FACTOR AFFECTING VALUE CHAIN ANALYSIS OF TEFF: THE CASE OF CHEHA DISTRICT, GURAGE ZONE SOUTHERN, ETHIOPIA

SENIOR RESEARCH

SET BY:

RETA MILILU

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ADVISOR: TSION.E (Mrs.)

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ABBREVIATIONS AND ACRONMYS

AAFC	Agriculture and Agri-Food Canada.
AARC	Adet Agricultural Research Center
ATA	Agricultural Transformation Agency
CSA	Central Statistical Authority
DA	Developmental Agents
EHNRI	Ethiopian Health and Nutrition Research Institute
EIAR	Institute of Agricultural Research
ESE	Ethiopian Seed Enterprise
FAO	Food and Agricultural Organization
GDP	Gross Domestic Products
HH	House Hold
IAEA	International Atomic Energy Agency
MoARD	Ministry of Agriculture and Rural Development
MoFED	Ministry of Finance and Economic Development

ABSTRACT

This research was conducted in Gurage zone cheha woreda to identify the factor affecting of teff value chain analysis. The specific objectives of the study was to identify actors in teff value chain and their roles,To identify factor affecting value chain teff supplied to the market, and to identify the constraints and opportunity in teff value chain in the study area. From the study I used both primary and secondary data source. The primary data was collected from 92 producers through interview, observation, and prepared questionnaires in sample respondents. The secondary data was conducted in written document, published and unpublished martial and other websites. The researcher used multiple regression model to identify the factors affecting quantity of teff supplied to the market, from 9 explanatory or independent variable 4 variables' are significant such as family size, quantity of teff produced , sex of household, and access to market information's. Generally value chain analysis of teff was participate many actors such as input supplier, retailer, producer,and wholesaler. The result indicates there were opportunities and constraints. The constraints were lack of access to market information, access to credit, soil erosion, no enough supply of input like quality of seed fertilizer, equipment and harvested machineries. The opportunities include the actors involved in quantity of teff supplied to markets were get value, and increase the linkage of actors through sharing of information. So value chain is important today in the world to increase and income of each individual. Based on the result I recommended the government and other organizations supply availability of raw materials, access to credit to increase market supply of teff, develop educational training, and access to market information's.

***Key word**: constraint, teff, opportunity, upgrading, value chain*

1. INTRODUCTION

1.1 Background of the study

Agriculture is the mainstay of the Ethiopian economy, contributing about 36.7% of the country's GDP and providing employment for 72.7% of the population (ATA, 2023; FAO, 2022). Within the agricultural sector, cereals are the dominant crops, covering about 80% of the total grain crop area and contributing about 87% of the total grain production (CSA, 2022).

Teff, an indigenous cereal crop in Ethiopia, is a significant contributor to the country's agricultural output. In 2021, teff covered about 24% (2.8 million hectares) of the total grain crop area and contributed 18.9% (31.2 million quintals) to the total Meher cereal production (CSA, 2022). Teff is not only a staple food crop in Ethiopia but also a major source of livelihood for millions of smallholder households (Sultan, 2021).

Despite the importance of teff in the Ethiopian economy, the value chain of the crop faces various challenges, including low productivity, limited access to improved inputs, asymmetric market information, and inefficient marketing systems (Efa, 2021; Timmer and Akkus, 2021).

These challenges have hindered the ability of smallholder teff producers to benefit fully from the value chain. Understanding the factors that influence its value chain is crucial for enhancing production, improving distribution, and ensuring broader accessibility.This study, conducted in 2024, focuses on the Cheha district of the Gurage zone in southern Ethiopia, examining the value chain of teff and the various factors that affect it. The value chain analysis approach was employed to assess the different stages of the teff supply chain, from production to consumption, and to identify the key actors, their roles, and the challenges they face.The value chain analysis of teff examines the various stages involved in bringing the crop from the producer to the final consumer, including production, processing, transportation, storage, and marketing. By identifying the key stakeholders, interactions, and constraints at each stage, researchers and policymakers can develop strategies to optimize the value chain and ensure equitable benefits for all involved.According to a comprehensive value chain study conducted by the Ethiopian Agricultural Transformation Agency (ATA) in 2023.

1.2 Statement of the Problem

Teff played a crucial role in Ethiopia's agricultural sector, yet smallholder farmers in the Cheha district faced significant challenges that impeded the effective functioning of the teff value chain. These challenges included inadequate infrastructure, limited access to financial resources, inconsistent quality control, and a lack of sufficient market information. Consequently, farmers struggled to optimize production and enhance profitability, adversely impacting their livelihoods. A key gap was the limited access to reliable market information for teff producers. Previous research identified constraints such as shortages of fertilizer and seed supply, price-setting issues, and restricted access to credit (Efa, 2021). However, the interplay among these factors and their specific effects on the teff value chain in Cheha remained inadequately explored, restricting stakeholders' ability to devise targeted interventions for improving efficiency, inclusiveness, and sustainability.

There was a notable lack of comprehensive studies specifically examining the teff value chain in the Cheha district, as most existing literature generalized findings across broader regions without considering the unique socio-economic and environmental contexts (Efa, 2021). Additionally, limited data on the teff market chain in Cheha meant previous research failed to provide a comprehensive mapping of the actors involved and the flow of teff from production to consumption. This market chain analysis aimed to fill this gap through in-depth interviews and surveys with stakeholders, including producers, collectors, wholesalers, retailers, and consumers.

Furthermore, while previous research identified general constraints affecting the teff market, there was insufficient analysis of how these constraints interacted and influenced the economic viability of smallholder farmers in the district (Minten et al., 2013). The literature often overlooked the role of gender within the teff value chain, making it essential to understand how gender dynamics affected market participation and access to resources to develop inclusive strategies (Dagmawit, 2016). Lastly, many past studies employed models that did not adequately capture the continuous nature of market supply; this research addressed this methodological gap by utilizing a multiple linear regression approach to provide a more understanding of the factors influencing teff supply (Mohammed, 2011).

1.3. Research question

- ✧ The study will attempt to answer the following research questions:
- ✧ Who are the key actors involved in the teff value chain in the Cheha district, and what are their roles?
- ✧ What are the major opportunities and constraints faced by the different actors along the teff value chain?
- ✧ What is facto affecting teff value chain in the study area

1.4. Objectives of the study

1.4.1. General Objective

- ✧ The general objective of this study is to analyze the value chain of teff in the Cheha district of the Gurage Zone, Southern Ethiopia.

1.4 2. Specific objectives

- ✧ To identify the key actors involved in the teff value chain and their roles.
- ✧ To assess the opportunities and constraints along the teff value chain.
- ✧ To identify factor affecting teff value chain supplied to the market.

1.5. Scope and Limitation of the Study

This study was undertaken in Cheha District, Gurage zone of South Nation Nationalities and Peoples Region (SNNPR). The study was conducted in one district and important information was collected from sample households and value chain actors involved in teff value chain in the study area. The study in the woreda it would lack details of area information which would reinforced in understanding of the whole woreda system particularly in relation to Teff value chain studies. However, there are spatial as well as temporal limitations to make the study more representatives in terms of wider range of area coverage, limited budget and time horizon. Furthermore, since Ethiopia has a broad diversified agro ecologies, institutional capacities,

organizations and environmental conditions, the result of the study have limitations to make generalizations and make them applicable to the country as a whole. These limitations are mainly due to limited time, budgets and facilities.

1.6. Significance of the study

This study was design to address the prevailing information gap on the subject and contribute to proper understanding of the challenges and assist in developing improved value chain development strategies and value addition activities to benefit of smallholder farmers, traders, and other market participants. The study was focusing on the analyzing teff value chain in Cheha district, analyze the actors, assessing the market margin of teff and value chain upgrading of teff, to identify the opportunity and constraints of teff value chain in study area.

2. LITERATURE REVIEW

2.1. Theoretical Review

2.1. 1.Definition and concepts of value chain

The term ‘Value Chain’ is using by Michael Porter in his book "Competitive Advantage: Creating and Sustaining superior Performance" (2013). The value chain analysis describes the activities the organization performs and links them to the organizations competitive position.

An organization’s competitive advantage is based on their product’s value chain. The goal of the company is to deliver maximum value to the end user for the least possible total cost to the company, thereby maximizing profit (Porter, 2005).

A value chain is the full range of activities required to bring a product from conception, through the different phases of production and transformation. A value chain is made up of a series of actors (or stakeholders) from input suppliers, producers and processors, to exporters and buyers engaged in the activities required to bring agricultural product from its conception to its end use (Kaplinsky and Morris, 2002).

According to Bammann (2007) has identified three important levels of value chain.Value chain actors: The chains of actors, who directly deal with the products, i.e. produce, process, trade and own them.Value chain supporters: The services provided by various actors who never directly deal with the product, but whose services add value to the product.Value chain influencers*:* The regulatory framework, policies, infrastructures, etc.The value chain concept entails the addition of value as the product progresses from input suppliers to producers and consumers.

A value chain, therefore, incorporates productive transformation and value addition at each stage of the value chain.At each stage in the value chain, the product changes hands through chain actors, transaction costs are incurred, and generally, some form of value is added. Value addition results from diverse activities including bulking, cleaning, grading, and packaging, transporting, storing and processing Kaplinsky, R., & Morris, M. (2001)

Supply chain: It is taking to mean the physical flow of goods that are requiring for raw materials are transformed into finished products. Supply chain management is about making the chain as

efficient as possible through better flow scheduling and resource use, improving quality control throughout the chain, reducing the risk associated with food safety and contamination, and decreasing the agricultural industry's response to changes in consumer demand for food attributes (Dunne, 2001).

2.1.1. Value chain analysis

Describes the activities within and around an organization, and relates them to an analysis of the competitive strength of the organization. Therefore, it evaluates which value each particular activity adds to the organizations products or services. This idea was built upon the insight the organization is more than a random compilation of machinery, equipment, people and money. Only if these things are arranged into systems and systematic activates it will become possible to produce something for which customers are willing to pay a price. Porter argues that the ability to perform particular activities and to manage the linkages between these activities is a source of competitive advantage. In most industries, it is rather unusual that a single company performs all activities from product design, production of components, and final assembly to delivery to the final user by itself. Most often, organizations are elements of a value system or supply chain. Hence, value chain analysis should cover the whole value system in which the organization operates.A typical value chain analysis can be performed in the following steps:Analysis of own value chain which costs are related to every single activityAnalysis of customer's value chains how does our product fit into their value chain Identification of potential cost advantages in comparison with competitors Identification of potential value added for the customer – how can our product add value to the customers value chain (e.g. lower costs or higher performance) – where does the Customer sees such potential.Wolinski, J., & Coates, G. (2016).

2.1.2. Major concepts guiding agricultural value chain analysis

Agricultural value chain analysis views effective demand as the force that pulls goods and services through the vertical system. Hence, value chain analysis need to understand the dynamics of how demand is changing at both domestic and international markets, and the implications for value chain organization and performance. Value chain analysis also needs to examine barriers to the transmission of information in the changing nature of demand and incentives back to producers at various levels of the value chain (MSPA, 2010).Production

In agricultural value chain analysis, a stage of production can be referred to as any Operating stage capable of producing a saleable product serving as an input to the next stage in the chain or for final consumption or use. Typical value chain linkages include input supply, production, assembly, transport, storage, processing, wholesaling, retailing, and utilization, with exportation included as a major stage for products destined for international markets. A stage of production in a value chain performs a function that makes significant contribution to the effective operation of the value chain and in the process adds value Kaplinsky, R., & Morris, M. (2001).

Governance refers to the role of coordination and associated roles of identifying dynamic Profitable opportunities and apportioning roles to key players (Kaplinsky and Morris, 2002). Value chains imply repetitiveness of linkage interactions. Governance ensures that interactions between actors along a value chain reflect organization, rather than randomness. The governance of value chains emanate from the requirement to set product, process, and logistic standards, which then influence upstream or downstream chain actors and results in activities, roles and functions. Value chains can be classified into two based on the governance structures: buyer-driven value chains, and producer-driven value chains. Buyer-driven chains are usually labor intensive industries, and so more important in international development and agriculture.

Value chain upgradingUpgrading refers to the achievement of technological capabilities and market linkages that enable firms to improve their competitiveness and move into higher-value activities (Kaplinsky and Morris, 2002). Upgrading in firms can take place in the form of process upgrading, product upgrading, functional upgrading and chain upgrading. Upgrading entails not only improvementsIn products, but also investments in people, know how, processes, equipment and favorable work Conditions.

2.1.3. Benefit of Value Chain in Agricultural Sector

It is an innovation that enhances or improves an existing product, or introduces new products or new product uses. This allows the farmer to create new markets, or differentiate a product from others and thus gain an advantage over competitors. In so doing, the farmer can ask a higher premium (price) or gain increased market share or access. Adding value does not necessarily involve altering a product; it can be the adoption of new production or handling methods that increase a farmer's capacity and reliability in meeting market demand. Value-added can be almost anything that enhances the dimensions of a business. The key is that the value-adding

activity must increase or stabilize profit margins, and the output must appeal to the consumer (AAFC, 2004).Value chain is useful as a poverty-reduction tool if it leads to increase on and off farm rural employment and income. Increased agricultural productivity alone is not a sufficient route out of poverty within a context of globalization and increasing natural resource degradation. A focus on post-harvest activities, differentiated value added products and increasing links with access to markets for goods produced by low-income producers would appear to be the strategy open to smallholders (Lundy *et al*., 2002).

Traditionally, little attention has been paid to the value chains by which agricultural products reach final consumers and to the intrinsic potential of such chains to generate value added and employment opportunities while high income countries add nearly US$185 of value by processing one tone of agricultural products, developing countries add approximately US$40. Furthermore, while 98 percent of agricultural production in high-income countries undergoes industrial processing, barely 38 percent is processed in developing countries. These indicate that well developed agro-value chains can utilize the full potential of the agricultural sector (UNIDO, 2009).

2.1.4. Developing Value Chain Systems towards the Benefits of the Poor

Developmental organizations. The focus of the approach lies in the promotion of economic potentials of the poor and disadvantaged groups of people (OECD, 2006). The main aim is to enable them in recent years, the pro-poor growth approach has become one of the key concerns of to react and take advantage of new opportunities arising as a result of economic growth, and thereby overcome poverty (Berg *et al.,* 2006). The promotion of value chains in agribusiness aims to improve the competitiveness of agriculture in national and international markets and to generate greater value added within the country or region. The key criterion in this context is broad impact, i.e. growth that benefits the rural poor to the greatest possible extent or, at least, does not worsen their position relative to other demographic groups. Pro-poor growth is one of the most commonly quoted objectives of value chain promotion. In recent years, the need to connect producers to markets has led to an understanding that it is necessary to verify and analyze markets before engaging in upgrading activities with value chain operators. Thus, the value chain approach starts from an understanding of the consumer demand and works its way

back through distribution channels to the different stages of production, processing and marketing (GTZ, 2006).

2.2. Empirical review

According to the World Bank (2013), because African countries have quickly developing economies, agriculture is central to their development plans, and efforts have been made to link production with agribusiness for better growth in agriculture. Nowadays, it earns an average of 24 percent of its annual growth from farmers, and their crops value chains reveal common and well-known constraints, such as poor infrastructure; fragmented and risky markets; poorly functioning input markets; difficulties accessing land, water, and finance; and inadequate skills and technology. More revealing, however, are the significant differences across value chains.

Efa et al. (2016) showed that teff value chain upgrading practices employed by teff farmers included using improved seed and differentiating the product by color to meet the consumer demand. Teff traders entirely determine teff price and standard. Teff farmers' production and marketing constraints included shortages of fertilizer and seed supply, price setting, and insufficient access to credit, whereas those of teff traders included double taxation, insufficient infrastructure, capital shortage, inadequate credit service, farmers' reluctance to sell teff, lack of demand, scarcity of storage facilities and lack of government support. The study area is known for teff production, mainly for market and family consumption. The supply of teff in the study area is subjected to a seasonal variation, with a surplus during harvest being its main feature. Yet, there is no such study that tries to look into the whole spectrum of the teff value chain in the district, which encouraged the researcher to perform the necessary teff value chain analysis. Since teff is an economically and socially crucial crop in the study area, this study is designed to address the prevailing information gap on the proper understanding and identifying actors involved in the chain and their respective roles, governance and upgrading practices of smallholder farmers, identifying and prioritizing constraints on teff production and marketing in the study area.

According to Minten et.al (2013) teff value chain had divided in to upstream and downstream. The use of modern input such as herbicide, pesticide, improved seed varieties, chemical fertilizer increased productivity in upstream of teff value chain, however, broadcasting is common method

used for teff sowing. The share of red teff in production declined from 36 percent of total production to 20 percent. The reasons for the decline of red teff produce over time. First, the prices for red teff are significantly low. Second, red teff traditionally used to have higher productivity than white teff; this is now changing as high-performing white varieties have recently become available. Thirdly, only very few improved red varieties are currently available.

According to a study conducted by Reardon et al. (2012), major changes are happening in agricultural and food markets worldwide and especially so in developing countries; supermarkets revolution, share of high-value crops have increased, quality demands rise, food safety requirements for export countries, vertical integration, up-scaling, disintermediation, and branding.

According to Bekabil et al. (2011) teff value chain program supports the doubling of teff production and ensures farmers to access sufficient markets to capture the highest value from their production, increase incomes and reducing the price to consumers within five years.

2.2.1. Determinants of teff market supply

Different articles were reviewed in relation to determinants of market supply for agricultural commodities in general and teff in particular. The main purpose of this section is to identify the factors that affect market supply of agricultural products and the method they used to quantify the cause and effect relationship between variables. Efa (2016) analyzed determinants of market participation and intensity of marketed surplus of teff producers in Bacho and Dawo districts of Oromia region, Ethiopia using double hurdle econometric model. His result indicated that family size, credit access, farm size, lagged market price, agro ecology and transport equipment affect the market participation of teff producers; on the other hand, proxy to nearest market, perception of farm gate price, family size, farm size, on/off farm income, agro-ecology and livestock ownership were found to be statistically significant factors of intensity of marketed surplus of teff producers.

The study conducted by Mohammed (2011) applied multiple linear regressions model to identify determinants of market supply of teff and wheat in Halaba Special Woreda, Southern Ethiopia. The author runs separate regression analysis for the teff and wheat. Among 11 explanatory variables, sex of the household head, teff production, access to market information

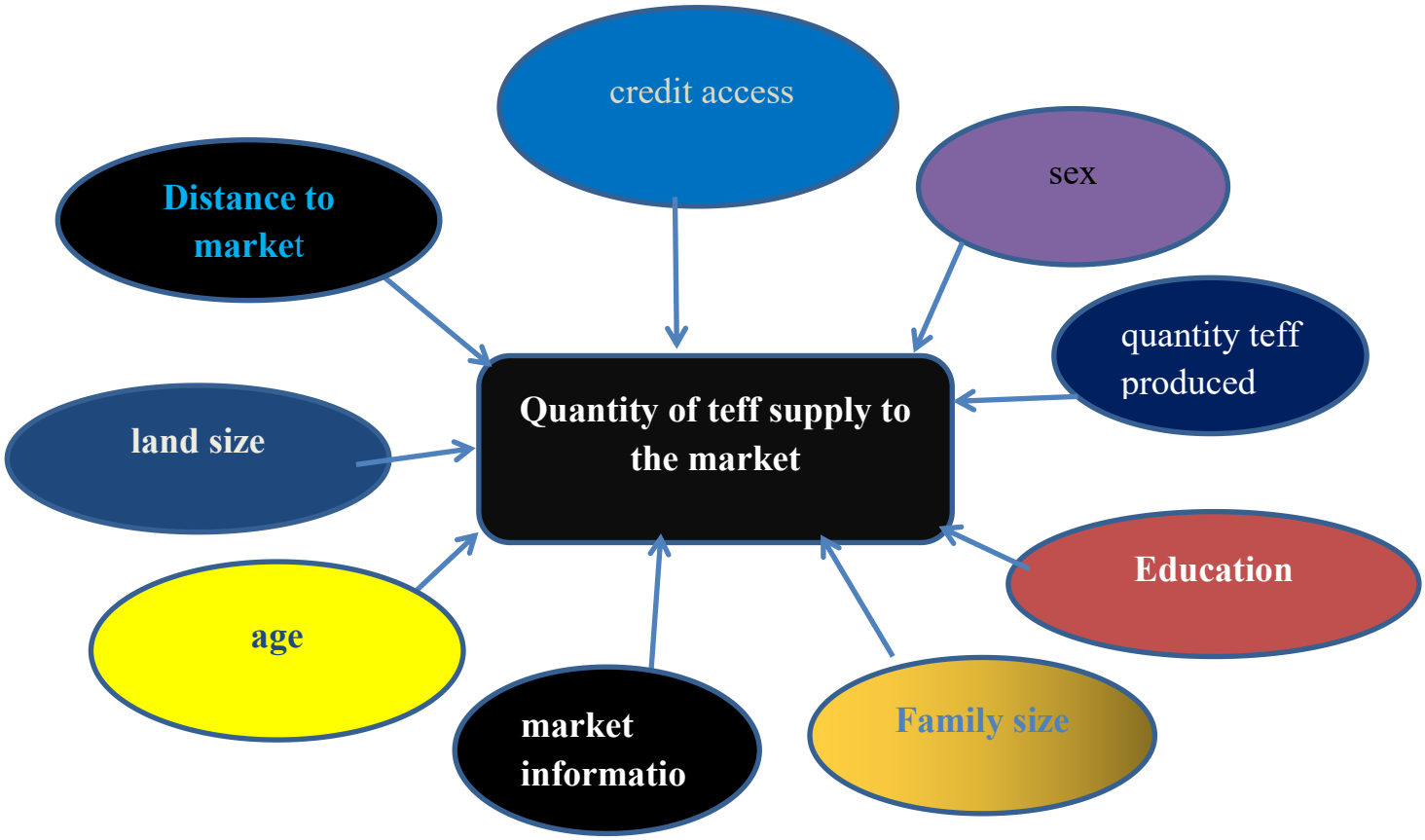
and extension service were statistically significant factors affecting teff market supply; on the other hand, price of other crops, wheat production and credit access affect market supply of positively and significantly. In addition to the above study, Azeb etal. (2017) analyzed factors affecting teff and wheat market supply in dendi district, West Shoa Zone, Ethiopia using multiple linear regressions. Similar to Mohammed (2011), he incorporated 11 explanatory variables and examined separate analysis for teff and wheat market supply. He got the same result with Azeb et al. (2011) who analyzed the determinants of quantity of teff market supply; whereas, price of teff in 2013/14, wheat quantity produce and credit access significantly and positively affected market supply of wheat.

The key factors identified in this study that affect the teff value chain analysis include:Production Factors:Land size Teff seed variety Use of fertilizers and pesticides Access to extension services Post-harvest Handling Factors:Teff threshing and cleaning practices Access to storage facilities Transportation methods Market Factors:Access to market information Bargaining power of smallholder farmers Market channels and linkages Price fluctuations Institutional Factors:Access to credit and financial services Policies and regulations related to teff production and marketing Coordination among value chain actors The study found that addressing these factors can improve the efficiency and competitiveness of the teff value chain in the study area. It highlights the need for interventions across the different stages of the value chain to enhance value addition and benefits to smallholder farmers.Eshetie, T. M., Gizaw, B. A., & Mulualem, T. (2018).

2.2.1 Conceptual framework

The following diagram illustrates the conceptual framework of the Factor affecting value chain of te in which the estimate Qauntity of teff supply to the market is dependent variable while, (age, sex, family size, education, ditance to market,credit access, market information,quantity teff produced,and land size) are the independent variable.

Fig 2.2.3 Conceptual framework

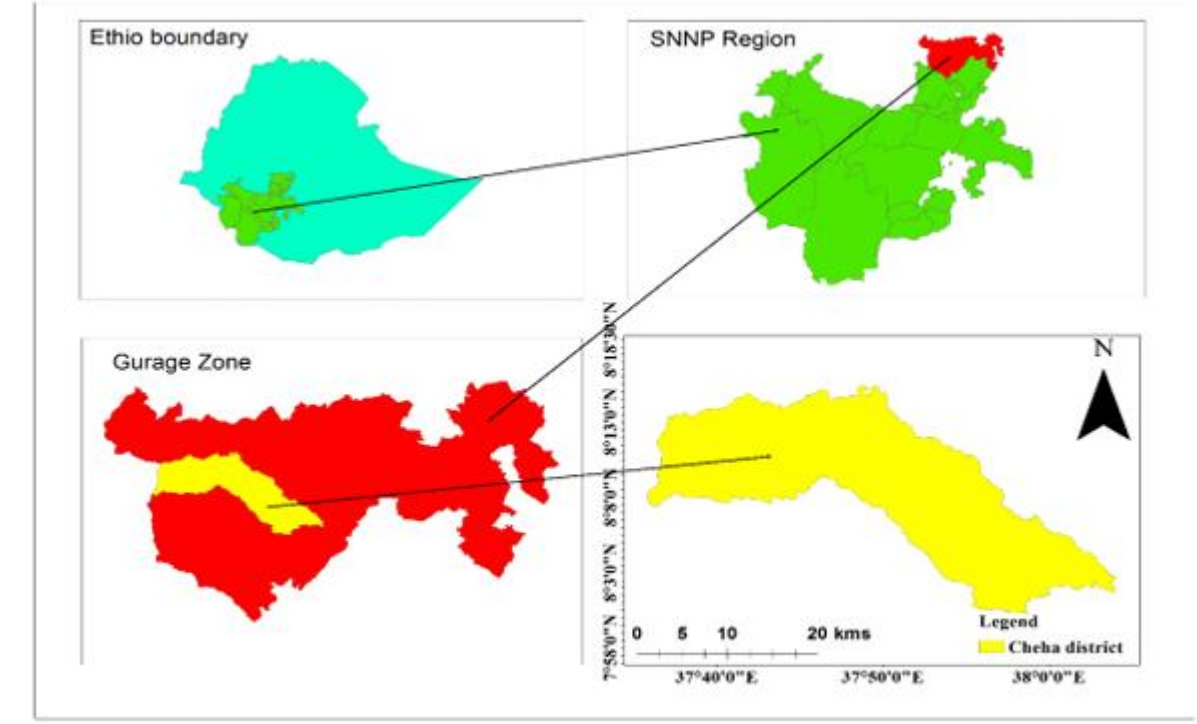


3. METHODOLOGY

3.1. Description of the Study Areas

This study was carried out in Cheha district, which was situated in the South Nation and Nationalities and Peoples Regional State. The district was 197 km south of Addis Ababa and about 30 km from Wolkite town. Cheha district was located between 7.99-8.25 latitude north and 37.59-38.06 east. The mean maximum and minimum temperatures were 27 and 18, respectively. Rainfall was received by the district between 900-1500 mm. It had 40 kebeles populated by 237,722 people. It also covered a total of 57,315 hectares (ha). The majority of the land was dominated by the weyna dega agro-climate zone, which took a total area of about 80% of the entire land, followed by dega with a total coverage of 20%. Cheha woreda was bordered by Abeshge district to the north, Geta and Enemor district to the south, Ezha and Gumer district to the east, and Yem special district and Oromiya. (Badasa Garara, 2014). As for the ethnic population of the town, it was predominantly occupied by SNNP and Gurage people, and others, but they were few in number. In terms of language, Guragic was used widely in urban and rural kebeles. In terms of the economic status in the district, the people were engaged in different activities, with a majority being engaged in large enterprises, micro-activities, and transportation. Some other people made a livelihood by working as civil servants and used their skills in various sectors and companies in the town, and there were industrial and manufacturing business activities within the town that served many people. As far as the economic activities of the residents are concerned, Cheha District also had residents who were involved in various arable and dairy agricultural activities, which were prevalent among the population residing in the newly integrated twelve rural kebeles. Agriculture was the most prominent economic activity of the residents in these kebeles.

Figure 1, Map of the study area



3.2 Sampling sizes and sampling techniques

The study employed a two-stage purposive sampling technique, followed by systematic random sampling. In the second stage, two kebeles—Luka and Eba, along with Wizera and Degag—were selected based on their volume of Teff production and accessibility. In the third stage, a systematic sampling method was applied to select 92 households from the list of households in the sampled kebeles, ensuring that the selection was proportional to the population size of each kebele. The sample size of respondents was determined using Yamane's formula (1967), aiming for a 90% confidence level and a 10% margin of error. Additionally, the sample size was proportionally allocated based on the total number of households in the selected kebeles.

90% and 10% margin of error. Also the sample size is determined proportionally to the total households

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

n=1190/1+1190(0.1)*2=92

Where, n= is number of respondent

N= is the total number

e = is the precision level. A 90% confidence level was taken and e= 0.1

After we use the systematic random sampling (proportionately) in order to get number of respondents from each kebeles.

For luka and eba = 92x660/1190 =51

For wizera and degag =92x530/1190=41

3.2.1. Trader's sampling technique

The sample size of the traders was taken from the study area during the survey time. During the survey time 47 traders (i.e.7 input suppliers, 10 retailers, 10 wholesalers and producer 20) were addressed. Therefore the study has addressed for a sample size of 47 traders.

3.3 Methods of Data Collection

The study was employs both primary and secondary data sources. Primary data was collected from interview using questioners and direct observation of the study area. The secondary data was collected from published and unpublished documents and annual reports of the governmental document.

3.4 Methods of Data Analysis

The study was both descriptive analysis and econometric model for analyzing the data.

3.4.1. Descriptive Analysis

Descriptive statistics such as mean, maximum, minimum, standard deviation, frequencies and percentages were used in process of examining and describing socio-economic and demographic characteristics of actors.

3.4.2. Econometric Method of Data Analysis

To assess the determinants teff market supply a multiple linear regression model were used. Econometrics analysis would be used to estimate the causal relationship between the dependent and explanatory variables. Multiple linear regression models are a model in which dependent variables depend on two or more explanatory variables. Accordingly, the model specified as in the following form.

$Yi=\beta'o + \beta'ixi + ui$

Where yi= Quantity of teff supply to the market ui = Disturbance term

βo = Intercept

βi= Coefficient of explanatory variable

xi= Vector of explanatory variables such as: age, sex, family size,land size, education , market information, Distance to the market, Access to credit, quantity produced.

The basic objective of using regression equation on this study is to make the study more effective at describing, understanding and predicting the stated variables.

Regress Performance on Selected Variables

$Yi = \beta0+ \beta1X1 + \beta2X2 + \beta3\ X3 + \beta4X4 + \beta5X5 + \beta6X6 + \beta7X7 + \beta8X8 + \beta9X9$

Where: X_1=Age of the household head (AGHH):-

X_2=Education (EDUCAT)

X_3= Family size (FAMSZ)

X_4=land size (LSIZE)

X_5= Distance to market (DSTMKT):

X_6=Access to credit (ACCR):

X_7= Access to market information (ACMIF):

X_8=quantity of produced (QPRD)

X9= Sex of household head (SHH);

Y is the response or dependent variable-Quantity teff of supply the market

3.5. Definitions and Hypothesis of Variables

Dependent variable

Quantity of teff supply to the market, which was a continuous variable measured in quintals of teff supplied to the market during the 2024/2025 year.

Variable specification and hypotheses: - In the way of identifying factors influencing teff supply to the market, the main task was exploring which factors potentially influenced and how these factors were related to the dependent variables. Teff supply to the market: - The supply of teff denoted as Y was the dependent variable measured in terms of quintals. A number of factors could influence the supply of teff. However, the importance of these variables in explaining the produced amount varied depending on the crop type, area of production, and degree of supply. The independent variables that were expected to influence the dependent variables of teff supply were the following:"

Independent variables

Age of the household head (AGHH): - This was a continuous variable measured in years. The expected sign was positive. As an individual stayed longer, he/she had better knowledge and decided to allocate a larger size of land, produce more, and supply more. Hence, a direct relation was assumed between age and the amount supplied. Recent studies, such as those by Mekonnen et al. (2022), found that the age of the household head had a significant positive effect on teff supply, indicating that older farmers, on average, supplied 15% more teff than their younger counterparts. This suggests that experience and knowledge gained over time may enhance agricultural productivity.

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Education (EDUCAT): It was a continuous variable that referred to the schooling years for the formal education of household heads. Education enhanced information acquisition and adjustment abilities of the farmer, thereby improving the quality of decision-making (Fakoya et al., 2007). Thus, education was hypothesized to have a positive effect on supply.

Land holding size (LSIZE): This was a continuous variable measured in hectares of land owned by the household. Those who had a larger land size or more hectares could allocate significant land to raise their teff production, thereby increasing marketable surplus. The study by Alemayehu (2012) indicated that a unit increase in land allocated for ginger resulted in an 11.1 quintal increase in the amount of ginger supplied to the market. Oliyad et al. (2017) found that

increasing land allocated to groundnuts increased farmers' likelihood of choosing wholesaler outlets over consumer outlets. Additionally, a recent study by Tesfaye (2023) showed that each additional hectare allocated to teff production led to a 15 quintal increase in market supply, reinforcing the hypothesis that land size positively influenced the volume of teff market supply and the likelihood of farmers choosing local collectors, wholesalers, retailers, and consumers, as they utilized all outlets to maximize average market prices

.**Quantity produced (QPRD):** This was a continuous variable measured in quintals, directly contributing to the quantity supplied to the market. Those who produced larger amounts supplied in larger volumes, while those who produced smaller amounts supplied in smaller volumes. Studies by Mohammad (2011), Sultan (2016), Kindie (2007), Bosena (2008), and Assefa (2009) found that the amounts of teff, wheat, grain, rice, red pepper, sesame, cotton, and honey produced by households positively affected the marketable supply of each commodity. Furthermore, a recent study by Mekonnen et al. (2022) indicated that an increase in teff production by one quintal was associated with a corresponding increase in market supply of 1.2 quintals. For this study, it was hypothesized that the quantity produced positively affected the volume of teff supply.

Distance to market (DSTMKT): This was a continuous variable measured in kilometers. The closer the market, the lesser the transportation charges, reduced transaction costs, and other marketing costs. The study conducted by Berhanu and Hoekstra (2008) on enhancing market orientation of smallholders regarding grain marketed surplus in Ethiopia revealed a negative relationship between grain marketed surplus and distance to market. Additionally, a recent study by Tesfaye et al. (2023) confirmed that for every kilometer increase in distance to the market, the quantity of teff supplied decreased by approximately 0.5 quintals. Therefore, as the market became farther from the farm, the marketed supply was low. Thus, distance to the nearest market was hypothesized to have a negative relationship with teff supply.

Access to credit (ACCR): This was a dummy variable representing access to both formal and informal credit for farm-related purposes, measured as 1 if a farmer had access to credit and 0 otherwise. Access to credit was an important source of financing for the agricultural activities of smallholder farmers (Kinde 2005). Additionally, a recent study by Abebe et al. (2023) found that

farmers with access to credit were 1.5 times more likely to increase their teff production compared to those without access. Hence, access to credit was predicted to have a direct relationship with supply.

Access to market information (ACMIF): This was a dummy variable that took a value of 1 if a farmer had market information and 0 otherwise. Farmers' marketing decisions were based on market price information, and poorly integrated markets could convey inaccurate price information, leading to inefficient product movement. Therefore, it was hypothesized that market information was positively related to supply.

Sex of household head (SHH): This was a dummy variable that took a value of 1 if the household head was male and 0 otherwise.

Family size (FAMSZ): It was a continuous variable measured in adult equivalent (AE). Production was a function of labor, and the availability of labor was assumed to have a positive relation with the quantity of supply.

Table1: Definitions, measurement of explanatory variables and expected effects

Variable	Description of variable	Types	Value	Expected sign
DSTMKT	Distance to market	Continuous	Kilometres	-ve
SHH	Sex of the Household Head	Dummy	Male=1, Female=0	+/-ve
FAMZ	Family size	Continuous	Number of family	+/-ve
ACCRD	Access to credit	Dummy	Access =1 not access =0	+ve
EDUCAT	Education	Continuous	Year	+ve/-ve
AGHH	Age of the households	Continuous	Year	+ve
QPRD	Quantity of teff produced	Continuous	In quintal	+ve

LSIZE	Land Size	Continuous	In hectares	+ve
ACMIF	access to market information	Dummy	inform=1 no inform=0	+ve

4. RESULTS AND DISCUSSIONS

4.1. Demographic characteristics of sample households and all actors

The following section provides overall picture of the sample households using descriptive statistics such as mean, standard deviation, frequencies, minimum and maximum.

Table 2: Descriptive analysis of dummy variable

Sex of household	Freq.	percent	Cum
Female	30	32.61	32.61
Male	62	67.39	100
Total	92	100	
Using credit			
No	42	45.65	45.65
Yes	50	54.35	100
Total	92	100	
Access to Market information			
No	40	43.48	43.48
Yes	52	56.52	100
Total	92	100	

Among the 92 farmers 62(67.39%) were males and 30(32.61%) were females. Among the 92 farmers 50 were using credit service and 42 were they didn't using credit service. From 92 of the producers 54.35% the using credit service and 45.65% was not using credit service. Among the 92 farmers 52 were access to market information and 40 were they didn't access to market information

Table 3: Descriptive Statistics for continuous variables

Variable	Obs	Mean	Std. Dev.	Min	Max
AGHH	92	37.26087	12.45464	20	59
EDUHH	92	7.706522	3.76665	0	15
FAMZ	92	4.586957	1.638494	2	7
LSIZE	92	2.706522	1.124532	1	4
DISMKT	92	6.108696	2.735427	2	12
QPRD	92	21.81522	5.73198	14	30

In the above table provides a summary of the descriptive statistics of the age of household head. Age ensured in years, provided a clue on working ages of households. The mean age of the sample household, heads was 37, years with the minimum and maximum age of 20 and 59 years, respectively. The implication of this mean age was in the area is mostly dominated by working age group this leads to improve the productivity of teff on cheha district. And also the mean family size of the total sample households was 4.58 persons with the minimum and maximum, family size of 2 and 7 this might assist them for a better participation of households in the Quantity of teff produced. The respondents have an average of 7.7 education level in teff production with a standard deviation of 3.76 years. The mean of, land size of the, total sample household was 2.7 with the minimum and maximum age of 1 and 4 hectare, respectively.

The mean of distance from the market is 6.108696, with the maximum and minimum value 12and 2 respectively. Quantity teff produced from the sample mean was 21.81522 and from the sampled respondents the minimum and maximum teff production was 14 and 30 quintiles. so the producer produced maximum amount of teff the supply more quantity than less produced.

4.2 .Teff Value Chain Actors and Roles

- **Input supplier**

At this stage of the value chain, there are many actors who are involved directly or indirectly in agricultural input supply in the study area. As revealed by sample farmers the input suppliers 7 respondent was asked in teff value chain are farmers, cooperatives union and district agriculture bureau. The input provided includes seed, fertilizer, herbicides and pesticides. The problem of teff production in the district was the unsuitable usage of seed and fertilizer by the farmers. This happens due to farmer's knowledge of how to use the fertilizer or lack of money to buy the amount of fertilizer that applied per hectare of land.

- **Producers/Farmers**

Teff producers are small-scale farmers who grow teff mainly for home consumption and increasingly for income through the marketing of surplus product. We asked 20 producers for get information. They are the major actors who perform most of the value chain functions right from input supply to consumer in the conducted areas. Teff growers are the major actors who perform most of the value chain functions right from farm inputs preparation on their farms or procurement of the inputs from other Sources to post harvest handling and marketing. The major value chain functions that teff growers perform include ploughing, planting, fertilization, irrigating, weeding, pest/disease controlling, harvesting and post-harvest handling. The seeds that are used are in most cases home saved seeds of local varieties and improved seed obtained from cooperatives/agriculture bureaus. After harvests, the teff is sold mainly to local traders such as retailers and wholesalers; they can also sell directly to local consumers. Farmers are value chain actors that participate in both productions as well as the marketing of surplus commodities they produce. In general all of the farmers are teff producers on their own land but few of them are landless.

- **Wholesalers**

Wholesalers are mainly involved in buying teff from local collectors and producers in larger volume than any other actors and supplying them to retailers and consumers and asked from 10 wholesaler. They also store product, usually for a prolonged period of time. Survey result

indicates that wholesale markets are the main assembly centers for teff in their respective surrounding areas. They have better storage, transport and communication access than other traders. Within a district they resell to consumers such as government workers, retailers, wholesalers, hotels and injera sellers.

- **Retailers**

Retailer involvement in the chain includes buying of teff, transport to retail shops, grading, displaying and selling to consumers. We asked 10 retailer. Retailers are key actors in teff value Chain in areas. They mostly buy from wholesalers and sell to urban consumers. Sometimes they could also directly buy from the producers. Consumers usually buy the product from retailers as they offer according to requirement and purchasing power of the buyers. Retailers can be divided in to urban and rural in the case of other perishable agricultural products such as potato, tomato and other because of the reason that they are not traded in large scale. They are highly related with other actors hence they buy from wholesalers as well as from producers. The same is true that their demographic characteristics are similar with that of wholesalers.

4.3 Factors affecting Teff market supply in study area

Interpretation of OLS estimates is possible if and only if the basic assumptions of multiple linear regression model are satisfied. Thus, hypothesized explanatory variables were checked for existence of multicolliniarity, heteroscedasticity and omitted variable.The test for multicollinearity suggests that there is no serious problem of multicollinearity among explanatory variables because the mean VIF is about 1.21. The omitted variable bias test, with Ramsey RESET test (F (9, 82) = 51.69; prob > F= 0.000); the null that there is not omitted variable in the model is accepted suggesting that the model has no problem of omitted variable bias. Heteroscedasticity test was performed using Breusch-pagan/Cook-Weisberg(chi2 (1) = 0.53; prob > chi2 = 0.07); ; suggests that the errors are of the same variance. The null that the errors have constant variance is accepted. The fitness of the model (Adjusted R2) was 0.8337 that passed the tests and indicating about 83% of the variation in volume of teff supplied to the market by households was explained by the variables included in this model.

Table 4: Econometric model result

QTSMT	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHH	-.7062934	.3904873	-1.81	0.074*	-1.483097	.0705103
AGHH	.0086339	.0146029	0.59	0.556	-.0204158	.0376836
EDUHH	.0629719	.066978	0.94	0.350	-.0702686	.1962125
FAMZ	.5259415	.2257075	2.33	0.022**	.0769375	.9749456
LSIZE	-.3694679	.2900014	-1.27	0.206	-.946373	.2074373
ACMKTINF	-3.193295	1.262176	-2.53	0.013**	-5.704166	-.6824242
USCRED	-.0950212	1.427594	-0.07	0.947	-2.934961	2.744919
DISMKT	-.0825832	.1002327	-0.82	0.412	-.2819779	.1168115
QPRD	.7398941	.082144	9.01	0.000***	.5764836	.9033047
_cons	-4.773447	1.669301	-2.86	0.005	-8.094218	-1.452675

Observation=92, R^2= 0.8501, Adj R-squared= 0.8337 and Prob > F= 0.0000.
Where; ***, **,* means statistically significant at 1%, 5% and 10% respectively

Family size: It is a variable, measured in number. Production is a function of labor, and availability of labor is assumed to have positive relation with volume of quantity of teff supplied to the market. Therefore, family size positively and significantly related with quantity of teff supplied to the market 5% probability level. The coefficient of family size was 0.53 this indicates the family size increase by one the quantity of teff to supplied to the market also increase by 0.53 kilogram. This finding is consistent with the finding of Takele *et al.* (2017) who found that having large family size was a better for delivering output to the final outlet.

Quantity of teff produced (QPRD): It is the total amount of teff produced in quintals in 2023 production year in the study area. Also the study result indicated that quantity of teff produced affected quantity supplied to the market positively at 1% significance level. Positive sign of the coefficient indicates that as quantity produced increases by 1 quintal the quantity of teff supplied to the market increases by 0.74kilogram.

This result indicates that farmers who produces large quantity of teff supplies large quantity of produce for the market. This result is in line with study by Sultan (2016) which indicates that

quantity of wheat produced affects 62 market supply positively and significantly at 1% significance level. The same study by (Azeb et al., 2017) indicated that quantity of teff produced was significantly affected teff quantity sold at 1% level.

Sex of household: Sex of the household is negatively affect and significance at 10% probability level. The coefficient of sex of the household was -0.71, this indicates the household women increase by one the quantity of teff supplied to the market was decrease by 0.71 kilogram.There is a negative relationship between quantity of teff supplied to market and sex of household. The result is in line with Dagmawit (2016) who found that being male headed household head positively affected the market participation of maize market. The result indicates inconsistency.

Access to market information: Access to market information was negatively affect and significance at 5% probability level. The coefficient of access to market information was -3.2. The result shows there was negative relationship between access to market information and quantity of teff supplied to market. The coefficients indicate when the producers have no access to market information increase by one the quantity of teff supplied to the market also decrease by 3.2 kilogram.

4.4. Constraints and Opportunities in teff product in Value Chain

A number of challenges, opportunities and entry points for further technological, institutional and organizational innovation for upgrading the value chain in the study area were identified by the different value chain actors. In this subsection, the major constraints and opportunities are briefly discussed.

4.4.1. Constraints of teff product in Value Chain

The performance and effectiveness of teff production depends on the various factors that affected the supply chain actors through different channels. According to Seyfu (1997), most Ethiopian farmers use traditional landraces of Teff that are distributed all over the country.The same types of varieties are also used in areas where double cropping is practiced and that have adequate rainfall. In the highly productive. Usually there are different constraints that lead to low production of teff in the conducted areas, human capacity shortage, and lack of infrastructure such as road, irrigation water, communication & other, Soil erosion ,Lack of credit access, insufficient input supply(fertilizer & seed),drought, lack of enough training, traditional land

cultivation systems by only using oxen, fragmentation of land, traditional product handling i.e. using sack to cover teff & storing it to live house ,lack of teff research center and etc. are some drawbacks of teff production or production constraints. Natural factors such as drought, frosts, rainfall, water supply and flood are often beyond the control of farmers and institutions.

The major teff marketing constraints are related with non-availability of market/limited access to market, low price of product, lack of storage, and lack of transport, low quality product that cannot meet consumers demand and perish ability, unfair pricing and cheating of traders during weighting, Lack of market information providing institutions, higher transportation. Again all traders engage in teff value chain confirmed that there is marketing problems in teff value chain. The major teff marketing constraints mentioned by traders are related with the limited power of price setting, the problem of supply shortage, lack of storage facility, problem in information flow, low product quality and lack of support from concerned bodies Traders also mention that the main cause of these problems are lack of teff supply in quantity and quality, especially during summer, fluctuation of price, high demand of teff, absence of subsidy, taxation, multiple number of brokers and etc. are some market constraints of Teff in value chain

4.4.2. Opportunities of teff product in Value Chain

The District is naturally endowed though they have some production and marketing constraints. Some of the potentials to mention are the following. The District are very suitable to produce not only teff products but also other market oriented commodities of cereal, vegetables, pulses and/or animal production. Relatively fertile arable land and abundant underground water potential are some to mention. The deployment of development agents at each kebeles based on their academic back ground are also important policy dimensions. More or less training about different activities of teff production is being offered by governmental bodies on fertilizer application, seed sowing systems(be Mesmer mezrat),provision of improved seed, fertilizers, and Debo activities, locally teff seed producers etc. are some teff production opportunities in conducted areas. On the other hand, availability of market demand throughout the year, growing number of buyers, high experience in teff trade and growing price were some of the opportunities of teff by most of the producers. More or less there are contracted road that connect each kebele and district town so this make them suitable to move their products to the town.

5.CONCLUSION AND RECOMMENDATION

5.1. Conclusion

Generally, the study was conducted in Gurage zone with specific in cheha woreda. Teff is one of the most cereal crops in Ethiopia and other worlds used to home consumption, source of income, and other. The study attempted to investigate value chain analysis of teff in the area. Selection of the crops was mainly based on their relative importance because of that teff is our best dish but there is no more study regarding the teff crops on its insufficiency or problems surrounding teff production and productivity in that area. The study was conducted in order to identify actors & their roles, identifying opportunities and constraints of teff value chain, and to identify determinants of volume of Teff supplied to the market in study area. The data was collected from both primary and secondary sources. The primary data for this study were collected from 92 farmer or producers of the each kebeles, Wholesalers, retailers and input suppliers through application of appropriate statistical Procedures, producers are sampling from both kebeles by random sampling techniques and the other respondents are sampling randomly. The method of data analysis Bothe used descriptive and econometrics analysis. Descriptive statistics such as mean, frequency, and percentage. The econometrics result indicate the factor affecting of teff supplied to the market. Based on the result quantity of teff produced, and family size was positively affect to market supply of teff and sex of household and access to market information was negatively affect teff supply to the market . The opportunities of teff production is household consumption, source of income, and economic growth. A Rain failure, higher cost of fertilizer and, soil erosion, labor shortage, lack of Credit access, and prevalence of crop disease were some of the production problems faced by farmers. Besides, unfair pricing and weighing, lack of institutions providing market information, multiple taxes, high input prices and chemical herbicide were farmers marketing problems.

5. 2. Recommendation

To solve the challenge which was investigated in the study, the following important points should be recommended accordingly:

- The government has to make information access through using socially media, so that the framers can increase their bargaining power & price decision to teff product.
- Improve the quantity of teff production through supply quality of seed availability, advance in technology, using pesticides, fertilizer, and machinery
- Increase women participation in supply of teff to market working with gender mainstreaming and women empowerment organization.
- District agricultural office should disseminate right information about the production system with right time so that the production cost should be minimized in the properly manner.
- Improve the labor usage in teff production by increasing educational level, technological advance, and information about to production system.

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7. APPENDIX

Hence the questionnaires are prepared for chain actors the demographic characteristics of all actors are similar.

For producers

1. Sex of household head_____ 1.male --- 0.femal

2. Total number of family members

3. Education level of household head _1. Illiterate 2. Primary school 3. Preparatory

4. Read and write 5. Secondary school,

4. Total teff land: _____ timed _____ ha. 1 ha = 4 timed or 1 timad = 0.25 ha)

5. Do you have correlation with other actors in the teff value chain? a. Yes b.No

If say yes, who are they? 1. Wholesalers 2.retailers 3.traders 4.consumers 5.others_____

6. From where do you find input supply of teff? 1. Government 2.NGO 3. Farmers 4. their_____

7. Amounts of teff Produced per unit area of land, _____quintal.

8. To whom do you sell? 1. Wholesaler 2. Retailer 3.Consumer

4. Processors 5.Brokers 6.Local collector

9. Did you know the market prices before you sold your teff in 2016? 1=Yes 0=No

10. What types of input supply do you use to produce teff? 1. DAP 2. UREA 3. Compost 4. Other

11. What do you do if you didn't get the expected price for your teff supply? 1. Took back home

3. Sold at lower price 2. Took to another market on the same day 4.store until price rise

12. How do you handle your product?

13. What are constraints of teff production in value chain? _____.

14. What are opportunities of teff production in value chain? _____

15. Access to market information? (Yes) (No)

16. Total Land size the producer?

17 .Quantities of teff supply?

18. Experience of farmer in teff production?

19. Do you have your own land? 1. Yes 2. No

20. Total farm lade size owed, rated, shared

End of the interview

End of the interview thank you very much for responding to the questions.

Access to market information*?*

Name of the enumerator: _____ date of interview: _____

Questioners for Wholesalers

1. From whom you purchase teff? 1. Producers 2.Rural collectors 3.Both

2. What types of teff do you purchase? 1. Magna 2.Sergegna 3.Other

3. What is the total amount of teff you purchase? 1. ---------quintals

4. In what form do you sell your product? 1. Raw 2.processed 3.packed 4.other

5. What is your role in teff value chain? _____.

6. To whom you sell teff? 1. Retailers 2. Consumers 3. Both

7. What are constraints of teff marketing in value chain? _____.

8. What are opportunities of teff marketing in value chain? _____

9. Do you have correlation with other actors? 1. Yes 2.No, if yes what are your correlations activities?

10. Where do you store your products? _____.

11. What is your packaging material? _____.

Questions for Retailers

1. From whom you purchase teff? 1. Producers 2.Rural collectors 3. Wholesalers

2. What is the total amount of teff you purchase? 1 ---------quintals.

3. To whom you sell teff?

4. What types of teff do you like to buy & sell? 1. Magna 2. Sergegna 3. other_____.

5. Do you have correlation with other actors? 1. Yes 2.No

6. What are constraints of teff marketing in value chain? _____.

7. What are opportunities of teff marketing in value chain? _____.

Source	SS	df	MS	Number of obs	=	92
				F(9, 82)	=	51.69
Model	1223.56115	9	135.951239	Prob > F	=	0.0000
Residual	215.688853	82	2.63035187	R-squared	=	0.8501
				Adj R-squared	=	0.8337
Total	1439.25	91	15.8159341	Root MSE	=	1.6218

QTSMT	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHH	-.7062934	.3904873	-1.81	0.074	-1.483097	.0705103
AGHH	.0086339	.0146029	0.59	0.556	-.0204158	.0376836
EDUHH	.0629719	.066978	0.94	0.350	-.0702686	.1962125
FAMZ	.5259415	.2257075	2.33	0.022	.0769375	.9749456
LSIZE	-.3694679	.2900014	-1.27	0.206	-.946373	.2074373
ACMKTINF	-3.193295	1.262176	-2.53	0.013	-5.704166	-.6824242
USCRED	-.0950212	1.427594	-0.07	0.947	-2.934961	2.744919
DISMKT	-.0825832	.1002327	-0.82	0.412	-.2819779	.1168115
QPRD	.7398941	.082144	9.01	0.000	.5764836	.9033047
_cons	-4.773447	1.669301	-2.86	0.005	-8.094218	-1.452675

Test for multicollinearity of explanatory variables

Variables	VIF	Tolerance
Sex of house hold	1.18	0.847458
Age of house hold head	1.25	0.8
Education	1.11	0.9009
Family size	1.33	0.751879
Land holding size	1.43	0.6993
Access market information	1.05	0.95238
Using credit	1.18	0.84745
Market to market	1.11	0.9009
Qauntity of teff produced	1.25	0.8
Mean VIF	1.21	

Result of Heteroskedasticity Test

hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of Quantity of teff Suppliedkg

chi2(1) = 0.53

Prob > chi2 = 0.07