activities. Sample farmers participated in social organization was 40.98%. Related to credit services only 13.93% of the sample farmers had access to credit either in the form of cash or kind. However, the majority of sample respondents (about 86.07% of them) had not used credit because of high interest rate, shortage of credit service, religious view

and inappropriate payback period of received loan. The Chi-square test result showed that insignificant differences between Teff market participant and non-participant farmers with respect to access to credit service. Sample respondents' access to market information was 58.2%. The Chi-square test result showed that statistically significant difference between Teff market participant and non-participant sample households indicating that percentage of sample respondents who had access to market information was greater than non-participant.

Table 4. Summary of descriptive dummy variable.

Market Participation decision								
Variables	Response	Participants (n=85)		Non-participants (n=37)		Over all (n=122)		χ^2 -value
		Freq	%	Freq	%	Freq	%	
non/and off-farm activity participation	Yes	23	27.06	6	16.22	29	23.77	1.672
	No	62	72.94	31	83.78	93	76.23	
Participation in social organizations	Yes	40	47.06	5	13.51	50	40.98	16.568
	No	45	52.94	32	86.49	72	59.02	
Credit service access	Yes	14	16.47	3	8.11	17	13.93	1.5032
	No	71	83.54	34	91.89	105	86.07	
Access to market information	Yes	56	65.88	15	40.54	71	58.20	6.805
	No	29	34.12	22	59.46	51	41.80	

Source: Survey result, 2023

3.2. Teff Commercialization Index

The level of commercialization of Teff was 37.3%, which ranges from zero substance farming to fully commercialized 100%. This result was similar finding with [18]. Thus, more than half of the produced not commercialized for Teff use for consumption purposes (Table 5).

Table 5. Commercialization index of Teff production.

Commodity	Statistics			
	Mean	Std.Dev	Minimum	Maximum
Teff	0.373	0.312	0	1

Source: Own survey result, 2023

3.3. Results of the Econometric Model

In this section, double-hurdle model was used to identify determinants of market participation decision and level of Teff commercialization.

3.3.1. Factors Affecting Teff Market Participation Decision

The probit regression model was used to analyze Teff market participation decision. The overall goodness-of-fit of the probit model was statistically significant at 1% probability level which indicates that the model explain the relationship between the dependent and at least one independent variable. The result indicated that Teff market participation decision was significantly influenced by experience of Teff production, lagged price of Teff, land allocated for Teff production and participation in social organization (Table 6).

Experience in household head Teff production: Experience of Teff production is found to have a positive and significant influenced on Teff market participation decision as prior expecta-

tion at 1% level of significance. This result implies that for each additional one year, the probability of households' Teff market participation decision would increase by 1.6%, keeping all other

factors constant. The experienced farmers decide to participate more as accumulated knowledge through experience. This is in line with the finding of [19].

Table 6. Determinants of sample households market participation decision of Teff.

Variables	Coefficient	Robust Std.Err	P > z	Marginal effect
Education status	-0.006	0.049	0.896	-0.001
Family size	-0.092	0.077	0.233	-0.017
Dependency ratio	0.383	0.344	0.266	0.725
Experience of Teff production	0.084***	0.029	0.004	0.016
Livestock holding (TLU)	-0.076	0.056	0.172	-0.014
Lagged price of Teff in ETB	0.072**	0.031	0.019	0.014
Land allocated for Teff production	2.604***	0.581	0.000	0.492
Social organization participation	0.677*	0.397	0.088	0.120
Credit services access	-0.094	0.489	0.847	-0.019
Frequency extension contact	0.075	0.070	0.142	0.014
Access to market information	-0.055	0.440	0.215	-0.010
Distance to market center	-0.009	0.035	0.793	0.002
Constant	-4.840***	1.524	0.001	

***, **, *: implies statistical significance 1%, 5% and 10% levels, Log pseudo likelihood = -38.698, Pseudo R² = 0.483, Wald chi² (12) = 54.64, Prob > chi² = 0.0000, N = 122, Source: model result, 2023.

Lagged market prices of Teff: Lagged market prices of Teff is found to have a positive and significant influenced on Teff market participation decision as prior expectation at 5% level of significance. This result implies that for each additional one Ethiopian Birr, the probability of households' Teff market participation decision would increase by 1.4%, keeping all other factors constant. This is because prices stimulate production, and thus market supply to market. This is in line with the finding of [20].

Size of land allocated for Teff production: Size of land allocated for Teff production is found to have a positive and significant influenced Teff market participation decision at 1% level of significance. This result implies that for each additional hectare of land, the probability Teff market participation decision would increase by 49.2%, keeping all other factors constant. This could

be due to economies of scale that would increase to farmers to get the opportunity to harvest more and increase their participation. Those who have more allocate their land for Teff production can produce more that giving them more market participation decision than who less allocated land for Teff production. This is in line with the finding of [20].

Participation in social organizations: Social organization participation had a positive and significant affected on sample household Teff market participation decision at 10% significance level. The result implies those farmers that participate in different social organization were 12% more probability Teff market participation decision than others, keeping all other factors constant. This indicated that sharing market information can increases market participation decision. This is in line with the finding of [21].

Table 7. Factors affecting level of Teff commercialization by sample households.

Variables	Coefficient	Robust Std.Err	P > z
Education level	0.019***	0.005	0.000
Family size	-0.010	0.009	0.236
Teff farming experience	0.005**	0.025	0.029

Variables	Coefficient	Robust Std.Err	P > z
Livestock holdings (TLU)	-0.007	0.006	0.245
Lagged price of Teff	0.008**	0.004	0.036
Land for Teff production	-0.005	0.046	0.911
Participation in social organization	0.020	0.040	0.621
Credit service access	-0.022	0.042	0.590
Frequency of extension contact	0.006	0.005	0.268
Access to market information	0.022	0.041	0.594
Distance to all weather road	- 0.007	0.007	0.592
Distance to market center	- 0.017***	0.005	0.000
Constant	0.111	0.140	0.421
Sigma	0.153***	0.017	0.000

***, **, implies statistical significance at 1%, and 5% levels, Log pseudo likelihood = 41.021, Wald chi2 (12) = 141.48, Prob> chi2= 0.0000, N = 85 Limit: lower = 0, upper = + inf, Source; model result, 2023.

3.3.2. Factors Affecting Intensity of Teff Commercialization

The truncated model results indicated that the intensity of Teff commercialization was influenced significantly by education level, Teff production experience, lagged price of Teff and distance to market center (Table 7).

Education level of household head: Education level was found to have a positive and significantly influenced on farmers levels of Teff commercialize at 1% level of significance. Each additional one formal year of schooling would increase farmer's level of Teff commercialization by 1.9% than others. This implied that education increases the skill and ability to use market information better, which increase level of Teff commercialization. This results in line with the findings of [22].

Experience in Teff production: Experience in Teff production was found to have a positive and significant influenced on levels of Teff commercialize as prior expectation at 5% level of significance. Each additional one year of sample household head would increase farmer's level of Teff commercialization by 0.5% than others, keeping all other factors constant. This implied as farmer that has been involved in the production of Teff production more skills to increase productivity that leads to increase level of Teff commercialization. This results in line with the findings of [23].

Lagged market prices of Teff: A lagged market price of Teff is found to have a positive and significant influenced on level of Teff commercialization as prior expectation at 5% level of significance. This result implies that for each additional one Ethiopian Birr, the level of Teff commercialization would increase by 0.8%, keeping all other factors constant. This is because prices stimulate production, and thus market supply

to market. This is in line with the finding of [24].

Distance to market center: Distance to market center influenced farmers' level of Teff commercialize negatively as prior expectation at 1% significance level. The result indicated that distance to residence to market center increases by one kilometer, the level of Teff commercialization would decrease by 1.7%, keeping all other factors constant suggesting that longer distances to the market increase travel time. This is in line with the findings of [25, 26].

4. Conclusions and Recommendations

4.1. Conclusions

The descriptive and inferential analysis indicated significant difference terms of education level, cultivated land size, area allocated for Teff production, livestock holdings, Experience in Teff production, Frequency of extension contact, social organization participation, access to market information and distance of farm from market center of Teff market participants and non-participants sample households. The result also indicated that 69.67% of sample households were Teff market participant and the average intensity Teff commercialization was 37.3%.

The double hurdle model result indicated that, experience of Teff production, lagged price of Teff, land allocated for Teff production and participation in social organization positively influenced household head Teff market participation decision whereas, level of Teff commercialization significantly and positively influenced by education level, experience in Teff production and lagged price of Teff. Distance to market center was influenced level of Teff commercialization negatively.

4.2. Recommendations

Based on the findings of this study, the following recommendations are made.

Farmers should allocate more land for *Teff* production to increase market participation decision in East Shewa since *Teff* is major crop produced in East Shewa Zone of Oromia Region.

Agricultural office, research centers and Trade and market development office should focus on training and capacity building related to *teff* market related issues as *Teff* now days export commodity in our country.

Participation in social organization significantly affected farm households' *Teff* market participation decision positively. The Unions need to strength the organization by giving training and encourage farmers participate in different social organizations like producer cooperatives and consumer cooperatives.

Distance to market center affected sample household head level of *Teff* commercialization negatively. The office of transport authority and other concerned bodies need to strength construction of different infrastructure and transport facilities to enhance farmers' level of *Teff* commercialization.

Finally Agricultural offices and research centers cooperatively arrange field days for farmers exchange their experience sharing on *teff* production technologies that enhance market participation decision and level of *Teff* commercialization.

Abbreviations

GDP	Growth Domestic Product
TLU	Tropical Livestock Unit
GTP	Growth Transformation Plan
HCI	Household Commercialization Index
VIF	Variance Inflation Factors
AIC	Akaike's Information Criteria

Author Contributions

Asfaw Negesse Senbeta is the sole author. The author read and approved the final manuscript.

Conflict of Interest

The authors declare no conflicts of interest.

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