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THE WHEAT VALUE CHAIN AND FOOD SECURITY IN ARSI ZONE: OROMIA NATIONAL REGIONAL STATE, ETHIOPIA

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The Wheat Value Chain and Food Security in Arsi Zone, Oromia National Regional State, Ethiopia

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A Dissertation Submitted to the Department of Geography and Environmental Studies in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Geography and Environmental Studies (Specialization in Socioeconomic Development Planning and Environment)

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This is to certify that the thesis prepared by Solomon Ketema, entitled: The Wheat Value Chain and Food Security in Arsi Zone, Oromia National Regional State, Ethiopia and presented in fulfillment of the requirement for the degree of doctor in philosophy in Geography and Environmental Studies (Specialization in Socioeconomic development planning and environment) complies with the regulations of the university and meets the accepted standards with respect to originality and quality

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Declaration

I, the undersigned, declare that this thesis is my original work, and all sources used in the dissertation have been appropriately acknowledged.

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DEDICATION

To the memory of my mother, Ayalech Jima Hunde

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Acronyms and Abbreviations

ADB:	African Development Bank
AZFECO:	Arsi Zone Finance and Economic Cooperation Office
BoARD:	Bureau of Agricultural and Rural Development
CARE:	Cooperative for Assistance and Relief Everywhere
CFS:	Committee on World Food Security
CR4:	Concentration Ration
CSA:	Central Statistics Agency
CSI:	Copping Strategy Index
DAs:	Developmental Assistants
EHNRI:	Ethiopian Health and Nutrition Research Institute
FAO:	Food and Agricultural Organization
FEDOoAZ:	Finance and Economic Development Office of Arsi Zone
FGD:	Focus Group Discussion
FTC:	Farmers Training Centers
GDP:	Gross Domestic Product
HDDS:	Household Dietary Diversity Score
HHs:	Households
IFAD:	International Fund for Agricultural Development
Kcal:	Kilocalorie
MDGs:	Millennium Development Goals
Qts:	Quintals
S-C-P:	Structure-Conduct-Performance
SNNPR:	South Nations, Nationalities and People Region
SPSS:	Statistical Package for Social Sciences
SSA:	Sub-Saharan Africa
SWOT:	Strength, Weakness, Opportunities and Threat
ton/ha:	Ton per hectare
WFP:	World Food Programme

Abstract

The value chain is considered as one way out of poverty and ensuring foods security status of smallholder farmers in Ethiopia. The main objective of this study is to assess the wheat value chain and its role in food security in Arsi Zone, Oromia National Regional State, with specific attention to identify and map actors and activities, marketing margins, constraints and opportunities, marketing outlet choice determinants, rural household food security and the role of wheat value chain to ensure food security status.To achieve the intended outcomes the study uses both primary and secondary data collected through questionnaires, interviews, FGD, and desk review from a total of 336 randomly selected households. A m*ulti-stage sampling procedure was used to select the sample smallholder farmers for the study. A purposive sampling technique was used to select sample for FGD and interview. Household sample survey (questionnaires), interview, focus group and field observation were the main tools of generating primary data. Secondary data were obtained from a range of governmental organizations of which the most important ones were zonal and woreda level agricultural and rural development office. To analyze the data,, different statistical tools such as percentages, tables, frequency distribution were used to assess the socio-economic and demographic characteristics of the households, resource ownerships, SWOT analysis of wheat value chain, the concentration ratio (CR4) to identify market structure and independent t-test to assess the difference in the wheat production between male and female headed households, vale chain mapping to identify and map actors and activities in the wheat value chain, household food balance model, dietary diversity, copping strategies to assess the food security status of the households, one-way ANOVA and post hoc tests were used to identify the dietary energy availability of the households among different kebeles, multinomial logistic regression to identify the determinants of market outlet choice. The result of the study reveals that the actors in the wheat value chain are input suppliers, producers, brokers, wholesalers, processors, traders, and consumers. Whereas the supporting actors are development agents, office of agriculture and rural development, cooperatives/unions, trade and industry office, and financial/credit institutions. The direct link between farmers and processors were very weak or low. The price was set by buyers along the chain and thus, the governance along the chain was buyer-driven. The market along the chain was inefficient and imperfect. The daily average percapita food availability obtained from Household Food Balance Model was 1743.21 which is far from nationally recommended 2100kcal. Likewise, the result from the household dietary diversity score reveal that the domination of monotonous dietary for the household in the study area and the coping strategy index tells us the presence of moderate to severe food insecurity.The result from the multinomial logistic regression indicate that among the ten explanatory variables included in the model seven of them were statistically significant at 1%, 5% and 10%. Those factors significantly affecting wheat producers market outlet*

choices were sex, age, education, year of participation, nearby market, nearby road and quantity produced. Farmers in the study area encounter marketing problem during harvesting seasons which accommodate the cost of production and create profit. Likewise, the well function of wheat value chain enhances the food security status of the poor in increasing their production and productivity, and generating income which increases their economic capacity. Therefore, the study recommends based on the result that the issue of link between producers and processors, marketing, access to credit, and cost of inputs must receive attention to improve the livelihood of the farmers. The issue of food in/security also should receive attention from the government, donors and other concerned bodies to improve the household level food security status. Likewise strengthening education, expansion of road infrastructure, telecom, and access to credit which promote farmers profitable market outlet choices in one hand and increases the production and productivity of wheat in another way should need consideration from stakeholders. Moreover, government and other stakeholder should create effective and efficient market which benefit the farmers on one hand and strengthening the well functioning of value chain which increases the participation of the farmers in the chain.

Key words: Value chain, Food in/security, Wheat, Market outlet, Multinomial logistic model, HDD, coping strategy, Arsi, Oromia

CHAPTER ONE

GENERAL INTRODUCTION

Background of the Study

Agriculture is an engine of economic growth for different countries in the world. Its importance is very significant in developing countries since it supports a huge number of poor people in rural areas and work in agriculture (Kaplan et al., 2016). At a global level, 75% of the poor live in the rural area and most of them are engaged in agriculture (Webber & Labaste, 2010). It is the heart of most African countries' economy except for the mineral producers. It plays a crucial role in poverty reduction, job opportunities, income generation, and food security as well as the entire economic growth of the continent. According to Ba (2016), the agricultural sector accounts for 65% of employment opportunities, 40% of export earnings, and 17% of the GDP shares in Africa. In SSA 65% of the population lives in rural areas and the sector provides 75% of the labor forces in which the majority of the farmers are low-income and lead a subsistent life (Webber & Labaste, 2010). It is the basis of economic growth, poverty reduction, and ensuring food security in the region. It is believed that growth generated by agriculture in the area is more several times effective in reducing poverty than GDP growth in other sectors (Schaffnit-Chatterjee, 2014).

In East Africa in which the number of people making their living in the countryside accounts for more than 80% and the level of poverty in the areas is estimated to be around 50% (Wonder, 2014). In the region, the agricultural sector plays an important role in safeguarding the huge employment opportunities, sources of high GDP which account for 43% in Ethiopia and 12-22% in Kenya and Uganda. But this sector does not ensure the living standard, food security, and nutrition since a huge number of people suffer from the problem of poverty (42% to 53% in the country mentioned above) (Yamano et al., 2011). In line with this, smallholders in the area suffer from a harsh life in which they operate farming on less than two hectares of land and they are under the problem of food deficiencies occurring regularly following the dry season (Wonder, 2014).

Similarly, the role of the agricultural sector in Ethiopia is very crucial since a huge number of the population which accounts for 80% engaged in the sector (Berhanu, 2004; CARE, 2014). It is the foundation of the economic growth of the country. Thus, the government of the country strives to improve the sector by designing and implementing different policies. But, poverty is still a serious problem in the country, and chronic and acute food insecurity is widely spread. CARE (2014) reveals that in the country, one-third of the population lives below the poverty line and most of them depend on subsistence agriculture. The highest numbers of rural populations and smallholder farmers suffer from chronic and acute food insecurity. The number of people facing chronic food insecurity accounts for 10% of the total population of the country and will rise to 15% during frequent drought years.

In the agricultural sector of the country, cereal is the most dominant subsector. The contribution of the cereal subsector in the country is very prominent since it shares the largest employer in the rural area, agricultural land use, calorie intake, and national income. Its share in terms of rural employment, total cultivated land, household food expenditure, and calorie intake is estimated to be 60%, 73%, 40%, and 60%, respectively. Likewise, the contribution of the subsector to the national income is crucial (Shahidur, 2010; Shahidur and Asfaw, 2013).

Among the most important staple food sources in Ethiopia, wheat plays a vital role for centuries. In this day according to the report of FAO (2014) cited in Minot et al. (2015), wheat is one of the most important crops grown in Ethiopia, which is the source of food for consumers and a source of income for the farmers. Similarly, they identified that wheat and wheat products contribute 14% of the calorie intake in Ethiopia, and wheat takes the second rank as the most staple food after maize. In terms of areal cultivation, this crop ranked fourth, and in terms of gross production ranked fourth or fifth after *teff*, *enset*, and maize and approximately tied with sorghum (Minot et al. 2015).

Despite wheat being produced in such huge amounts and covering a large area for cultivation in Ethiopia, the country imports a large volume of wheat each year. Based on the amount of the harvest and other different factors, domestic wheat consumption originated from imports accounting for 25-35% of the country. In addition, the government subsidizes the import of

wheat and delivers it to large-scale flour mills as the pre-requisite to selling to the bakeries at a controlled price to make it affordable for poor consumers (Minot et al., 2015). Therefore, to ensure food security and reduce the level of poverty in the country, transforming (increasing productivity and production) the agricultural sector, particularly the wheat sub-sector, is the proper way out. This could be accomplished by promoting the value chain development strategy. Value chains serve as a vehicle for the introduction of new production techniques, technologies, logistics, labor processes, organizational relationships, and networks, according to Trienekens (2011); van Dijk & Trienekens (2012).

The value chain can be defined as "*the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use"*(Kaplinsky, 2000, 2004; Kaplinsky and Morris, 2000). It incorporates the consecutive linkages via which raw materials and resources are transformed into products for the market. In the context of the agricultural sector, it can be defined as "*agricultural Value Chain (AVC) identifies the set of actors (private, public, including service providers) and a set of activities that bring a basic agricultural product from production in the field to final consumption, where at each stage value is added to the product. It may include production, processing, packaging, storage, transport, and distribution*" (ADB, 2013). In addition, it can also be defined as the method of describing various chains needed to bring farm products from the farm to the end users (McGregor and Stice, 2014).

It is a key framework that has been used to comprehend the way inputs and services are brought together and used to grow, transform, or manufacture a product. It is also used to comprehend the way the products physically move to reach the consumer and how the value increases along the chain. It gives significant means to recognize business-business relationships that link the chain, methods for increasing efficiency, and ways to empower businesses to raise productivity and add value and also offers a reference point for progress in supporting services and the business environment. It can contribute to pro-poor initiatives and better linking of small businesses with the market. Increasingly, the value chain approach is being used to guide and

drive high-impact and sustainable initiatives focused on rising productivity, competitiveness, entrepreneurship, and the growth of small and medium enterprises (Webber & Labaste, 2010).

The aim of poverty-oriented promotion of agricultural value chains, which accentuates modernization and connectivity to the markets, is to put resource-poor smallholder producers and processors in a better position to increase their production and productivity, to improve the quality and marketing of their products, and accordingly to create higher incomes. At the same time, it aims to offer poverty lessening by making paid employment in primary production, processing, or in trade. Also, since the food crisis of 2007/2008, the promotion of staple-food value chains has increasingly been deployed to improve food security (Kaplan et al., 2016). From this entire argument on the benefits of the value chain in terms of poverty reduction and ensuring food security aspects of the farmers in developing countries, it is important to study the wheat subsector value chain in Ethiopia and investigate its role in food security. Therefore, the overall aim of this study is to assess the wheat value chain and its role in food security in Arsi Zone, Ethiopia.

Statement of the Problem

Agriculture is the foundation of the economic growth of Ethiopia or it is the heart of the Ethiopian economy. This is since the economy of the country is dependent on agriculture. The sector contributes 43% of the GDP and 90% of the foreign export (CARE, 2014), and creates an estimated 85% of job opportunities (Mann & Warner, 2016). But, the agricultural sector of the country suffers from different serious problems which hamper the benefits the smallholder enjoys in particular and the country in general. Some of the factors are weak market linkage, limited use of selected seeds and chemical fertilizers, incapability of the country to attain sufficient production or output, and inability to ensure that it meets export quality standards (CARE, 2014).

In Ethiopia, cereals constitute the largest share of agriculture. The contribution of the cereal sector is very high, as it dominates in terms of share in rural employment, agricultural land uses, calorie intakes of the community, and contribution to the national income (Shahidur and Asfaw

2013). Wheat is one of the main cereal crops in which Ethiopia is the second largest producer in SSA next to South Africa (Gebreselassie et al., 2017; White et al., 2011). It is one of the most staple crops cultivated as sources of food for consumers and income for producers (FAO, 2014 cited in Minot et al., 2015). In fact, more than 4.5 million smallholder farmers are engaged in wheat cultivation in the country (Minot et al., 2015; Samuel et al., 2017). In addition, state farms and commercial farms are engaged in the production of wheat in the country. The largest part of wheat cultivation is dominated by smallholder farmers, and almost all wheat production is conducted under rain-fed conditions (Kenea et al., 2017).

On this day, the annual wheat total production in Ethiopia accounts for 3.43 million tons from over 1.63 million hectares of land (Alemu et al, 2014). It covers an estimated 17% of the total land under the cereal crops with an average of 20.10 quintals per hectare. According to FAO (2009), this is the lowest yield per hectare, as compared to the world average of 40 quintals per hectare. Similarly, its yield in the country is very low as compared to Africa's and world level, which is lower than 13% and 32%, respectively. In line with this, as compared to the wheat-producing countries in Africa, the wheat yield in Ethiopia is very low (2.4 tons/hectare). For example, wheat yields are 6.7 tons/ha in Egypt, 3.5 tons/ha in South Africa, and 3.0 tons/ha in Kenya (Minot et al., 2015).

The major factors for this low yield in the country are limited access to inputs, financial services, improved production technology, irrigation, and agricultural markets (Samuel et al., 2017). Ethiopia suffers from weak market linkages on both the input and output sides. Farmers either cannot afford improved inputs or lack the knowledge to use them. Weak systems connect agricultural outputs to processors and numerous barriers exist that prevent quality products from reaching end users, such as insufficient packaging and storage, the inability of Ethiopian products to meet international market standards and restrictive trade regulations (USAID, 2011).

Market participation among wheat producers is very low, though grown over time following the recent expansion of roads and urban centers in the country. Along with the increase in production, good and efficient markets that are expected to transfer a fair proportion of consumers' prices to producers are important to enhance and sustain market participation of

wheat producers, thereby creating a conducive environment for the process of agricultural intensification to deepen further with a positive impact on poverty reduction (Samuel et al. 2017).

Thus, the prevalence of food insecurity in the study area specifically and the nation as a whole is the result of the poor yield of wheat production and the low degree of market participation of the wheat growers. The level of food insecurity among households in different woredas in the zone is not similar, according to AZFECO (2016) study. The severity of the issue fluctuates from year to year depending on the local rainfall pattern, and it is more severe in areas of the zone that are prone to drought. For instance, research done by many researchers in one of the *woreda*s in the zone shows that severe food insecurity has existed. Accordingly, the level of food insecurity accounts for 75 percent of the sampled households in Dodota *woreda* which could not attain the nationally recommended dietary energy intake/consumption of 2100kcal (Girum, 2016; Haile et al., 2005; Solomon, 2013).

Therefore, to improve wheat production and productivity in the Arsi zone, the development approach called value chain is the proper solution. The development and business communities involved in the African agriculture and agribusiness sectors have recently experienced a tremendous resurgence of interest in promoting value chains as a way to add value, diversify rural economies, and contribute to increasing rural household incomes in most sub-Saharan Africa (SSA) countries. Value chains are increasingly recognized as a means to reduce the rural poverty prevalent in the region (Webber & Labaste, 2007).

In general, ensuring the status of food security and lowering the level of poverty in Ethiopia generally, and the study zone in particular, calls for the appropriate policy approach that resolves the issue hampering the production and productivity of the agricultural sector specifically the wheat subsector, which is of utmost importance. This might be accomplished through the agricultural sector's intensification by making it easier for smallholder farmers to acquire inputs, particularly seeds, technologies, and efficient and effective markets for their produce.

Although the wheat value chain and food security have been independently investigated in Ethiopia (e.g., Tura, 2015; Haymanot, 2014; Sultan, 2016; Zewudie et al., 2016 and Tadessa et al., 2017) and food in/security (Girum, 2016; Mequanent et al., 2014; Meskerem and Degefa, 2015; Messay, 2011; Solomon, 2013) there have been few empirical studies that have focused on this topic. Furthermore, there is no research on the wheat value chain and its significance for food security at the national or local level. By examining the wheat value chain and its importance in food security in the Arsi Zone, this study seeks to close the research gap that exists in this area.

Objectives of the Study

General Objective

The overall objective of the study is to assess the wheat value chain and its role in food security in Arsi Zone, Oromia National Regional State: Ethiopia.

Specific Objectives

In light of the general objective stated above, the following specific objectives were set.

- To identify and map the set of actors and activities involved in the wheat value chain;
- To assess the wheat value chain and its marketing (margin, costs, channel, share, structure, and performance);
- To identify the constraints and opportunities of the wheat value chain;
- Investigate the market outlet choice determinants of smallholder wheat producer farmers
- To investigate the food security status, and to examine the role of the wheat value chain on the food security.

Research Questions

- ✓ What are the main actors and activities (primary and support) in the wheat value chain in the study area to bring the wheat from the production stage or input supplies to the end consumers? How do different actors in the wheat value chain integrated or mapped? What is the linkage between different actors as well as their power relations?

- ✓ What does the marketing structure, conduct, and performance look like? Which actors play a vital role in value-adding in the wheat value chain? How do the marketing costs, margins, and profits share among different actors?
- ✓ What are the constraints and opportunities being there in the wheat value chain?
- ✓ What are the socio-economic and demographic factors determining the market outlet choices of the smallholder wheat producers?
- ✓ Are the people in the study area food secure or insecure? Is the wheat value chain contribute to the food security of households in the study area?

Significance of the Study

The study will be a valuable resource for further research and as additional literature in the field of value chain and its role in food security from a scholarly perspective. Different stakeholders (at the local, regional, and national levels) could use the study's findings as input for designing agricultural policies.

Theoretical Literature

There has been extensive theory-building in the last decades in the field of the value chain. The scientific discipline works to the progress of value chain theory grouped into the global value chain, supply chain management, new institutional economics, and social network theory. The emphasis of the global value chain is the position of lead firms in the chain and power relationships between developing countries and the Western markets. The social network theory accentuates on the interrelationships between economic and social interactions in the production network consisting of multiple horizontal and vertical relationships between value chain actors. The main focus of supply chain management is investigating the management and control of intercompany operations (flows of products and services). The new institutional economics studies the governance of transactions between companies (Trienekens, 2011).

Among these different theoretical perspectives, this study is guided by social network theory and new institutional economics. Social network theory is adopted for this study since the wheat value chain analysis focuses on the various actors in the chain and their relationships. According

to Trienekens (2011), the social network approach views companies as embedded in a complex of horizontal, vertical, and business support relationships with other companies and other organizations supporting inputs and services (such as advisory services, credit facilitators, and transportation companies). He further believes that according to network theory, relationships are not only shaped by economic considerations; other concepts like trust, reputation, and power also have a key impact on the structure and duration of inter-company relationships. NIE with its branch called transactional cost economics investigates the rationale for governance choices related to in-company and intercompany organizational relationships. Transaction between companies is the unit of analysis in the TCE (Trieneken, 2012). Since the wheat value chain investigation emphasizes the governance relationships between different actors concerning transactions, TCE was adopted for this study.

Empirical Literature

The study conducted by Sultan on the analysis of the wheat value chain in the case of Sinana District, Bale Zone, Oromia Region, Ethiopia focuses on the marketing issues (the structure-conduct-performance of the market, factors determining market surplus, factors affecting farmers' market choice outlet and factors affecting wheat value addition). Thus, the result of his study from the probit model indicated that access to market information, the quantity of wheat produced, distance from the marketplace, access to market information, access to extension, and credit services significantly affect a farmer's decision to be engaged in value addition. The result identifies the main actors in the wheat value chain in the study area (input suppliers, farmers/producers, assemblers, wholesalers, processors, retailers, commission agents, and cooperatives). The market structure is oligopolistic from the result of the market concentration ratio. In addition, the result from 2SLS indicated that the size of landholding, livestock ownership, family size, and quantity of wheat produced influences the amount of wheat supplied to the market significantly. The multinomial logit model used by the research indicates the factors which determine the market outlet choices of the farmers.

The study conducted by Tura (2015) on market supply and value chain analysis of wheat in the case of Tiyo and Hetosa Districts in Arsi, Ethiopia focuses on the analysis of market supply and

wheat value chain in the study area. The result of the study identifies the primary actors of the wheat value chain in the study area (input suppliers; farmers; traders; brokers; processors; retailers; and consumers). It further indicates the significant factors which determine the amount of wheat marketed surplus (value-adding activities, livestock holding of household, access to credit, family size, access to non-farm income, type of saw used, and cultivated land for wheat) from the result of Tobit analysis.

The other study conducted by Haymanot (2014), entitled analysis of the value chain of durum wheat in the District of Bale Zone with specific objectives of identifying durum wheat value chain actors and their roles, examining the performance of actors in the chain, and analyzing the determinants of the volume of durum wheat marketed in the study area come up with different finding. The result of the study identifies the main actors of the Durum wheat value chain (input suppliers, producers, cooperatives/unions, local collectors, rural wholesalers, processors, urban wholesalers, urban retailers, supermarkets, and consumers) and value chain supporters. In addition, the result of the study reveals that producers as incapable of benefiting from the further value chain and the chain as governed by the processors. The result from multiple regression models indicates that the volume of marketed is positively and significantly affected by the sex of the household heads, utilization of improved seed, lag market price, amount of credit, land size, and livestock holding.

The research gap identified from the reviewed literature is the absence of discussion on enabling the environment for the better functioning of the value chain specifically the role of informal or formal rules, regulation, and policies. In line with this, there is no literature at the national and local level written and documented on the wheat value chain and its role in food security. Therefore, this study tries to assess the wheat value chain and its role in food security.

Based on different literature the following conceptual framework is developed by the researcher. The framework integrates different concepts to describe the wheat value chain and its role in food security. The enabling environment (policies, rules, regulations, norms, and the like), are the components of the value chain which facilitate or retard the overall functioning of the wheat value chain. In line with this, the integration/interaction between different actors in the chain

(input suppliers, producers, processors, distributors, and consumers) through which the movement of products, information, and finance are indicated in the framework. In the end, the effects of the enabling environment, supporting activities, and the interaction and activities of different actors result in the betterment of food security in generating available production, more income, and creating job opportunities.

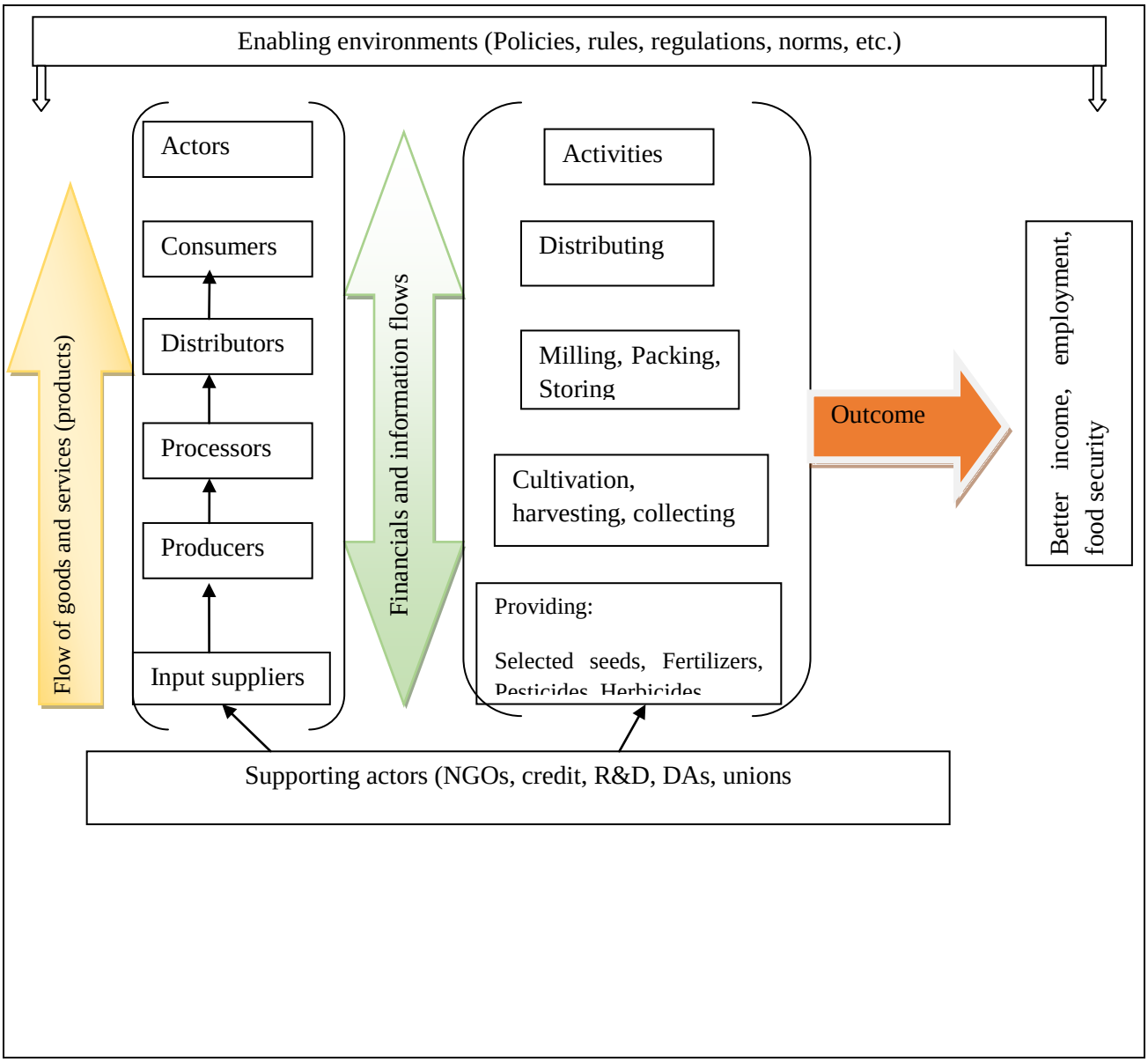

Figure 2.1: Conceptual framework of the study

Source: Developed by a researcher from literature

Ethical Consideration

The importance of ethical issues in scientific research is crucial since they have an impact on the validity of the results. Because of this, several authors place a strong focus on concerns like informed consent, participant anonymity, and participant confidentiality. Despite knowing who collected the data, the researcher is still required to maintain participant anonymity. The researcher must also keep the information that was disclosed to the responders private (Cohen et al, 2000). The researcher should maintain and secure the participant's name from public exposure according to Neuman (2007) argument. Additionally, Neuman stressed that the researcher only makes the data publicly available in aggregate form and under the condition that it is not linked to individual unique responses.

Anonymity is the other ethical issue in scientific research, which does not allow the mentioning of the name of the respondents. It is a way of keeping or protecting the identity of the participants by using a fictitious name or location and altering some attributes. Thus, the participant's name was kept secret and they remained anonymous (Neuman, 2007). In line with this, anonymity helps the researcher to keep by no means the information given by the participants not revealing their identity. Therefore, in such a way the participant’s privacy is ensured. In general, the principal means of ensuring anonymity then is not using the names of the participants or any other personal means of identification (Cohen et al., 2000). Therefore, in this study, the researcher ensured these issues before the data collection period.

Delimitation of the Study

The concept of the agricultural value chain and its significance for food security is a broader concept. Hence, to make it manageable and workable this study is limited to the wheat value chain and its role in food security. Smallholder or farm households are the main units of analysis used in this study. Finally, this study was geographically confined to four kebeles of the Arsi Zone Zone found 175km from the capital city of the country Addis Ababa.

Organization of the Dissertation

There are six chapters in this article-based dissertation. The first chapter covers the general introduction section, which covers the study's background, problem statement, objectives, research questions, significance, ethical considerations, delimitation, and organization. The second chapter deals with the wheat value chain in the study area. It explores the actors and activities in the wheat value chain, the link between different actors, governance along the chain, and marketing.

The third chapter exhibited the market outlet choice determinants of smallholder wheat-producing farmers. The fourth chapter emphasizes the rural household food security status. It explores resource ownership and access to productive assets (land) as well as the status of food security measured with the Household Food Balance Model, Household dietary diversity, and coping strategy.

Chapter five presents the role of the wheat value chain in the food security status of rural households. It explores the cost and benefit share among different actors, wheat production in the study area, and wheat as a source of income, food, and employment. The sixth chapter presents the summary, conclusion, and policy implication of the study as well as the gaps for future research.

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CHAPTER TWO

Analysis of Wheat Value Chain in Central Ethiopia: In the Case of Arsi Zone

Abstract

The study envisioned analyzing the wheat value chain with specific objectives of assessing the actors and their roles, marketing of wheat, governance, and profit share among actors. A concurrent/convergent parallel mixed-method research design was employed for the study. Data were collected from a sample of 336 farm households using questionnaires, interviews, and FGD. Descriptive statistics were used to analyze the survey data. An independent t-test was used to analyze the yield/year quantity produced gender-wise. Moreover, the S-C-P model was used to evaluate wheat marketing efficiency and functioning in the study area. The result from the value chain analysis indicates the main actors in the study area include input suppliers, producers, brokers, wholesalers, processors, traders, and consumers while the supporting actors are DAs, BoARD, cooperatives/unions, trade and industry officials, and financial/credit institutions. There is a weak or low direct link between producers and processors. The governance along the wheat value chain is buyer-driver type since the marketing price is set by the buyers. The study also identified inefficient and uncompetitive markets. Therefore, the issue of a link between producers and processors, marketing, access to credit, and cost of inputs must receive attention to improve the livelihood of farmers.

Keywords: Wheat, value chain, governance, marketing, Arsi, Ethiopia

Introduction

The cereal subsector is the most dominant in the agricultural sector of the country. It is the largest employer in the rural area with prominent shares in agricultural land use, calorie intake, and national income. Its share in terms of rural employment, total cultivated land, households' food expenditure, and calorie intake is estimated to be 60%, 73%, 40%, and 60%, respectively. Likewise, the contribution of the subsector to the national income is considerable (Shahidur 2010; Shahidur and Asfaw, 2013).

Among the most important staple food sources in Ethiopia, wheat plays a vital role for centuries. According to the report of FAO (2014) cited in Minot et al., (2015), wheat is one of the most important crops grown in Ethiopia, which is the source of food for consumers and a source of income for the farmers. Wheat and wheat products contribute 14% of the calorie intake in Ethiopia, and wheat takes the second rank as the most staple food after maize. In terms of areal coverage and gross production, this crop ranked fourth and fourth or fifth respectively after *teff*, *enset*, and maize (Minot et al., 2015).

Despite wheat has been produced in such a huge amount and covering a large area for cultivation in Ethiopia, the country imports a large volume of wheat every year. In addition, the government subsidizes the import of wheat and delivers it to large-scale flour mills as the pre-requisite to selling to the bakeries at a controlled price to make it affordable for poor consumers (Minot et al., 2015).

Now a day, the annual wheat total production accounts for 3.43 million tons cultivated over 1.63 million hectares in Ethiopia (Tolesa et al., 2014). It covers an estimated 17% of the total land under cereal crops with an average production of 20.10 quintals per hectare. This is the lowest yield per hectare as compared to the world average of 40 quintals per hectare. In line with this as compared to the wheat-producing countries in Africa, wheat yield in Ethiopia is very low (2.4 tons/hectare). For example, wheat yields are 6.7 tons/ha in Egypt, 3.5 tons/ha in South Africa, and 3.0 tons/ha in Kenya (Minot et al., 2015). The major reason for this low yield in the country

is the limited access to inputs, financial services, improved production technology, irrigation, and agricultural markets (Samuel et al., 2017).

Ethiopia suffers from weak market linkages on both the input and output sides. Farmers either cannot afford improved inputs or lack the knowledge to use them. Weak systems connect agricultural outputs to processors and numerous barriers exist that prevent quality products from reaching end-users, such as insufficient packaging and storing, the inability of Ethiopian products to meet international market standards, and restrictive trade regulations.

Market participation among wheat producers is very low, though grown over time following the recent expansion of roads and urban centers in the country. Along with an increase in production, good and efficient markets that are expected to transfer a fair proportion of consumers' prices to producers are important to enhance and sustain market participation of wheat producers, thereby creating a conducive environment for the process of agricultural intensification to deepen further with a positive impact on poverty reduction (Samuel et al., 2017).

Therefore, to ensure food security and alleviate the level of poverty in the country, transforming (increasing productivity and production) the agricultural sector, particularly the wheat sub-sector, is the proper way out. This could be achieved through the promotion of the value chain development strategy. Trienekens (2011); van Dijk & Trienekens (2012) revealed that the value chain is a vehicle by which new methods of production, technologies, logistics, labor processes, and organizational relations and networks are introduced. It is a key framework that has been used to comprehend the way inputs and services are brought together and used to grow, transform, or manufacture a product. It is also used to comprehend the way the products physically move to reach the consumer and how the value increases along the chain. It gives significant means to recognize business-business relationships that link the chain, methods for increasing efficiency, and ways to empower businesses to raise productivity and add value and also offers a reference point for progress in supporting services and the business environment. It can contribute to pro-poor initiatives and better linking of small businesses with the market.

Increasingly, the value chain approach is being used to guide and drive high-impact and sustainable initiatives focused on raising productivity, competitiveness, entrepreneurship, and the growth of small and medium enterprises (Webber and Labaste, 2010).

Although different studies were conducted on the wheat value chain in Ethiopia (Tura, 2015; Haymanot, 2014; Sultan, 2016; Zewudie et al., 2016; Tadessa et al, 2017), they focused on a few aspects of the wheat value chain without touching every aspect of the chain. Therefore, this study tries to fill the existing research gap by studying the wheat value chain that is, identifying the actors and activities, marketing, profit share, and governance in the wheat value chain in the Arsi Zone of Central Ethiopia.

Literature Review

The Concepts and Definitions of Value Chain

The value chain is a concept that traces back to the Francophone *filiere* approach (which means 'thread' in English) which developed in the 1960s. It is used to designate the flow of physical inputs and services in the production of a final product (a good or a service) (Kaplinsky & Morris, 2000; Nang'ole, Mithöfer, & Franzel, 2011; Webber & Labaste, 2007). In the beginning, it has been employed to investigate contract farming and vertical integration in French agriculture (Hoang, 2015; M4P 2008). Similarly, the concept has been employed to examine the agricultural system in developing nations under the rule of the French colony. Its analysis is widely used as a tool to investigate how the agricultural system in developing countries is organized (M4P, 2008). But, later on, the concept applied to agriculture in developing countries, such as the model implemented to develop the cotton sectors in West and Central Africa. The practitioners of the filiere investigation do not have a unique single theoretical framework, thus, they have borrowed from different theories and methodologies for their analysis (Webber & Labaste, 2010; Webber & Labaste, 2007). After a long time of stress over the analysis of the influence of local institutions over local production, it started to involve more directly with the issues of trade and marketing to discuss the working of commodity chains within an increasingly liberalized context (Webber & Labaste, 2007).

The most popular definition of the value chain is the one which has been formulated by Porter in the 1980s on firm competitive advantages (UNIDO, 2009b). Accordingly, value chain refers to the discrete activities firm performs in different stages such as designing, producing, delivering, marketing, and supporting its products to discover the source of competitive advantages. Similarly, M4P (2008) indicates that Porter used the value chain framework to assess how a firm should position itself in the market and its relationship with suppliers, buyers, and competitors. The value chain displays total value and consists of value activities and margins. Value activities refer to the physical and technological unique activities a firm performs. But margins refer to the differences between the total value and the collective cost of performing the value activities.

Porter divides the value activities in his value chain framework into two broader categories such as primary and support activities (M4P, 2008; Nang'ole et al., 2011; Porter, 1985; UNIDO, 2009b). Primary activities refer to the activities involved in the physical creation of products and their sales and transfer to the buyer as well as after-sale assistance. This value activity is grouped into five generic activities (inbound logistics, operations, outbound logistics, marketing and sales, and services). Whereas, support activities refer to the activities which support the primary activities through providing purchased inputs, technology, human resources, and various firm-wide functions (Porter, 1985; UNIDO, 2009b).

Despite, the value chain concept defined differently by various writers the one which has been formulated by Kaplinsky & Morris (2000) is more inclusive and comprehensive. Accordingly, they define the term as "*the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use"*.

Value-added: Value added refers to the adding of value at different stages in the value chain. Thus, it is created at different stages by various actors in the chain. It might refer to the quality, costs, delivery times, delivery flexibility, innovativeness, and the like. The amount of value added by actors is determined by the willingness of the end consumer to pay. Opportunities for a company to add value depend on several factors, such as market characteristics (size and

diversity of markets) and the technological capabilities of the actors. Moreover, market information on product and process requirements is key to be able to produce the right value for the right market (Trieneken, 2012). In line with this, according to UNIDO (2009a), value-added refers to the value created during the manufacturing process conducted by each industrial establishment.

Value chain actors: In the center of the agricultural value chain, there is the presence of actors who have been involved in producing and delivering goods and services to the end users via the sequence of activities (Henriksen et.al., 2010 cited in McGregor & Stice, 2014). According to McGregor & Stice (2014), Value chain actors refer to the people at each stage of the chain involved in the movement of a product from the farms to the consumers. Thus, actors in the wheat value chain mean different stakeholders who move wheat from the farm to the end consumers such as input suppliers, producers, processors, distributors (wholesalers and retailers), and consumers.

Value chain constraints: The importance of the value chain, its main aim, is to create value-added products or services for the market via transforming the resources and by the use of infrastructure within the sphere of opportunities and constraints of its institutional environment (Trieneken, 2012; Trienekens, 2011). Thus, different kinds of constraints determine value chain development. It refers to the factors which determine the activities or actors in the value chain.

Value chain governance: Governance can be defined differently by various intellectuals or it has many meanings in different contexts and disciplines. However, from the context of the value chain concept, it is used to encompass the sharing of information and systematic standards promoted by the "governing" entity in a value chain (Webber & Labaste, 2010). It concerns the power to control what is happening in the value chain and the rules that determine how the game is played. It is broader than just the government; it deals with cooperation between the whole stakeholders (Altenburg et al., 2009 cited in van Dijk & Trienekens, 2012).

Moreover, in the value chain concept governance indicates the relationships among the buyers, sellers, service providers, and regulatory institutions that operate within or influence the range of

activities required to bring a product or service from inception to its end use (Kaplinsky and Morris, 2001cited in Ouma et al., 2017). Governance is all about the power and the ability of actors to exert control at any point in the chain by setting or enforcing product or process parameters under which others in the chain operate (Ouma et al., 2017).

Value chain analysis: Value chain analysis can be defined as the process of disintegrating the chain into its different parts to better comprehend the structure and functioning of the chain. Its analysis includes different activities such as identifications of the main actors in different stages and discerning their functions and relationships; determining the chain governance, or leadership, to facilitate chain formation and strengthening, and identifying value-adding activities in the chain and assigning costs and added value to each of those activities. The flows of goods, information, and finance through the various stages of the chain are evaluated to detect problems or identify opportunities to improve the contribution of specific actors and the overall performance of the chain (UNIDO, 2009a).

It is an instrument used for looking into the steps and actors in each stage along the link to identify weaknesses to resolve and opportunities for maximizing profits for all actors engaged in the chain (McGregor and Stice, 2014). It has been also used to identify the constraints in the enabling environment in which the chain functioning. It further rests on discerning the various activities and mapping the interactions that may generate costs or value in the production and sale of a product or service (Webber and Labaste, 2010). Its level of analysis may be handled at the global, macro, meso, or micro level (Gerefi and Kaplinsky, 2001cited in van Dijk & Trienekens, 2012). According to Kaplinsky & Morris (2000), there are no mechanistic ways of value chain analysis, rather the approaches depend on the questions intended to be answered.

Methods of the study

Study Area

Arsi Zone is one of the zones in Oromia National Regional State found 175km from the capital city of the country, Ethiopia. It shares boundaries with East Shewa Zone in the north and northwest, West Arsi Zone in the south and southwest, Bale Zone in the south, southeast, and

east, West Hararge Zone in the north and northeast, and Afar National Regional State in the extreme north (Figure1). Astronomically the zone lies between 7008’58’’N - 8049’00’’N latitude and 38041’55’’ E - 40043’56’’ E longitude. Having a total area of 21009 km2, it accounts for about 5.8% of the total area of the Regional State (FEDOoAZ, 2010).

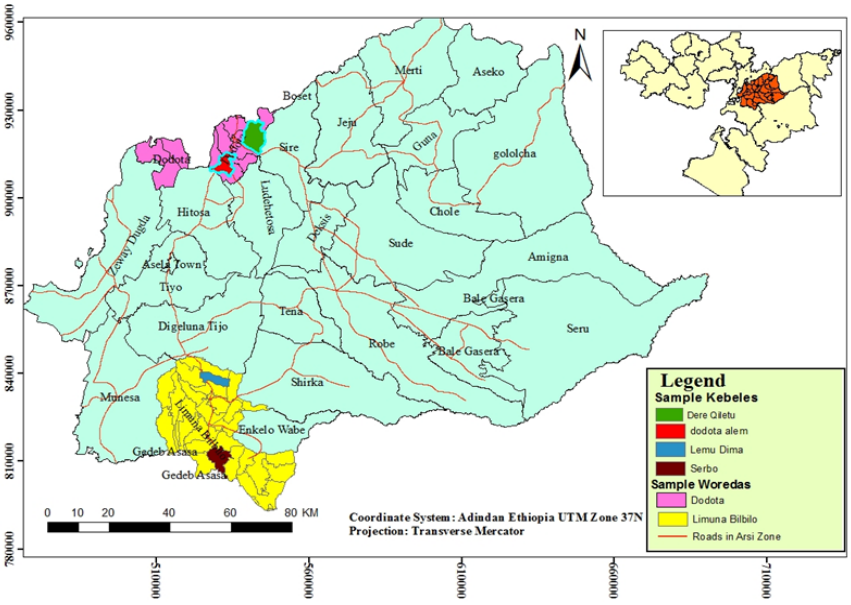

Figure 1: Map of the study area

Source: Produced from Ethio GIS data base

The study area is known for its diversified climate condition due to its diverse altitude. It is predominantly characterized by moderately cool (40%) followed by cool (34 %) annual temperature. Cool/cold type of thermal part is found in the highland areas of Chilalo, Bada, Gugu, Enkolo, and Kaka Mountains. whereas moderately warm temperature is found in the lowland areas of Gololcha, Amigna, Seru, and Merti districts as well as in Wabi Shabelle river valleys and Awash Gorges. The mean annual temperature of the zone range between 20-250c in the lowland and 10-150c in the central highland of the zone. However, there is a slight monthly variation of temperature in which February to May are the hottest months while October to January is the coldest months. The mean annual rainfall of the area varies from 633.7 mm at Dera station (located at an altitude of 1680 meters amsl) to 1059.3 mm at Bekoji station (located at an altitude of 2760 meters amsl). Generally, Arsi Zone receives abundant and well-distributed

rainfall both in amount and season (AZFECO, 2016; Yazachew and Kasahun, 2011). As seen from the following (Fig. 2) long-term trend of rainfall in the study zone Limu Bilbilo receives better amount of rainfall than Dodota *Woreda*. This specifies the presence of variation in rainfall among different woredas in the zone.

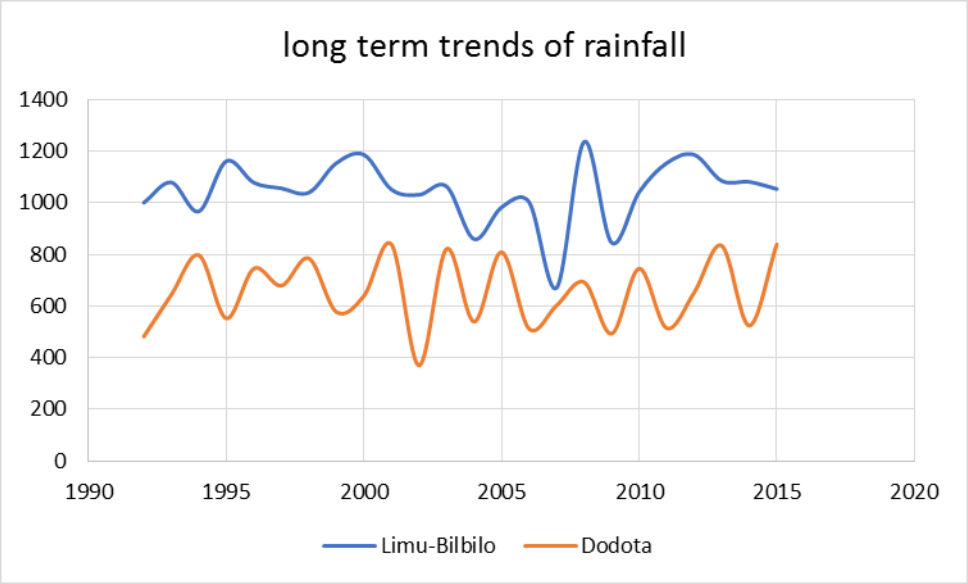

Fig. 2: Long term trends of rainfall in the study area (1992-2015)

Source: Agricultural and Rural Development Office of Arsi Zone (2019/20)

Research Designs and Approaches

Plano Clark and Creswell (2015) identify quantitative, qualitative, and mixed types of research approaches; and the three approaches are not as discrete as they first appear. The research approach adopted for this study is a mixed one since the wheat value chain cannot be studied with only a single approach. Likewise, they argue that researchers could employ mixed-method studies when they believe the use of both quantitative and qualitative data would provide a better understanding of the research problem. The use of quantitative or qualitative methods had some weaknesses, and the use of both (quantitative and qualitative) concurrently results in neutralizing the weakness of each method (Creswell, 2014). Similarly, Creswell (2012) argues that the use of quantitative and qualitative research methods (mixing the two) can help us to understand the problem and research question better than either method.

Thus, a concurrent/convergent parallel mixed-method research design was employed for the study. According to Creswell (2014) and Plano Clark and Creswell (2015), it refers to the collection of data simultaneously (quantitative and qualitative data), merging the data, and using the result to understand the problem. This design allows the weaknesses of one approach to be offset by the strengths of the other form and a complete understanding of a research problem results from collecting both quantitative and qualitative data. Thus, the issues of the wheat value chain cannot be studied alone quantitatively or qualitatively.

A cross-sectional survey research design was employed to gather the quantitative types of data and a case study design was employed to collect the qualitative types of data for the study. The survey research design was employed to collect data on the socioeconomic status, assets status, amount of wheat production, inputs used for cultivation, and access to the financial institution. Whereas, the case study design was taken into account for the in-depth assessment of the wheat value chain (issues of governance, trust, commitment, attitudes, and perception).

Sources, Types, and Tools of Data Collection

The necessary data for this study were generated from both primary and secondary sources. Primary sources were households selected as a sample from the sampling frame in the study area, purposively selected elders, development agents, the agricultural office of the *woreda* and zone, and traders in the local area (*woreda* and zone level), and from FGD. Secondary sources were different documents and reports in the agricultural offices of the *woreda* and zone, the processor office, and any other necessary documents accessed from the internet, available books, magazines, journals, and published or unpublished documents. The tools/instruments employed in the study were questionnaires (structured and unstructured), interviews (structured and unstructured), observation, FGD, and trans-walk based on the objectives intended to achieve.

Sampling Procedures

Multi-stage sampling procedures were used to select the necessary sample for the study. First, after the *woredas* were stratified according to their amount of wheat production in quintals, purposive sampling was employed to select two *woredas* (Limu Bilbilo- from wheat-producing and Dodota-from less wheat-producing) from the study zone and two *kebeles* each from the

selected *woredas* (Sarbo, Lemu Dima, Dire Kiltu and Dodota Alem) to generate sample households for the study. Second, once the study *woreda*s and *kebele*s for the study were identified based on the amount of wheat production, simple random sampling was employed to select the sample households from the selected sample *kebeles* for the study. This is because it reduces the level of bias that might outbreak during the selection of the sample. Third, samples for interviews (traders, farmers, principals of the *woredas,* and zone) were selected purposively to generate in-depth information. The total number of sampled households was generated from the target population (households in the selected *kebeles*) based on their proportion of total households (Table 1).

Table 1: Distribution of sample size across selected *woreda*s and *kebele*s

Woreda	*Kebele*	Total HHs	Sample
Limu Bilbilo	Sarbo	622	78
	Lemu Dima	721	88
Dodota	Dire Kiltu	611	78
	Dodota Alem	736	92
Total		2690	336

Sample Size Determination

According to Cohen et al., (2000), there is no clear-cut answer for how much sample size is appropriate for the study; rather it depends on the purpose of the study and the nature of the population under investigation. Therefore, in order to reduce the sampling error incurred due to inappropriate sample size, time for the study, heterogeneity or homogeneity of the population under study, costs for the study, and the like; it is important to limit the sample size under study. Thus, according to Kothari (2004), if the study population is finite in number, the following mathematical formula is appropriately used to determine the sample size for the study. Therefore, at 95% confidence level, 5% significance level (degree of freedom is=1-0.5=0.5), and the standard variate at a 95% significance level is 1.96, the total sample size for the study is 336 households. $n = \frac{z^2.p.q.N}{e^2(N-1)+z^2.p.q} = \frac{(1.96)^2(0.5)(0.5)(2690)}{(0.05)^2(2690-1)+(1.96)^2(0.5)(0.5)} = 336$

Where, n= refers to the number of sample size

P= sample proportion

q= population proportion (q = 1 – p = 1 – 0.5 = 0.5)

e= acceptable error

N=total population

z= the value of standard variate at acceptable significance level (1.96 at 95%)

Methods of Data Analysis

To process and analyze, the collected data, value chain mapping, and Statistical Package for Social Sciences (SPSS) statistical software version 20 were used. Data collected through a questionnaire survey was processed by using SPSS statistical software version 20. Descriptive statistics were used to analyze the survey data collected from smallholder wheat producers in the study areas. An independent t-test was used to analyze the yield/year quantity produced gender-wise. Moreover, the S-C-P model was used to evaluate wheat marketing efficiency and functioning in the study area.

Results and Discussion

The Socio-economic and Demographic Characteristics of Wheat Producers

The sampled households which account for 80.95% were male and the rest 19.05% were female. The highest proportion of household heads cannot read and write followed by primary school, read and write, and secondary school, which accounts for 47.31%, 25.30%, 13.10%, and 13.10%, respectively. Only 1.19% of household heads attended tertiary education or graduated with a certificate. Therefore, it requires more and more work to improve the educational level of the farmers, since educational status or level determines new technology and innovation adoption and coping with new knowledge and ideas to increase their production and productivity. In terms of marital status, 86% of the farmers were married and only 0.30% were single. The remaining 13.7% were divorced and widowed. Islam and Orthodox Christianity are the dominant religions in the study area accounting for 56.25% and 34.52%, respectively whereas, the rest are catholic (5.65%), protestant (1.49%), and followers of other religions (2.08%).

Table 2: The socio-economic and demographic characteristics of the households

		Kebele of household head				Total	%
		Dire Kiltu	Limu dima	Sarbo	Dodota Alem		
Sex	Male	70	76	59	67	272	80.95
	Female	8	12	19	25	64	19.05
Total		78	88	78	92	336	100
Educational level	Not read and write	24	40	41	54	159	47.31
	Read and write	7	9	10	18	44	13.10
	Primary	24	26	21	14	85	25.30
	Secondary	20	12	6	6	44	13.10
	Certificate and above	3	1	0	0	4	1.19
Total		78	88	78	92	336	100
Religion	Orthodox	27	58	18	26	116	34.52
	Muslim	33	27	57	59	189	56.25
	Catholic	6	3	3	7	19	5.65
	Protestant	5	0	0	0	5	1.49
	Others	7	0	0	0	7	2.08
Total		78	88	78	92	336	100
Marital status	Married	74	78	67	70	289	86.00
	Single	0	0	1	0	1	.30
	Divorced	3	4	3	13	23	6.85
	Widowed	1	6	7	9	23	6.85
Total		78	88	78	92	336	100

Source: Own survey data (2019/20)

Wheat Production and Marketing Channel

The study area is well known for the production of wheat and is identified as the wheat production corridor by the government. The result from the sample households (Figure3) reveals that the total wheat production was 2654 quintals (2019/20). Of the total production, only 38.58% were supplied to the market while the rest 44.37% and 17.05% were used for home consumption and reserved for a future better market, and for seeds, respectively. The farmers in the study area sell their produce to purchase other food items, pay for school and health expenses, purchase clothes for members of the households, and pay back loans.

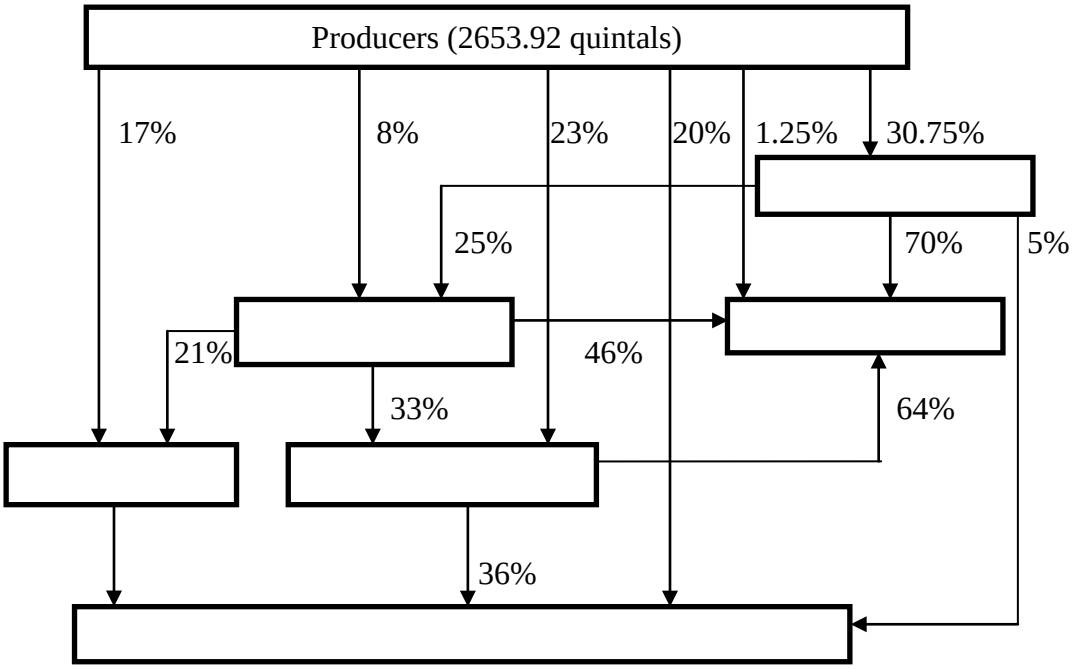

Figure 3: Wheat Production and Marketing Channel

Source: Computed from survey data (2019/20)

Producers **Consumers**

I. Producers → Retailers → Consumers

II. Producers → Brokers → Consumers

III. Producers → Union/Cooperatives → Consumers

IV. Producers → Brokers → Processors → Consumers

V. Producers → Processors → Consumers

VI. Producers → Brokers → Wholesalers → Processors → Consumers

VII. Producers → Wholesalers → Retailers → Consumers

In Figure 3 the marketing channel of wheat from its production until it reaches the final consumers is depicted. Accordingly, the largest quantities of wheat products were received by brokers, unions/cooperatives, and consumers who share 30.75%, 23%, and 20%, respectively. The direct link of producers/farmers to the processors was very weak or low with a share of only 1.25%. This indicates the low capacity of the producers to deal with the processors.

Wheat marketing routes in the study area

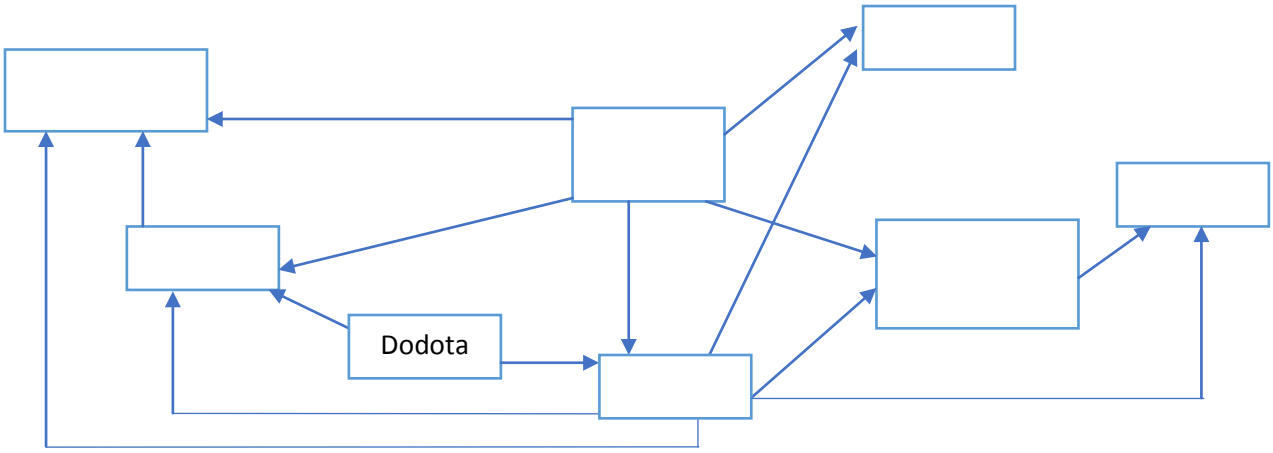

Figure 4: Wheat marketing routes of the study area

As depicted in figure 4, wheat marketing routes start from the *woreda* towns (Dhera and Bokoji) and move to different marketing center throughout the country. Dhera and Bokoji towns are the centers for traders who buy and transport wheat grain from Dodota and Limu Bilbilo *Woredas*. Aggregation is performed in these towns before transporting the wheat grain to different urban centers such as Asella, Adama, Shashemene, Hawasa and Addis Ababa.

Wheat Value Chain Mapping

This section presents the main actors and their functions as well as the enabling environment along the wheat value chain in the study area. The value chain map (Figure 5) highlights the engagement of different actors involved directly or indirectly in the chain from conception to end-users. Generally, the actors in the wheat value chain are primary actors who are directly involved in wheat production and distribution (input suppliers, producers, brokers, wholesalers, retailers, and consumers), and secondary actors who enable the chain to properly function(DAs, microfinance, BoARD, trade, and industry office and the like).

The group discussants reveal that they access information from the market, brokers, radio, traders, relatives, and through the telephone. Their main focus is price information in the nearby *woreda* market. The producers of wheat miss buyers' information, i.e., the preference of buyers which critically determines the price of the wheat within the market. They strongly indicate that sometimes brokers and a few traders cheat them on the price of the wheat and weight of the crops during marketing which reduces their trust in the source of information from these actors.

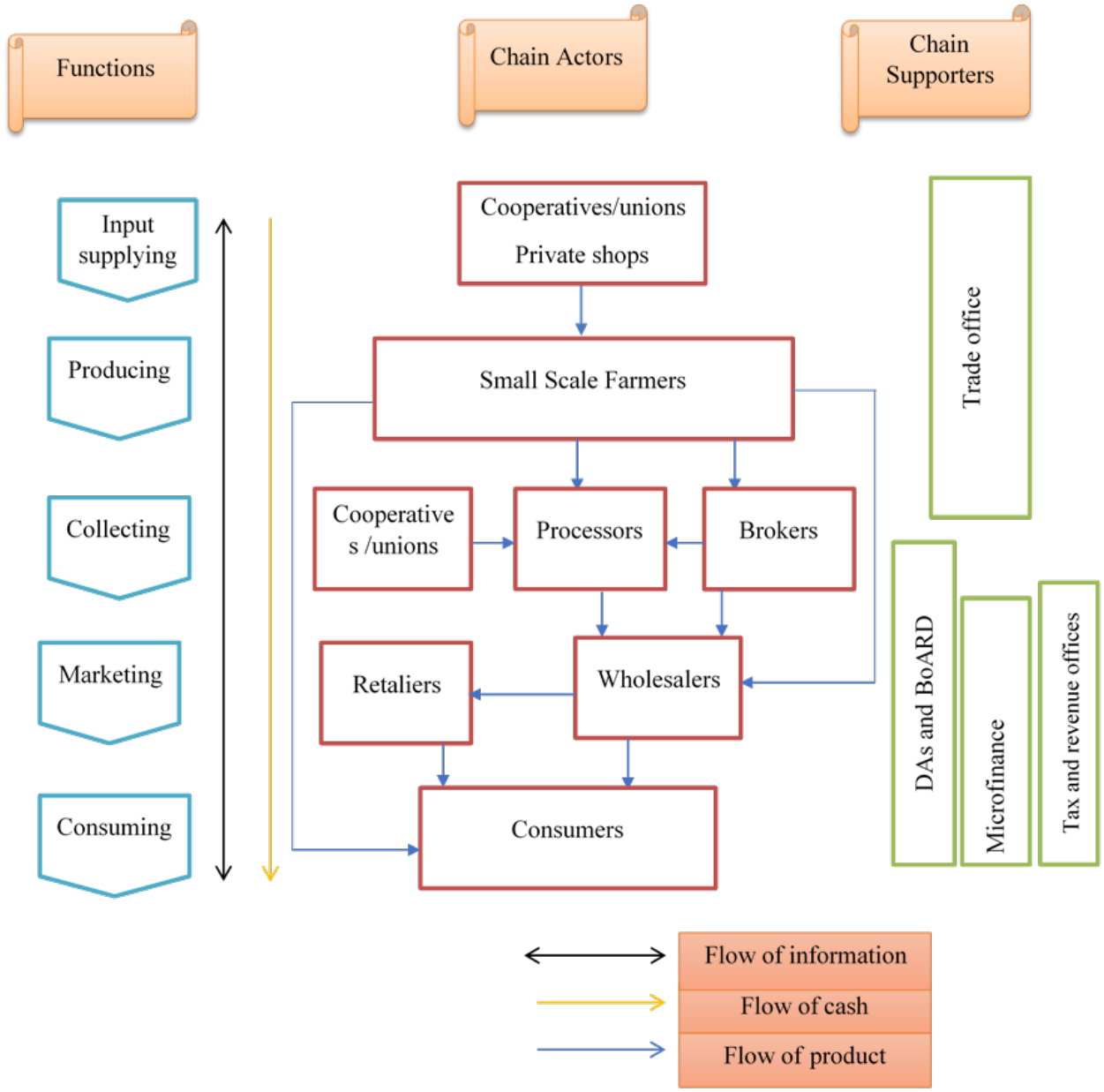

Figure 5: Wheat Value Chain Mapping

Source: Constructed based on field survey data (2019/20)

Wheat Value Chain Actors and Their Functions

The wheat value chain reveals backward and forward linkages in which the backward link starts with farmers' links toward the input suppliers. To comprehend how wheat moves along the chain from input supply point to consumption, it was necessary to detect the role played by each actor in the chain. The main actors in the study area include input suppliers, producers, brokers, wholesalers, processors, traders, and consumers, while the supportive actors are DAs, BoARD, cooperatives/unions, trade and industry officials, and financial/credit services.

Input suppliers: They are organizations and institutions which deliver inputs to the farmers to increase the production and productivity of wheat. It is obvious the role of input suppliers for the effective and efficient wheat value chain development is very crucial. Farmers need appropriate, quality and quantity of inputs (seeds, fertilizers, herbicides, pesticides and insecticides) to produce required amount and quality of wheat. The main input suppliers are different cooperatives/unions and private shops. According to the group discussants, the farmers in the area obtain fertilizers and selected seeds from cooperatives/unions, whereas insecticides, pesticides, and herbicides are purchased from private shops. The unavailability of the required amount and the high costs of the inputs prevent producers from using the inputs as per the recommended amount on their farms. Particularly, the insecticides, herbicides, and pesticides (e.g. 2, 4-D, Pallas, Topic, Tilt and others) are not timely available in the required amount from the cooperatives/unions, thus the producers are forced to buy the required inputs from private shops at high prices.

Farmers/producers: Farmers/producers are the core actors in the wheat value chain which prepare the land for cultivation, plowing, sowing, producing, pests/herbs/diseases controlling, harvesting, post-harvest handling, and selling wheat crops to the market. The entire farmers in the study area perform the production of wheat during the rainy season of the country (*kiremt* season) which means they depend primarily on rain-fed agriculture for their grain. The result from the sample households indicates the presence of high differences between households in the level of wheat produced within a year. Thus, the minimum and maximum annual wheat production was 1.50 quintals and112 quintals respectively. Except for a few (5.65%), the

producers in the study area sell large quantities of their produce during and soon after the harvesting season to the brokers, traders (wholesalers and retailers), processors, and cooperatives/unions. To examine gender-based difference in agricultural production, independent t-test was used based on the following hypotheses:

H_o: There is no significant difference in wheat production in quintals between female and male-headed farmers.

H_a: There is a significant difference in wheat production quintals between female and male-headed farmers.

Table 3: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Amount of wheat produced in 2018/9 in quintals	Equal variances assumed	37.983	.000	5.766	334	.000	11.70083	2.02935	7.70891	15.69275
	Equal variances not assumed			9.973	302.525	.000	11.70083	1.17320	9.39217	14.00948

The p-value reported for Levene's Test for Equality of Variance in Table 3 above is p = 0.000, which is well below the 0.05 threshold. Therefore, there is no need of assuming equal variance. Simply referring to the value under column significance (2- tailed), the variation can be identified. Thus, since the p-value (.000) is less than 0.05, it shows the presence of significant differences in wheat production (quintals/year) in relation to gender. Therefore, there is enough evidence to reject the null hypothesis and accept the alternative hypothesis. This indicates the presence of a significant difference in the amount of wheat yield produced per year between the male and female-headed households.

Brokers: Brokers are the middlemen or dealers who connect the producers with the buyers in the study area. The brokers based their site in the nearby market center and receive orders from

traders and deal with the farmers. The benefit share of the brokers varies from farmers to farmers as well as traders to traders which range between 10-30 birr per quintal. The number of brokers (formal and informal) in the post-harvesting season increases to grasp the surplus produced with fewer prices.

Processors: Processors are essential actors in the wheat value chain. Their main activities are buying wheat from different actors in the chain and performing different activities to transform the wheat crops into various value-added products such as flour, macaroni, and spaghetti. After buying the wheat crops, they perform activities like cleaning, grinding, milling, packing, storing, and distributing the product, particularly to wholesalers, bakers, and higher institutions. The processors have strict quality parameters and they expect wheat suppliers to meet these quality parameters.

The main suppliers of wheat crops to the processors are government, cooperatives/unions, and local collectors. Most of the sampled processors in the study area are inclined to receive more wheat crops from the government since they are forced to sell their products (particularly flour) to the bakers at a restricted price. The demand for these value-added products is currently increasing and this would increase their profitability. However, the lack of quality wheat supply in the locality, irregularity, and shortage of electric power, input, and output price fluctuation is a challenging problem.

Wholesalers: Wholesalers are the main market dealers/ actors who buy the wheat in large amounts and sell it to the processors and some extent to the retailers in the different market centers like Adama, Assalla, and Addis Ababa. The availability of cell phones this day makes it easier for the dissemination of market-related information to wholesalers to transport the product to different markets.

Retailers: Retailers are the actors along the wheat value chain which have direct contact with the consumers. They receive or buy wheat from wholesalers, brokers, and producers and finally, they sell it to the consumers.

Supportive Value Chain Providers along the Wheat Value Chain

In line with the primary actors, supportive value chain providers play a crucial role. Some of the enabling environments that strengthen the wheat value chain in the study area in particular as well as in the country, in general, are research and development centers, development agents, banks, microfinance, BoARD, and the like. They are actors involved in advisory and training services, information provision, financial support, and research. The main supporters in the wheat value chain in the study area are DAs, *woreda* and zonal agricultural and rural development bureau, Meklit microfinance, Oromia microfinance, and Bureau of Trade and Industry.

The survey result indicates that Development Agents (DAs) and BoARD are essential supportive actors who work on the training and advisory services. Most of the advisory and training services are provided on fertilizer application, wheat production, crop management, harvesting, and pre- and post-harvest handling. These advisory and training services are given through a farm to farm visits, experience-sharing tours, and visit to demonstration/model farmers' sites. But the main challenging problem in these advisory and training services was the unequal participation of farmers, lack of interest to participate, and the quota system for training.

The group discussants reveal that the FTC (Farmers Training Center) and houses for the DA experts are established here and there in different *kebele*s to train the farmers and for close assistance, counseling, and follow up of the farmers on the production and productivity of wheat and other crops, use of inputs, crop management, disease controlling and other advisory services. However, some of the FTCs become malfunction and the experts make their residence in the town which creates a serious contact gap between producers and experts.

In the study area, the main financial service providers were cooperatives/unions, Meklit microfinance, Oromia Saving and Credit Institutions, and individual lenders. The number of households that had access to credit accounts for 16.7 percent. Effects of bureaucracy, fear of paying back debt, lack of better information, and lack of interest to borrow were the main factors for the low level of access to credit.

Marketing in the Wheat Value Chain

Wheat Market Structure

The structure of the market refers to how the market is systematized to govern the attribute of rivalry and the pricing behavior in the market. It encompasses the degree of the seller and buyer concentration, entry condition, the extent of agents and product differentiation, the distribution of market information, and its agency in improving price and quality comparisons (Bukar et al., 2015; Nzima et al., 2014). This study assessed the wheat market structure using market concentration and barriers to entry.

The market concentration refers to the number and size distribution of sellers and buyers in the market measured in terms of concentration ratio with the following formula:

$$C = \sum_{i=1}^{r} Si$$

Where, C = concentration ratio

Si = percentage share of the i^{th} firm

r = number of largest firms for which the ratio is going to be calculated

The concentration ratio is expressed in terms of CRx, which stands for the percentage of the market sector controlled by the biggest X firms. For four-firm (CR4) concentration ratio is the most typical concentration ratio for judging the market structure (Kohl & Uhl, 1985). A CR4 of over 50% is generally considered a strong oligopoly; CR4 between 33% and 50% is generally considered a weak oligopoly and a CR4 of less than 33% is no oligopoly at all rather explains competitive nature of the market.

The result from the concentration ratio which considers the average volume of wheat bought by the largest wholesalers in considering the four-firm criteria indicates the presence of strong oligopoly market power (Table 4). The four-firm together control 77.42% of the zonal market (Assela) during the peak production season. Thus, the wheat market in the study area is inefficient and not competitive ($C_4 = C_1+C_2+C_3+C_4=77.42$).

Table 4: Concentration ratio of top four traders

Trader	Average volume of wheat handled per week (Qts)	Market share (%)
1	220	23.16
2	186	19.58
3	175	18.42
4	145	15.26
5	124	13.05
6	100	10.53

The barrier to entry: The main barriers to the entry considered in the study are licensing procedure and capital.

Licensing procedures: In the study area, all traders had trade licenses except a few emerging during the harvesting season when the wheat crop supply is high in the market. Some of these unlicensed traders emerge during the high supply period to buy the wheat at low prices and store for a better price.

The licensing procedures in the study area is easy since nothing hinder the traders enter into the market as long as they fulfill the required criteria which are verified by the Office of the Revenue in the *woreda*. Although theoretically, it is compulsory to have a license to enter the grain market, the simplicity to have a grain license and the absence of strong restrictions to enter into the grain market with respect to licensing made grain marketing relatively free to enter. Thus, entry into wheat trading is easy.

Capital: Capital is the main determining factor to run a business since the one that can afford the required price enter the market and operate. In order to handle the required quantity of products traders need a sufficient amount of capital to help their firms to operate in a healthy way. But the effect of bureaucracy and a high amount of interest from the lender are the main challenging factors for the traders not to effectively participate in the market.

Wheat Marketing Conduct

Marketing conduct is the nature of the firms or the decision of the firms concerning the pricing and output policy. It incorporates the decision of firms to whom they sell their produces or from whom to buy. It includes the methods employed by an array of firms in shaping price and

output, sales promotion policies that are directed at altering the nature of the product sold, and various selling strategies that are used to achieve specific market results (Bukar et al., 2015; Nzima et al., 2014).

Price Setting Strategy

The result from the respondents indicates that the wheat market decision (61.9%) was set by traders (Table 5). The other respondents indicate that the marketing price was set through negotiation and demand and supply account for 17.0% and 14.9%, respectively. The remaining producers (2.7%) reported that they decide on the price of their produce taken to the market.

Table 5: Price setting of wheat

Actors	Frequency	%
Traders/buyers	208	61.9
Self/farmers	9	2.7
Supply and demand	50	14.9
Negotiation	57	17.0
Others	12	3.6
Total	336	100

Buying and Selling Strategy

The result from the survey indicates the selling system was conducted through cash payment. They reported the price of wheat is the main determining factor that influences to whom they sell their products. The majority of the farmers (58.45%) sell their produce during and soon after the harvesting season since they need money for payment for credit, school expenses, and purchase of other food items and clothes for household members. A number of farmers supply their products by assessing the marketing information, i.e., price information, marketplace information, and buyer's information account for 41.55%.

Cost and Benefit Distribution among Actors in the Wheat Value Chain

As the item moves through each chain actor, they add value to the product via cleaning, sorting, processing, packing, creating space, and time utility. From the survey result in Table 6, the highest profit share goes to traders as compared to producers (23.81%). It indicates the farmers

receive a low-profit share despite the fact that they are determined to produce quality wheat and bear all the related risks of production. Thus, to make the producers beneficiary in the chain, it is important other actors share associated risk through agreement. This might motivate and encourage producers to produce surplus and quality wheat required by different actors.

Table 6: Wheat marketing costs and benefits of actors

Item (birr/quintals)	Producers	Brokers or Agents	Union	Processors	Wholesalers	Retailers
Purchase price	-	1340	1350	1350	1340	1345
Production cost	1050	-	-	-	-	-
Marketing cost						
Labor	5	5	6	6	5	5
Transport	8	6.5	6.5	7	5	5
Pack material	7	7	7	7	7	7
Tax	-	2	2.34	3	1.75	1.24
Telephone	-	1.20	1.23	1.42	1.31	1.35
Total marketing cost	20	21.70	23.07	24.42	20.06	19.59
Total cost	1068	1361.70	1373.07	1374.42	1360.06	1364.59
Sales price	1345	1450	1500	1600	1550	1620
Marketing margin	295	110	150	250	210	275
Percentage share of margin	22.87	8.53	11.63	19.38	16.28	21.32
Profit margin	277	88.3	126.93	225.58	189.94	255.41
Percentage share of profit	23.81	7.59	10.91	19.39	16.33	21.96

Governance along the Wheat Value Chain

In the value chain literature, governance indicates the relationships among the buyers, sellers, service providers, and regulatory institutions that operate within or influence the range of activities required to bring a product or service from initiation to its end use (Kaplinsky & Morris, 2000). Governance is all about the power and the ability of actors to exercise control at any point in the chain by setting or enforcing product or process parameters under which others in the chain function (Ouma et al., 2017).

The study result reveals that the entire wheat value chain in the study area was governed by buyers who decide on the selling price of wheat. The majority, that is, 62.2 percent of the selling price was determined by buyers followed by negotiation (17%) and by supply and demand (14.9%). Among buyers, processors were the vital governing actors in the wheat value chain in which they have strict quality parameters or standards that the suppliers should meet. This is mainly because the level of quality of wheat determines the quality of their end products (spaghetti, macaroni, and flour). Due to low capital capacity and low bargaining power, farmers are forced to sell their products at the price offered by traders. Thus, producers are price takers. The actors in the wheat value chain blame each other in which farmers blame traders for offering lower prices whereas traders blame farmers for not providing quality wheat that meets their standard. In general, the governance along the wheat value chain is buyer-driven.

SWOT Analysis of Wheat Value Chain

Strengths	**Weaknesses**
Input suppliers sell fertilizers and selected seeds in farmstead Expansion and construction of road and communication infrastructure The current plan of the government to expand the group production of wheat to nullify the import	Limited credit (lack of working capital) Weak collaboration among actors Lack and the high price of selected seeds, pesticides, and insecticides Low or no connection with a research center and universities High involvement of brokers Low input utilization Weak flow of information (product quality, market place, and buyer's preferences)
Opportunities	**Threat**
Expansion and presence of processors The increasing need for wheat and wheat products due to increment in population and urbanization Training in production and marketing	Changing/variability of climate Decreasing soil fertility Incidence of diseases (rust) High costs of tractors and combiners Price variability

Sources: Own analysis

Conclusions

From the survey result, eight main alternative market channels were identified for wheat marketing from its production until it reaches the final consumers. Accordingly, the largest quantities of wheat products were received by brokers/agents, unions/cooperatives, and consumers which share 30.75%, 23%, and 20%, respectively. The direct link of producers/farmers to the processors was very weak or low, sharing only 1.25%. This emanates from the null agreement between farmers and processors as the survey result reveals on the one hand and the low capacity of the producers to deal with the processors on the other.

Wheat production and productivity are critically determined by the shortage and expensiveness of inputs, specifically by the untimely availability and unavailability of the required amount of selected seeds and fertilizers, and the high cost of pesticides, insecticides, and herbicides found in private shops. Farmers in the study area sold their produce during harvesting and soon after the harvesting seasons at a lower price to cover housing expenses, purchases of clothes for members of households, cover health and educational expenses, and payment of credit. The marketing situation of wheat is mainly complicated by the informal broker/agents increased during the harvesting seasons to grasp the surplus produce at less price.

For the well-functioning of the wheat value chain, the role played by a supportive or enabling environment is very critical. The support provided by the DAs, woreda, and zonal agricultural and rural development bureau is at a good stage, despite the presence of unequal participation and lack of interest to participate from the farmers' side and the quota system for training from the office. In line with this, the malfunctioning of FTCs creates a serious problem for the advisory and training services in the area. The other main enabling environment i.e., financial institutions closes their door for farmers to provide credit. It is obvious the accessibility of farmers to a financial institution via credit facilitates the progress of wheat production and productivity in the required quality and amount and motivates the farmers to produce more.

The marketing in the study area is strongly oligopolistic in which few firms dominate the market. Thus, it requires the engagement of the trade and industry office to create a conducive

environment to change the imperfect marketing structure to be competitive and efficient for all actors involved.

In view of the finding and the above conclusion various policy options draw 1) The local government officials and other stakeholders should mobilize the existing resources on the timely avail of selected seeds and fertilizers as well as create a conducive link with the producers or importers of insecticides, pesticides, and herbicides for fair prices of these inputs. 2) The national and regional governments work in collaboration for the good function of FTCs with the intent of its establishing and repairing the deteriorated or malfunctioned FTCs 3) The government should revise the financial policies which provide credit directly to the farmers without the closed door policy of the bank institution in the country.

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CHAPTER THREE

Determinants of Market Outlet Choice by Smallholder Wheat Producers in Arsi Zone of Oromia National Regional State, Ethiopia

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Abstract

Wheat is one of the staple crops widely cultivated in the Arsi Zone of Ethiopia. It is the source of food and provides income for the majority of smallholder farmers. To this end, to benefit smallholders from their produce identifying and selecting the appropriate market is crucial. However, selecting an appropriate market channel is not an easy task because there are different factors that influence market outlet choices. Hence, this study scrutinized the determinants of market outlet choice of smallholder wheat producers in Arsi Zone, Oromia National Regional State, Ethiopia. It uses both primary and secondary data collected through questionnaires and desk reviews from a total of 336 randomly selected households. Data were analyzed using multinomial logistic regression, percentage, and crosstabulations of frequency distribution. The result from the multinomial logistic regression specifies that among the ten explanatory variables included in the model, seven of them were statistically significant at 1%, 5%, and 10%. Those factors significantly affecting wheat producers' market outlet choices were sex and year of participation at 1% significant level, education, nearby market and quantity produced at 5% significant level, and nearby road and age at 10% significant level. Based on the results, the study recommended that the government and stakeholders should focus on strengthening education, expansion of road infrastructure, telecom, and access to credit which promote farmers' profitable market outlet choices on one hand and increases the production and productivity of wheat in another way.

Keywords: Wheat, Market outlet, Multinomial logistic model, Arsi

Introduction

Cereal is one of the largest agricultural subsectors in Ethiopia. The subsector dominates in terms of its share in rural employment, agricultural land uses, and calorie intakes of the community and in terms of its contribution to the national income (Shahidur and Asfaw, 2013). Wheat is one of the main cereal crops in which Ethiopia is the second largest producer in SSA next to South Africa (Samuel et al., 2017; White et al., 2011). It is one of the most staple crops cultivated as a source of food for consumers and a source of income for producers (FAO, 2014 cited in Minot et al., 2015). In fact, more than 4.5 million smallholder farmers engaged in wheat cultivation in the country (Minot et al. 2015; Samuel et al., 2017). Despite, wheat has been cultivated by state farms and commercial farms, its largest part is dominated by smallholder farmers, and almost all wheat production is conducted under rain-fed conditions (Tadesse et al., 2017).

To this day, the total annual wheat production accounts for 3.43 million tons cultivated over 1.63 million hectares in Ethiopia (Tolesa et al., 2014). It covers an estimated 17% of the total land under the cereal crops with an average of 20.10 quintals per hectare. According to FAO (2009), this is the lowest yield per hectare as compared to the world average of 40 quintals per hectare. Similarly, its yield in the country is very low as equated to Africa's and world level which is lower at 13% and 32%, respectively. In line with this as compared to the wheat-producing countries in Africa, wheat yield in Ethiopia is very low (2.4ton/hectare). For example, wheat yields are 6.7 tons/ha in Egypt, 3.5 tons/ha in South Africa, and 3.0 tons/ha in Kenya (Minot et al., 2015).

The major sources of this low yield in the country mainly emanate from the limited access to inputs, financial services, improved production technology, irrigation, and agricultural markets (Samuel et al., 2017). Ethiopia suffers from weak market linkages on both the input and output sides. Farmers either cannot afford improved inputs or lack the knowledge to use them. Weak systems connect agricultural outputs to processors and numerous barriers exist that prevent quality products from reaching end users, such as insufficient packaging and storage, the inability of Ethiopian products to meet international market standards, and restrictive trade regulations.

Market participation among wheat producers is very low, though grown over time following the recent expansion of roads and urban centers in the country. Along with an increase in production, good and efficient markets that are expected to transfer a fair proportion of consumers' prices to producers are important to enhance and sustain market participation of wheat producers, thereby creating a conducive environment for the process of agricultural intensification to deepen further with a positive impact on poverty reduction (Samuel et al., 2017).

The decision made by wheat producers in Ethiopia on the choices of profitable market channels is one of the fundamental tasks. They use different market alternatives to supply their wheat produce to promote their livelihood and the income or profit earned from their production. As inferred from different empirical studies on various crops (Abebe et al., 2018; Hawlet et al., 2019; Tadie et al., 2019; Taye et al., 2018; Tewoderos et al., 2020; Yonnas et al., 2019) the main factors determining the decision of smallholder wheat producers market outlet choices are demographic, institutional factors, socioeconomic factors, infrastructural facilities, the existing market alternatives, prices, and transportation cost.

Cereal crops have been extensively cultivated in the Arsi zone, particularly wheat, barley, teff, sorghum, and pulses are pre-dominant (Yazachew and Kasahun, 2011). Farmers in Arsi Zone sell their wheat products through various market outlets to increase or maximize expected utility or profit. Despite, farmers in the study area sell wheat via different market outlets, there are no empirical evidence documents on the factors determining market outlet choice of smallholder wheat producers in the study area. Therefore, this study is conducted with the main objective of identifying factors impeding market outlet choice of smallholder wheat producers in the area.

Review of related literature

Market participation among wheat producers is very low, though grown over time following the recent expansion of roads and urban centers in the country. Along with an increase in production, good and efficient markets that are expected to transfer a fair proportion of consumers' prices to producers are important to enhance and sustain market participation of wheat producers, thereby

creating a conducive environment for the process of agricultural intensification to deepen further with a positive impact on poverty reduction (Samuel et al., 2017). However, smallholder farmers' decision to select appropriate market outlets can be affected by various factors such as demographic, institutional factors, socioeconomic factors, and access to market outlets. There are different studies in different parts of the country that explored the major determinants of the value chain development of cereal crops. For example, Hawlet et al (2019) studied the determinants of market outlet choice decisions of tomato producers in Fogera *woreda*, South Gonder Zone, Ethiopia. The result from multivariate probit estimation indicates the age of household heads, education status of tomato producers, market distance, owning transport facilities, access to credit, household size, and land size were the main factors determining the tomato farmers market outlet choices.

Dessie et al. (2018) analyzed factors affecting the market outlet choice of wheat producers in the North Gondar Zone, Ethiopia. The results of a multivariate probit model reveal that the age of the household, education status of the household, credit access, livestock number, off-farm income, and total land-holding size of farmers significantly affected the market channel choice decisions in one or another way.

Eshetu et al. (2022) studied the determinants of the wheat value chain in the case of the North Shewa Zone of the Amhara region, Ethiopia. The logistic regression result of the study implies that participation of off-farm income, availability of market information, distance from the marketplace, number of livestock owned by household, extension service, and education were the main factors that determine farmers' market outlet choice at different significant levels.

Tariku et al. (2021) investigated the determinants of cereal crop commercialization among smallholder farmers in Guji Zone, Ethiopia. The results of the study from ordered probit model estimation indicate that the sex of the household heads, ownership of equines, cultivated land size, frequency of extension contact, credit use, value of crop produced and
medium perception of lagged crop prices was among the factors determining the commercialization of cereal crops at different significant levels.

However, many of the aforementioned researches show the determinants of market outlet choices of different crops (Hawlet et al., 2019; Dessie et al., 2018; Eshetu et al., 2022; Tariku et al., 2021) and other several studies have been focused on the northern and southern area of the country. But this study inclined to the central part of the country which is considered as the wheat-producing corridor and granary of wheat and barley in the country. To assess determinants of market outlet choice of producers of the wheat multinomial logistic regression model was used. Thus, this study analyzed whether the market outlet choice of smallholder farmers is constrained by different factors or not.

Study Area and Methodology

Study Area

Arsi Zone is one of the zones in Oromia National Regional State found 175km from the capital city of the country. It gained the name Arsi from the Oromo ethnic groups that inhabit the area for a long period. It shares boundary lines with East Shewa Zone in the north and northwest, West Arsi Zone in the south and southwest, Bale Zone in the south, southeast, and east, West Hararge Zone in the north and northeast, and Afar National Regional State in the extreme north (Figure 1). Astronomically the zone lies between 7008’58’’N - 8049’00’’N latitude and 38041’55’’ E - 40043’56’’ E longitude. Having a total area of 21009 km2, it accounts for about 5.8% of the total area of the Regional State (FEDOoAZ, 2010).

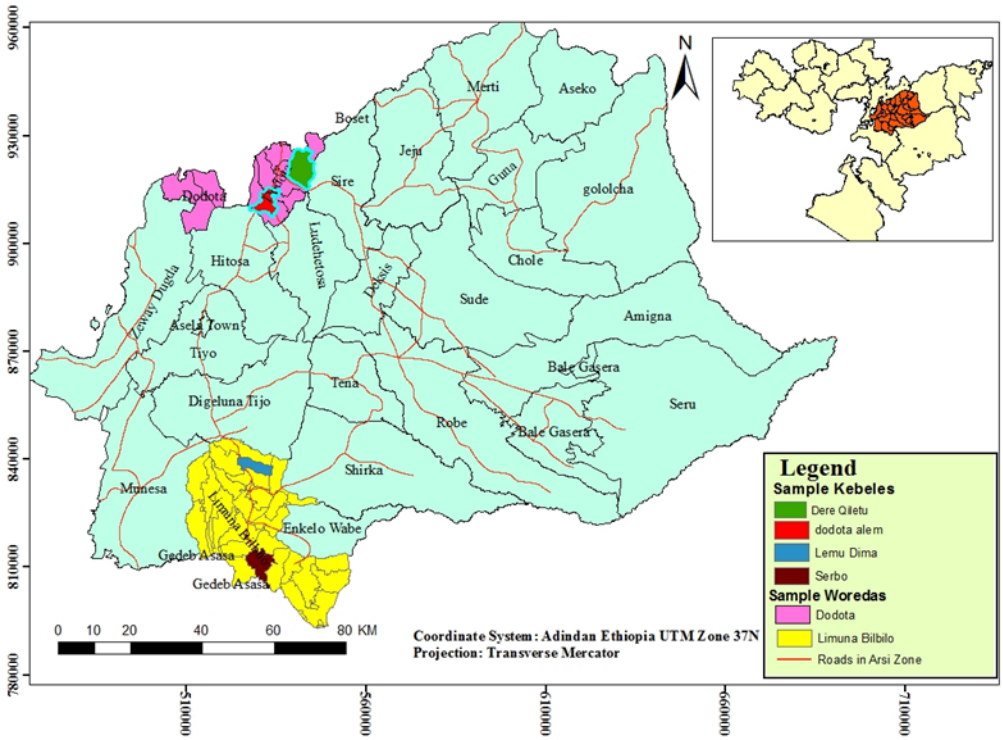

Figure 1: Map of the study area

Source: Produced from Ethio GIS data base

The climate of the zone is known by different agro-climatic zones due to its diverse altitude. It is predominantly characterized by moderately cool (40%) followed by cool (34 %) annual temperature (Figure 2). The mean annual temperature of the zone ranges between 20-25^{0}c in the lowland and 10-15^{0}c in the central highland of the zone. The mean annual rainfall of the area varies from 633.7 mm at Dera station (located at an altitude of 1680 meters amsl) to 1059.3 mm at Bekoji station (located at an altitude of 2760 meters amsl). Generally, Arsi Zone receives abundant and well-distributed rainfall both in the amount and season (AZFECO, 2016; Yazachew and Kasahun, 2011).

The area is known by diversified physiographic structures in which altitude varies between 805meter (the lowest point) found at the extreme east of Seru district in Wabi Gorge and on 4195 meters (highest peak) at Mountain Kaka (Yazachew and Kasahun, 2011). The major physiographic division of the area includes mountain ranges, massifs, and high plateau, low plateau and associated lowlands, and lowlands (FEDOoAZ, 2010).

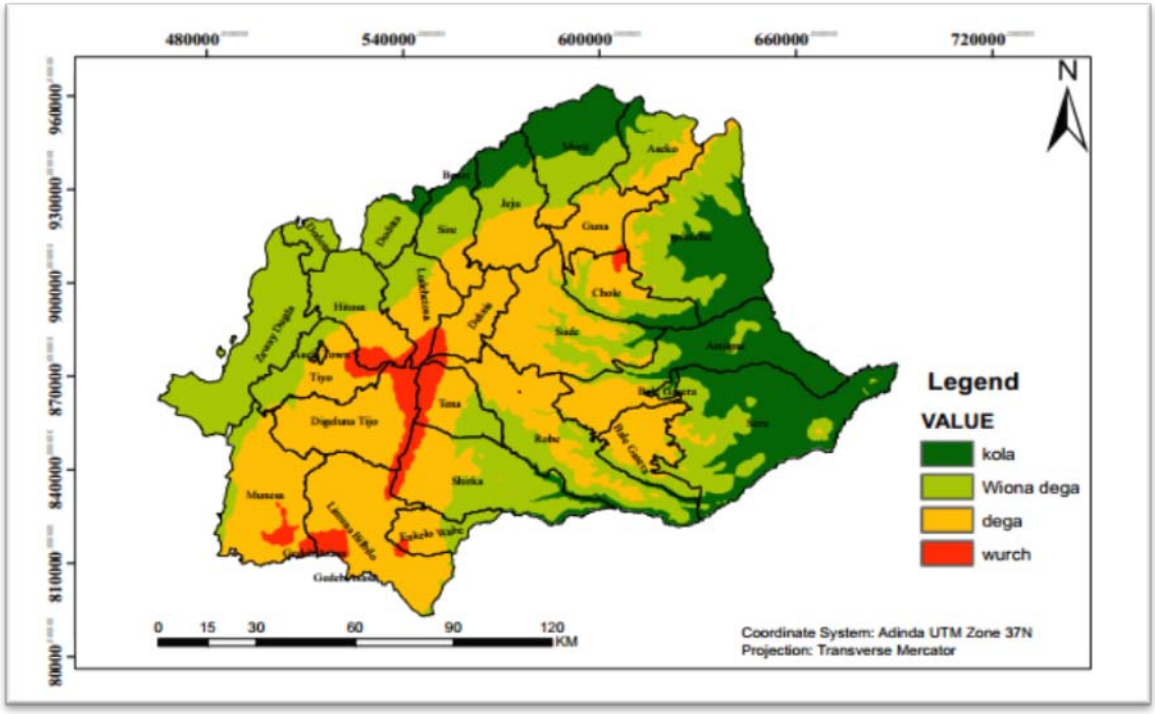

Figure 2: Agroclimatic map of Arsi Zone

Source: Produced from Ethio GIS data base

The zone is naturally endowed with numerous rivers and streams. It has a high network or density of perennial rivers and streams. The soils in the area are composed of diversified types and natures formed from current volcanic activities. This creates a conducive and fertile soil for different agricultural activities (FEDOoAZ, 2010). As a result of diversified physiographic structure (altitude), temperature, rainfall, and parent material from which soils are derived, the area hosts different kinds of natural vegetation. However, the natural vegetation which once densely and extensively covered the land of the area due to human interventions is currently found at some pockets of Munesa- Shashamene, Arbagugu, and Chilalo Galema State Forest and the eastern peripheral lowlands of Amigna, Seru, and Gololcha and the lowland of Ziway Dugda (FEDOoAZ, 2010). The available natural forests of the area provide habitats for different kinds of wild animals. Despite the deterioration of wild animals due to human intervention in their habitats, the area possesses different species of wild animals such as Mountain Nyala, leopard, Menelik's bushbuck, lion, warthog, and hippopotamus (AZFECO 2016).

The total population of the area was 3,377,806 with 1,695,152 males and 1,682,654 females. The number of people inhabiting the urban area of the zone accounts for only 13.13% which is below the national level (AZFECO, 2016). This reveals a huge number of populations in the area live in the countryside. The dependency ratio is very high where the dependent population accounts for 47.58%. The crude population density of the zone is moderate (123 persons/km2) as compared to the most densely populated zones of the country (Yazachew and Kasahun, 2011).

Agriculture is the main economic activity in the zone where people engage in crop cultivation, livestock and poultry raising, and beekeeping. Rain-fed crop cultivation is the most dominant economic activity. Smallholder farmers share the largest total crop production and total land under cultivation which accounts for 96.2% and 96.45%, respectively. The main crops cultivated are cereals, pulses, oilseeds, vegetables, fruits, root crops, and others (Yazachew & Kasahun, 2011). As inferred from the same document the wheat production and productivity increased from year to year and also the land under wheat production showed an increment. However, smallholder farmers suffer from efficient and appropriate markets which accommodate their produce and provide expected returns for their produce.

Methods and Materials

The theoretical perspectives, ontological and epistemic views, methodological strategies, and specific methods of data collection and analysis are the building block of the research. The theoretical perspective which is guided by the epistemic view, which in turn determines the methodological strategies and methods for data collection and analysis should be defined and formulated clearly and comprehensively in the research (Crotty, 1998; Gray, 2004, 2017). This illustrates the existence of strong interrelationships between ontology, epistemology, methodology, and methods.

From the two quite opposite ontological stances in Western thought, the ontology of accentuating the presence of reality as represented by identifiable properties denoted by symbols, words, and concepts as opposed to formlessness, chaos, interpenetration, and absence ontology of becoming (Gray, 2004, 2017) has been adopted for this study. Ontology is being adopted for the study

since households and different actors in the market outlet choices exist in reality which have identifiable properties explained by the existence of a movement of wheat crops from producers to different actors via various marketing channels.

In line with the ontological stance, it is important to consider the epistemic view which enlightens the way of understanding and explaining how we know what we know (Crotty, 1998). The epistemic views which guide this study are objectivism and constructivism since using one of them does not broadly and entirely pave the way to study determinants of market outlet choice of wheat producers.

Objectivism is an epistemic view that advocates the presence of reality independent of the human mind and the concern of the researcher is all about discovering this objective truth (Gray, 2004, 2017). The theoretical perspective which fits with this epistemic view and is well-suited to the objective of the study is positivism. Its central argument is the presence of realities external to the researcher and these realities are tested directly through scientific investigation. Therefore, in the wheat marketing outlet choices, data on socio-economic and demographic characteristics were objectively collected with questionnaires analyzed objectively with different statistical instruments.

The second epistemic stance adopted for the study is constructivism. Its main argument is truth and meaning do not exist in some external world but are created by the subject's interactions with the world. Meaning is constructed not discovered, so subjects construct their own meaning in different ways, even in relation to the same phenomenon (Creswell, 2009; Crotty, 1998; Gray, 2004, 2017). Thus, the trust, belief, and attitude of the farmers to profit maximization and different channel choices were not understood and comprehended similarly or at the same level.

Though positivism and constructivism emerge from different epistemological perspectives, they are under the umbrella of similar ontology, i.e. ontology of being. Thus, in order to study in detail and comprehensively the determinants of the market outlet of farmers in the wheat value chain and come up with valid and reliable findings and a strong conclusion, we believe using both objective reality and subjective views in amalgamation is very crucial.

Research Designs and Approaches

Plano Clark and Creswell (2015) identify quantitative, qualitative, and mixed types of research approaches; and the three approaches are not as discrete as they first appear. The research approach adopted for this study is a mixed one since the wheat marketing outlet choices cannot be studied with only a single approach. Likewise, they argue that the researcher could employ mixed-method studies when they believe the use of both quantitative and qualitative data would provide a better understanding of the research problem. The use of quantitative or qualitative methods had some weaknesses, and the use of both (quantitative and qualitative) concurrently result in neutralizing the weakness of each method (Creswell, 2014). Similarly, Creswell (2012) argues that the use of quantitative and qualitative research methods (mixing the two) can help us to understand the problem and research question better than either method.

Thus, a concurrent/convergent parallel mixed-method research design was employed for the study. According to Creswell (2014) and Plano Clark and Creswell (2015), it refers to the collection of data simultaneously (quantitative and qualitative data), merging the data, and using the result to understand the problem. They argued that the basic rationale for this study is that one data collection form supplies strengths to offset the weaknesses of the other form and that a complete understanding of a research problem results from collecting both quantitative and qualitative data. Thus, the issues of the market outlet choice determinants in the wheat value chain cannot be studied alone quantitatively or qualitatively.

Sources, Types, and Tools of Data Collection

The necessary data for this study were generated from both primary and secondary sources. Primary sources were households selected as a sample from the sampling frame in the study area. Secondary sources were different documents and reports in the agricultural offices of the *woreda* and zone, the processor office, and any other necessary documents accessed from the internet, available books, magazines, journals, and published or unpublished documents. The tools/instruments employed in the study were questionnaires (structured and unstructured), observation, and desk reviews based on the objectives intended to achieve.

Sampling Procedures

Multistage sampling procedures have been used sequentially to select the two *woredas* from Arsi Zone, four *kebeles* from each *woreda*, and rural farm household heads from each rural *kebeles* (the smallest administrative units in Ethiopia). First, after the *woredas* were stratified according to their amount of wheat production in quintals, purposive sampling employed to select two *woredas* (Limu Bilbilo- from wheat-producing and Dodota-from less wheat-producing) from the study zone and two *kebeles* each from the selected *woredas* (Sarbo, Lemu Dima, Dire Kiltu and Dodota Alem) to generate sample households for the study. Second, once the study *woreda*s and *kebele*s for the study were identified based on the amount of wheat production, simple random sampling was employed to select the sample households from the selected sample *kebeles* for the study with the help of information obtained from DAs. This is because it reduces the level of bias which might arise during the selection of the sample. Third, the total number of sampled households was generated from the target population (households in the selected *kebeles*) based on their proportion of total households.

Table 1: Distribution of sample size across selected *woreda*s and *kebele*s

Woreda	*Kebele*	Total HHs	Sample
Limu Bilbilo	Sarbo	622	78
	Lemu Dima	721	88
Dodota	Dire Kiltu	611	78
	Dodota Alem	736	92
Total		**2690**	**336**

Sample Size Determination

Sample size determination is one of the technical areas which requires the researcher's ability to decide the appropriate sample size for the study based on the purpose of the study. According to Cohen et al (2000), there is no clear-cut answer for how much sample size is appropriate for the study undergoes; rather it depends on the purpose of the study and the nature of the population under investigation. Therefore, in order to reduce the sampling error incurred due to inappropriate sample size, time for the study, heterogeneity or homogeneity of the population

under study, costs for the study, and the like; it is important to limit the sample size under study. Thus, according to Kothari (2004), if the study population is finite in number, the following mathematical formula is appropriately used to determine the sample size for the study. Therefore, at 95% confidence level, 5% significance level (degree of freedom is=1-0.5=0.5), and the standard variate at 95% significance level is 1.96, the total sample size for the study is 336 households. $n = \frac{z^2.p.q.N}{e^2(N-1)+z^2.p.q} = \frac{(1.96)^2(0.5)(0.5)(2690)}{(0.05)^2(2690-1)+(1.96)^2(0.5)(0.5)} = 336$

Where, n= refers to the number of sample size

P= sample proportion

q= population proportion (q = 1 – p = 1 – 0.5 = 0.5)

e= acceptance error

N=total population

z= the value standard variate at acceptable significance level (1.96 at 95%)

Methods of Data Analysis

To process and analyze the collected data value chain mapping, and Statistical Package for Social Sciences (SPSS) statistical software version 20 were used. Data collected through questionnaire survey was processed by using SPSS statistical software version 20. Descriptive statistics were used to analyze the survey data collected from smallholder wheat producers through a questionnaire survey in the study areas. The appropriate econometric model that can help to identify determining factors of wheat producer farmers market outlet channel choice was multinomial logistic regression model. The multinomial logit (MNL) model is used to analyses the determinants of smallholder farmers' choice of market outlet in Arsi Zone of Ethiopia. This model suits such type of analysis as it permits the analysis of decisions across more than two categories, allowing the determination of choice probabilities for different categories. To describe the MNL model, let y denote a random variable taking on the values (1, 2, . . ., J) for J, a positive integer, and x denote a set of conditioning variables. In this study, *Y* is a dependent variable and represents the smallholder market outlet choice, whereas the *X* represents the factors that influence choice of market outlet which contains household attributes and *P*1, *P*2…*Pj* as

associated probabilities, such that $P1 + P2 + \ldots + Pj = 1$. This tells as how a certain change in X affects the response probabilities $P\ (y = j/x)$, $j = 1, 2 \ldots J$. Since the probabilities must sum to unity, $P\ (y = j/x)$ is determined once the probabilities for $j = 2 \ldots J$ are known.

$$p(y = {}^{1}/_{x}) = 1 - (p2 + p3 + \cdots + pj) \qquad (1)$$

In the MNL model, it is usual to designate one as the reference category. The probability of membership in other categories is then compared to the probability of membership in the reference category. Consequently, for a dependent variable with j categories, this requires the calculation of $j - 1$ equations, one for each category relative to the reference category, to describe the relationship between the dependent variable and the independent variables. The choice of the reference category is arbitrary but estimated as the most market outlet which accept the farm products. The estimation of MNL model for this study was conducted by normalizing one category which is named as "base category". The market outlets were grouped into five because farmers used more than one outlet, and the base category was "processors." The theoretical explanation of the model is that in all cases, the estimated coefficient should be compared with the base group or reference category. Therefore, the generalized form of probabilities for an outcome variable with j categories is:

$$pr(yi = j/x) = pr_{ij=}\frac{\exp(x'\beta_j)}{1+\sum_{j=2}^{j}\exp(x'\beta_j)}, j = 1,2, \ldots, J \qquad (2)$$

For j>1

The parameter estimates of the MNL model only provide the direction of the effect of the independent variables on the dependent (response) variable; estimates represent neither the actual magnitude of change nor the probabilities. Unbiased and consistent parameter estimates using this model need to assume independence of irrelevant alternatives that requires that the probability of using a certain market outlet choice method by a given household is independent from the probability of choosing another market outlet method.

Table 2: Summary of independent variables used in multinomial logistic model

Variables	Type	Measurement/ Definition	Hypothesis
Sex of household heads	Dummy	1 = male, 0 = female	+/-
Age of household heads	Continuous	Years	+/-
Number of family size	Continuous	Number	+
Educational status of household heads	Dummy	1 = educated, 0 = uneducated	+
Year of participation in wheat cultivation	Continuous	Years	+
Number of oxen owned	Continuous	TLU	+
Distance DA from household residence	Continuous	Km	+
Nearby market	Continuous	Km	+
Nearby roads	Continuous	Km	+
Access to credit	Dummy	1 = yes, 0 = no	+
Market information	Dummy	1 = yes, 0 = no	+
Quantity of wheat produced	Continuous	Quintals	+

Results and Discussion

The Socio-economic and Demographic Characteristics of Wheat Producers

The result from the finding in Table 3 reveals that the sampled household heads which account for 80.95% were male and the rest 19.05% were female. The mean age of sample household heads was 50.96 years with standard deviation of 10.606 years, which indicates most of the respondent farmers were experienced in crop production. Likewise, the average years of household heads participated in wheat production was 23.92 which reveals that farmers in the study area have good experiences in wheat production. In terms of marital status, 86% of the farmers were married and only 0.30% were single. The rest 13.7% were divorced and widowed. The average family size for the sampled households in the study area was 5.52. Despite the

government take different measures to control rapid population growth the mean family size in the study area is higher.

Table 3: The socio-economic and demographic characteristics of the households

Continuous variables	**Mean**		**SD**
Age	50.96		10.606
Family size	5.52		1.864
Year of participation	23.92		10.105
Land in hectare	1.7231		.831
Distance to DA (km)	2.16		.903
Distance to road (km)	2.26		1.897
Dummy variable	**Responses**	**Frequency**	**Percent**
Sex	Male	272	80.95
	Female	64	19.05
Education	Educated	133	39.58
	Uneducated	203	60.42
Marital status	Married	289	86.00
	Single	1	0.30
	Divorced	23	6.85
	Widowed	23	6.85
Access to land	Yes	329	97.92
	No	7	2.08
Access to DA	Yes	305	90.77
	No	31	9.23
Access to market information	Yes	315	93.75
	No	11	6.25

Sources: Survey result (2019/20)

The result of the study indicates that about 39.58% sample households were educated (attended formal education) while the remaining 60.42% were uneducated (never attend any form of formal education). It is obvious the educational background of the farmers determines their

readiness to accept new ideas and innovation which influence the production and productivity of their produces. Thus, more educated farmers are expected to adopt new technologies to increases their production and productivity of wheat and have knowledge to select appropriate marketing channel for their produces. For instance, Hawlet et al. (2019) argue that education boosts the knowledge of the producers that will enable them to collect information, interpret the information received, and make knowledgeable marketing decisions.

In terms of landholding, the mean landholding per household heads in hectares was 1.72. The landholding per hectare is one of the productive assets which determine the production of wheat. The number of household heads owning land or have access to land was 97.92 while the remaining 2.08% were landless or have no own land. The landless households get land for wheat production through yearly renting, share cropping or long-term purchases. The number of households with access to DAs accounts for 90.77% and the remaining 9.23% had no contact with DA. Accessible household heads to DA were beneficiary since they obtain training and advisory services on fertilizer application, wheat production, crop management, harvesting, and pre- and post-harvest handling. The average distance of the DA center from the farmers' residence is 2.16km. Households having access to market information constitutes 93.75% while the rest 6.27% had no access. The respondents reveal that they access information from the market, brokers, radio, traders, relatives, and through telephone. Their main focus is price information from the nearby *woreda* market. The producers of wheat miss buyers' information, i.e., the preference of buyers which critically determine the price of the wheat within the market.

Wheat Production and Marketing Channel

The study area is well known in the production of wheat and identified as the wheat production corridor by the government. The result from the sample households reveals that the total annual wheat production was 2653 quintals. From the total production only 38.58% supplied to the market while the rest 44.37% and 17.05% were used for home consumption and reserved for a future better market, and for seeds, respectively. The farmers in the study area sell their products to purchase other food items, payment for school and health expenses, purchase of clothes for members of the households, payment for credit, and few due to surplus production.

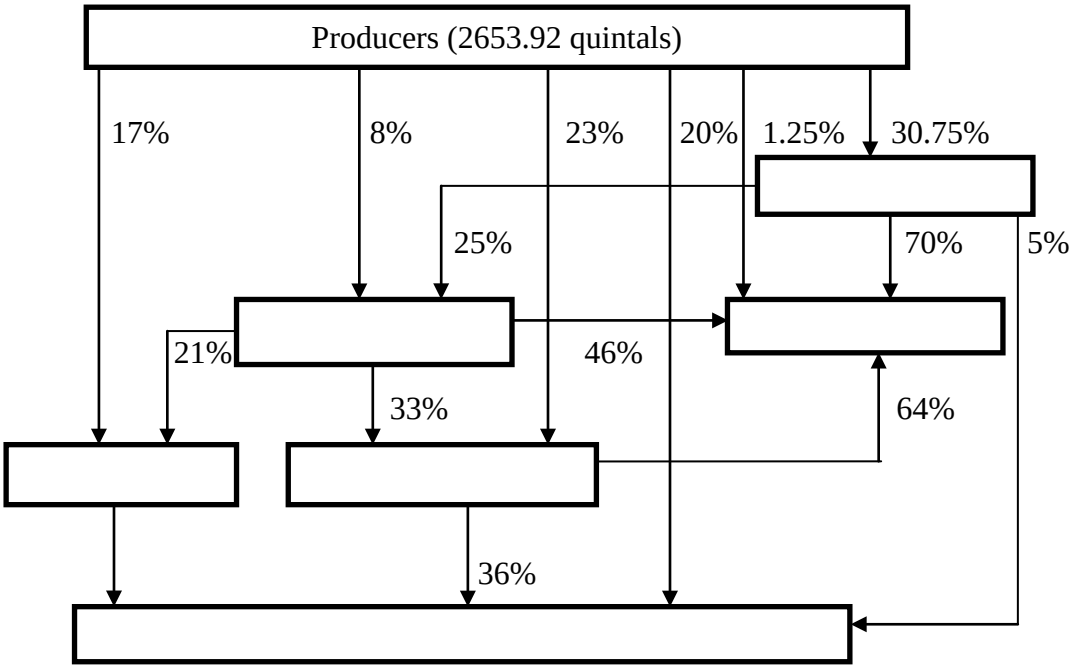

Figure 3: Wheat Production and Marketing Channel

Source: Computed from survey results (2019/20)

Producers Consumers

I. Producers → Retailers → Consumers
II. Producers → Brokers → Consumers
III. Producers → Union/Cooperatives → Consumers
IV. Producers → Brokers → Processors → Consumers
V. Producers → Processors → Consumers
VI. Producers → Brokers → Wholesalers → Processors → Consumers
VII. Producers → Wholesalers → Retailers → Consumers

From the survey result the main alternative market channels were identified for wheat marketing. On Figure 3 the marketing channel of wheat from its production until it reaches the final consumers was identified. Accordingly, the largest quantities of wheat products were received by brokers, unions/cooperatives, and consumers which share 30.75%, 23%, and 20%, respectively. The direct link of producers/farmers to the processors was very weak or low with a share of only 1.25%. This emanates from the null agreement between farmers and processors as the survey

result revealed on one hand and the low capacity of the producers to deal with the processors on the other hand.

Factors affecting market outlet choices

The wheat producer farmers in the study area have an option to sell their produce via different marketing channels. But the appropriate channel choice of the farmers are determined by different factors. They are factors which determine the decision of farmers to choose suitable marketing channels such as different demographic, socio-economic and institutional factors. As clearly depicted in Table 4, the model had a likelihood ratio test with a Chi square statistic of 256.293 with 50 degrees of freedom and a corresponding p-value of 0.000. This reveals that the calculated Chi square statistics is greater than the tabulated at 5% significance level. Hence, at 5% significance level the coefficients of the respective variables are jointly significant in explaining variation in the choice of market outlet by the farmers. Then the model was tested for the validity of the independence of irrelevant alternatives using assumptions by Hausman specification test procedure.

Table 4: Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	855.096			
Final	598.803	256.293	50	.000

The alternative “processers” was used as a base category (bench mark alternative). This implies that the discussion of the results focuses on the impact of the explanatory variables on a use of brokers, wholesalers, cooperatives, consumers and retailers category in relative to use of processors (the base category). Among the ten explanatory variables included in the model seven of them were statistically significant at 1%, 5% and 10%. Those factors significantly affecting wheat producers’ market outlet choices were sex, age, education, year of participation, nearby market, nearby road and quantity produced.

Table 5: Multinomial logistic model estimation for determinants of wheat producer's outlet choice

	Brokers		Cooperatives		Wholesalers		Consumers		Retailers	
	Coef.	Robst std.	Coef.	Robst std.	Coef.	Robst std.	Coef.	Robst std.	Coef.	Robst std.
Sxhh (female)	17.231	35.03*	16.325	12.983*	19.864	43.95*	17.119	26.13*	4.585	35.615
Aghh	-.149	.862	-.226	.798***	.043	1.044	-.066	.936	15.983	.893
Nfamilsz	-.067	.935	.253	1.288	2.991	19.901	-.249	.779	-.113	.907
Edulevhh	-2.450	.086**	-.606	.545	-1.901	.149	-2.691	.068**	-.097	.137**
Yerpartic	.150	1.162	.239	1.271**	-.627	.534	.124	1.132	-1.989	1.136
Nombox	.159	1.172	.233	1.262	-3.710	.024	-.758	.469	.128	1.180
Dasupport	-1.478	.228	-.662	.516	-18.03	.000	-.294	.745	.166	1.120
nearbymarket	-.349	.706**	-.486	.615**	-.160	.852	-.080	.923	.114	.784**
Nearbyroad	3.843	46.6***	3.356	28.6***	1.924	6.848	3.168	23.6***	-.244	25.0***
accescredit	3.140	23.110	1.011	2.749	.146	1.157	2.703	14.926	3.245	10.160
Marktinfo	.311	1.364	-.391	.676	3.663	38.980	2.861	17.476	2.318	.375
whetproduc	-.068	.934**	-.079	.924**	-.386	.680**	-.440	.644**	-.980	.925**
Const.	2.710		6.052		15.388		3.299		4.585	

Dependent variable is market outlet choices, *, ** and *** are statistically significant at 1%, 5% and 10%, respectively.

Source: Survey data (2019/20)

According to the result from multinomial logistic regression model in Table 5, the probability of farmers choose broker market channel was significantly determined by sex at 1% significance level, education, nearby market, nearby road and by amount/quantity produced at 5% significance level. The result from the study reveals that male-headed households prefer to sell their wheat produce to processors than brokers as compared to female-headed households. It is due to the fact that male headed households have better market participation, access to marketing information and better contact with different market dealers. The educational status/level of the households negatively affects the probability of choosing brokers at 5% significance level as compared to processors.

As the literacy level of the farmers increases the probability of choosing brokers over processors declines by 86%, ceteris paribus. This implies that educated households sell their wheat produce to the processors than brokers. This is because educated farmers have good skill, knowledge and information about the marketing of their produces and they synthesis and detect the profitable marketing channel. This study is consistent with (Abebe et al., 2018; Hawlet et al., 2019; Taye et al., 2018; Tewoderos et al., 2020) and they found that educational status of the household heads affect tomato, sorghum, wheat and onion market channel choices.

Distance to the nearest market has negatively determined the probability of farmers to choose brokers over processors at 10% significance level. This indicates that as the distance to the nearest market becomes shorter the farmers sell their products to processors than brokers. It means as the market closer to the farmers the probability of choosing brokers over processors decreases by 70.6%, ceteris paribus. This is due to the fact that the farmers in the study area consider the profit they obtain from selling to processors was better and they trust more the selling prices offered by processors than brokers. Access to the nearest road has positively determined the probability of household to sell their produce to brokers than processors at 5% significance level. It is because brokers were found even in the far distance from all weathered roads and this reduces the transportation cost for the producers. This result is consistent with Hawlet et al. (2019) who found that market distance has a positive relation with collectors and tomato producers sell their produce at the farm gate to collector than wholesaler.

The probability of choosing cooperatives market outlet was determined by sex at 1% significant level, and nearby market and by year of participation at 5%, and by age and nearby road at 10% significance level. The finding of the study specifies female headed households tend to sell their wheat produces to cooperatives than processors at 1% significance level. The age of households negatively determines to choose cooperatives at 10% significance level. Being others constant as the age of farmers increases by a year, the probability of farmers to sell their wheat produce to cooperatives decreases by 79.8%. Thus, they were inclined to sell their produce to processors. This is due to the fact that the current easier marketing information pave a way for the farmer to consider and sell their produce to whom present better price. Distance to all weathered road has a significant and positive effect on the decision of choosing cooperative market outlet at 10%

significance level over a processor. This is due to the fact that cooperative market outlet was located in the nearest distant than processors which reduces the cost of transportation for the farmers. Year of participation has positively affected farmers choose of cooperative market outlet at 5% significance level. This designates that as the year of farmers' participation in marketing increases by a year, the probability of selling their wheat to the cooperatives increases by 127.1%, ceteris paribus. This is because farmers highly stick to the cooperatives specifically when they are member of the cooperatives. Amount/quantity of wheat produced determines the probability of choosing cooperatives negatively at 5% significance level. This implies that farmers who produce surplus or high amount of wheat present their produce to processors than cooperatives since processors bought large quantity and have accommodate the cost of the produce timely.

The probability of choosing wholesalers market outlet was determined by sex at 1% significance level and by quantity of wheat produced at 10% significance level. The result from the study reveal that male headed households prefer to sell their wheat produce to processors than wholesalers as compared to female headed households. It is due to the fact that male headed households have better market participation, access to marketing information and better contact with different market dealers. Amount/quantity of wheat produced determines the probability of choosing wholesalers negatively at 5% significance level. This implies that farmers produce surplus or high amount of wheat present their produce to processors than wholesalers since processors bought large quantity and have accommodate the cost of the produce timely.

The probability of choosing consumer market outlet was determined by sex and quantity of wheat produced at 1% significant level, by education and amount of wheat produced at 5% significant level and by distance to roads at 10% significant level. The result shows that female household heads tend to prefer consumers over processors compared to male household heads. This is mostly as a result of male headed households have an opportunity to communicate with different market dealer than female households who confined to home. The educational status of the household heads negatively determines the consumers market outlet choices at 5% significant level. Being other things constant, as the literacy level of the farmers increases the probability of choosing consumers over processors declined by 68%. It was negatively influenced consumers market outlet choices means as the literacy level of the household heads increases the probability of selling their wheat produces to consumers declined. It is due to the fact that educated farmers

have the knowledge and skill to analyze the profitability of different market channel choices and thus, they prefer processors over consumers. Amount/quantity of wheat produced determine the probability of choosing consumers negatively at 5% significant level. This implies that farmers produce surplus or high amount of wheat present their produce to processors than consumers since processors buy large quantity and accommodate the cost of the produce timely This result is in line with Tadie et al., (2019) found that the quantity of teff produced have a positive and significant relationships with wholesalers and retailers market outlet. Distance to all weathered road has a significant and positive effect on the decision of choosing consumers market outlet at 10% significant level over a processor. This is due to the fact that most wheat producers desire to sell their products at the farm gate without suffering transaction costs. This study is consistent with Hawlet et al. (2019) found that positive relationship with the likelihood of choosing collectors and consumers channel.

The probability of choosing retailer market outlet was determined by the quantity of wheat produced, by education and nearby market at 5% significant level, and nearby road at 10% significant level. The educational status of the household heads negatively determines the retailers market outlet choices at 5% significant level. It negatively influenced retailers market outlet choices means as the literacy level of the household heads increases the probability of selling their wheat produces to retailers declined. It is due to the fact that educated farmers have the knowledge and skill to analyze the profitability of different market channel choices and thus, they prefer processors over retailers. Distance from the nearest market was found to have positive and significance relationship with the likelihood of choosing retailers market outlet at 5% significant level. The result indicate that those household heads located far from the nearest market are less likely in delivering wheat produce to processors market outlet and more likely in delivering wheat produce to retailers' market outlet. This is due to the fact that as the distance from the nearest market increases the cost of transportation and the time spent for transporting the wheat produce increases. Amount/quantity of wheat produced determine the probability of choosing retailers negatively at 5% significant level. This implies that farmers produce surplus or high amount of wheat present their produce to processors than retailers since processors buy large quantity and accommodate the cost of the produce timely.

Conclusion

Wheat is one of the cereal crops produced extensively in the study area, and the sources of food for consumers and source of income for producers. Despite, wheat has been produced extensively in Ethiopia in general and the study area in particular the yield per hectare is lower as compared to wheat producing countries in Africa and the world in general. One of the contributing factors for this low yield per hectare is limited access to agricultural markets though show improvement due to current expansion of roads and urban centers.

The wheat producer farmers in the study area chooses different marketing channel which increases their profitability. Brokers, consumers, wholesalers, retailers, cooperatives and processors were the marketing outlet channels identified by wheat farmer producers. The largest quantity of wheat produced by farmers in the study area received by brokers, unions/cooperatives, and consumers which share 30.75%, 23%, and 20%, respectively. The direct link of producers/farmers to the processors was very weak or low with a share of only 1.25%. Among the ten demographic, socio-economic and institutional explanatory variables included in the model seven of them were statistically significant at 1%, 5% and 10%. Those factors significantly affecting wheat producers market outlet choices were sex, age, education, year of participation, nearby market, nearby road and quantity produced.

Based on the result and finding of the study the following policy implication were formulated to promote the flow of wheat product from producers to the ultimate consumers through different outlets to boost the benefit the smallholder farmers received. 1) to reduce the role the brokers, which complicate the marketing of wheat in the study area, the government and other stakeholders should work on the expansion of road infrastructure. This is due to the fact that the brokers found everywhere where the road infrastructure could not reach to grasp the benefit of wheat market with minimum cost which hamper the life of small holder farmers. 2) Awareness creation on sources of market information, how to select appropriate market channels and how to get fair price should be given by development agents and market experts in the study area. 3) to boost the production and productivity of wheat in the study area and active participation of smallholder farmers in agricultural investment working capital play a pivotal role. Hence, it is important to provide credit service to producers at the fair interest rate because it helps them to participate in both wheat production and marketing activities and facilitate the time to search the appropriate market channel.

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CHAPTER FOUR

Rural households' food security status in Arsi Zone, Oromia National Regional State, Ethiopia.

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Rural households' food security status in Arsi Zone, Oromia National Regional State, Ethiopia.

Abstract

Purpose*: Food insecurity (chronic and acute) is one of the challenging factors facing the rural households in Ethiopia. Despite, different food security studies exist in Ethiopia most of them are limited to single measurement of food security and lack conceptual and methodological reflection. Hence, this study assesses the food security situation of the rural households of Arsi Zone, Ethiopia with different measures of food security status.*

Methods*: It uses both primary and secondary data collected through questionnaires, interviews, FGD, and desk review from total of 336 randomly selected households. To capture clear and comprehensive picture of the household's food security status in the study area, Household Food Balance Model, dietary diversity, coping strategy index, mean, and cross-tabulations of frequency distribution were used because of the absence of a single methodological measure of the indicator of household food security status.*

Results*: The number of households prone to food insecurity in the study area accounts for 69.94% which could not acquire minimum daily allowance, 2100kcal during the study period. The result from the Household Food Balance Model indicates that the daily average per capita available for the household was 1743.21, which is far from the nationally recommended 2100kcal. Likewise, the result from the HDDS reveals that the domination of monotonous dietary for the household in the study area and the coping strategy index tells us the presence of moderate to severe food insecurity.*

Conclusion*: The food insecurity exists in area of surplus producing like Arsi Zone which is considered as the granary of wheat and barley producing corridor in the country. Therefore, the issue of food security must receive attention from the government, donors, and other concerned bodies to improve the household-level food security status.*

Keywords: Food in/security, household dietary diversity, coping strategy, Arsi, Oromia

Introduction: Background

Chronic hunger affect an estimated 842million and 223million people in the global and Sub-Saharan Africa in 2013, respectively, which could have left behind those countries found in SSA to achieve the MDGs (Wonder, 2014). In addition, the level of undernourishment has been significantly very high in the region which accounts for 32.7% between 2011-2013 (Wonder, 2014). In line with this fact, according to the report of FAO which has been declared at a different time one could understand that the percentage of people who suffer from poverty, undernourishment, and food insecurity declined, but at a slow rate. For instance, the number of people undernourished in the 1990s were more than one billion and declined to 925 million in 2010. Those 925million people were the ones which could not have access to sufficient food to meet their dietary energy requirements (Ballard et al., 2011). Similarly, the number of people unable to acquire sufficient food to meet their daily minimum dietary energy requirements over one year in low and middle-income countries accounts for 775million in 2014-16 (FAO et al., 2017).

The attempt made by different countries to reduce the level of undernourishment has been progressive and crucial since the 1990s. But, the number of people suffer from the problem of undernourishment at the global level is very high, estimated to be 805million (show the level of chronically undernourished in 2012-4). This indicates that one out of nine people does not have enough food to eat worldwide. The trend of hunger lessening shows significant difference within and between regions across the globe. The largest proportion, which has been estimated to be 791million lived in developing regions in 2012-4. The level of undernourishment in Africa, Sub-Saharan Africa, and Ethiopia is very high which accounts for 226.7, 214.1, and 32.9million, respectively (FAO, IFAD, and WFP, 2014).

According to ADB (2014) cited in Abdulahi (2017), Ethiopia is one of the developing countries that suffer from serious food insecurity and famine. Chronic and transitory food insecurity affects a large portion of the population of the country. In line with these facts, according to CSA and WFP (2014) and CARE (2014) in Ethiopia, the number of people who live below the poverty line and are unable to afford the minimum calorie intake for a healthy and active life is

estimated to more than 30percent, i.e. earning less than $1.25 a day (CARE, 2014). In addition, the country has seen in a serious challenge of malnutrition in which 44% of children under five years of age are stunted and 10% are affected by acute malnutrition. Moreover, at the national level, the number of households who were food energy deficits accounts for 40% at the threshold of 2,550 kilocalories per adult equivalent per day.

Arsi zone is considered as a food self-sufficient area in the country as a general picture. However, as the report from the office of rural and agricultural development of 2019/20 indicates, depending on the rainfall condition, the rural households faces different level of food insecurity. The status of food insecurity differs from *woreda* to *woreda* as well as household to househld in different kebeles.

There are several studies such as Alemayehu (2001); Solomon (2013); Messay (2010, 2011); Degefa (2009); Zerihun and Getachew (2012); Meskerem and Degefa (2015); Misgina (2014) and Abduselam (2017) conducted on the assessment of food security status across Ethiopia, most of the studies inclined to investigate the food security situation in the low producing area of the country which ignores the surplus producing area which failed to show the broader picture of the problem understudy. Besides, as far as the knowledge of the writer of this paper no research has been conducted in Arsi Zone on the status of rural household food security. Thus, this study attempted to assess the household level food security status with the help of different measurements in the study area.

Conceptual and Theoretical Framework

Concepts

The concept of food in/security has been the concern of academicians, politicians, and policy-makers for a long period. The definition and concept of the term evolved through time since different elements in the concepts and definitions were defined and redefined in different times (Hoddinott, 1999; Weingärtner, 2004).

The concept of food security goes back to 1943 when forty-four forward-looking governments met at the Hot Springs Conference of Food and Agriculture (CFS, 2012; De Muro & Mazziotta, 2010; Pangaribowo et al, 2013) in Virginia, USA to consider the goal of freedom from want concerning food and agriculture (CFS, 2012; Weingärtner, 2004). Accordingly, they come up with "freedom from want" which refers to a secure, adequate, and suitable supply of food for every man, woman, and child (CFS, 2012; De Muro and Mazziotta, 2010; Pangaribowo et al., 2013).

In the 1970s the concept of food security looks from the food-supply point of view which stressed ensuring that all people all over the world have enough food to eat (Pangaribowo et al., 2013). Thus, the World Food Conference held in Rome in 1974 following the succession of poor harvests worldwide defines food security as *"availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices"*(CFS, 2012; De Muro and Mazziotta, 2010).

The concept of food security in the 1980s went from the availability dimension of food to the entitlement concept following the work of Sen (1981). Sen argued that the availability of food does not tell us how starvation develops without the falling in their availability, and nor does tell us why some people starved and the others, not during the falling of food availability. Therefore, according to him, this is the matter of ownership, which he called an entitlement. According to Pangaribowo et al. (2013), Sen advocates that the food-related problem could govern by production and agricultural activities as well as by the structure and processes governing the entire economies and societies. In line with this, sufficient or adequate food supply alone does not ensure food security unless the poor and vulnerable people also had physical and economic access to that food (CFS, 2012).

More or less a more comprehensive and inclusive definition of food security appear in the 1990s when the world food summit (FAO, 1996) defines the concept. Accordingly, food security exists "*when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life*" (Castell et al., 2015; CFS, 2012; De Muro & Mazziotta, 2010; Leroy et al., 2015). This definition

consists of various vital dimensions of food security such as availability, access, utilization (Castell et al., 2015; Deitchler et al., 2010), and stability (CFS, 2012). Hence, this study attempts to consider this definition to investigate the status of household-level food in/security.

The reverse is food insecurity which is defined as *the limited or uncertain availability of nutritionally adequate and innocuous foods or the limited or uncertain capacity for acquiring adequate foods by socially acceptable means*. At the time when individuals encounter food decline in food quality, variety or desirability, and reduction in food intake at the time, it results in the outbreak of low food security (Castell et al., 2015).

Theoretical Framework

To have better understanding about the food security situation a clear understanding of the theory of food security is very crucial. Thus, this study considers the 'general explanation' theory, and the food availability decline model and food entitlement decline model. As the argument of 'general explanation theory' the performance of household food security was determined by drought, flood, land degradation, inaccessibility to productive resources and population pressure. It results in disruption of agricultural production and attributes the household to decline in food availability (Devereux, 2009).

The rural household food security situation depends on their own production or sell livestock and purchase food grain in the market. Thus, food security is the interplay between food availability and entitlement. This is why the food availability decline model and food entitlement decline model were considered for the study. Food Availability Decline model is fixed towards understanding of the main deterrents for an increased agricultural production which would result in decline in food availability. The key advocate of the model is that, anything which disturbs food production, such as drought and flood by reducing the availability of food for prolonged period causes famine. Food Entitlement Decline model was coined for the first time by Sen, 1981. He advocates the mere existence of food in the economy or in the market does not entitle a person to consume and famine could persist without aggregate availability decline. Sen

profoundly believes that it is access to food that plays a crucial role in securing command over food.

Study Area, Methods and Materials

Study Area

Arsi zone is one of the zones in Oromia National Regional State found at 175km from the capital city of the country, Finfinnee on Finfinnee-Adama-Bale Robe main road. It gained the name Arsi from the Oromo ethnic groups that inhabit the area for a long period. It shares boundary lines with East Shewa Zone in the north and northwest, West Arsi Zone in the south and southwest, Bale Zone in the south, southeast and east, West Hararge Zone in the north and northeast, and Afar National Regional State at the extreme north. Astronomically the zone lies between $7^0$08’58’’N - $8^0$49’00’’N latitude and $38^0$41’55’’E - $40^0$43'56"E longitude. Having a total area of 21009Km^2, it accounts for about 5.8% of the total area of the Regional State (FEDOoAZ, 2010).

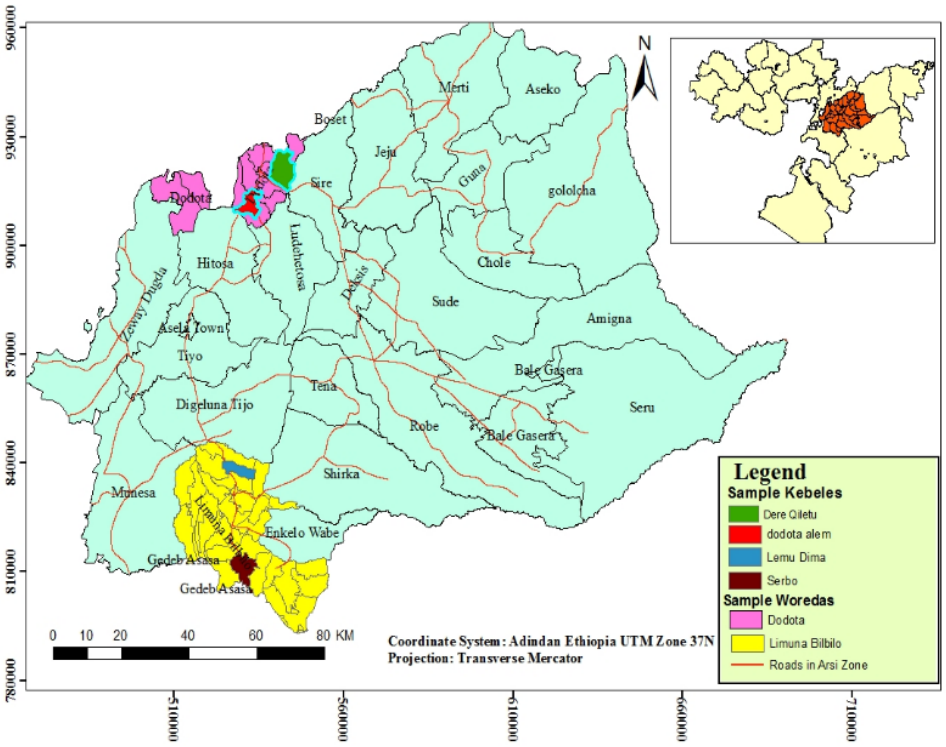

Figure 1: Map of the study area (Source: Produced from Ethio GIS database, 2019/20)

Biophysical Profile of the Zone

The climate of the zone is known by different agro-climatic zones due to its diverse altitude. It is predominantly characterized by moderately cool (40%) followed by cool (34 %) annual temperature. Cool/cold type of thermal part is found in the highland areas of Chilalo, Bada, Gugu, Enkolo, and Kaka Mountains. whereas moderately warm temperature is found in the lowland areas of Gololcha, Amigna, Seru, and Merti districts as well as in Wabi Shabelle river valleys and Awash Gorges. The mean annual temperature of the zone range between 20-25^{0}c in the lowland and 10-15^{0}c in the central highland of the zone. However, there is a slight monthly variation of temperature in which February to May are the hottest months while October to January is the coldest months. The mean annual rainfall of the area varies from 633.7 mm at Dera station (located at an altitude of 1680 meters amsl) to 1059.3 mm at Bekoji station (located at an altitude of 2760 meters amsl). Generally, Arsi Zone receives abundant and well-distributed rainfall both in amount and season (AZFECO, 2016; Yazachew and Kasahun, 2011).

The area is known by diversified physiographic structures in which altitude varies between 805meter (the lowest point) found at the extreme east of Seru district in Wabi Gorge and on 4195 meters (highest peak) at Mountain Kaka (Yazachew and Kasahun, 2011). The major physiographic division of the area includes Mountain ranges, Massifs, High Plateau, Low plateau and Associated Lowlands, and Lowlands (FEDOoAZ, 2010).

The zone is naturally endowed with enormous rivers and streams. It has a high network or density of perennial rivers and streams. Chillo-Galema mountain ranges are the major water source for the main perennial rivers of the zone. It is the source of Wabe-Shabelle tributaries such as Wabe, Robe, Elele, Megna, Gololcha, Ejersa, and Shenen rivers, and also the sources of Awash river basins and tributaries such as Keleta, Chulule, Arba, and Awash. The zone shares a boundary line with lakes Ziway and Langano with East Shewa, and Melka- Wekena and Koka with Bale and East Shewa zones, respectively (FEDOoAZ, 2010).

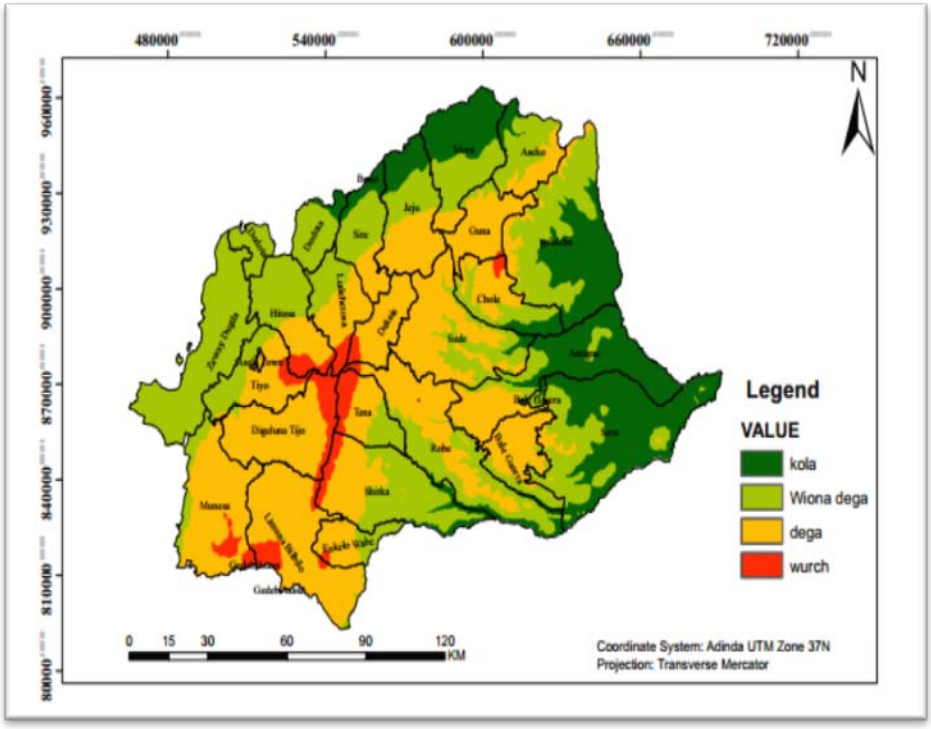

Figure 2: Agroclimatic map of Arsi Zone (Source: Produced from Ethio GIS database, 2019/20)

The soils in the area are composed of diversified types and natures formed from current volcanic activities. The most dominant soils are Chromic and Pellic Vertisols (30%), Luvisols (13%), Cambisols (23%), Andosols (4%), Lithosols (6%), Fluvisols (2%), and others such as Phaeozems, Orthic Solonchak, Calcic xerosols, Eutric regosols, Gypsic Yermosols, Mollic Gleysols and Orthic Acrisols (11%). This creates a conducive and fertile soil for different agricultural activities (FEDOoAZ, 2010).

As a result of diversified physiographic structure (altitude), temperature, rainfall, and parent material from which soils are derived the area host different kinds of natural vegetation. But, the natural vegetation once densely and extensively covers the land of the area due to human interventions, currently found at some pockets of Munesa- Shashamene, Arbagugu, and ChilaloGalema State Forest and the eastern peripheral lowlands of Amigna, Seru and Gololcha and the lowland of Ziway Dugda (FEDOoAZ, 2010).

The available natural forests of the area provide habitats for different kinds of wild animals. Even though the deterioration of wild animals due to human intervention on their habitats, the area possesses different species of wild animals such as Mountain Nyala, leopard and Menelik'sbushbuck, lion, warthog, and hippopotamus. These wild animals are restricted to Chilalo Galema mountain range forest and Delfaker (the only controlled hunting Game Reserve areas of the Zone), Kaka mountain, Munesa –Shashamene State forest, Arbagugu State Forest, and the eastern lowland of Amigna, Gololcha, and Seru districts and around and in Lake Ziway and Langano where population interferences are non or low (AZFECO, 2016).

Socio-Economic Profile of the Zone

From a demographic point of view, the total population of the area accounts for 3,377,806 with 1,695,152 males and 1,682,654 females. The number of people who inhabit the urban area of the zone accounts for only 13.13% which is below the national level (AZFECO, 2016). This reveals a huge number of populations in the area live in the countryside. The dependency ratio is very high in which the dependent population accounts for 47.58% (0-14years + above 65) and independent account52.42% (15-64years). The crude population density of the zone is moderate (123person/km^2) as compared to the most densely populated zones of the country (Yazachew and Kasahun, 2011).

Agriculture is the main economic activity in the zone in which people engage in crop cultivation, livestock and poultry raising, and beekeeping. Crop cultivation is the most dominant economic activity which is rain-fed. Smallholder farmers share the largest total crop production and total land under cultivation which accounts for 96.2% and 96.45%, respectively. The main crops cultivated are cereals, pulses, oilseeds, vegetables, fruits, root crops, and others. In line with this state farms are engaged in crop production in the area (Yazachew and Kasahun, 2011).

Methods and Materials

Philosophical Underpinning

The ontological and epistemological stands, theoretical perspectives, methodological strategies, and specific methods of data collection and analysis are the building block of the research. The theoretical perspective which is guided by the epistemological stance espoused, which in turn determines the methodological strategies and methods for data collection and analysis should be defined and formulated clearly and comprehensively in the research (Crotty 1998; Gray, 2004, 2017). This tells us the presence of hierarchal structures between ontology, epistemology, methodology, and methods.

Among the two quite opposite ontologies in western thought, the ontology of being which accentuates the existence of reality as represented by identifiable properties denoted by symbols, words, and concepts as opposed to formlessness, chaos, interpenetration, and absence of ontology of becoming (Gray, 2004, 2017) has been adopted for this study. It is since the felling and shortage of food reflected in the form of famine, food consumed by people, and the like exist in reality.

In line with the ontological stance, it is important to consider the epistemological perspective which enlightens the way of understanding and explaining how we know what we know (Crotty, 1998). The epistemological perspectives which guide this study are objectivism and interpritivism since using one of them does not comprehensively and entirely pave a way to study food in/security.

Objectivism is an epistemic view that advocates the presence of reality independent of the human mind and the concern of the researcher are all about discovering this objective truth (Gray, 2004, 2017). The theoretical perspective fits with this epistemic view and is well-suited with the objective of the study is positivism. Its central argument is the presence of reality external to the researcher and these realities are tested directly through scientific investigation. Therefore, in the food security analysis data on the socio-economic and demographic profile, amount of crop produced, sold, and reserve for consumption, received from relatives, and resource ownership

was objectively collected with questionnaires and structured interviews and were analyzed objectively with different statistical instruments.

The second epistemic perspective adopted for the study is constructivism. Its main argument is truth and meaning do not exist in some external world but are created by the subject's interactions with the world. Meaning is constructed not discovered, so subjects construct their own meaning in different ways, even concerning the same phenomenon (Creswell, 2009; Crotty 1998; Gray, 2004, 2017). Thus, the perception of people to the coping strategies and feeling of food insecurity was not understood and comprehended similarly or at the same level. Similarly, their perception and knowledge can emerge from their personal feeling and understanding which create a variation on the meaning.

Though positivism and interpritivism emerge from a different epistemological perspective they are under the umbrella of similar ontology, i.e. ontology of being. Thus, to study in detail and comprehensively the rural household food security status and come up with valid and reliable findings and strong conclusions the researcher believes using both objective reality and subjective views in amalgamation is very crucial.

Research Designs and Approaches

Plano Clark & Creswell (2015) identify quantitative, qualitative, and mixed types of research approaches; and the three approaches are not as discrete as they first appear. The research approach adopted for this study is a mixed design since food security status cannot be studied with only a single approach. Likewise, they argue that researchers could employ mixed-method studies when they believe the use of both quantitative and qualitative data would provide a better understanding of the research problem. The use of quantitative or qualitative methods had some weaknesses, and the use of both (quantitative and qualitative) concurrently result in neutralizing the weakness of each method (Creswell, 2014). Similarly, Creswell (2012) argue that the use of quantitative and qualitative research method (mixing the two) can help us to understand the problem and research question better than either method.

Thus, a concurrent/convergent parallel mixed-method research design was employed for the study. According to Creswell (2014) and Plano Clark & Creswell (2015), it refers to the collection of data simultaneously (quantitative and qualitative data), merging the data and using the result to understand the problem. They argued that the basic rationale for this study is that one data collection form supplies strengths to offset the weaknesses of the other form and that a complete understanding of a research problem results from collecting both quantitative and qualitative data. Thus, the issues of food security cannot be studied alone quantitatively or qualitatively. This helps the study to overcome the problem that emerges due to the use of quantitative or qualitative approaches alone.

The approach was steered by the principles and procedures of survey research design. The reason for the use of the design is one of the commonly employed in mixed research approach helps to infer to the total population, and in-depth analysis of the concern of different stakeholders. It allows to ask about many things at one time, that it is compatible with cross sectional design for the time frame of the study. The reliability and validity are critical in the study. Thus, the issue of stability, internal reliability and inter-observation consistency were checked to realize the reliability of the study. Moreover, the research validity was attained through careful sampling, appropriate instrumentation and statistical treatments of the data.

Sources, Types, and Tools of Data Collection

The necessary data for this study were generated from both primary and secondary sources. Primary sources were households selected as a sample from the sampling frame in the study area and FGD. Secondary sources were different documents and reports in the agricultural offices of the woreda and zone and any other necessary written document accessed from the internet, available books, magazines, journals, and published or unpublished documents. The tools/instruments employed in the study were questionnaires (structured and unstructured), interviews (structured and unstructured), observation, FGD, and trans-walk based on the objectives intended to achieve.

Sampling Procedures

Multi-stage sampling procedures have been used to select the necessary sample for the study. First, after the woredas stratified according to their amount of wheat production in quintals purposive sampling was employed to select two *woredas* (Limu Bilbilo- from wheat-producing and Dodota-from less wheat-producing) from the study zone and two kebeles each from the selected *woredas* (Sarbo, Lemu Dima, Dire Kiltu and Dodota Alem) to generate sample households for the study. Second, once the study *woredas* and kebeles for the study were identified based on the amount of wheat production, simple random sampling was employed to select the sample households from the selected sample kebeles for the study. This is because it reduces the level of bias that might emerge during the selection of the sample. Third, samples for interviews (6 FGD containing women more knowledgeable informants, households, principals of the woredas and zone) were selected purposively to generate in-depth information. The total number of sampled households was generated from the target population (households in the selected kebeles) based on their proportion of total households.

Table 1: Distribution of sample size across selected woredas and kebeles

Woreda	*Kebele*	Total HHs	Sample
Limu Bilbilo	Sarbo	622	78
	Lemu Dima	721	88
Dodota	Dire Kiltu	611	78
	Dodota Alem	736	92
Total		**2690**	**336**

Sample Size Determination

Sample size determination is one of the technical areas which require the researcher's ability to decide the appropriate sample size for the study based on the purpose of the study. According to Cohen et al (2000), there is no clear-cut answer how much sample size is appropriate for the study to undergo; rather it depends on the purpose of the study and nature of the population under investigation. Therefore, to reduce the sampling error incurred due to inappropriate sample size, time for the study, heterogeneity or homogeneity of the population under study, costs for

the study, and the like; it is important to limit the sample size under study. Thus, according to Kothari (2004), if the study population is finite in number, the following mathematical formula is appropriately used to determine the sample size for the study. Therefore, at 95% confidence level, 5% significance level (degree of freedom is=1-0.5=0.5), and the standard variate at 95% significant level is 1.96, the total sample size for the study is 336 households.

$$n = \frac{z^2.\mathrm{p.q.N}}{e^2(N-1)+z^2.p.q} = \frac{(1.96)^2(0.5)(0.5)(2690)}{(0.05)^2(2690-1)+(1.96)^2(0.5)(0.5)} = 336$$

Where, n= refers to the number of sample size

P= Sample proportion

q= population proportion (q = 1 – p = 1 – 0.5 = 0.5)

e= acceptable error

N=total population

z= the value of standard variate at acceptable significance level (1.96 at 95%)

Methods of Data Analysis

The food security status of the households was analyzed with the help of total calorie consumption per day (kcal), household dietary diversity score, and coping strategy index in this study. This is since there is no single standard measures of food security exist. The household kcal food intake per day (kilocalories per day per household) is used to measure the dietary energy available for the households. The dietary energy available for the households measured in terms of kcal has been derived from the available food grain supply based on EHNRI's food composition table. It was done based on the Household Food Balance Model which has been employed by different scholars (Messay, 2001; Degefa, 1996 and Eshetu, 2000) for calculating the balance between grains gained and lost. The kcal amount per 100gram was calculated based on the types of food consumed by the households since the calorie equivalence of the grains is varied based on their end product prepared for consumption. The mathematical expression for Household Food Balance Model is:

NGA = (GP + GB + FA + GG) - (HL+ GU + GS +GV)

Where, NGA= Net grain available/year/household

GP= Total grain produced/year/household

GB= Total grain bought/year/household

FA= Quantity of food aid obtained/year/household

GG= Total grain obtained through gift or remittance/year/household

HL= Post-harvest losses/year

GU=Quantity of grain reserved for seed/year/household

GS=Amount of grain sold/year/household

GV=Grain given to others within a year

In line with the dietary energy availability for households, HDDS was employed to measure households' food security. It is used to measure the different food groups consumed by the member of the household within the previous 24hours. It is selected for the study since obtaining data is straightforward, applicable at the household or individual level, and a more diversified diet is highly correlated with such factors as caloric and protein adequacy, the percentage of protein from animal sources (high-quality protein), and household income (Swindale and Bilinsky, 2006).

The coping strategy index was used to analyze the ways or methods households cope with the shortfalls of food or food shortage. It is the tool used to measure the behavior of the households during the period of food shortage. According to Maxwell & Caldwell (2008), CSI is an indicator of household food security that is relatively simple and quick to use, straightforward to understand, and correlates well with more complex measures of food security. It is used to measure what the household does during the period of food shortage.

Results

The Socio-economic and Demographic Characteristics

It is very decisive to see the socio-economic and demographic characteristics of the population to have a clear picture about the study area. Accordingly, the result from Table 2 below reveals that the sampled households which account for 80.95% were male and the rest 19.05% were female. Despite, the educational level of the households was not similar across the sample kebeles, the highest proportion of the household heads cannot read and write followed by a primary school,

read and write, and secondary school which accounts for 47.31%, 25.30%, 13.10%, and 13.10%, respectively. The percentage share of the household heads attends tertiary education or graduate with certificate and above share only 1.19%. Therefore, it requires more and more work to improve the educational level of the farmers since educational status or level determines new technology and innovation adoption and cope with new knowledge and ideas to increases their production and productivity

Table 2: The socio-economic and demographic characteristics of the households

		kebele of household head				Total	%
		Dire Kiltu	Limu dima	Sarbo	Dodota Alem		
Sex	Male	70	76	59	67	272	80.95
	Female	8	12	19	25	64	19.05
Total		**78**	**88**	**78**	**92**	**336**	**100**
Educational level	Not read and write	24	40	41	54	159	47.31
	Read and write	7	9	10	18	44	13.10
	Primary	24	26	21	14	85	25.30
	Secondary	20	12	6	6	44	13.10
	Certificate and above	3	1	0	0	4	1.19
Total		**78**	**88**	**78**	**92**	**336**	**100**
Religion	Orthodox	27	58	18	26	116	34.52
	Muslim	33	27	57	59	189	56.25
	Catholic	6	3	3	7	19	5.65
	Protestant	5	0	0	0	5	1.49
	Others	7	0	0	0	7	2.08
Total		**78**	**88**	**78**	**92**	**336**	**100**
Marital status	Married	74	78	67	70	289	86.00
	Single	0	0	1	0	1	.30
	Divorced	3	4	3	13	23	6.85
	Widowed	1	6	7	9	23	6.85
Total		**78**	**88**	**78**	**92**	**336**	**100**

Sources: Computed from the survey result (2019/20)

In terms of marital status, 86% of the farmers were married and only 0.30% were single. The rest 13.7% were divorced and widowed. This tells as the presence of stable marital status. Muslim and Orthodox Christianity is the dominant religion in the study area which accounts for 56.25% and 34.52%, respectively. Whereas, the rest were 5.65 % catholic, 1.49% protestant, and 2.08% other religious followers.

Resources Ownership Status of the Households

Discussing and seeing the resources ownerships of the households in the study area is very vital since on one hand or another determines their food security status. They determine the food security status of the farmers as they are the sources of foods, cash, and as means of agricultural production. The well-off (have adequate livestock) farmers were better in the status of the food security in the study area than the poor. Almost all the livestock in the study area were indigenous and relatively they were less productive.

As can be seen in Table 3 below, there is a high disparity in the number of different livestock possession among the households which range between 0 to 5. It is obvious this put a tremendous effect on the level of food security/insecurity of the households since directly or indirectly linked with the supply status or access side of food. In line with this fact, the average number of different species of livestock possessed by the households is low.

Table 3: The livestock ownership of the households

Kind of livestock	Sum	TLU	Mean	Range	Min.	Max.	Variance
Number of oxen	717	717.00	2.13	5	0	5	1.113
Number of cows	390	390.00	1.16	5	0	5	.553
Number of calves	291	98.94	.87	4	0	4	.701
Number of goats	409	61.35	1.22	11	0	11	6.947
Number of sheep	1251	187.65	3.72	15	0	15	11.383
Number of poultry	2351	11.755	7.00	20	0	20	20.098
Number of donkeys	497	323.05	1.48	4	0	4	.770

Source: Sample survey (2019/20)

In-country like Ethiopia where traditional agriculture dominates the economy without doubt productive assets such as draught power obtained from oxen critically determine the agricultural production and productivity. The study result indicates that 74% of the households have access to farm oxen whereas the rest 24% were not. The distribution of oxen among households who have their own is not equal. Among the households that possess their own oxen, 47% have at least a pair of oxen for cultivating their land. The households that owned more than two oxen account for 36%. The rest 17 % of the households in the study area possess only one ox. Those households owned a single ox cultivate their land through borrowing (ploughing one day for him and the next day for the other) and sometimes renting from the other on daily basis. The study by Meskerem and Degefa (2015) realize that the presence of wider gap in available dietary energy between households who possess one ox and four oxen. This reveal that draught power obtained from oxen put tremendous effects on the food security status of the rural households.

Access to land or land ownerships

As can be revealed in Table 4 below, the percentage share of households' access to land accounts for 94.5, while 5.4 percent were landless. It is clear that one of the productive assets, land, plays a crucial role in the agricultural production and productivity on one hand and the food security status of the people on the other hand. Thus, for the landless in the study area, lack of this productive asset put a tremendous effect on their food security status as revealed by the group discussants. To fulfill their shortage of land for cultivation they use sharecropping, purchasing from others on yearly basis, and renting. The main challenging factor during renting and purchasing from others was the expensive cost of the land.

Table 4: Household access to land in hectare

		.00	.25-.75	1.00	1.1 - 2.0	2.1 – 3.0	3.1 – 4.0	>4.00
Kebeles of household head	Dire kiltu	5	15	9	21	20	5	3
	Limu Dima	4	5	6	32	35	4	2
	Sarbo	3	12	15	36	7	3	2
	Dodota alem	6	15	10	42	14	2	4
Total		18	45	40	131	76	14	11
Percent		**5.4**	**13.4**	**11.9**	**39.0**	**22.6**	**4.2**	**3.3**

Sources: Computed from the survey result (2019/20)

Measures of food security status

Dietary energy supply analysis (Kcal)

Dietary energy available is one of the techniques used to measures the food security component specifically the food adequacy level which is measured with the help of kilocalorie content. The household kcal food intake per day (kilocalories per day per household) is used to measure the dietary energy available for the households. The dietary energy available for the households measured in terms of kcal has been derived from the available food grain supply based on EHNRI's food composition table. It was done based on the Household Food Balance Model which has been employed by different scholars (Messay, 2001; Degefa, 1996 and Eshetu, 2000) for calculating the balance between grains gained and lost. The kcal amount per 100gram was calculated based on the types of food consumed by the households since the calorie equivalence of the grains is varies based on their end product prepared for consumption.

Table 5: Total quantity of grain available and dietary energy equivalent by types of crops

Types of food crops	**Total quantity (Qtls)**	**Total dietary energy (kcal)**	**Dietary energy per quintal (kcal/Qtls)**
Teff	566.50	91,319,800.00	161,200.00
Barely	1608.25	363,898,727.50	226,270.00
Wheat	3567.00	610,599,060.00	171,180.00
Maize	627.50	80,213,325.00	127,830.00
Pulses	131.00	18,379,300.00	140,300.00
Vegetables	213.00	13,376,400.00	62,800.00
Oil seeds	33.50	3,132,250.00	93,500.00
Total	**6746.75**	**1,180,918,862.50**	**-**

Source: Organized from survey data based on EHNRI composition table (2019/20)

The result of the study indicates that the main sources of household food requirements are own production, purchase from the market, and food aid. Cereals, pulses, fruits, vegetables, and livestock products are the main food items used for home consumption and present for the market. Cereals and pulses with their end product dominate household dietary energy supply. The main dietary energy supply of the rural households in the study area is obtained from barely,

wheat, teff, pulses and maize which shares 23.02, 17.42, 16.40, 14.27 and 13%, respectively. Thus, the study intentionally considers these food sources to calculate household dietary energy supply. Thus, the result from the Household Food Balance Model indicates that the overall food energy available for the household was 1,180,918,862.50. This tells us the daily average per capita of 1743.21kcal, which is far from the nationally recommended 2100kcal. From this result, one can understand the presence of food insecurity in the surplus producing areas like Arsi Zone which is considered as the wheat and barley producing corridor in the country. This justifies mere availability of food crops at a national or regional or local level is not a guaranty for food security at the household's level.

As can be seen from Table 6 below, in taking in to account the minimum national recommended Kcal allowance for an adult in Ethiopia the number of food insecure households in the study area accounts for 69.94%. The rest 30.06% of the study rural households were food secure. Thus, from this general picture it is possible to infer that the presence of high food insecurity situation in the study area.

Table 6: The status of sample household food security

Category	Count	Percent
Food secure	101	30.06
Food insecure	235	69.94

Source: Computed from survey data (2019/20)

It is the right time to identify the mean difference in the dietary energy availability of households living in different kebeles in the study area. To assess the dietary energy availability of the household's one-way ANOVA was used since four main independent categorical groups (kebeles of household) and one dependent continuous variable (dietary energy measured in Kcal) exist. Thus, the following null and alternative hypotheses were formulated.

H_o: There is no significant difference in the dietary energy availability for households in different kebeles.

H_a: There is a significant difference in dietary energy availability for households in different kebeles.

Table 7: Dietary energy availability for households in Kcal

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	110676522.870	3	36892174.290	48.099	.000
Within Groups	254645547.122	332	767004.660		
Total	365322069.992	335			

As can be seen from the above Table 7, there is a significant difference in the mean dietary energy availability among households living in different kebeles in the study area. A significant difference in the dietary energy availability (Kcal) exist among household found in different kebeles since the significant value is less than 0.05 or the F-vale is higher as seen from the above table. But it does not tell us which group is different from which groups. Thus, it is possible to conduct post hoc tests to identify where the mean differences exist. From the post hoc table illustrated in Table 8 the presence of significant difference in the availability of dietary energy among households in different kebeles since the p-value is less than 0.05 (p=0.000). Thus, at 0.05 significant level except for Dodota alem and Dire kiltu or vice versa, there are clear mean differences in the dietary energy availability.

Post Hoc Tests

Multiple Comparisons

Table 8: Dependent variable: Dietary energy availability for households in Kcal

	(I) kebele of HHS	(J) kebele of household head	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Scheffe	Sarbo	Limu dima	-727.60404*	136.19602	.000	-1110.2987	-344.9094
		Dire kiltu	703.86923*	140.23832	.000	309.8162	1097.9223
		Dodota alem	583.85668*	134.79763	.000	205.0913	962.6220
	Limu Dima	Sarbo	727.60404*	136.19602	.000	344.9094	1110.2987
		Dire kiltu	1431.4737*	136.19602	.000	1048.7786	1814.1679
		Dodota alem	1311.4602*	130.58702	.000	944.5267	1678.3948
	Dire kiltu	Sarbo	-703.86923*	140.23832	.000	-1097.9223	-309.8162
		Limu Dima	-1431.4737*	136.19602	.000	-1814.1679	-1048.7786
		Dodota alem	-120.01256	134.79763	.851	-498.7779	258.7528
	Dodota alem	Sarbo	-583.85668*	134.79763	.000	-962.6220	-205.0913
		Limu Dima	-1311.4602*	130.58702	.000	-1678.3948	-944.5267
		Dire kiltu	120.01256	134.79763	.851	-258.7528	498.7779
LSD	Sarbo	Limu Dima	-727.60404*	136.19602	.000	-995.5200	-459.6881
		Dire kiltu	703.86923*	140.23832	.000	428.0015	979.7369
		Dodota alem	583.85668*	134.79763	.000	318.6915	849.0218
	Limu Dima	Sarbo	727.60404*	136.19602	.000	459.6881	995.5200
		Dire kiltu	1431.47327*	136.19602	.000	1163.5573	1699.3892
		Dodota alem	1311.46072*	130.58702	.000	1054.5784	1568.3430
	Dire kiltu	Sarbo	-703.86923*	140.23832	.000	-979.7369	-428.0015
		Limu Dima	-1431.4727*	136.19602	.000	-1699.3892	-1163.5573
		Dodota alem	-120.01256	134.79763	.374	-385.1777	145.1526
	Dodota alem	Sarbo	-583.85668*	134.79763	.000	-849.0218	-318.6915
		Limu Dima	-1311.4602*	130.58702	.000	-1568.3430	-1054.5784
		Dire kiltu	120.01256	134.79763	.374	-145.1526	385.1777

*. The mean difference is significant at the 0.05 level.

Table 9: The level of food in/security in different Kebeles

Food security status	Kebeles							
	Limu Dima		Sarbo		Dodota Alem		Dire Kiltu	
	no	%	no	%	no	%	no	%
Food insecure	46	52.28	41	52.56	78	84.78	70	89.74
Food secure	42	47.72	37	47.44	14	15.22	8	10.26
Total	**88**	**100**	**78**	**100**	**92**	**100**	**78**	**100**

Source: Computed from survey result (2019/20)

As illustrated in Table 9, the level of food in/security is varied from kebele to kebele. Accordingly, the high number of food insecure households found in Dire Kiltu which accounts for 89.74% followed by Dodota Alem (84.78%), Sarbo (52.56%) and Limu Dima (52.28%). It is clear that the food insecurity situation is higher in Dodota *Woreda* as compared with Limu-Bilbilo. Hence, different stakeholders (governmental and NGOs) will use this priority at the time of addressing any support or help in the study area.

Dietary diversity analysis (HDDs)

The dietary diversity included in this study consists of a simple count of food groups consumed by the member of the household in the previous 24 hours in the home. It is a measure of access dimension of food security in counting the number of food groups consumed by the member of the household in the past 24hours. Kennedy et al., (2010) indicate that the household dietary diversity tells us household economic access to food (dietary energy). It is mainly related to the economic capacity of the households to access diversified foods. Studies (Kennedy, 2010; Hoddinot and Yohannes, 2002 and Hatloy *et al*., 2000) reveal that increment in the dietary diversity is correlated with the socio-economic status and household food security level (special household energy availability).

Table 10: Food groups consumed by households in Arsi Zone

Food groups	Limu-bilbilo (n=168)		Dodota (n=168)		Total%
	Count	%	Count	%	
Cereals	159	94.6	168	100	97.3
Root and tubers	42	25	27	16.1	20.55
Fruits	13	7.7	6	3.6	5.65
Vegetables	125	74.4	117	69.6	72
Fish	0	0	0	0	0
Eggs	23	13.7	14	8.3	11
Meat	2	1.2	0	0	0.6
Legumes	138	82.1	146	86.9	84.5
Milk and its products	63	37.5	27	16.1	26.8
Sugar/honey	37	22	29	17.3	19.65
Condiments	153	91.1	137	81.5	86.3

Source: survey result from 24hours recall period

As can be seen from Table 10 above, most of the households in the study area consume the food groups under cereals (97.3%), legumes (84.9%), condiments (86.3%), and vegetables (72%) within the past 24 hours. While none of the households consume fish food groups, and few of them consume meats (0.6%), fruits (5.65%), eggs (11%), sugar/honey (19.65%), and roots and tubers (20.55%). This tells us the differences in the number of food groups consumed by the households in the study area. Concerning the number of food groups consumed by the households, one of the interviewees from Dire kiltu kebele (Dodota *woreda*) indicates that it is difficult to obtain different food groups and she sold (like eggs) for the purchase of others (like condiments). Her interview directly translated from Afaan Oromo:

> *I was born and grew here in Dire kiltu. I live here for the past 62years. I have six hens and I sold twenty-five eggs per week on average. What I experience and learned from my ancestor was selling the food groups like eggs for the purchase of condiments like sugar, coffee, and tea. Eating eggs means missing these condiments. Eggs, fruits, and meat are the food groups of the rich or the wealthiest groups of my community.*

As Ruel (2003) reveals one of the techniques employed to define the cutoff points for assessing the varying level of dietary diversity in the community is creating terciles and sometimes

quintiles. Thus, the tercile of dietary diversity score was used in this study to classify the household in the study area. A scale was established as low (1-4), medium (5-8), and high (9-12). The result displayed in Table 11 below, reveal that the highest proportion of the household fall in the first tercile which means consumes low dietary diversity. The number of households in the low dietary diversity score was 79.4percent. Whereas, the number of households in the medium and high dietary diversity score accounts for 12.5percent and 5.1percent, respectively. From the study result, one can conclude that the presence of food insecurity since most of the households fall in the low dietary diversity groups. It means the households in the study area frequently consume monotonous types of food groups.

Table 11: Household classification into tercile based on the number of food groups consumed

Tercile	Count	Percent
Low (1-4)	267	79.4
Medium (5-8)	42	12.5
High (9-12)	17	5.1

Copping strategies (CSI)

The coping strategy index was used to analyze the ways or methods households cope with the shortfalls of food or food shortage. It is the tool used to measure the behavior of the households during the period of food shortage. According to Maxwell & Caldwell (2008), CSI is an indicator of household food security that is relatively simple and quick to use, straightforward to understand, and correlates well with more complex measures of food security. It is used to measure what the household does during the period of food shortage.

Table 12: Coping strategies grouped and ranked by FGD of households

	In the past 7 days, if there had been times when you did not have enough food or money to buy food, how many days has your household had to:	Row score	Severity weight	Weighted score= frequency * weight
A	Relay on less preferred or less expensive food	5	1	5
B	An entire day without eating	0	4	0
C	Send a member of a household to beg	0	4	0
D	Gather wild fruits, hunt/harvest immature crops	1	4	4
E	Limit portion at mealtime	6	1	6
F	Consume seed stock held for next season	2	4	8
G	Send household members to eat elsewhere	2	3	6
H	Borrow food, or rely on help from friends or relatives, government	4	2	8
I	Restrict consumption by an adult for small children to eat	3	2	6
J	Feed working members of the household at the expense of non-working	4	2	8
K	Reduce the number of meals eaten in a day	5	1	5
N	Work on others in exchange for food	3	2	6
			Total	**62**

Source: Computed from field survey

key to the ranks

1: least severe

2: moderately severe

3: severe

4: very severe

As illustrated in Table12 above, the response of focus group discussants to the food shortfall or lack of money to buy was stratified according to the severity level of the responses. The responses indicate the various perception of the respondent to the question of food shortfall or indicate how the respondents manage the food shortfall. It is obvious that the severity level of the coping mechanisms or strategies is not equally weak or strong (i.e., it goes from least severe to very severe mechanisms). For instance, relying on less preferred or less expensive food is the least severe strategy than staying an entire day without eating or sending a member of the household to beg which is one of the most severe strategies.

The household coping strategy index score was obtained by multiplying the row score/frequency by the severity weight of the strategy. As the result of the group discussants indicate the household CSI score was 62. The number (62) is a general picture that seems nothing to tell the severity of food insecurity. But, according to Maxwell & Caldwell (2008), a higher score specifies a greater level of coping, and hence increased food insecurity. Thus, the food security situation in the study area was moderate to severe since the result of the CSI is higher. Likewise, since most of the households use moderate coping mechanisms and a few severe mechanisms it is possible to conclude the food security status was moderate to severe. Moreover, the result from the CSI directly correlated with an average calorie available for the household in the study area which was 1743.28 kcal per day which indicates the lower-calorie available for the household.

Discussion and Conclusion

Food in/security is one of the pressing challenges of the world particularly for the developing nations. It will continue to be the center of discussion and studies since chronic and acute food insecurity is worsened by climate variability across the globe. It has been pronounced and become critically serious in developing nations specifically in SSA countries. In the situation in Ethiopia, rural households, which depend on rainfed agriculture suffer acute and chronic food insecurity depending on the trends of climate.

The essential theme of this study was to investigate rural household food security status in Arsi Zone, Ethiopia. The study integrates different types of food security measurements to capture the full image of food security status of rural households in the study area since there is no single measure which assess different dimension of food security. Among many

measures of food security status Household Food Balance Model, household dietary diversity score and copping strategies were used for the study.

The result from household food balance model which measures the food availability of the households indicate that the overall food energy available for the household was 1,180,918,862.50 kilo calories which is equivalent with 1743.21 daily average per capita very far from the nationally recommended 2100kcal. The single most important source of food for the households is subsistence crop farming. Barely, wheat, teff, sorghum and pulses are the crops produced in the area and used as a source of food. Attempt was made to compare the daily average per capita in other *woreda* (Meskeram and Degefa, 2015; Messay, 2011; Degefa, 2001). The study by Meskerem and Degefa (2015) in Girar Jarso *woreda* specifies the average daily per capita volume of 951.9 kcal; the study by Messay (2011) in Kuyu *woreda* indicate the average daily per capita value of 842.1 kilo calories and study by Degefa (2001) in Oromia Zone of Amhara Region reveals that the average daily per capita value of 1415 kilo calories. From the comparison result of the study it is possible to infer the presence of food insecurity in the study area still the study area was better in the average daily per capita.

Household in the study area uses different coping mechanisms when they fell the shortage of food or presence of food insecurity in Arsi Zone. Since the level of food insecurity among households in the study area was not similar, the coping mechanisms they used also varies. Different studies (Degefa 2010; Meskerem and Degefa, 2015; Messay, 2011; Solomon, 2013; Tewodros and Fikadu, 2014) identify various copping strategies to food shortage by the households. In this study among the twelve coping mechanisms presented for discussion, the group discussants classify them as least sever, moderately sever, sever and very sever. The classification is based on the felling or perception of the households to practice easily. For instance, relay on less preferred food or less expensive food, limit portion of mealtime and reduce the number of meals eaten per day (less severe) as compared to an entire day without eating, sending a member of household to beg and consuming seed stock held for the next season (very severe) mitigating strategies.

In an area like Arsi Zone considered surplus producing region researchers give little emphasis for the study of food in/security status. This is because most of the time researchers

and investigators perceive studying the food security status as insignificant in surplus-producing areas. But the finding of this study come up with the presence of moderate to severe food insecurity in the Arsi Zone which is considered as the granary of cereal crops (wheat and barley) in Ethiopia. Thus from the result of the study the researcher recommend 1) researchers in the area of food in/security should turn their attention to the area of a surplus producing region to investigate the food security situation at the grassroots and contextualize the food security issues 2) the policy makers should look into the result and finding from different geographical localities during policymaking in the area of food security 3) donor organizations and NGOs should look into the surplus producing areas when they assist needy people (like food aid).

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CHAPTER FIVE

Assessment of the Wheat Value Chain Role in Food Security in Arsi Zone, Oromia National Regional State, Ethiopia

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Assessment of the Wheat Value Chain Role in Food Security in Arsi Zone, Oromia National Regional State, Ethiopia

Abstract: *The study examined the role of wheat value chain in the food security in Arsi Zone, Oromia National Regional State, Ethiopia. It uses both primary and secondary data collected through questionnaires, FGD, interview and desk review from a total of 336 randomly selected households. Data were analyzed using value chain mapping, percentage and cross-tabulations of frequency distribution. The result from the value chain analysis indicates the main actors in the study area include input suppliers, producers, brokers, wholesalers, processors, traders, and consumers, while the supporting actors are DAs, BoARD, cooperatives/unions, trade and industry office, and financial/credit institutions. Farmers receive a low-profit shares (23.81%) despite the fact that they are determined to produce quality wheat and bearing all the related risk of production. Farmers in the study area encounter marketing problem during harvesting seasons which accommodate the cost of production and create profit. Likewise, the well function of wheat value chain enhances the food security status of the poor in increasing their production and productivity, and generating income which increases their economic capacity. Therefore, the study recommends the government and other stakeholder to create effective and efficient market which benefit the farmers on one hand and strengthening the well function of value chain which increases the participation of the farmers in the chain.*

Keywords: Wheat, Value Chain, Food Security, Arsi

Introduction

Agriculture is the backbone of economic growth and development of various countries across the world. The significance of the sector in developing countries has been very prominent because the number of rural poor people working in agriculture is very high [15]. As [28] revealed that more than 75% of poor people make their life in rural area and most of them participate in the sector globally. The sector is the heart of economic growth of African countries except the mineral producers. It plays a crucial role in poverty reduction, job opportunities, income generation and food security as well as the entire economic growth of the continent. [3] specify that the role of the agricultural sector to employment opportunities accounts for 65% and 40% of the export earnings of Africa and accounts for 17% of the GDP shares. In SSA 65% of the population live in the rural areas and the sector provides 75% of the labor forces in which the majority of the farmers are low-income and lead a subsistent life [28]. It is the basis of economic growth, poverty lessening and ensuring food security of the region. It is believed that growth generated by agriculture in the area is more several times effective in reducing poverty than GDP growth in other sectors [24].

Agriculture plays a crucial role in Ethiopia since the number of people engaged in the sector is very high which accounts for more than 80% [4] and [5]. Without doubt it is the foundation of the economic growth of the country. But poverty is still a serious problem in the country, and chronic and acute food insecurity widely spread. [5] reveals that in the country, one-third of the population lives below the poverty line and most of them depend on subsistence agriculture. The highest numbers of rural populations and smallholder farmers suffer from chronic and acute food insecurity. The number of people facing chronic food insecurity accounts for 10% of the total population of the country and will rise to 15% during frequent drought years.

In the country, the cereal subsector is the dominant of the agriculture sector. Its role is very prominent since it shares the largest employment opportunity in the rural area, agricultural land uses, calorie intake and national income. Its share in terms of rural employment, total cultivated land, households' food expenditure and calorie intakes estimated to 60%, 73%, 40% and 60%, respectively. Likewise, the contribution of the sub-sector to the national income is crucial [25] and [26]. Wheat played a prominent role for centuries as a source of

food among the cereal crops produced in the country. In this day according to the report of FAO (2014) cited in [21] wheat is one of the most important crops grown in Ethiopia, which is the source of food for consumers and source of income for the farmers. Similarly, they identified that wheat and wheat products contribute 14% of the calorie intake in Ethiopia, and wheat takes the second rank as the most staple food after maize. In terms of areal cultivation, this crop ranked fourth and in terms of gross production ranked fourth or fifth after *teff*, *enset*, and maize and approximately tied with sorghum [21].

Despite wheat has been produced in such huge amount and cover a large area for cultivation in Ethiopia, the country imported a large volume of wheat year to year. Based on the amount of the harvest and other different factors, the domestic wheat consumption originated from imports accounts for 25-35% in the country. In addition, the government subsidizes the import of wheat, and deliver to the large-scale flour mills on the pre-requisite to sell to the bakeries on the controlled price to make affordable for the poor consumers [21]. Therefore, to ensure the food security and alleviate the level of poverty in the country, transforming (increasing productivity and production) the agricultural sector, particularly the wheat sub-sector, is the proper way out. This could be achieved through the promotion of the value chain development strategy. [27] and [11] reveal that value chains as a vehicle by which new methods of production, technologies, logistics, labor processes and organizational relations and networks are introduced.

Value chain can be defined as "*the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use*" [16], [17] and [18]. It incorporates the consecutive linkages via which raw materials and resources are transformed into products for the market. As it adopts to the agricultural sector, it can be defined as *"agricultural Value Chain (AVC) identifies the set of actors (private, public, including service providers) and a set of activities that bring a basic agricultural product from production in the field to final consumption, where at each stage value is added to the product. It may include production, processing, packaging, storage, transport and distribution"* [1]. In addition, it can also be defined as the method of describing various chain needed to bring farm products from the farm to the end users [20].

It is a key framework which has been used to comprehend the way inputs and services are brought together and used to grow, transform, or manufacture a product. It is also used to comprehend the way the products physically move to reach the consumer and how the value increases along the chain. It gives significant means to recognize business-business relationships that link the chain, methods for increasing efficiency, and ways to empower businesses to rise productivity and add value, and also offers a reference point for progresses in supporting services and the business environment. It can contribute to pro-poor initiatives and better linking of small businesses with the market. Increasingly, the value chain approach is being used to guide and drive high-impact and sustainable initiatives focused on rising productivity, competitiveness, entrepreneurship, and the growth of small and medium enterprises [28].

The aim of poverty-oriented promotion of agricultural value chains, which accentuates modernization and connectivity to the markets, is to put resource-poor smallholder producers and processors in a better position to rise their production and productivity, to improve the quality and marketing of their products, and accordingly to create higher incomes. At the same time, it aims to offer to poverty lessening by making paid employment in primary production, in processing or in trade. Also, since the food crisis of 2007/2008, the promotion of staple-food value chains has increasingly been deployed with a view to improving food security [15]. From this entire argument on the benefits of value chain in terms of poverty reduction and ensuring food security aspects of the farmers in developing countries, it is important to adopt in the wheat subsector in Ethiopia and investigate its role in food security is crucial.

In general, to ensure the status of food security and lessening the level of poverty in Ethiopia in general and the study zone in particular require the appropriate policy approach which overcome the problem hampering the production and productivity of the agricultural sector specifically the wheat subsector is a paramount important. This could be achieved through the intensification of the agricultural sector through easing the accessibility of the smallholder farmers to inputs, selected seeds, technologies, and efficient and effective markets for their produce. Therefore, the overall aim of this study is to assess the role of wheat value chain in food security in Arsi Zone, Ethiopia.

Study Area, Methods, and Materials

Study Area

Arsi zone is one of the zones in Oromia National Regional State found at 175km from the capital city of the country, Finfine on Finfine-Adama-Bale Robe main road. It gained the name Arsi from the Oromo ethnic groups inhabit the area for a long period of time. It shares boundary lines with East Shewa Zone in the north and northwest, West Arsi Zone in the south and southwest, Bale Zone in the south, southeast and east, West Hararge Zone in the north and northeast and Afar National Regional State at the extreme north. Astronomically the zone lies between $7^0$08'58''N - $8^0$49'00''N latitude and $38^0$41'55''E - $40^0$43'56''E longitude. Having the total area of 21009Km^2, it accounts for about 5.8% of the total area of the Regional State [12].

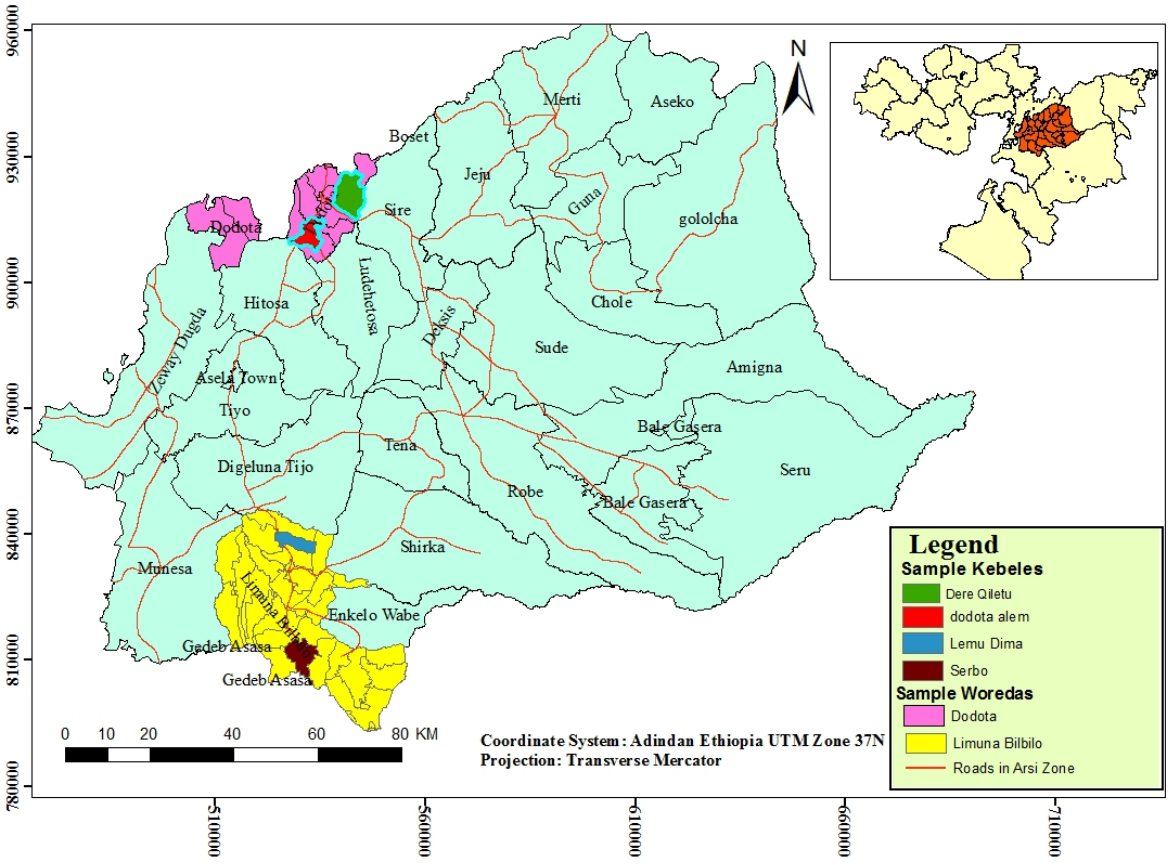


Figure 1. Map of the study area (Source: Produced from Ethio GIS data base, 2019/20).

Biophysical Profile of the Zone

The climate of the zone is known by different agro-climatic zones due to its diverse altitude. It is predominantly characterized by moderately cool (40%) followed by cool (34%) annual temperature.

Cool/cold type of thermal part is found in the highland areas of Chilalo, Bada, Gugu, and Enkolo and Kaka Mountains. whereas moderately warm temperature is found in the lowland areas of Gololcha, Amigna, Seru and Merti districts as well as in Wabi Shabele river valleys and Awash Gorges. The mean annual temperature of the zone range between 20-25°C in the lowland and 10-15°C in the central highland of the zone. However, there is a slight monthly variation of temperature in which February to May are the hottest months while October to January are the coldest months. The mean annual rainfall of the area varies from 633.7 mm at Dera station (located at an altitude of 1680 meters amsl) to 1059.3 mm at Bekoji station (located at an altitude of 2760 meters amsl). Generally, Arsi Zone receives abundant and well-distributed rainfall both in amount and season [2] and [29].

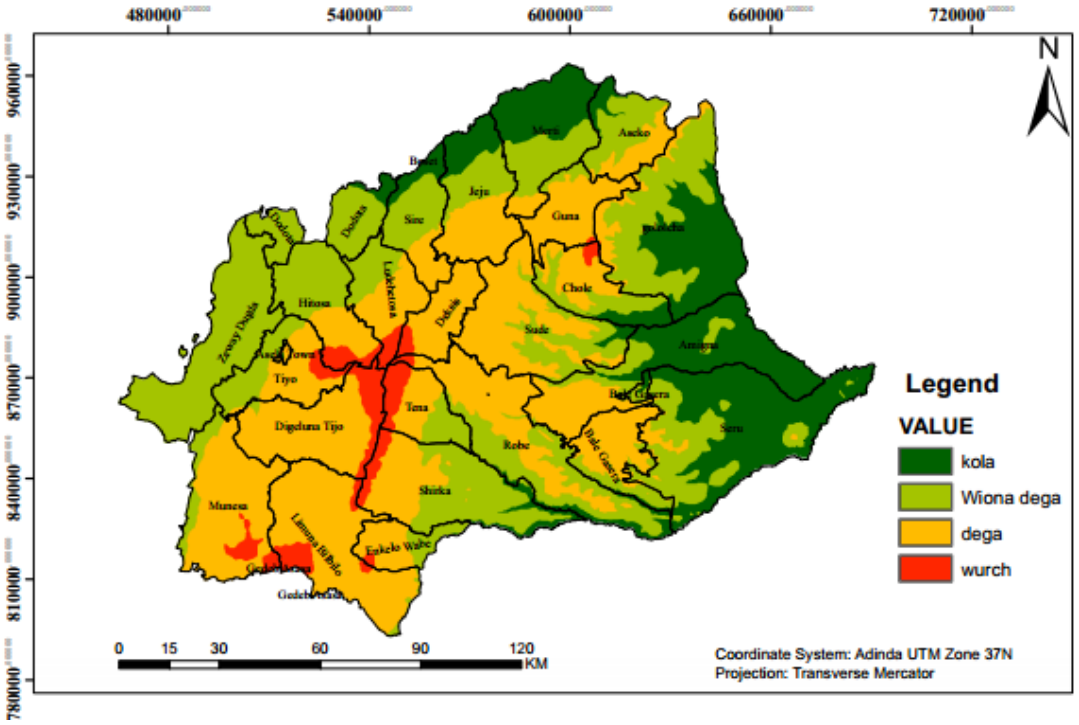


Figure 2. Agroclimatic map of Arsi Zone (Source: Produced from Ethio GIS data base, 2019/20).

The area is known by diversified physiographic structures in which altitude varies between 805 meters (the lowest point) found at the extreme east of Seru district in Wabi Gorge and on 4195 meters (highest peak) at Mountain Kaka [29]. The major physiographic division of the area includes Mountain ranges, Massifs and High Plateau, Low plateau and Associated Lowlands, and Lowlands [12].

The zone is naturally endowed with enormous rivers and streams. It has high network or density of perennial rivers and streams. Chilalo-Galema mountain ranges are the major water source for the main perennial rivers of the zone. It is the source of Wabe-Shabelle tributaries such as Wabe, Robe, Elele, Megna, Gololcha, Ejersa and Shenen rivers, and also the sources of Awash river basins and tributaries such as Keleta, Chulule, Arba and Awash. The zone has shares boundary line with lakes Ziway and Langano with East Shewa, and Melka- Wekena and Koka with Bale and East Shewa zones, respectively [12].

The soils in the area are composed of diversified types and natures formed from current volcanic activities. The most dominant soils are Chromic and Pellic Vertisols (30%), Luvisols (13%), Cambisols (23%), Andosols (4%), Lithosols (6%), Fluvisols (2%), and others such as Phaeozems, Orthic Solonchak, Calcic xerosols, Eutric regosols, Gypsic Yermosols, Mollic Gleysols and Orthic Acrisols (11%). This creates a conducive and fertile soil for different agricultural activities [12].

As a result of diversified physiographic structure (altitude), temperature, rainfall and parent material from which soils are derived the area host different kinds of natural vegetation. But, the natural vegetation once densely and extensively covers the land of the area due to human interventions, currently found at some pockets of Munesa- Shashamene, Arbagugu and ChilaloGalema State Forest and the eastern peripheral lowlands of Amigna, Seru and Gololcha and the lowland of Ziway Dugda [12].

The available natural forests of the area provide habitats for different kinds of wild animals. Even though the deterioration of wild animals due to human intervention on their habitats, the area possesses different species of wild animals such as Mountain Nyala, leopard and Menelik's bushbuck, lion, warthog, and hippopotamus. These wild animals are restricted to Chilalo Galema mountain range forest and Delfaker (the only controlled hunting Game Reserve areas of the Zone), Kaka mountain, Munesa –Shashamene State forest, Arbagugu State Forest and the eastern lowland of Amigna, Gololcha and Seru districts and around and in lake Ziway and Langano where population interferences are non or low [2].

Socio-Economic Profile of the Zone

From a demographic point of view, the total population of the area accounts for 3,377,806 with 1,695,152 males and 1,682,654 females. The number of people inhabits the urban area of the zone accounts for only 13.13% which is below the national level [2]. This reveals huge number of

populations in the area live in the countryside. The dependency ratio is very high in which dependent population accounts for 47.58% (0-14 years + above 65) and independent account 52.42% (15-64 years). The crude population density of the zone is moderate (123 person/km^2) as compared to the most densely populated zones of the country [29].

Agriculture is the main economic activities in the zone in which people engage in crop cultivation, livestock and poultry raising, and beekeeping. Crop cultivation is the most dominant economic activities which is rain-fed. Smallholder farmers share the largest total crop production and total land under cultivation which accounts for 96.2% and 96.45%, respectively. The main crops cultivated are cereals, pulses, oilseeds, vegetables, fruits, root crops and others. In line with this state farms engaged in crop production in the area [29].

Methods and Materials

Philosophical Underpinning

In scientific investigation ontological and epistemological view, the theoretical perspective, methodological strategies and specific methods of data collection and analysis are its foundation. As [10], [13] and [14] reveals the theoretical perspective which is guided by the epistemic view adopted which in turn determine the methodological strategies and specific methods of data collection and analysis should clearly defined and formulated. It is clear this indicate the strong interrelationship between the ontological and epistemic view, theoretical perspective, methodological strategies and methods of data collection and analysis.

Among the two quite contrary ontologies in the western thought, the ontology of being which accentuates on the existence of reality as represented by identifiable properties denoted by symbols, words and concepts as opposed to formlessness, chaos, interpenetration and absence ontology of becoming [13] and [14] has been adopted for this study. It is due to the fact that wheat value chain (the presence of different actors and activities, the interaction between different actors) exist in realities which have identifiable properties explained by the existence of a movement of wheat crops from producers to end consumers, food consumed by people, and the like.

In line with the ontological stance, it is important to consider the epistemological perspective which enlightens the way of understanding and explaining how we know what we know [10]. The epistemological perspectives which guide this study are objectivism and constructivism since using

one of them does not comprehensively and entirely pave a way to study the role of wheat value chain in food security.

Objectivism is an epistemic view which advocate presence of reality independent of human mind and the concern of the researcher is all about discovering this objective truth [13] and [14]. The theoretical perspective fit with this epistemic view and well-suited with the objective of the study is positivism. Its central argument is the presence of reality external to the researcher and these realities tested directly through scientific investigation. Therefore, the role of wheat value chain in the food security analysis, data on the socio-economic and demographic profile, amount of crop produced, the profit share among actors, and the income of the household were objectively collected with questionnaires and structured interview and were analyzed objectively with different statistical tools.

The second epistemic perspective adopted for the study is constructivism. Its main argument is truth and meaning do not exist in some external world but are created by the subject's interactions with the world. Meaning is constructed not discovered, so subjects construct their own meaning in different ways, even in relation to the same phenomenon [7], [10], [13] and [14]. Thus, the perception of people to the benefit of participating in the wheat value chain and feeling of food insecurity were not understood and comprehended similarly or at the same level. Similarly, their perception and knowledge can emerge from their personal feeling and understanding which create variation on the meaning.

Though positivism and constructivism emerge from diverse epistemological perspective they are under the umbrella of similar ontology, i.e. ontology of being. Thus, in order to study in detail and comprehensively the role of wheat value chain to enhance household food security and come up with valid and reliable finding and strong conclusion the researcher believes using both objective reality and subjective views in amalgamation is very crucial.

Research Designs and Approaches

[22] identify quantitative, qualitative and mixed types of research approaches; and the three approaches are not as discrete as they first appear. The research approach adopted for this study is a mixed design since the role of wheat value chain to ensure the food security status cannot be

studied with only a single approach. Likewise, they argue that researcher could employ a mixed method studies when they believe the use of both quantitative and qualitative data would provide a better understanding of the research problem. The use of quantitative or qualitative methods had some weaknesses, and the use of both (quantitative and qualitative) concurrently result in neutralizing the weakness of each method [9]. Similarly, [8] argue that the use of quantitative and qualitative research method (mixing the two) can help us to understand the problem and research question better than either method.

Thus, concurrent/convergent parallel mixed method research design was employed for the study. According to [9] and [22] it refers to the collection of data simultaneously (quantitative and qualitative data), merge the data and use the result to understand the problem. They argued that the basic rationale for this study is that one data collection form supplies strengths to offset the weaknesses of the other form and that a complete understanding of a research problem results from collecting both quantitative and qualitative data. Thus, the issues of the wheat value chain cannot be studied alone quantitatively or qualitatively. This help the study to overcome the problem emerges due to the use of quantitative or qualitative approach alone.

Cross-sectional survey research design was employed to gather the quantitative types of data and case study was employed to collect the qualitative types of data for the study. Survey research design was employed to collect data on the socio-economic status, amount of crops produced and access to the financial issues. Whereas, case study design was taken in to account for the in-depth assessment wheat value chain (issues of feeling, attitudes and perception by farmers).

Sources, Types, and Tools of Data Collection

The necessary data for this study were generated from both primary and secondary sources. Primary sources were households selected as a sample from the sampling frame in the study area, interview, desk review and from FGD. Secondary sources were different documents and reports in the agricultural offices of the woreda and zone and any other necessary write document accessed from the internet, available books, magazines, journals and published or unpublished documents. The tools/instruments employed in the study were questionnaires (structured and unstructured), interview (structured and unstructured), and FGD based on the objectives intended to achieve.

Sampling Procedures

Multi-stage sampling procedures has been used in order to select the necessary sample for the study. First, after the woredas stratified according to their amount of wheat production in quintals purposive sampling employed to select two woredas (Limu Bilbilo- from wheat producing and Dodota-from less wheat producing) from the study zone and two kebeles each from the selected woredas (Sarbo, Lemu Dima, Dire Kiltu and Dodota Alem) to generate sample households for the study. Second, once the study woredas and kebeles for the study identified based on the amount of wheat production, simple random sampling was employed to select the sample households from the selected sample kebeles for the study. This is due to the fact that it reduces the level of bias which might outbreak during the selection of the sample. Third, sample for interview were selected purposively to generate in-depth information. The total number of sampled households were generated from the target population (households in the selected kebeles) based on their proportion of total households.

Table 1. Distribution of sample size across selected *woredas* and kebeles.

Woreda	**Kebele**	**Total HHs**	**Sample**
Limu Bilbilo	Sarbo	622	78
	Lemu Dima	721	88
Dodota	Dire Kiltu	611	78
	Dodota Alem	736	92
Total		2690	336

Sample Size Determination

Sample size determination is one of the technical areas which require the researcher's ability to decide the appropriate sample size for the study based on the purpose of the study. According to [6], there is no clear-cut answer for how much sample size is appropriate for the study undergoes; rather it depends on the purpose of the study and nature of population under investigation. Therefore, in order to reduce the sampling error incurred due to inappropriate sample size, time for the study, heterogeneity or homogeneity of the population under study, costs for the study and the like; it is important to limit the sample size under study. Thus, according to [19] if the study

population is finite in number, the following mathematical formula is appropriately used to determine the sample size for the study. Therefore, at 95% confidence level, 5% significance level (degree of freedom is=1-0.5=0.5) and the standard variate at 95% significant level is 1.96, the total sample size for the study is 336 households.

$$n = \frac{z^2.p.q.N}{e^2(N-1)+z^2.p.q} = \frac{(1.96)^2(0.5)(0.5)(2690)}{(0.05)^2(2690-1)+(1.96)^2(0.5)(0.5)} = 336$$

Where, n= refers to the number of sample size

P= sample proportion

q= population proportion (q = 1 – p = 1 – 0.5 = 0.5)

e= acceptable error

N=total population

z= the value of standard variate at acceptable significance level (1.96 at 95%)

Methods of Data Analysis

To process and analyze the collected data, value chain mapping, and Statistical Package for Social Sciences (SPSS) statistical software version 20 were used. Data collected through questionnaire survey was processed by using SPSS statistical software version of 20. Descriptive statistics were used to analyze the survey data collected from smallholder wheat producers through a questionnaire survey in the study areas. The net marketing margin refers to the net income the actors obtained after the marketing cost deduced. The result obtained from the equation tells us the higher the marketing margin reduces the producer's share and vice versa. It also provides an indication of welfare distribution among production and marketing agents. Thus, mathematically calculated as follows:

$$NMM = \frac{Gross\ marketing\ margin - Marketing\ cost}{consumer\ price} * 100$$

Where, NMM= Net Marketing Margin

Finding and Discussion

The Socio-economic and Demographic Characteristics

It is very crucial to see the socio-economic and demographic characteristics of the population to further understood the study area. Accordingly, the result from Table 2 below reveals that the

sampled households which accounts for 80.95% were male and the rest 19.05% were female. Despite, the educational level of the households was not similar across the sample kebeles, the highest proportion of the household heads cannot read and write followed by primary school, read and write, and secondary school which accounts for 47.31%, 25.30%, 13.10%, and 13.10%, respectively. The percentage share of the household heads attends tertiary education or graduate with certificate and above share only 1.19%. Therefore, it requires more and more works to improve the educational level of the farmers since educational status or level determine new technology and innovation adoption and cope with new knowledge and ideas to increases their production and productivity.

Table 2. The socio-economic and demographic characteristics of the households.

		kebele of household head				**Total**	**%**
		Dire Kiltu	**Limu dima**	**Sarbo**	**Dodota Alem**		
Sex	Male	70	76	59	67	272	80.95
	Female	8	12	19	25	64	19.05
Total		78	88	78	92	336	100
Educational level	Not read and write	24	40	41	54	159	47.31
	Read and write	7	9	10	18	44	13.10
	Primary	24	26	21	14	85	25.30
	Secondary	20	12	6	6	44	13.10
	Certificate and above	3	1	0	0	4	1.19
Total		78	88	78	92	336	100
Religion	Orthodox	27	58	18	26	116	34.52
	Muslim	33	27	57	59	189	56.25
	Catholic	6	3	3	7	19	5.65
	Protestant	5	0	0	0	5	1.49
	Others	7	0	0	0	7	2.08
Total		78	88	78	92	336	100
Marital status	Married	74	78	67	70	289	86.00
	Single	0	0	1	0	1	.30
	Divorced	3	4	3	13	23	6.85
	Widowed	1	6	7	9	23	6.85

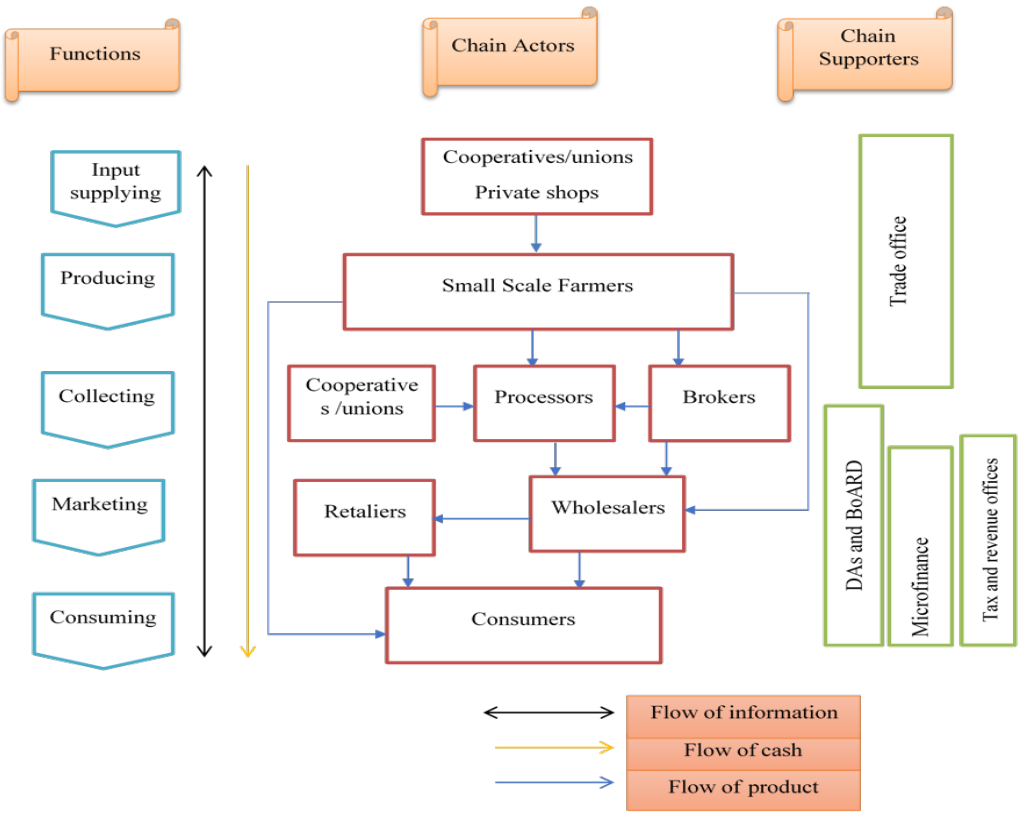
	kebele of household head				Total	%
	Dire Kiltu	Limu dima	Sarbo	Dodota Alem		
Total	78	88	78	92	336	100

Sources: Computed from survey result

In terms of marital status 86% of the farmers were married and only 0.30% were single. The rest 13.7% were divorced and widowed. This tells as the presence of stable marital status. Muslim and Orthodox Christianity is the dominant religion in the study area which accounts for 56.25% and 34.52%, respectively. Whereas, the rest were 5.65% catholic, 1.49% protestant and 2.08% others religious follower.

Wheat Value Chain Mapping

This section presents the main actors and their functions as well as the enabling environment in the wheat value chain in the study area. The value chain map (Figure 3) highlights the engagement of different actors involved directly or indirectly to reach the wheat from its conception to end-users. Generally, the actors in the wheat value chain are primary actors (directly involved in wheat production and movement: input suppliers, producers, brokers, wholesalers, retailers, and consumers) and supportive or enabling environment (indirectly involved in the wheat production and movements: DAs, microfinance, BoARD, trade, and industry office and the like).



Source: Constructed based on field survey data (2019/20)

Figure 3. Wheat Value Chain Mapping.

The group discussants reveal that they access information from the market, brokers, radio, traders, relatives, and through telephone. Their main focus is price information in the nearby and *woreda* market. The producers of wheat miss buyers' information, i.e., the preference of buyers which critically determine the price of the wheat within the market. They strongly indicate sometimes brokers and few traders cheat them on the price of the wheat and weight of the crops during marketing which reduces their trust in the source of information from these actors.

Wheat Value Chain Actors and Their Functions

This section attempts to identify and discuss the main and supportive actors across in the wheat value chain in the study area. The main actors in the study area include input suppliers, producers, brokers, wholesalers, processors, traders, and consumers. While the supportive actors are DAs, BoARD, cooperatives/unions, trade and industry office, and financial/credit services.

Input suppliers: They are organizations and institutions which provide inputs to the farmers to increase the production and productivity of the wheat in the study area. The main input suppliers are different cooperatives/unions in the study area and private shops. According to the group discussions, the farmers in the area obtained fertilizers and selected seeds from cooperatives/unions, whereas insecticides, pesticides, and herbicides from the private shops. The unavailability of the required amount and the high costs of the inputs put tremendous negative effects on the producers not to use the inputs as per the recommended amount on their farms. Particularly, the insecticides, herbicides, and pesticides were not timely available, and unavailable in the required amount in the cooperatives/unions, thus the producers exposed to high costs of these inputs from the private shops.

Farmers/producers: Farmers/producers are the main actors in the wheat value chain which prepare the land for cultivation, ploughing, sowing, producing, pests/herbs/diseases controlling, harvesting, post-harvest handling, and selling wheat crops to the market. The entire farmers in the study area perform the production of wheat during the rainy season of the country (*kiremt* season) which means they are rain-fed dependent. The result from the sample households indicates that the presence of high differences between households in the level of wheat produced within a year. Thus, the minimum amount of wheat produced accounts for 1.50 quintals whereas the maximum was 112 quintals per year. Except a few (5.65%), the producers in the study area sell large quantities of their produce during and soon after the harvesting season to the brokers, traders (wholesalers and retailers), processors, and cooperatives/unions.

Brokers: Brokers are the middlemen or dealers which connect the producers with the buyers in the study area. The brokers based their site in the nearby market center to the farmers. They receive orders from traders and deal with the farmers. The benefit share of the brokers varies from farmers to farmers as well as traders to traders which ranges between 10-30 birr per quintal. The number of brokers (formal and informal) in the post-harvesting season increased to grasp the surplus produced with less prices.

Processors: Processors are essential actors in the wheat value chain. Their main activities are buying wheat from different actors in the chain and perform different activities to transform the wheat crops to various value-added products such as flours, macaroni, and spaghetti. After buying the wheat crops, they perform activities like cleaning, grinding, milling, packing, storing, and distributing the product particularly to the wholesalers, bakers, and higher institutions. The processors have strict quality parameters and they expect wheat suppliers to meet these quality parameters.

The main suppliers of wheat crops to the processors are government imported subsidized wheat, cooperatives/unions, and local collectors. Most of the sampled processors in the study area inclined to receive more wheat crops from the government since they are forced to sell their product (particularly flour) to the bakers at a restricted price. The demand for these value-added products is currently increasing and this would increase their profitability. However, the lack of quality wheat supply in the locality, irregularity, and shortage of electric power, input, and output price fluctuation is a challenging problem.

Wholesalers: Wholesalers are the main market dealers/actors who buy the wheat in large amounts and sell to the processors and to some extent to the retailers in the different market centers like Adama, Assalla, and Addis Ababa. The availability of cell phone this day makes easier for the dissemination of market related information to wholesalers to transport the product to different markets.

Retailers: Retailers are the actors along the wheat value chain which have direct contact with the consumers. They receive or buy wheat from wholesalers, brokers, and producers and finally they sell to the consumers.

Supportive Value Chain Providers Along the Wheat Value Chain

In line with the primary actors, supportive value chain providers play a crucial role. Some of the enabling environment strengthen the wheat value chain in the study area in particular as well as in the country, in general, are research and development, development agents, banks, microfinance, BoARD, and the like. They are actors involved in advisory and training services, information providing, financial supports, and research. The main supporters in the wheat value chain in the study area are DAs, *woreda* and zonal agricultural and rural development bureau, Meklit microfinance, Oromia microfinance, and Bureau of Trade and Industry.

The survey result indicates that Development Assistants (DAs) and BoARD are essential supportive actors who work on the training and advisory services. Most of the advisory and training services are provided on fertilizer application, wheat production, crop management, harvesting, and pre- and post-harvest handling. These advisory and training services are given through a farm to a farm visit, experience sharing tours, and visit demonstration/model farmers' sites. But the main challenging

problem in this advisory and training services was unequal participation of farmers, lack of interest to participate, and the quota system for training.

The group discussants reveal that the FTC (Farmers Training Center) and home for the DAs expert established here and there in different *kebele*s to train the farmers and for a close assistance, counseling and follow up of the farmers on the production and productivity of wheat and other crops, use of inputs, crop management, diseases controlling and other advisory services. However, some of the FTCs become malfunctioned and the experts make their residence in the town which creates a serious contact gap between producers and experts.

In the study area, the main financial service providers were cooperatives/unions, Meklit microfinance, Oromia Saving and Credit Institutions, and individual lenders. The number of households' access to a credit account for 16.7 percent. Effects of bureaucracy, fear of paying back debt, lack of better information, and lack of interest to borrow were the main challenging factors identified for the low level of access to credit.

Cost and Benefit Distribution Among Actors in the Wheat Value Chain

As the item moves through each chain actors, they add value to the product via cleaning, sorting, processing, packing, creating space, and time utility. From the survey result in Table 3, the highest profit share goes to traders as compared to producers (23.81%). It indicates the farmers receive a low-profit shares despite the fact that they are determined to produce quality wheat and bearing all the related risk of production. Thus, to make the producers beneficiary in the chain, it is important other actors share associated risk through agreement. This might motivate and encourage producers to produce surplus and quality wheat required by different actors

Table 3. Wheat marketing costs and benefits of actors.

Item (birr/quintals)	Producers	Brokers or Agents	Union	Processors	Wholesalers	Retailers
Purchase price	-	1340	1350	1350	1340	1345
Production cost	1050	-	-	-	-	-

Marketing cost						
Labor	5	5	6	6	5	5
Transport	8	6.5	6.5	7	5	5
Pack material	7	7	7	7	7	7
Tax	-	2	2.34	3	1.75	1.24
Telephone	-	1.20	1.23	1.42	1.31	1.35
Total marketing cost	20	21.70	23.07	24.42	20.06	19.59
Total cost	1068	1361.70	1373.07	1374.42	1360.06	1364.59
Sales price	1345	1450	1500	1600	1550	1620
Marketing margin	295	110	150	250	210	275
Percentage share of margin	22.87	8.53	11.63	19.38	16.28	21.32
Profit margin	277	88.3	126.93	225.58	189.94	255.41
Percentage share of profit	23.81	7.59	10.91	19.39	16.33	21.96

Wheat Production in the Study Area

As can be seen from the following Table 4, the yield (Q/h) obtained increased continuously during different cropping seasons in the study area. The change in the quantity or yield obtained was very high for wheat. For instance, the yield (Q/h) during the 2016/7 cropping season was 20.72 which was increased into 42.5 in 2017/8 and to 78.5 quintals (2018/9) per hectare for wheat. As the DAs, *woredas* and zonal experts indicate one of the critical reasons for the increment of the production of wheat per hectare is the government plan and intention to substitute the export for own produce. Thus, every concerned bodies in the *woreda* and zonal level intimately trained, consult and follow up from the starting of the production to the end. The farmers were trained on wheat production, management, marketing, pre- and post-harvest handling, input uses and harvesting. Since the study zone considered as the wheat producing corridor the inputs (selected seeds, fertilizers, insecticides and herbicide avail on time for the farmers. But the farmers in the study area somewhat against to the view of the *woredas* and zonal experts on the availability of inputs and timely avail of the inputs. They indicate that the inputs were not avail on time and they were not available in the required amount (particularly selected seeds and insecticides). Thus, they were exposed to high cost to purchases these inputs from the private shops. Likewise, the group discussants reveal that wheat rusts, late high rainfall (for Limu-Bilbilo), erratic type of rainfall i.e., start late and end soon (Dodota woreda), high cost for inputs, low price for their produces and shortage of inputs were the main challenges for the productivity and production of wheat.

Table 4. Major crops produced in the study area.

Major Crops	2016/7			2017/8			2018/9
	Cultivated Land (h)	Production (Qtls)	Yield (Q/h)	Cultivated Land (h)	Production (Qtls)	Yield (Q/h)	Yield (Q/h)
Teff	96,737.15	750,550.50	7.76	61,940.00	805,855.50	13.0	16.4
Wheat	327,941.08	6,794,861.15	20.72	262,745.00	11,171,221.10	42.5	78.5
Barley	206,729.23	4,371,932.18	21.15	174,162.25	5,224,896.30	30.0	39.6
Others	158,369.10	2,580,937.50	16.30	81,882.00	2,498,014.00	30.5	33.4
Pulses	144,837.30	1,429,277.55	9.87	80,082.25	1,500,159.00	18.7	16.7
Oil Seed	40,689.50	965,984.00	23.74	48,250.60	715,738.00	14.8	12.6

Source: Statistical Abstract of Arsi Zone of the year 2016/7 and 2017/8

Wheat as a Source of Income

In the study area the main sources of income for the households generated from the sales of agricultural products such as grain, livestock and their products, vegetables, and from sales of firewood and charcoal. As seen from Table 5, the most important sources of income for the households was generated from the sales of grain which accounts for 76.14%. The incomes generated from the sales of livestock and their products, and income received from credit constitutes the second and third place which shares 18.92% and 3.45%, respectively. Some household in the study area sold their crops not due to surplus production but for different purposes such as payment for tax, purchases of agricultural inputs, other food stuffs, home materials, payment of credit and to cover school and health expenses. From grain sales the most income obtained from the sales of wheat by the households. Wheat sales share 95.74% of the household total income generated from the sales of grains. Thus, in one hand or another the income generated from sales of wheat widen an opportunity for the household to diversify their foods.

Table 5. Summary of households' major source of cash income.

Sources		Total	%
		1,874,580.00	76.14
Grain sales	Wheat	1,794,670.00	95.74
	Oilseeds	46,348.00	2.47

	Teff	30,618.00	1.63
	Maize	2944.00	0.16
Livestock & their products		465,749.00	18.92
Vegetables		6379.00	0.26
Firewood & charcoal		12,760.00	0.52
Credit		85,400.00	3.45
Transfer		17,100.00	0.69
Total		2,461,968.00	

Source: Field survey 2019/20

Wheat as a Source of Employment

Wheat has been cultivated for centuries in Ethiopia. It is one of the cereal crops widely cultivated and takes 4th and 4th or 5th in terms of area cultivated and gross value production, respectively. This indicates that wheat is the most widely cultivated crops in the country next to *teff*, maize and sorghum. Likewise, the number of wheat producer farmers accounts for 4.7 million, and sometimes it is considered to reach 5 million which make up 35% of all smallholder farmers [21] and [23].

In the study area the land under wheat cultivation accounts for more than 46.7% followed by barely (29.4%) and teff (17.3%). Similarly, almost all sampled households cultivated wheat in different amounts which ranges from 1.5 - 112 quintals per year. It is the sources of employment in the study area since the owner of tractor tilling the land for cultivation per hectare and owner of combiner for harvesting wheat produces. It is the sources of employment for the daily laborer during preparation of land for cultivation and harvesting. Likewise, different actors involved in the wheat value chain generate different amount of benefits. The income generated from the involvement of different actors in the wheat value chain in one hand play a vital role in the betterment of the living standard of those actors and also for ensuring the food security status of the households. For the local households (families of wheat producers and daily laborer) the income generated from the wheat value chain increases the access dimension of food security. It increases the access dimension of food security means it opens the path for the households to purchases different kind of food stuff via the income obtained from the sales of wheat.

Wheat as a Source of Food Security

Wheat and wheat product play a vital role in the calorie intake of the country which contributes about 14% of the total calorie consumption. This figure raised to 15% according to [23]. This makes wheat the second sources of calorie intake next to maize in the country [21] and [23]. Wheat in the study area is one of the major sources of food for the member of households. It is consumed in the form of bread, injera, *akawi* (whole roasted), *mullu* (boiled wheat with water and salt), *marqa* (cooked flour wheat with water and salt), *qince* (split boiled wheat with water and salt), macaroni and spaghetti. This reveal that wheat and its product play a crucial role in the food security status of the household in the study area. Similarly, as the result organized from survey data based on EHNRI composition table of dietary energy available measure in Kcal indicate wheat takes a lion share in the food security of the household. The percentage shares of wheat in the dietary energy availability accounts for 52.87% followed by barely (23.84%), maize (9.30%) and teff (8.40%).

Role of Wheat Value Chain in Food Security

Value chain adoption to the agricultural sector in agrarian countries has an enormous potential to increases the availability and affordability of the agriculture product for the poor household. Likewise, the wheat value chain which incorporates all the necessary actors can enhance the food security status of the people in the local as well as national setting. As seen from Figure 4 below value chain supporter at the local, regional, national or global level help the chain actors to function appropriately. Appropriate regulatory framework and policies, share of indigenous knowledge, mobilization of financial resources and arrangement of market by the supportive value chain can enhance the well function of those different actors in the wheat value chain. It helps the flow of goods, products and services among the actors. In this case it helps the movement of wheat and wheat product from the producers to the end consumers.

In a well-functioning wheat value chain, the inputs required for wheat production avail timely and in the required amount for the producers to increase the production and productivity of their produces. But as seen in the previous discussion above the result from the group discussant indicate that high cost of the inputs and their shortage put tremendous negative effects on their production. Despite, the high cost of the inputs and their shortage some farmers in the study area produces surplus. Farmers which produce surplus lack market which accommodate the cost of

their produces. They have good marketing information obtained through their cell phone, and weekly from the market.

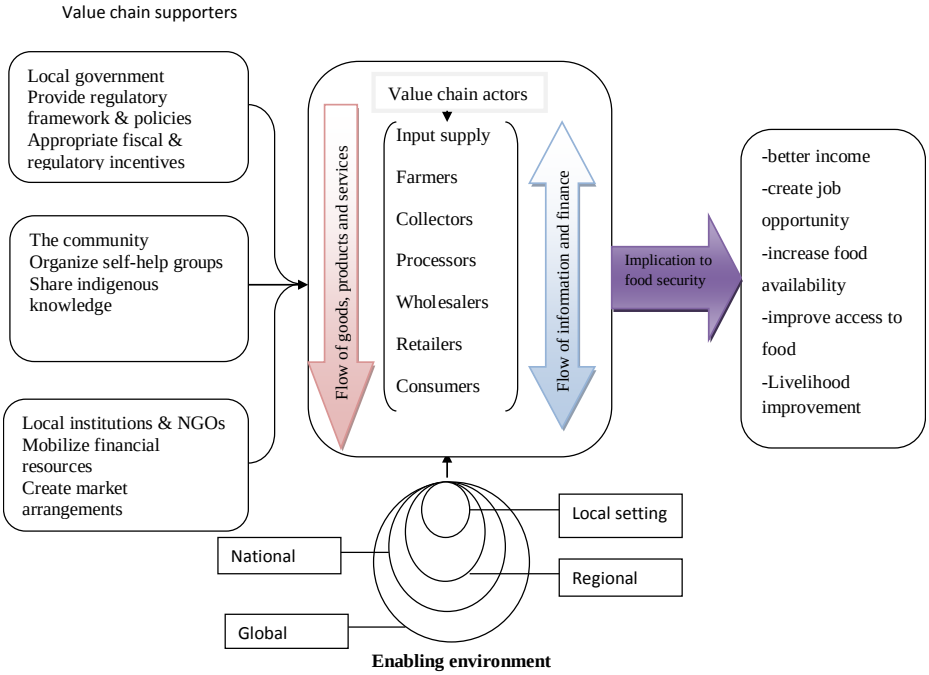
Research center and higher institution play a crucial role in producing and disseminating innovative technology through effective value chain. The technology transfer via the value chain generates significant productivity increment for the production activities at the farmer level. It creates good opportunities for the wheat producers to inputs which increases their production and productivity. Moreover, it helps the farmers to generate higher incomes, and improve the food security status of farmers participating in the wheat value chain. But as the group discussants indicate that their relationships/contacts with research center (Kulumsa) and higher institution (Arsi University) found in the study locality is very weak.

The increment in the production and productivity of the wheat increases the availability dimension of food security. The wheat surplus producer farmers in the study area generate income from the produce presented for the market. This in one way or another increase the access of those farmers to other food stuff which help them to diversify their food. Consuming diversified food groups means better food security since the household have an opportunity to access nutritional quality.

The wheat value chin in the study area create a widen opportunity for different actors involved in the chain. It creates job opportunity for input suppliers, farmers, daily laborer (work on the farmer's field, loading on cart and car, and cleaning in store), owner of tractors and combiners, brokers, processors, wholesalers and retailers. This helps those actors to generate income which increases the economic capacity of different poor and none-poor actors for food. This helps them to ensure their food security status.

It is obvious that connecting smallholder farmers in the study area with effective and efficient market are the way to increases the farmer household income. This can be achieved through successful value chain approach. Thus, in the study area connecting the wheat producer smallholder farmers with effective and efficient market which accommodate the cost of their produce will increase their income. If this effort is effective it will enhance the food security status of the farmers. The group discussants indicate that, particularly during the harvesting season, they encounter marketing problem. They were forced to sell their produces to different actors with a lower price which make them frustrated. Thus, creating conducive marketing via contracting

farming between producers and other actors (processors and wholesalers) may benefit the farmers. Inclusive wheat value chain in which all the involved actors can benefit is the pathway for creating efficient market.



Source: Developed by a researcher from survey and literature

Figure 4. *Implication of wheat value chain for food security.*

Conclusion

Wheat producers have good price information received from market weekly, traders, retailers, and via their cell phone. But they miss buyer's information (buyer's preferences) which seriously determine the price of wheat. They encounter timely avail of inputs (selected seeds, insecticides, herbicides and pesticides) and unavailability of fertilizers in the required amounts, and they consider the cost of these inputs were very high (expensive). The number of brokers increased during the harvesting and post-harvesting seasons to grasp the surplus wheat with a lesser price (informal one complicated the marketing of the wheat). Processors have strict quality parameters and they expect the wheat supplies should meet this quality parameters. They encounter lack of quality wheat in the locality, irregularity and shortage of electric power, input and output price fluctuation.

The role of enabling environment (DAs, BoARD and financial institution) in the production and productivity is significant. The role played by DAs and BoARD in the study area to increases the production and productivity of wheat via advisory and training services on fertilizers application, wheat production, crop management, harvesting, pre- and post-harvest hand is significant. Unequal participation of farmers, lack of interest to attend and the quota system were the pressing challenges in the advisory and training services. Access to financial institutions also play crucial role in the production and productivity of wheat. But the number of wheat producers' access to credit was very low which accounts for 16.7%. Effects of bureaucracy, fear of paying back debt, lack of better information, and lack of interest to borrow were the main challenging factors identified for the low level of access to credit.

Adopting value chain in the agriculture sector (in the wheat sub-sector) in the study area is a paramount important. It is true since the various actors in the chain can benefit from the involvement in the chain. The actors involved in the chain beneficiary from the wheat value chain since it creates job opportunity, help to generate income and create better living standard and ensure the food security status of actors in the chain. It ensures the food security status of the farmers households in create opportunity in increasing the availability and access dimension of food security.

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CHAPTER SIX

CONCLUSION, RECOMMENDATIONS AND IMPLICATIONS FOR FUTURE STUDY

Introduction

The overall objective of the dissertation was to explore the wheat value chain, the food security status of rural households and the role of wheat value chain in food security of the rural households in Arsi Zone, Oromia Nation Regional State, Ethiopia. Despite, there are promising changes on the study of value chain and food security, the role of wheat value chain in sustain the food security of rural households locally and nationally still requires important research investigation. In the subsequent section, the experience learned and the contribution of the study, the upcoming research agenda, policy implication and recommendation were discussed.

Summary and conclusion

The actors and their roles, marketing of wheat, governance, and profit share among actors were investigated in the study. The result from the value chain analysis indicates the main actors in the study area include input suppliers, producers, brokers, wholesalers, processors, traders, and consumers while the supporting actors were DAs, BoARD, cooperatives/unions, trade and industry office, and financial/credit institutions. Farmers/producers in the study area encounter market which accommodate good price for their produce, lack of different inputs, and timely avail of inputs and high cost of inputs particularly purchased from the private shops.

There is a weak or low direct link between producers and processors. Processors identify lack of quality wheat supply, irregularity, and shortage of electric power, input, and output price fluctuation were among the main challenging problem. The governance along the wheat value chain is buyer-driver type since the marketing price is set by the buyers. The study also identified inefficient and uncompetitive markets. The role of the DAs in the production and productivity of wheat in the study area was very essential. But the result from group discussants reveal that the FTCs build here and there in different kebeles of the study area become malfunctioned which create serious contact gap between the experts and the framers.

Wheat is one of the major crops which grown for consumption and market purpose in Arsi Zone. Hence, farmers can select one or more appropriate channels based on its comparative advantage and accessibility of channels for farm product to maximize their return. The result of a multinomial logistic regression model reveals that the probability to choose different market outlet was significantly influenced by sex, age, education, year of participation, nearby market, nearby road and quantity produced at different significant level.

The rural household's food security status of the study area measured in terms of Household Food Balance Model, dietary diversity score and copping strategies to capture good pictures of the food security situation in surplus producing area. The number of households prone to food insecurity in the study area accounts for 69.94% which could not acquire minimum daily allowance, 2100kcal during the study period. The result from the Household Food Balance Model indicates that the daily average per capita available for the household was 1743.21, which is far from the nationally recommended 2100kcal. Likewise, the result from the HDDS reveals that the domination of monotonous dietary for the households in the study area and the coping strategy index tells us the presence of moderate to severe food insecurity. This reveals food insecurity exists in all part of the country (means areas of surplus production as well as low producing). The result of the study signifies the advocacy of Sen availability of foods is not a guaranty for food security rather it is the matter of entitlement or ownership.

Recommendations

Based on the main discussions and conclusions of the study the following policy recommendations have been formulated to assure sustainable rural households food security and livelihood as well as expected rural development. Hence, this requires strong, effective and efficient policies, strategies and practices to boost the agricultural production and productivity (the wheat sub-sector) and increases and ensures the food security situation of Arsi Zone Rural Households in particular and the rural household of the country in general. Therefore, the following policy options and suggestions assumed as the blueprint for future policy makers and practitioners.

- Financial capacity to boost the agricultural production and productivity play crucial role (bank, micro finance and credit union) which in turn sustain the food security status of

the rural households and their livelihoods. The policy makers and practitioners should incorporate the easy way to benefit the rural community from those financial sectors in their rural focused policies and strategies.

- ❖ The issue of food security needs the mobilization of all round or inclusive policies and strategies (resources, households, institutions and NGOs). The policy makers and practitioners should incorporate effective value chain approach which brings all-inclusive rural based development strategies.
- ❖ The role of the expertise (DAs) and the training center for the farmers (FTCs) play a crucial role to boost the agricultural production and productivity of the farmers. Hence, policy makers should incorporate the way to rehabilitate the malfunctioned FTCs in the study area to trainee the farmers on the use of agricultural input, preparation of land, and post-harvest loss.

Implications for future study

The results from this study has provided significant evidence on wheat value chain, food security and the role of wheat value chain to sustain food security of rural households in Arsi Zone, Oromia National Regional State, Ethiopia. In this respect, future research may offer more insights into such issues. Hence, the following issues which were not adequately investigated in this study need further studies:

- ➢ This study gives detail emphasis to the actors and their functions, marketing and profit shares, governance and challenges encounter different actors. Upgrading is one of the pillars need to be discussed in the concept of value chain. Hence, the issue of upgrading which was not discussed in this study might be the concern of future research.
- ➢ The study of food security concerned with four different dimensions with different methodologically application. Although this study offers good insight of the level of food security at household level in the study area still it requires the future study which emphasize on the utilization and stability dimensions which were not discussed in this study.
- ➢ This study focuses on the contribution of wheat value chain approach to sustain the food security at the household level in the rural geographically setting. Thus, the future

research agenda which investigate the role of wheat value chain for the urban household's food security could consider the issue. In addition, the future research could consider the nexus between wheat value chain and food security.

- In this day the interference of government in the production and productivity of the wheat sub-sector become pronounced. Hence, future research required to discuss the effects of government intervention (positive or negative) on the effective functioning of wheat value chain.

Appendices

Appendix 1: Questionnaries

Addis Ababa University

College of Social Science

Department of Geography and Environment Studies

Questionnaire for Household Heads

Dear respondent,

The objective of this study is to assess the wheat value chain and its role in food security in your kebele. Its ultimate goal is gathering information to achieve the stated objective for conducting research for the fulfillment of academic requirement. Your genuine and correct response for the questions help the researcher to come up with the right and correct finding at the end. Therefore, since any response for the questions kept secret and not given to unathourized person without your consent, give appropriate and genuine answer for each question without any fear and trouble.

Thank you so much!

Part I

General background of the households

1. **General questions**

1.1. Name of the kebele_____

1.2. Sex of household head Male _____ Female_____

1.3. Age of household head_____ (in year)

1.4. Number of family size_____ Male_____ Female_____

1.5. Educational level of household head Not read and write ☐ Read and write ☐ Primary (1-8) ☐ Secondary (9-12) ☐ Certificate and above ☐

1.6. Marital status of household Married ☐ Single ☐ Divorced ☐ Widowed ☐

1.7. Religion Orthodox ☐ Muslim ☐ Protestant ☐ Catholic ☐ Other ☐

1.8. How long have you been participating in wheat production? _____years

2. Asset status of household

2.1. Number of livestock

S.N.	Types of livestock	Number	TLU
1	Oxen		
2	Cows		
3	Calves		
3	Goats		
4	Sheep		
5	Poultry		
6	Other		

2.2. Do you have land? Yes_____ No_____

2.3. If your answer for question No 2.2 is yes, how much in hectare according to the following categories?

Types of land	Size in hectare
Crop land	
Grazing land	
Forest land	
Barren land	
Farmstead	
Irrigable land	

2.4. What proportion of your landholding was covered by the following types of crops in 2019/20? (Estimate)

S.N.	Types of crops	Amount in hectare
1	*Teff*	
2	Wheat	
3	Barely	
4	Maize	
5	Sorghum	

6	Pulses	
7	Oil seeds	
8	Vegetables	
9	Others	

2.5. Compared to the land needs of your household, how do you rate your present landholding?

A. More than enough B. Enough C. Too small D. Not at all

2.6. If your answer for Question no. 2.5 is 'C', how do you fulfill the land requirement of your household?

A. Purchasing land C. Share cropping

B. Renting from other farmers D. Other (please, specify)

2.7. If your answer for question no 2.6 is A or B, how is the cost?

A. Too expensive B. Moderate C. Low/cheap

2.8. How much money did the household earned from the following sources during last crop-year? (Estimate)

S.N.	**Sources**	**Estimated income in Birr**
1	Livestock and their products	
2	Grain sales	
3	Firewood and charcoal sale	
4	Credit	
5	Transfer	
6	Others	

3. Agricultural production practices and constraints

3.1. Did you use the following farm inputs in 2017/8 production year?

A. Fertilizer Yes_____ No _____
B. Herbicides/insecticides Yes _____ No _____

C. Selected seeds Yes _____ No _____

3.2. What amount of the following farm inputs did you apply during last crop-year per hectare of farmland?

A. Fertilizer _____kg/hectare

B. Herbicides/insecticides _____ liters/hectare

C. Selected seeds _____ kg/hectare

3.3. How do you rate the current cost of fertilizers? It is;

A. beyond my capacity C. high but I could afford to buy

B. fair D. cheap

3.4. Where do you obtain agricultural inputs?

A. Cooperatives/union C. NGOs E. Private shops F. other (please specify) _____

B. Research center D. OoARD

3.5. Why did you prefer the chosen sources to get the needed inputs? _____

3.6. Do you always get inputs at the right time? A. Yes _____ B. No _____

3.7. If your answer for question no 3.6 is No, what are the reasons?

A. Unavailability B. Far distance C. Others (specify)

3.8. Do you always get inputs in the quantities that you need? A. Yes ___ B. No ____

3.9. If your answer for question no 3.8 is No, why? (Multiple response is possible)

A. I am not sure of the benefit C. Too expensive D. Not available on time

B. Cash shortage E. Other (please, Specify) _____

3.10. What do you use to plough your land? A. Own Oxen B. Rented Tractor

C. Rented oxen D. Others (please, Specify) _____

3.11. If rented tractor, how much it costs you per hectare _____birr, how about if rented oxen _____birr/hectare?

3.12. What do you use to harvest your wheat? A. Manually harvested B. Combiner harvester

3.13. If you use combiner for harvesting how much you paid per quintal in 2017/8 harvesting time? _____birr, how if manually _____birr/man day.

3.14. Where do you store wheat after harvest?

A. In sacks C. Granary

B. Mud made material "Gombisa" D. Other (please specify) _____

3.15. What are the major wheat production constraints?

S.N.	**Constraints**	**Rank according to their severity**	**Remark**
1	Rust		
2	Low soil fertility		
3	Mono cropping		
4	Weed		
5	Shortage of inputs		
6	Shortage of selected seeds		
7	Low price of wheat		
8	Shortage of rainfall		
9	Problem of high rainfall		
10	High price of inputs		
11	Pest outbreaks		
12	Other (please, specify)		

3.16. Are you supported by rural development agent in your farm activities?

A. Yes _____ B. No _____

3.17. How do you rate the importance of the rural development agents? (Estimate)

A. Very important B. Moderately important C. Unnecessary

3.18. How far the center of development agent from your homestead in km?

A. Less than 1km B. 1-5km C. 6-10km D. more than 10km

3.19. How much quantities of grain did you produced during last crop year (2017/18)?

S.N.	**Grain types**	**Quantity produced in quintals**	**Quantity sold in quintals**	**Quantity kept for seed in quintals**
1	Wheat			
2	Barely			
3	Maize			
4	Sorghum			
5	Pulses			
6	Oil seeds			
7	Teff			
8	Others			

3.20. Your crop output over the last years has been

A. increasing B. constant C. decreasing

3.21. If your answer is 'C' for question no 3.20, what do you think is the reason?

_____

3.22. Do you think that your annual crop output is sufficient to your family?

A. Yes B. No

3.23. If your answer is 'no' for question no 3.22, how do you cope with food grain shortfalls?

A. reducing number of meals B. selling animals

C. consuming wild foods D. borrowing cereals from relatives or friends

E. food Aid F. selling assets

G. other (please, specify) _____

3.24. How many kgs of cereals you received from relatives in the last production year or season (2017/18)? _____

3.25. What was the amount of cereals you provided for relatives in different form in the last production season 2017/18 in kg? _____

3.26. Have you experienced pest outbreak in the last crop season (2017/8)? A. Yes B. No

3.27. If your answer for question no 3.26 is yes, how did you solve it?

A. Using pesticides B. Traditional way of controlling pest C. Other (please, specify)

3.28. What are the cost of wheat production and its amount in 2017/18?

S.N.	Types of cost	Quantity	Unit price	Total cost
1	Fertilizers in kg/hectare			
2	Selected seeds in kg/hectare			
3	Pesticides in liter/hectare			
4	Herbicides in liter/hectare			
5	Labor cost in birr/hectare			
6	Combiner cost in birr/hectare			
7	Tractor cost in birr/hectare			
8	Transport cost in birr/kg			
9	Other (please specify)			

Part II: Questions related to wheat value chain

4. Marketing

4.1. Where do you sell the wheat?

A. Farm gate D. Zonal market

B. Local market E. National market

C. *Woreda* market F. Other (please, specify) _____

4.2. Why do you choose this market place?

A. Its nearness D. Lack of transportation

B. Better price E. Lack of storage facility

C. Availability of buyers F. Other (please specify) _____

4.3. To whom did you sell your wheat crops last year (2017/18)? (multiple answers are possible)

A. Processors C. Cooperatives E. Consumers

B. Brokers D. Retailers F. Wholesalers

4.4. Why did you prefer the mentioned buyers/markets to sale your production?

A. Gives better prices B. Under contract C. Consistent & pays cash

D. Only proximate trader E. Others (Specify) ___

4.5. When did you get the money after sale?

A. As soon as you sold B. After some hours C. On the other day after sale

D. Other (please, specify) _____

4.6. What do you do, if the product is not sold on time?

A. Took back to home C. Took to another market

B. Sold it at lower price D. Sold on other market day

4.7. What mode of transportation do you use to transport your crops to the market?

A. Vehicles B. Pack animals C. Man power D. Other (please, specify)

4.8. Why do you prefer the mode of transport you use for moving your wheat product to the market? Specify _____

4.9. How far the near by market from your farmstead in km? _____

4.10. How far the near by road from your home in km? _____

4.11. Do your wheat products have preferred qualities by buyers? A. Yes B. No

4.12. If your answer for question no 4.11 is No, what interventions are needed to improve quantity and quality of wheat production to attract better prices? _____

4.13. Do you consider quality requirement of your customers in your production process?

A. Yes B. No

4.14. If your answer for question no 4.13 is Yes, what quality requirement do you consider (specify)_____

4.15. What was your source of information about quality requirement of your customers? _____

4.16. Do you have marketing information last year (2017/18)? A. Yes B. No

4.17. If your answer for question no 4.16 is Yes, from whom did you get the market information? A. DAs B. Kebele administration C. Woreda experts D. Radio E. Brokers F. From market G. Others (please, specify) _____

4.18. What type of information did you get? A. Price information B. Market place information C. Buyers' information D. Other (please, specify) _____

4.19. At what time interval do you get the information? A. Daily B. Weekly C. Monthly D. Other (please, specify) _____

4.20. Was the information you get is valuable? A. Yes _____ B. No _____

4.21. Did you know the market prices of wheat products before you sold? A. Yes B. No

4.22. If yes for question no 4.21, what is the price of wheat at the nearby market in kg? _____.

4.23. What is your perception towards current price of wheat? a. Attractive b. Not attractive

4.24. To whom you sell your wheat? (multiple answer is possible)

A. Cooperatives B. Trader in kebele market C. Traders

D. Local assembler E. Other (please, specify) _____

4.25. What is the reason for choosing the one selected in question 4.24?

A. Pays high price than others B. Low transportation cost C. Frequent purchase D. If others, please specify _____

4.26. Did you face difficulty in finding buyers when you want to sell wheat products?

A. Yes B. No

4.27. If your answer for no 4.26 is Yes, due to: A. Inaccessibility of market

B. Lack of market information C. Low price offered D. Other (please, specify) ___

4.28. Who sets your selling price for wheat in last season? A. Yourself B. Buyers

C. Set by demand and supply D. Negotiations E. Others (please, specify) _____

4.29. Why do you need to sell your wheat production?

A. Surplus production D. To purchase other food stuff

B. Payment of credit E. Purchase of educational and health services

C. Purchase of cloths for household members F. Others (please, specify) _____

4.30. Do you have any form of agreement with processors? A. Yes ____ B. No ____

4.31. If your answer for question no 4.30 is yes, what form of agreement do you have? Please, specify _____

5. Access to credit

5.1. Did you have access to credit last season/year (2017/18)? A. Yes ____ B. No_____

5.2. If your answer is yes for question no5.1, from where did you obtain credit (received or loan money?

A. Bank C. Microfinance D. Trader E. NGOs

B. Cooperative/union F. Others (please, Specify) _____

5.3. If your answer for question no 5.1 is no, why?

A. Lack of interest C. Fear of paying back D. Effect of bureaucracy

B. Lack of information E. others (please, specify) _____

5.4. If you borrow money from any financial institution, do you pay on time or as expected?

A. Yes B. No

5.5. If your answer for question no 5.4 is no, why? Please, specify_____

5.6. For what purpose have you borrowed the money?

A. Purchase of agricultural input D. For purchase of home material

B. For purchase of food stuff E. For educational and health payment

C. Other (please, specify) _____

6. Access to cooperatives, universities and research centers

6.1. Did you have access to cooperatives last season/year (2017/18)? A. Yes ___ B. No_____

6.2. If your answer for question no 6.1. is yes, why or what did you get from?

A. Better seeds and fertilizers availability C. Membership

B. Attractive price of inputs D. Other (please specify) _____

6.3. If your answer for question no 6.1. is no, why?

A. Inaccessibility C. Require membership E. Other (please, specify) _____

B. Lack of interest D. Bureaucracy

6.4. Did you have access to universities last season/year (2017/18)? A. Yes ___ B. No_____

6.5. If your answer for question no 6.4. is yes, what is the role of universities or research center for the production of wheat?

6.6. If your answer for question no 6.4. is no, why?

A. Inaccessibility C. Lack of knowledge on their role

B. Lack of information D. Other (please, specify) _____

7. Training and advisor services

7.1. Have you ever participated in wheat production system training in the last years?

A. Yes _____ B. No _____

7.2. If your answer for question no 7.1. is No, why? _____

7.3. If your answer for question no 7.1 is Yes, on which aspects, by whom and for how long you have got the training?

S.N.	Training types	By whom	For how long (days)
1	Wheat production		
2	Crop management		
3	Wheat marketing		
4	Pre and post-harvest handling		
5	Input application		

6	Harvesting		
7	Other (please specify)		

7.4. Did you get advisory service on wheat production practices before?

A. Yes _____ B. No _____

7.5. Who provides the advisory service? (Multiple response is possible)

A. Development agents C. NGOs E. Research centers

B. Woreda OoARD experts D. Neighbors and friends F. Others (specify) ____

7.6. 5. How do you get the advisory service? (Multiple response is possible)

A. Farm to farm visit by the development agent D. experience sharing tour

B. Visit to demonstration/ model farmers' site E. Other (please, specify) _____

C. Training

Part III: Questions related to food security

The following questions used to collect data related to the types of food groups the household members consumed within the home within the past 24hours.

Dear household heads, now I would like to ask you about the types of foods that you or anyone else in your household ate yesterday during the day and at night. Read the list of foods and place *one* in the box if anyone in the household ate the food in question, place *zero* in the box if no one in the household ate the food.

Household dietary diversity measure questions

S.N.	Questions and Filters	Coding Categories Yes=1 No=0
A	Any bread, rice noodles, biscuits, cookies, or any other foods made from millet, sorghum, maize, rice, wheat?	
B	Any potatoes, any other foods made from roots or tubers?	
C	Any fruits?	

D	Any vegetables? Any dark, green, leafy vegetables such as, bean leaves, spinach, pepper leaves?	
E	Any beef, lamb, goat, chicken, other birds, liver, kidney, heart, or other organ meats?	
F	Any eggs?	
G	Any fresh or dried fish or shellfish?	
H	Any foods made from beans, peas, lentils, or nuts?	
I	Any cheese, milk or other milk products?	
J	Any foods made with oil, fat, or butter?	
K	Any sugar or honey?	
L	Any other foods, such as condiments, coffee, tea?	

Copping strategy questions

S.N.	In the past 7 day, if there had been time when did not have enough food or money to buy food, how many days has your household had to:	Frequency: Number of days out of the seven	Severity weight: To be ranked by FGDs
A	rely on less preferred & less expensive food?		
B	purchase food on credit?		
C	borrow food, or rely on help from a friend or relatives, governments?		
D	gather wild food, hunt, or harvest immature crops?		
E	send household members to eat elsewhere?		
F	consume seed stock held for next season?		
G	send household members to beg?		
H	limit portion size at mealtime?		
I	restrict consumption by adults in order for small children to eat?		
J	feed working members of the household at the expense of non-working?		
K	reduce number of meals eaten in a day?		
L	skip entire day without eating?		
M	collect & sale charcoal?		
N	burn & sale firewood?		
O	work on others farm in exchange of food grain?		

Source: adopted from Messay (2012); Maxwell & Caldwell (2003)

Appendix 2: Checklist for Focus Group Discussion

Focus group participants,

The objective of this study is to assess the wheat value chain and its role in food security in your *kebele*. Its ultimate goal is gathering information to achieve the stated objective for conducting research for the fulfillment of academic requirement. Your genuine and correct response for the questions helps the researcher to come up with the right and correct finding at the end. Therefore, since any response for the questions kept secret, give appropriate and genuine answer for each question without any fear and trouble.

The focus group discussion is designed to gather information on different functions in wheat value chain, the actors involved in the wheat marketing, the flow of product, information and knowledge, types of relationships and linkages exist among the actors in the value chain, identification of upgrading strategies in the chain, analyze the governance structure available, identification of challenges in wheat marketing and other related issues stated in the research objectives.

Thank you so much!

I. Could you identify the major chain actors who are actively involved in wheat marketing in your areas with their functions? And which are more beneficial?
II. How is the value chain of wheat structured in your area?
III. Considering the complexity and the transactions of wheat, the rules exercised in wheat marketing, capabilities in the supply base and degree of co-ordination.
IV. What upgrading options for wheat value chain are available? and what are their advantages?
    A. Product upgrading
    B. Process upgrading
    C. Functional upgrading
    D. Chain upgrading
V. What are the major factors that affecting producers' decision to participate in wheat products market and the amount they are supplying to the market?

VI. What are the major constraints for producers, collectors, retailers, wholesalers and processors to operate in the value chain?

VII. What overall recommendations do you have in wheat production in your areas and the overall activities that have to be taken in enhancing the benefits through upgrading the livelihood of smallholder producers?

Appendix 3: Interview questions for woreda and Zone experts

Dear respondent,

The objective of this study is to assess the wheat value chain and its role in food security in your woreda/zone. Its ultimate goal is gathering information to achieve the stated objective for conducting research for the fulfillment of academic requirement. Your genuine and correct response for the questions helps the researcher to come up with the right and correct finding at the end. Therefore, since any response for the questions kept secret, give appropriate and genuine answer for each question without any fear and trouble.

A. Do you plan and work in collaboration with wheat producers to increases the production and productivity of wheat? How do you reach the producers?
B. What can you do to link the producers with the market to overcome the problem of marketing in the woreda/zone?
C. How do the wheat value chain create employment opportunities and how it contributes to ensure the food security of the community?
D. How is/was the production and productivity of the wheat crops in the woreda/zone (increases/decreases)? If it was decreases, what is the reason behind?
E. Are the wheat producing farmers equally consulted and supported by the development agents in the woreda/zone?
F. What are/were the main challenging factors of the wheat producers in your woreda/zone? And what are/were the solution formulated and implemented to solve the problem?

Thank you so much!

Appendix 2: Average annual rainfall in the study area

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1992	24.1	1.6	98.1	117.9	194.8	106.3	208.5	148.6	38.8	55	4.9	2	1000.6
1993	4.5	61.5	52.3	142.2	108.7	210	138.3	234.4	62.6	49.1	0.9	14.4	1078.9
1994	2.5	37.5	206.9	123.1	117.9	100.7	67.4	179.6	60.3	44.8	3.2	23.2	967.1
1995	12.9	36.5	85	201.3	52.7	79.5	184.6	262.6	103.4	129.6	8.3	5	1161.4
1996	20.2	46.2	98.3	155.6	82.8	87.1	172.9	155	67.2	101.1	11.6	80	1078
1997	4.1	224.9	108.1	146.9	38	60.4	155.1	217	72.8	8.5	17.2	3.3	1056.3
1998	5.3	68.5	140.9	30.9	81.1	123.3	197.2	255.1	97.4	8.9	0.9	30.2	1039.7
1999	112.9	91.2	39.4	130.1	54.7	116.9	164.3	216	36.1	126.7	52.4	13.1	1153.8
2000	55.2	99.4	2	148.9	175.8	123.9	163.8	222	138.2	50.3	3.5	3.2	1186.2
2001	0.8	0	37.6	128.2	50	168	246.5	274.7	95.7	6.3	38.6	5	1051.4
2002	0	41.4	94.2	151.8	73.4	50.1	181.7	230	157.2	17.5	1.2	32.4	1030.9
2003	35	3.1	5.9	58.7	12.3	140.2	55.5	154.3	124.9	229.2	158.3	86.1	1063.5
2004	8.3	4.7	34.1	112.4	54.3	61.6	159.2	254.6	97.1	52.4	14.2	6.8	859.7
2005	1.5	125.1	190.5	153.4	25.3	76	154.1	124.5	67.3	45.1	7.4	12.4	982.6
2006	14.2	55.1	25	87.5	143.3	230	121.2	165.4	87.3	56.9	13.5	3.6	1003
2007	4.8	0	85.9	20.5	8.3	177.3	111.2	110.6	78.9	43.5	23.5	6.9	671.4
2008	0	5.8	68	65.2	24.9	281	269.8	116.5	125.4	155	118	6.9	1236.5
2009	0	0	51	64.5	103.5	123.6	147.5	213	67.3	43.6	26	5.8	845.8
2010	5.3	68.5	143	30.9	81.1	123.3	197.2	255.1	97.4	8.9	0.9	30.2	1041.8
2011	112.9	91.2	39.4	130.1	54.7	116.9	164.3	216	36.1	126.7	52.4	13.1	1153.8
2012	55.2	99.4	2	148.9	175.8	123.9	163.8	222	138.2	50.3	3.5	3.2	1186.2
2013	0.8	0	37.6	128.2	55.6	168	246.5	274.7	122.4	6.3	38.6	6.3	1085
2014	0	41.4	94.2	151.8	73.4	142.6	193.5	189.4	157.2	18.5	12.4	6.9	1081.3
2015	35	4.8	5.9	58.7	12.3	140.2	87.5	167.3	189.5	143.6	122.6	86.1	1053.5
Ave.	21.4791	50.325	72.7208	111.9875	77.2791	130.45	164.65	202.433	96.6125	65.7416	30.5833	20.2541	1044.52

Annex 3: Composition of major foods most commonly consumed in the area

S/N	Description of major food kinds in the area	Average kcal/100 gram
Wheat	(1) boiled wheat (*mullu*), (2) wheat flour + maize flour + water (*buddena*), (3) wheat bread, (4) wheat flour + water (*buddena),* (5) porridge	170.18
Barley	(1) roasted barely flour + salt + water *(basso),* (2) barely flour + water *(buddena),* (3) barley flour + water *(bread),* (4) whole roasted barley *(akawi)*	226.27
Maize	(1)cooked maize flour with salt and water (porridge), (2) cooked maize flour with milk, salt and water (porridge), (3) split boiled maize with salt (*qinche*) cooked maize flour with meager salt and water (bread), (4) cooked maize flour, fermented (*buddena*)	127.83
Sorghum	(1) Boiled red sorghum (*mullu*), (2) sorghum + emmer wheat + water (*buddena), (3) pure* sorghum + water (*buddena*), *(4)* sorghum + tef + water (*buddena*).	185.83
Tef	(1) tef flour + sorghum flour + birds eye chili (*buddena*), (2) pure tef flour + water (*buddena),* (3) tef flour + sorghum flour (*buddena)*	161.20
Potato	shallot + garlic + chili + oil + ginger + salt (sauce or *itto*)	63.00
Bean	(1)split broad bean + butter + chili (sauce or *itto*), (2) split broad bean + shallot + oil + chili + garlic + ginger + salt (sauce or *itto*), (3) split broad bean + roasted pea flour + oil + chili (sauce or *itto*), (4) split broad bean + pea flour + shallot + chili + butter+ garlic + fenugreek + salt (sauce or *itto*)	75.00
Chick pea	(1) split chick pea + shallot chili + oil + garlic + salt	227.00

	(sauce or *itto*), (2) roasted chick pea + salt *(qollo)*	
Pea	(1) roasted pea flour + butter + chili + shallot + salt + spices (sauce or *itto*), (2) roasted pea + salt *(qolo),* (3) roasted pea flour + shallot + oil + turmeric + salt (sauce or *itto*)	138.00
Lentil	(1) split lentil + butter + shallot + chili + salt (sauce or *itto*), (2) split lentil + chili + shallot + oil + salt (sauce or *itto*)	93.50

Source: Computed based on EHNRI/FAO (1998) food composition table

Annex 4: Tropical Livestock Utility Conversion Table

Types of livestock	Number of livestock	Conversion factor	TLU
Ox	717	1.00	717.00
Cow	390	1.00	390.00
Calf	291	0.34	98.94
Goat	409	0.15	61.35
Sheep	1251	0.15	187.65
Poultry	2351	0.005	11.755
Donkey	497	0.65	323.05