

# Analyzing Determinants and Characterizing Actors in the Wheat Value Chain of Central Ethiopia

Abraham Ababiya<sup>1\*</sup>, Kacha Assefa<sup>2</sup>, Yisak Erigicho<sup>3</sup>

<sup>1</sup>Department of Agricultural Economics, College of Agricultural Science, Wachemo University, Ethiopia

<sup>2&3</sup>Department of Economics, College of Business and Economics, Wachemo University, Ethiopia

\* Corresponding Author: [abrahamababiya2@gmail.com](mailto:abrahamababiya2@gmail.com)

## ARTICLE INFO

Received: 30 Dec 2024

Revised: 19 Feb 2025

Accepted: 27 Feb 2025

## ABSTRACT

**Introduction:** Wheat is a globally significant cereal crop, ranking second to rice and playing a vital role in food security and agricultural trade. In Ethiopia, wheat production is central to rural livelihoods and the economy. However, inefficiencies and gaps within the wheat value chain limit its potential. This study found the structure of the wheat value chain and the key factors influencing its development in Central Ethiopia.

**Objectives:** The study aims to identify and map the major actors involved in the wheat value chain, and analyze the determinants affecting the development of the wheat value chain in the study area.

**Methods:** A multistage sampling procedure was employed. Hadiya and Silte Zones were selected using simple random sampling, followed by two districts and two towns, and subsequently four kebeles. Data were collected from a wide range of wheat value chain actors through structured interviews, supplemented with secondary sources. Descriptive statistics and econometric modeling were conducted using STATA 16 software to analyze the data.

**Results:** The analysis revealed that various socioeconomic and institutional factors significantly influence the development of the wheat value chain. These factors include off-farm income, access to market information and extension services, distance to markets, marital status, landholding size, education level, utilization of improved seeds, access to credit, and the availability of plowing and harvesting technologies.

**Conclusions:** To strengthen the wheat value chain, comprehensive interventions are needed. Policymakers, producers, NGOs, and development partners should collaborate to address systemic constraints and improve access to services, technologies, and markets for all value chain participants.

**Keywords:** Wheat Value Chain, Value Chain Actors, Determinants, Characterizing

## 1. INTRODUCTION

Agriculture remains the backbone of Ethiopia's economy, playing a critical role in national economic growth, export promotion, and employment generation (Warsanga & Evans, 2018; Mmasa & Msuya, 2012). Currently, agriculture accounts for approximately 35.8% of the national gross domestic product (GDP), contributes nearly 90% of export earnings, and employs 72.7% of the population (CIA, 2018). Additionally, about 15–17% of the Government of Ethiopia's (GoE) expenditures are allocated to the agricultural sector (Dawit et al., 2010). Crop production is a major contributor to agricultural GDP, accounting for approximately 28%, while livestock rearing constitutes about 40% of the sector's contribution (Duguma et al., 2012). Major crops cultivated in Ethiopia include coffee, pulses, oilseeds, potatoes, sugarcane, vegetables, and cereals (Ejersa, 2011). Among these, cereals are the primary source of daily caloric intake and a critical livelihood strategy for millions of smallholder farmers (Khader et al., 2019; Habte et al., 2020; Taffesse et al., 2012; Penker, 2006,

Currently, the most significant cereal crops produced in Ethiopia include wheat, barley, maize, teff, and sorghum (GAIN, 2014). These crops provide income for millions of smallholder farmers, accounting for 60% of rural employment, 80% of cultivated land, over 40% of household food expenditures, and more than 60% of total caloric intake (CSA, 2017). In the 2012 production season, cereals accounted for 18809 million kilograms of Ethiopia's total grain output, increasing to 235.45 million quintals in the 2014/2015 production year (CSA, 2015). In 2015/2016, total grain production rose by 2.41% compared to the previous year (CSA, 2016). The Central Statistical Agency (CSA, 2018; 2019) reported that cereal production, including wheat, reached 26780 million kilograms in 2017/2018 and 277.7 million quintals in 2018/2019, representing a 3.67% increase between the two seasons.

Despite the critical role of wheat in Ethiopia's economy and its potential as a strategic agricultural product, smallholder farmers continue to face numerous production constraints that hinder the development and commercialization of the wheat value chain (Warsanga & Evans, 2018; Stein & Barron, 2017). Value chain development has gained increasing attention in recent years as a strategy to boost and stabilize smallholder incomes and revitalize rural economies (Sacchi et al., 2019). However, empirical evidence on wheat value chain analysis and its challenges remains limited at the national level. Some studies focus primarily on wheat value chain analysis rather than its development constraints, as seen in Sultan (2016) in the Oromia Region and Tadesse et al. (2017).

This gap underscores the need for comprehensive research that addresses both the mapping and development challenges of the wheat value chain. Accordingly, this study focuses on analyzing determinants and characterizing actors in the wheat value chain of central Ethiopia.

## **2. OBJECTIVES**

### **2.1. General Objective**

The general objective of this study is to analyze determinants and characterize actors in the wheat value chain of Central Ethiopia

### **2.2. Specific Objectives**

- i. To characterize major wheat value chain system actors in the study area
- ii. To analyze the determinants of wheat value chain development in the study area

## **3. METHODS**

### **3.1. Description of the Study Area**

Central Ethiopia Regional State is one of the newly established federal regions of Ethiopia, officially formed in 2023 following the administrative restructuring of the former Southern Nations, Nationalities, and Peoples' Region (SNNPR). The region encompasses several zones and special Woredas, including Hadiya, Silte, Gurage, and Kembata Tembaro, among others. Strategically located in the central part of the country, it shares borders with Oromia Region to the north and west and Sidama Region to the south. The economy of Central Ethiopia is predominantly agrarian, with the majority of the population engaged in subsistence and small-scale commercial farming. Key agricultural outputs include cereals, enset (false banana), legumes, vegetables, and livestock, particularly dairy cattle and small ruminants.

Hadiya and Silte Zones, are the focus areas of this study, are located within the Central Ethiopia Regional State. Hadiya Zone lies approximately 232 kilometers south of Addis Ababa, the capital city of Ethiopia. This zone is situated at altitudes ranging from 1,500 to 3,000 meters above sea level, with average temperatures ranging between 18°C and 27°C. Based on the 2017 population projections for Ethiopia, Hadiya Zone has an estimated population of 1,710,812, comprising 846,852 males (49.5%) and 863,960 females (50.5%), with a population density of 342.64 persons per square kilometer. Administratively, Hadiya Zone consists of 13 District and 7 town administrations, with Hosanna Town serving as both the regional and zonal capital.

Silte Zone is located approximately 172 kilometers south of Addis Ababa. Geographically, it lies at 8° 1' 00" North latitude and 38° 20' 00" East longitude. According to the 2017 population projections, the zone has an estimated total population of 1,250,000, comprising 610,000 males and 640,000 females. Werabe Town serves as the administrative center of Silte Zone and also functions as a cluster center for the Central Ethiopia Regional State.

In both zones, the dominant economic activities include mixed farming, business activities, and employment in both public and private sectors. Farmers predominantly practice a mixed farming system, characterized by the integration of crop production and livestock rearing. The zones are particularly specialized in wheat production, with an average productivity of approximately 65 quintals per hectare.

### 3.2. Description of Sampling Methods

This study was conducted to analyze and develop the wheat value chain system and assess its constraints in the Hadiya and Silte Zones of Central Ethiopia. The sampling procedure was structured as follows: In the first stage, two Woredas (districts or municipalities), namely Lemmo and Sankura, were randomly selected from the two zones. In the second stage, four rural kebeles (communities or localities) were randomly selected from the chosen Woredas. Subsequently, from these kebeles, a total of 200 wheat-producing farmers were randomly selected for the 2023/24 production year, with the sample evenly distributed across the kebeles based on lists obtained from the kebele administrations.

To determine the sample size, the simplified formula proposed by Kothari (2004) was applied, ensuring a 95% confidence level, a 50% estimated population variance, and a 5% margin of error.

Additionally, the study included other key actors in the wheat value chain system:

- **Input suppliers:** 4 suppliers (one from each kebele);
- **Wheat grain traders:** 8 traders (4 from cooperatives and 4 from local collectors);
- **Processors:** 4 flour factories purposively selected from Hosanna and Werabe towns due to their significant role in the value chain;
- **Product traders:** 4 finished-product traders (bread, cake, and related goods) and 4 unfinished-product traders (flour traders);
- **Consumers:** 162 consumers selected from Hosanna and Werabe towns using probability proportional to size (PPS) sampling, 81 consumers of finished wheat products, and 81 consumers of unfinished wheat products.

The total number of respondents for the study was 386.

**Table 1: Sample size distribution summary**

Respondent Type	Number of Respondents	Selection Method
Wheat Producers	200	Randomly selected across 4 kebeles
Input Suppliers	4	One from each kebele
Wheat Grain Traders	8	4 from cooperatives, 4 from local collectors
Processors (Flour Factories)	4	Purposively selected from Hosanna & Werabe
Finished Product Traders	4	(Bread, cake, etc.)
Unfinished Product Traders	4	(Flour)
Consumers of Finished Products	81	From Hosanna & Werabe (PPS sampling)
Consumers of Unfinished Products	81	From Hosanna & Werabe (PPS sampling)
<b>Total Sample Size</b>	<b>386</b>	

Source: Author's design (2024)

### 3.3. Types of Data and Data Collection Methods

The study employed both primary and secondary data collected from multiple sources to ensure comprehensive and reliable findings.

Primary data were collected from key actors involved in the wheat value chain system through semi-structured interviews, key informant interviews, focus group discussions, and personal observations, all based on pre-tested checklists. Trained enumerators, under the close supervision of the researchers, administered the semi-structured interviews.

Qualitative data were gathered through five key informant interviews and four focus group discussions. Each focus group consisted of six participants, totaling twenty-four individuals, purposively selected to ensure triangulation, enhance the robustness of the findings, and maintain consistency with the study objectives. Additionally, four key informants comprising the heads of the agricultural development departments and trade and market development departments in both zones were purposively selected due to their direct engagement with wheat value chain activities.

Secondary data were collected from published books, journal articles, government reports, and unpublished documents from relevant offices and organizations. These sources were used to supplement and validate the primary data and to provide contextual information about the study area.

### 3.4. Methods of Data Analysis

The study employed both descriptive statistics and econometric modeling to analyze the collected data. Data analysis was conducted using STATA 16 software. Descriptive statistics were used to summarize and explain the demographic and socio-economic characteristics of wheat producers and other actors involved in the value chain. These statistics provided insights into variables such as family size, age, education level, land size, and wheat production volume.

The value chain analysis involved characterizing the wheat value chain system to understand the roles and relationships among actors, the flow of wheat products from producers to markets, and the flow of market information across the value chain. Value chain mapping provided a visual and analytical depiction of the wheat marketing system in the study area.

To analyze the determinants affecting wheat producers' participation in the market, a multivariate logistic regression model was employed. This model was chosen because not all wheat producers participated equally in the market, and logistic regression is well-suited for binary outcome variables. The model specification in matrix notation is presented as follows:

$$\text{Logit}(p) = \log(p/(1-p)) = \beta_0 + \sum_{i=1}^n \beta_i X_i \quad \text{Logit}(p) = \log\left(\frac{p}{1-p}\right) = \beta_0 + \sum_{i=1}^n \beta_i X_i$$

Where:

$\beta_0$  = constant term

$\beta_i$  = coefficients of the independent variables

$X_i$  = set of independent variables

$p$  = probability of a producer participating in the wheat market (ranges from 0 to 1)

The logistic model estimates the log-odds of a producer's market participation as a linear combination of explanatory variables. The coefficients were interpreted as the change in the log-odds associated with a one-unit change in the corresponding independent variable, holding all other variables constant. Additionally, the odds ratios were computed, showing the multiplicative change in the odds for each unit increase in the independent variables.

Diagnostic tests were conducted to check for multicollinearity among the explanatory variables using Variance Inflation Factors (VIF) and contingency coefficients. No serious multicollinearity problems were detected, as VIF values were below the critical threshold of 10 and contingency coefficients were below 0.75.

## 4. RESULTS AND DISCUSSION

### 4.1 Descriptive Statistics

The demographic characteristics of the sample producers were analyzed using variables such as family size, household age, education level, land size, and the total wheat production per household. As presented in Table 2, 5% (10) of the sampled households were female-headed, while 95% (90) were male-headed. Additionally, the marital status of the household heads revealed that the majority, 194 (97%), were married, whereas 3 (1.5%) were single, 3 (1.5%) divorced, and none were widowed.

Table 2: Discrete demographic and socio-economic variables of wheat producers

Sex	Male	190	95%
	Female	10	5%
	Total	200	100%
Marital status of HH	Single	3	1.5%
	Married	194	97%
	Divorced	3	1.5%
	Windowed	0	0%
	Total	200	100%
HH Education	Basic Education	69	34.5%
	Read and Write	23	11.5%
	Grade 1-4	57	28.5%
	Grade 5-8	37	18.50%
	Grade 9--12	7	3.5%
	Above grade 12	7	3.5%
	Total	200	100%
Off-farm activities	Off-farm activities	64	32
	No off-farm activities	136	68
	Total	200	100%
Market outlet	Wholesale	61	31.44%
	Local	110	55%
	Cooperative	17	8.5%
	Consumer	12	6%
	Total	200	100%
Access to Credit	Enough	24	12%
	Not enough	176	88%
	Total	200	100%
Access to improved seed	Enough	146	75.26%
	Not enough	54	24.74
	Total	200	100%

Source: Own survey data (2024)

Education level is a crucial factor influencing farmers' openness to new ideas, innovations, and technologies. Table 2 demonstrates that a significant portion of the sample population had attended 1st cycle education (33.12%) and primary education (23.13%), while 24.37% of the respondents were uneducated. These findings indicate that most members in the study area have access to education, offering a favorable opportunity for wheat producers to engage



in the value chain and equip smallholders with the skills to enhance leadership and marketing roles. Such education levels can contribute to strengthening value chain participation and improving the efficiency of output marketing.

Furthermore, the survey data highlighted educational achievements among respondents, with 69 individuals (34.5%) having attained basic education, 23 (11.5%) able to read and write, and 57 (28.5%) completing grades 1-4.

Among the total sample respondents, 37 individuals (18.5%) had achieved an education level corresponding to grades 5-8, while 7 (3.5%) had completed grades 9-12, and another 7 (3.5%) had attained an education above grade 12. Table 2 also reveals that the majority of the respondents, 136 (68%), were solely engaged in agricultural activities, with no off-farm economic pursuits. The remaining 68 respondents (32%) reported engaging in off-farm activities, highlighting that 68% of small producers primarily depended on agriculture for their livelihood.

Regarding market outlets in the study area, wheat producers predominantly utilized local collectors and wholesalers, accounting for 110 (55%) and 61 (32%) of the respondents, respectively. A smaller proportion of the producers indicated cooperatives (17 respondents, 8.3%) and direct consumers (12 respondents, 6%) as their market outlets. These findings suggest a reliance on intermediaries in the wheat value chain.

Access to credit remains a significant challenge for wheat producers in the study area. As shown in Table 2, 176 respondents (88%) reported inadequate access to credit facilities, while only 24 (12%) indicated having access. Conversely, the data on access to improved seed presents a more favorable scenario. Approximately 75.26% of respondents reported having access to improved seed varieties, compared to 24.74% who indicated otherwise. This demonstrates progress in seed accessibility, despite ongoing credit limitations.

## 4.2. Econometric Estimation

**Diagnostic Tests for Multicollinearity:** The model's explanatory variables were checked for multicollinearity using two techniques:

- Variance Inflation Factors (VIF): The values ranged from a minimum of 1.08 to a maximum of 1.91, which is well below the threshold of 10, indicating no significant multicollinearity.
- Contingency Coefficient: Ranges from 0.0045 (minimum) to 0.5481 (maximum), which are below 0.75, further confirming the absence of serious multicollinearity issues. Therefore, no continuous or discrete explanatory variables were dropped from the model as there was no evidence of multicollinearity problems. This ensures the reliability and validity of the model's estimates.

### 4.2.1. Factors that affect wheat producers' market outlet selection for cooperative

To examine what factors affect wheat producers market outlet choice in the study area, more than variables which are focused on wheat producer such as age, land size, sex, education level, distance to the market, household size, experience in wheat farming, credit access, type of wheat breed, market information, extension service, off-farm-income and membership to cooperative were the hypothesized variables for wheat producers market outlet choices in the study area.

The multivariate logistic regression model has been estimated by the maximum likelihood method. The overall model is significant at the 0.01, 0.05, and 0.1 significance levels as indicated in each level of the determinants of market outlet. The results indicated that off-farm income, plowing technology, and access to harvesting technology played a significant role in the probability of wheat market outlet choice. The results obtained in this study coincided with other research results (Abebe *et al.*, 2018; Sultan *et al.*, 2017; Sultan, 2016; Mohammed, 2011; Tadesse, 2011; Abraham, 2013). The results of the model and their possible explanations are presented below. The discussion of model output about each of the significant variables is provided below.

**Marital Status of Wheat Producer Household Head (MarHH):** Marital status of wheat producer household head negatively correlated with cooperative market outlet selection and significantly affected smallholder farmer market outlet selection in the case of cooperative at a 10% significance level. This reveals that as smallholder farmers, being single, divorced, and widowed have a high probability of participating in a cooperative.

**Household Head Education Level (HHedu):** Smallholder farmers' household head education level, just on the contrary as marital status it has a positive correlation with market outlet selection to supply wheat grain in a cooperative. So, household head education level affects positively at a 10% significance level. This implies that household head education level changes from basic education level to the ability to read and write status the smallholder selection for cooperative increases by 0.57%. Similarly, household head education shifts the education level from grade 1-4 to grade 5-8; the smallholder selection for cooperative increases by 0.57%.

**Off-farm income:** This variable affects positively and significantly market outlet choices of cooperatives at a 10% significance level. It is consistence with Abate *et al.* (2021) about the market outlet choices of wheat producers. The marginal effect results show that the likelihood of choosing cooperative market outlet choices is increased by 0.19% as compared to the other market outlet choices for a one birr (official currency of Ethiopia) increase in off-farm income from their previous income earned.

**Farm Plowing Technology (Plyingtech):** It is a dummy variable, which was the access of farm plowing modern technology correlated positively with cooperative market outlets to supply wheat grain. This variable positively and significantly affects the likelihood of producers choosing cooperative markets at a 10% significance level. The marginal effect results show that the likelihood of accessing cooperative market outlet choice increased by 0.11%

**Distance from the market outlets (MarkDist):** This variable influenced the choice of wheat producer outlet negatively and significantly at less than a 5% significance level. The distance to the market outlets and transport facilities by producers decreased the probability of choosing a wheat producer market outlet. This might be due to the reason that producers who are far from cooperative market outlet areas and have no transport facility could supply their product to local market center individual consumers directly by getting a better price, which might go to the other market outlets.

Table 3: Results of multivariate logistic regression model on wheat market outlet choices for cooperative

Cooperative	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
MarthH	-.2888104	.1688941	-1.71	0.089*	-.62209	.0444693
HHage	-.0035262	.0051297	-0.69	0.493	-.0136488	.0065963
HHedu	.0517572	.0311046	1.66	0.098*	-.0096217	.1131361
Landsize	.0812736	.0525652	1.55	0.124	-.0224535	.1850008
Offfram	.1882736	.107517	1.75	0.082*	-.0238903	.4004374
Acccredit	-.2163132	.1521895	-1.42	0.157	-.5166296	.0840033
Farmexpr	.0149725	.0078269	1.91	0.057*	-.0004724	.0304174
Plyingtech	.1057997	.0561783	1.88	0.061*	-.0050572	.2166565
Accimprseed	-.0727337	.111401	-0.65	0.515	-.2925618	.1470945
Typewheatseed	-.0080667	.0769882	-0.10	0.917	-.1599879	.1438545
MarkDist	-.1160701	.2058271	0.56	0.034**	.2222298	.5900896
_cons	.5073032	.615294	0.82	0.411	-.7068597	1.721466

Source: Own survey data (2024)

#### 4.2.2. Factors that affect wheat producer market outlet selection for retailers

Among the explanatory variables significantly affecting market outlet participation for local(retailer) markets are household head marital status (MarthH), land size (Landsize), off-farm activities (Offfram), access for credit (Acccredit), type of plowing technology (Plyingtech), access for new harvesting technology (AccHTechn), access to frequent extension service (AccExt), and access to agricultural training (Acctraining). These explanatory variables are significant at 1%, 5%, and 10% significance levels, but most of them are at the 1% significance level. Other independent variables were found to be insignificant and not considered in this study.

**Household head marital status (MarthH):** Household head marital status has a statistically significant effect on individual smallholder farmer participation in selling their wheat grain locally (for retailers) in the study area.

Being male has a positive and significant effect on the probability of farmers participating in supplying wheat produce for local collectors. The result indicated that a household head being male increases the probability of supplying wheat grain for local collectors.

**Land size (Landsize):** Land size variable refers to the total hectares of cultivated farmland that an individual farmer owned. It is expected that the larger the total area of the farmland the farmer owns, the larger the land is allocated for wheat, and the higher the output, which influences a large quantity of wheat supplied to the market. This implies that a one-hectare increase in the farm land to produce whatever types of cereal products increases smallholders' participation in supplying wheat grain for retailers by 1.3%.

**Off-farm activities (Off-farm):** Smallholder farmers who have off-farm activities have a statistically significant and positive effect on household participation in local market outlets. Off farm activities directly determine smallholder's farmer positively and significantly local market outlet choices as the main market target from other market access with 1% significance level probability. This implies off-farm activities effect result shows that the probability of accessing retailer as market outlet choice is increase by 2.41% as compared to other market outlet choices.

**Access to credit (Acccredit):** it has negative and significantly affect the probability of farmer participation to supply wheat produce for local collectors (retailor) as main market outlet for their wheat grain at 1% significance level. The result indicated that produces access to credit services decreases the probability of wheat production by 0.17% their supply amount to local market outlets is approximately.

**Plowing technology (AccHTechn):** - Having access to technology for plowing has a negative and statistically significant effect on smallholder producers to supply grain for retailers as market outlets in the study area. As depicted in the regression result below table that when smallholder farmers use modern plowing technology for their farmland decrease produces amount of wheat produced for the local market by 2.79% at 1% significance level.

**Access to technology to harvest (AccHTechn):** - Access to modern technology to harvest wheat grain has a positive and statistically significant effect on smallholder producers to supply grain for a local market outlet in the study area. As shown table number 4; below in the regression result shows that having access to new technology for smallholder farmers in the area has a positive and statistically significant effect on smallholder farmers at a 1% significance level. This implies that when producers adopt new plowing technology, especially for wheat production, it increases farmer supply amount of wheat grain by 2.83% for retailers.

**Access for extension service (AccExt):** Frequency of extension contact negative and significantly affects accessing local market outlet choices as compared with wholesale and cooperative market outlet choices at 5% significance level. This reveals that as an extension service from DA or the concerned body, the rise per monthly supply of wheat decreases by 4.58%. Similarly, having access to training concerning agricultural activities and marketing concepts may decrease the supply of wheat grain for the local market outlet by 4.65% per year at a 5% significance level

Table 4: Results of multivariate logistic regression model on wheat market outlet choices for local market

LocalColl	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
MartHH	1.811449	1.054282	1.72	0.086*	-.2549054	3.877803
Fsize	-.1305991	.12813	-1.02	0.308	-.3817292	.120531
HHage	-.0149162	.0317499	-0.47	0.638	-.0771448	.0473124
HHedu	-.0182275	.1973966	-0.09	0.926	-.4051177	.3686626
Landsize	1.299579	.4511023	2.88	0.004***	.4154347	2.183723
Offfram	2.404413	.9223574	2.61	0.009***	.5966256	4.2122
Acccredit	-2.902238	.9176772	-3.16	0.002***	-4.700852	-1.103623
Farmexpr	-.0490147	.0498688	-0.98	0.326	-.1467557	.0487264
Ployingtech	-2.789765	.8617431	-3.24	0.001***	-4.478751	-1.10078



Accimprseed	-0.8030717	.6777475	-1.18	0.236	-2.131432	.525289
AccChemi	1.387767	.92213	1.50	0.132	-.4195745	3.195108
AccHTechn	2.829498	.7451336	3.80	0.000***	1.369063	4.289932
AccExt	-4.582759	2.023379	2.26	0.024**	.6170086	8.548509
Acctraining	-4.653007	1.973448	-2.36	0.018**	-8.520894	-.7851188
_cons	-4.247608	4.17964	-1.02	0.310	-12.43955	3.944336

Source: Own survey data (2024)

#### 4.2.3. Factors that affect wheat producers' market outlet selection for wholesalers

**Education level of household head (HHedu):** - Education level of the household head is significantly and negatively affecting the supply of wheat at a 10% significance level. That means when the education level increases by one grade, the supply of wheat to the market decreases by 0.39 quintals. For this study, education level is classified into five categories. The first category is from basic education, the second category is primary education (from grade 1 to grade 4) and the third also primary education (from grade 5 to grade 8) fourth category is secondary education (from grade 9 to grade 12) and fifth tertiary education (grade 9 and above). The result shows that when a household head's educational level increases by one year, he/she could be market-oriented and supply their product to wholesalers rather than other market access.

**Size of land holding (Landsize):** - This variable positive and significant coefficient associated with this continuous variable, indicating that an increase in landholding size leads to a corresponding increase in the quantity of wheat marketed through wholesale channels. Specifically, the model estimates that, holding other factors constant, a one-hectare increase in farmland is associated with a 0.20% increase in the volume of wheat supplied to wholesalers. This relationship is statistically significant at the 1% probability level ( $p < 0.01$ ), implying a high confidence level in the result's robustness. The positive and significant effect supports the hypothesis that farmers with larger landholdings are more likely to allocate more area to wheat production, thereby generating higher output and surplus for market supply.

**Frequency of extension contact (AccExt):** The frequency of extension contact negatively and significantly affected accessing wholesale market outlet choices as compared with cooperative market outlet choices at the 5% probability level. The effect results of extension contact show that the likelihood of accessing the wholesale market outlet choice increases by 0.19%.

**Access to credit (Acc credit):** Access to credit positively and significantly affected the probability of farmers participating in supplying wheat produce for wholesalers. The result indicated that access to credit services increases the probability of wheat production by 0.17%. Because of this, producers who can get credit can participate in supplying wheat products for wholesalers.

**Participation of off-farm activities (Off-farm):** This variable positively and significantly affected accessing wholesaler market outlet choices as the main market target from other market access, with 1% significance level. The off-farm activities effect results show that the probability of accessing wholesaler market outlet choice decreases by 0.28% as compared to other market outlet choices when the farmer's participation changes in off-farm activities.

**Access to improved seed (Accimprseed):** - Having access to improved seed has a positive and significant effect on individual smallholder farmers' selection of wholesalers to supply wheat grain. Having access to improved wheat seed positively affects participation probability in wholesaler market access to supply wheat grain at a 1% significance level. This implies that farmers getting improved wheat seed for sowing may increase productivity, which in turn increases produces supply amount of grain and finally increases the probability of supplying grain for those wholesalers.

**Access to technology to harvest (AccHTechn):** - Access to modern technology to harvest wheat grain has negative and statistically significant effect on smallholder produces to supply grain for wholesalers in study area. Result reveals that having access to modern harvesting technology significantly affects the production of market outlets i.e. wholesaler market selection at 1% significance level.

Table 5: Results of multivariate logistic regression model on wheat market outlet choices for wholesaler market

Wholesalers	Coef	Std. Err.	t	P>t	[95% Conf. Interval]	
MartHH	-.0641955	.1126888	-0.57	0.570	-.2866084	.1582174
Fsize	.0015255	.0123275	0.12	0.902	-.0228052	.0258562
HHage	.0021617	.0035154	0.61	0.539	-.0047765	.0091
HHedu	-.0383904	.0213188	-1.80	0.073*	-.0804671	.0036863
Landsize	.2003597	.0354398	5.65	0.000***	.170307	.2304125
Offfram	-.2825172	.070219	-4.02	0.000***	-.4211079	-.1439266
Acccredit	.1686194	.1012366	1.67	0.098*	.0311903	.3684292
Farmexpr	.0074371	.005222	1.42	0.156	-.0028695	.0177437
Accimprseed	.2679793	.0753537	3.56	0.000***	.1167043	.4192544
Typewheats~d	.0207556	.0524108	0.40	0.693	-.0826873	.1241984
AccChemi	.0289824	.1345503	0.22	0.830	-.2365785	.2945432
AccHTechn	-.2265549	.0731573	-3.10	0.002***	-.3709447	-.082165
AccExt	-.1914283	.1619376	-1.18	0.039**	.2110431	.5281865
Acctraining	.1290862	.1039934	1.24	0.216	-.0761647	.3343371
_cons	1.551447	.4384187	3.54	0.001	.6861438	2.41675

Source: - Own survey data, 2014

## 5. CONCLUSION AND RECOMMENDATION

This study investigated the structure, performance, and determinants of the wheat value chain in Central Ethiopia, with a particular focus on the Hadiya and Silte zones. By identifying key actors and examining the factors influencing their roles and decisions, the research provides critical insights into the functioning and constraints of the existing ("AS IS") wheat value chain system. The comparison with international best practices and the formulation of targeted intervention areas further enhance the study's practical relevance.

Empirical findings highlighted the central role of producers and the multifaceted factors shaping their market outlet choices, namely, education, landholding size, access to extension services and credit, off-farm income opportunities, availability of improved seeds, and harvesting technologies. These determinants not only influence individual decision-making but also collectively determine the efficiency, inclusiveness, and competitiveness of the wheat value chain.

To foster a robust and market-responsive wheat sector, the study underscores the need for integrated interventions. Strengthening agricultural extension systems, improving access to credit and modern inputs, expanding off-farm livelihood opportunities, and enhancing farmer education are pivotal. Equally important is the promotion of multi-stakeholder collaboration, involving public institutions, private actors, and development partners, to ensure coordinated and sustainable value chain development.

Finally, the study advocates for ongoing research and benchmarking against successful international models to inform adaptive policy and programmatic decisions. Through such dynamic and evidence-based approaches, Central Ethiopia can transform its wheat value chain into a driver of agricultural productivity, food security, and rural economic growth.

## DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The author hereby declares that generative AI technologies such as Large Language Models have been used during the editing of the manuscript. The details of the AI usage are provided below:

1. Name and Source of Generative AI Technology: ChatGPT, developed by OpenAI

2. Version and Model: GPT-4-turbo, April 2025 release

3. Input Prompts Provided to the AI:

✓ Language editing of this manuscript.

- ✓ Please improve grammar, coherence, and flow in the attached academic paper
- ✓ Polish the language while preserving the original structure and meaning.

The AI was used solely for language enhancement, including grammar correction, clarity improvement, and academic tone refinement.

#### **DECLARATION OF CONFLICTS OF INTEREST**

The authors declare that there is no conflict of interest regarding the publication of this paper.

#### **REFERENCES**

- [1] Dawit, A. L., Van Der Merwe, M. M., & Smith, J. E. (2010). Emergency contraception: Practice of service providers in Addis Ababa, Ethiopia. *Africa Journal of Nursing and Midwifery*, 12(1), 64–72.
- [2] Duguma, B., Kechero, Y., & Janssens, G. P. J. (2012). Productive and reproductive performance of Zebu X Holstein-Friesian crossbred dairy cows in Jimma town, Oromia, Ethiopia. *Global Veterinaria*, 8(1), 67–72.
- [3] Habte, Z., Legesse, B., Haji, J., & Jaleta, M. (2020). Determinants of supply in the wheat value chain of Ethiopia. *Eastern Africa Social Science Research Review*, 36(1), 37–61.
- [4] Khader, B. F., Yigezu, Y. A., Duwayri, M. A., Niane, A. A., & Shideed, K. (2019). Where in the value chain are we losing the most food? The case of wheat in Jordan. *Food Security*, 11, 1009–1027.
- [5] Mmasa, J. J., & Msuya, E. E. (2012). Mapping of the sweet potato value chain linkages between actors, processes, and activities in the value chain: A case of "michembe" and "matobolwa" products. *Sustainable Agriculture Research*, 1(1), 130.
- [6] Penker, M. (2006). Mapping and measuring the ecological embeddedness of food supply chains. *Geoforum*, 37(3), 368–379.
- [7] Sacchi, G., Belletti, G., Biancalani, M., Lombardi, G., & Stefani, G. (2019). The valorisation of wheat production through locally-based bread chains: Experiences from Tuscany. *Journal of Rural Studies*, 71, 23–35.
- [8] Stein, C., & Barron, J. (2017). *Mapping actors along value chains: Integrating visual network research and participatory statistics into value chain analysis* (Vol. 5). International Water Management Institute (IWMI). CGIAR Research Program on Water, Land and Ecosystems (WLE).
- [9] Taffesse, A. S., Dorosh, P., & Gemessa, S. A. (2012). Crop production in Ethiopia: Regional patterns and trends. In *Food and agriculture in Ethiopia: Progress and policy challenges* (pp. 53–74).
- [10] Warsanga, W. B., & Evans, E. A. (2018). Welfare impact of wheat farmers' participation in the value chain in Tanzania. *Modern Economy*, 9(4), 853.