

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

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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 should 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

1. 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 work in agriculture is very high [15]. As [28] reveal 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 Ethiopian since the number of people engage in the sector is very high which accounts for more than 80% [4, 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, 26]. Wheat has been 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, 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"* [16-18]. 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 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 hamper 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.

2. Study Area, Methods, and Materials

2.1. 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°08'58"N - 8°49'00"N latitude and

38°41'55"E - 40°43'56"E longitude. Having the total area of 21009Km², it accounts for about 5.8% of the total area of the Regional State [12].

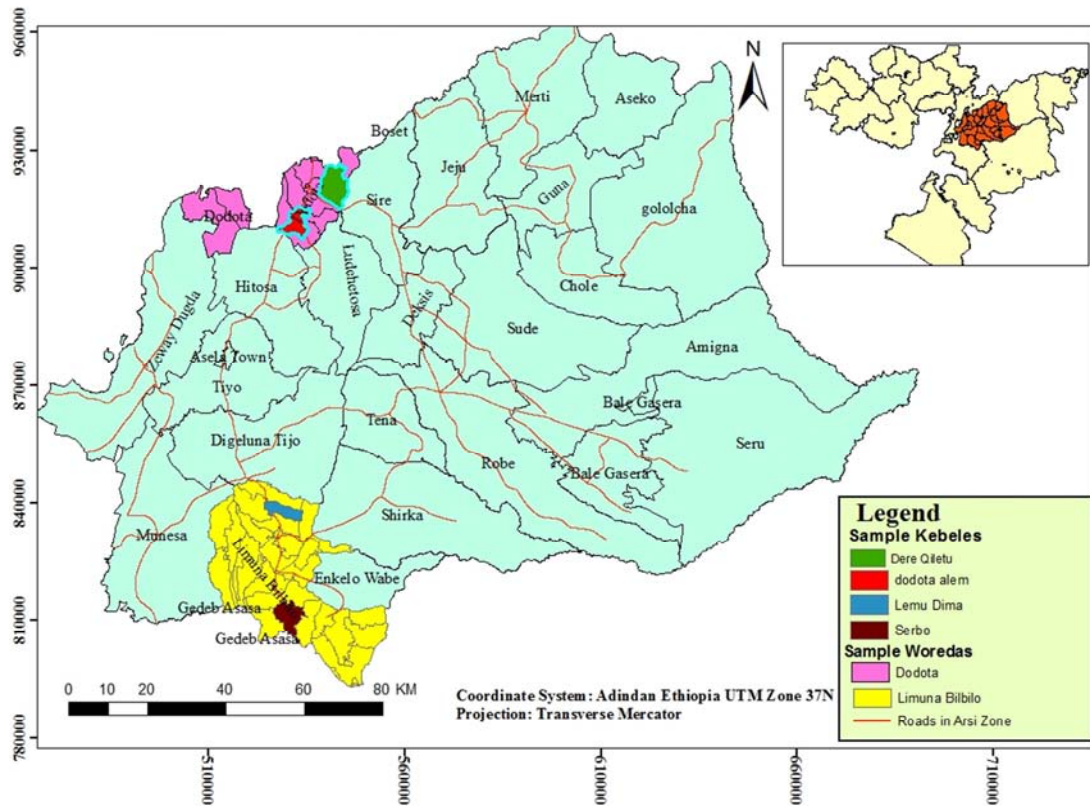


Figure 1. Map of the study area (Source: Produced from Ethio GIS data base).

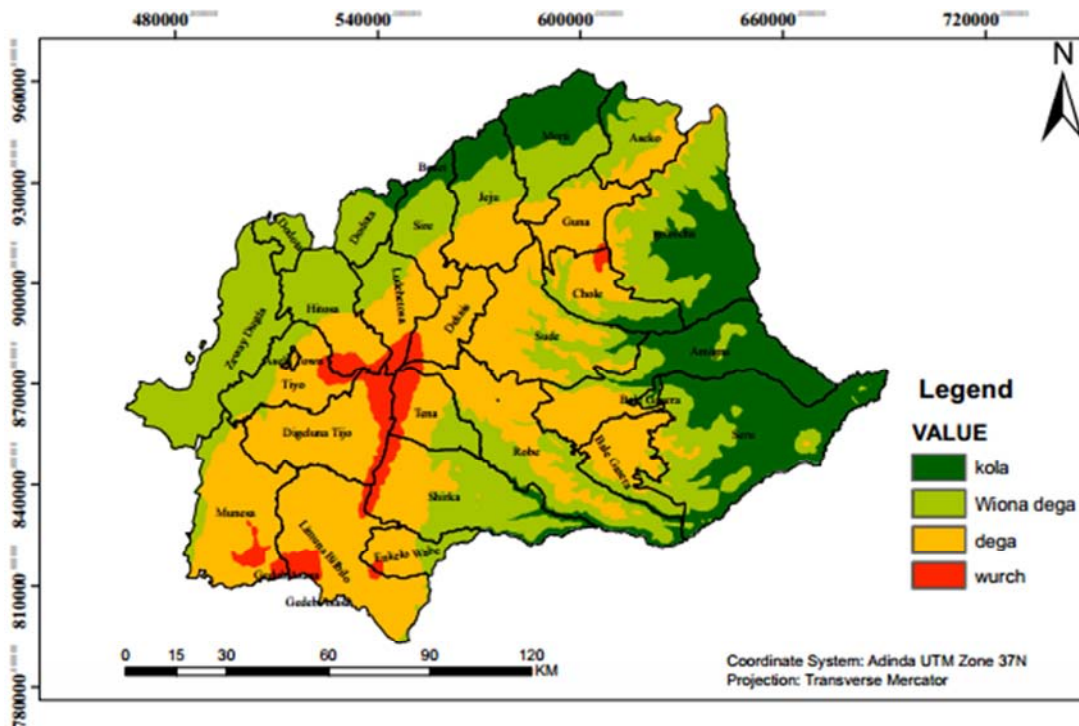


Figure 2. Agroclimatic map of Arsi Zone (Source: Produced from Ethio GIS data base).

2.1.1. 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 Wabishabele 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, 29].

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 Wabishabele tributaries such as Wabe, Robe, Elele, Megna, Gololcha, Ejersa and Shenan 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].

2.1.2. 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/km²) 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].

2.2. Methods and Materials

2.2.1. 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, 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, 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, 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, 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.

2.2.2. Research Designs and Approaches

Plano Clark et al. [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, 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).

2.2.3. 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.

2.2.4. 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

2.2.5. 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.

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

Where, n=refers to the number of sample size

P=degree of freedom

q=population proportion ($q=1-p=1-0.5=0.5$)

e=significance level

N=total population

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

2.2.6. 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 deducted. 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:

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

Where, NMM=Net Marketing Margin

3. Finding and Discussion

3.1. 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

		kebele of household head				Total	%
		Dire Kiltu	Limu dima	Sarbo	Dodota Alem		
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

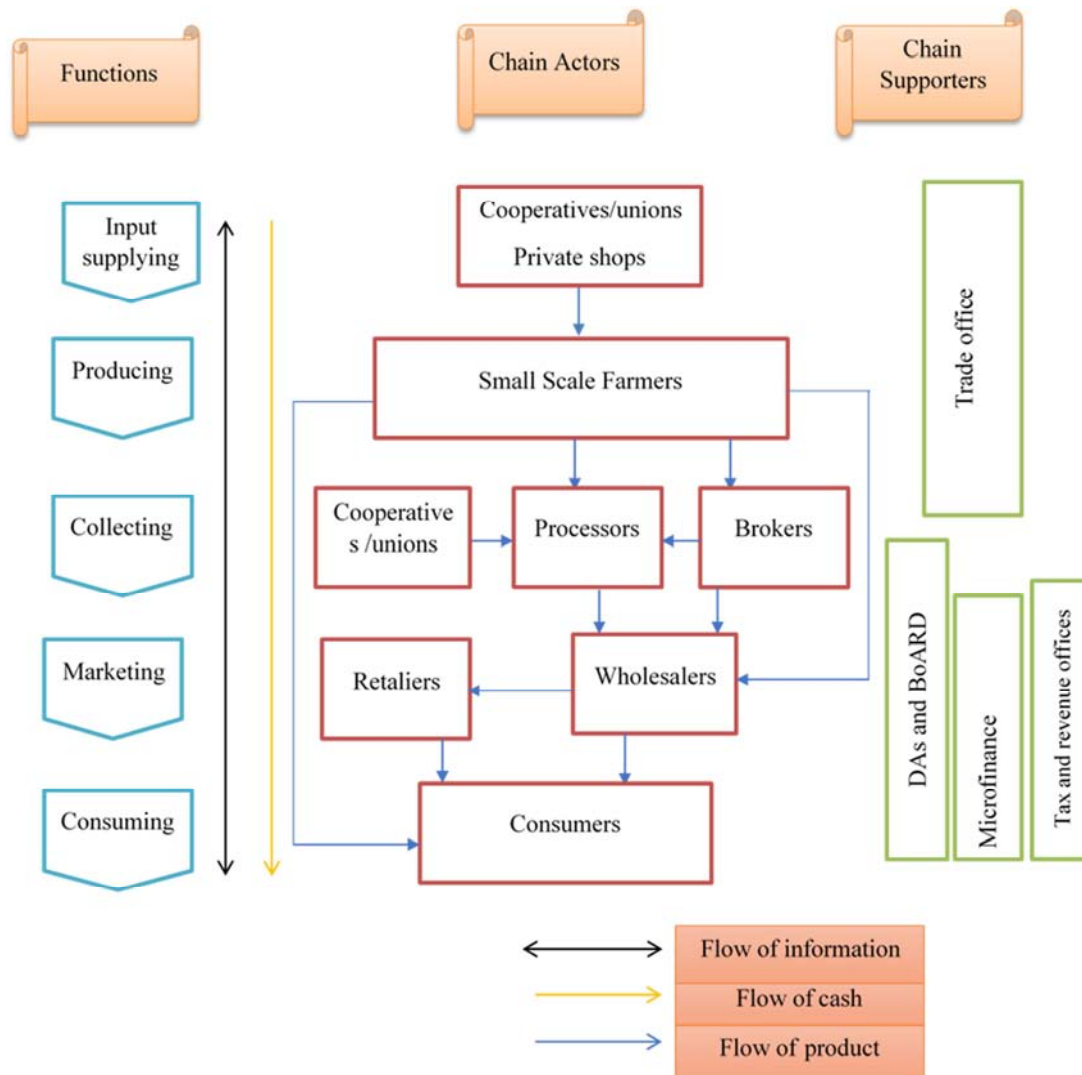
Sources: Computed from survey result

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.

3.2. 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

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.

3.3. Wheat Value Chain Actors and Their Functions

This section attempts to identify and discuss the main and supportive actors across 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.

3.3.1. 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 discussants, 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.

3.3.2. 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.

3.3.3. 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.

3.3.4. 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.

3.3.5. 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.

3.3.6. 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.

3.4. 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 *kebeles* 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.

3.5. 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

3.6. 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

3.7. 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
	Oilseeds	46,348.00
	Teff	30,618.00
	Maize	2944.00
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

3.8. 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, 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.

3.9. 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, 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%).

3.10. Role of Wheat Value Chain in Food Security

Value chain adoption to the agricultural sector in agrarian

countries has an enormous potential to increase the availability and affordability of the agriculture product for the poor household. Likewise, the wheat value chain which incorporate 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.

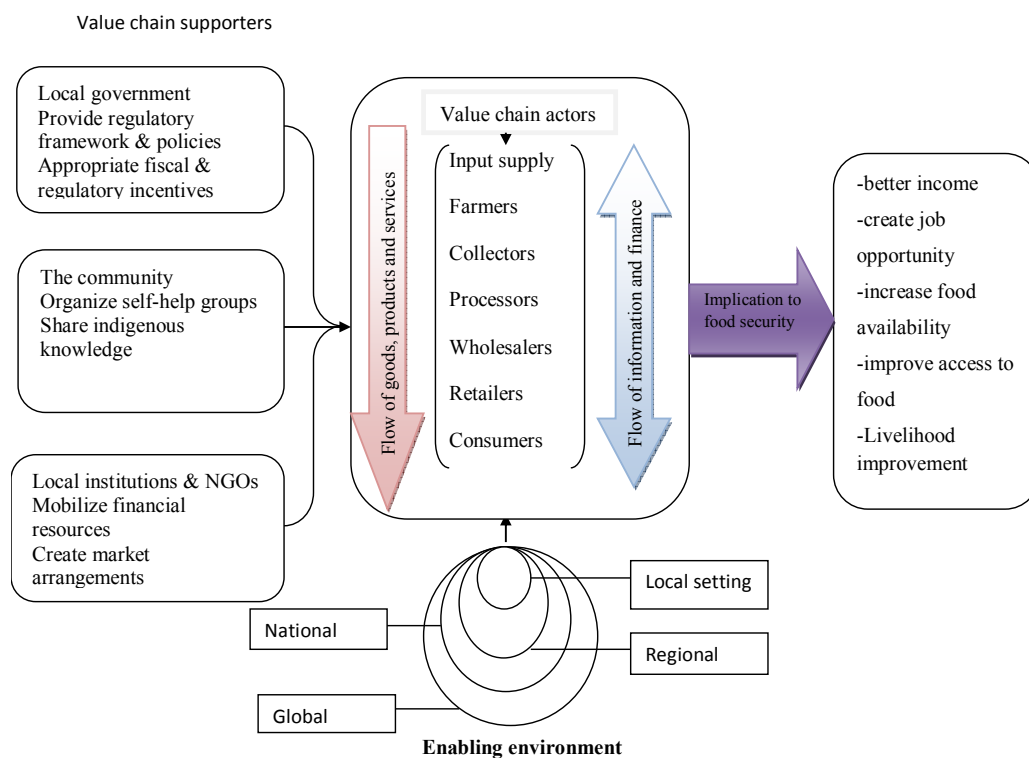
In a well-functioning wheat value chain, the input suppliers provide the inputs required for wheat production timely and in the required amount for the producers to increase the production and productivity of their produces. But as seen in the previous discussion above the result from the group discussion 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 produces 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 generate 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 increases 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 chain in the study area create a wider opportunity for different actors involved in the chain. It creates job opportunity for input suppliers, farmers, daily laborer (work on the farmers field, loading on cart and car, and cleaning in store), owner of tractors and combines, brokers, processors, wholesalers and retailers. This help those actors to generate income which increases the economic capacity of different poor and non-poor actors for food. This help them to ensure their food security status.



Source: Developed by a researcher from survey and literature

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

It is obvious that connecting smallholder farmers in the study area with effective and efficient market is the way to increase 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 were encounter marketing problem. They were forced to sold their produces for 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.

4. 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 increase 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.

Competing Interests

The authors declare that they have no competing interests.

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