Value Chain Analysis of Wheat (*Triticum aestivum*): The Case of Dembecha District, West Gojjam Zone, Ethiopia

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Abstract

This study aimed to analyze the value chain of wheat in Dembecha district of West Gojjam zone. A total of 130 farm households, 30 traders, 2 bakers, 1 processor, 4 cooperatives and 10 consumers were used to collect the data. Functional and institutional approach of value chain analysis showed input providers, producers, cooperatives, collectors, wholesalers, retailers, and processors were found to be important wheat value chain actors. Four firms concentration ratio (CR4) was found to be 39.78% and there were information asymmetry and observed barriers to enter into wheat market. Buying, selling and pricing strategies showed deviation of wheat market from competitive market norms. Analysis of marketing margins revealed that processors received the highest (39.72%) marketing margin and retailers received the least marketing margins (4.85%) from consumers' price. Even if wheat in the study area deviate from competitive market norms as a result of oligopolistic market structure and conduct, profitability analysis of wheat market showed all market actors operated at profitable level. Supporting farmers and increase productivity through practical research, develop pie-growing mechanisms among actors, founding agro-processing firm, providing infrastructural facilities, designing advance way of disseminating market information, determining appropriate pricing strategies should be done to strength value chain development.

Keywords: Dembecha, Market Concentration ratio, Pie-growing, Value chain, Wheat

Introduction

Ethiopia's agricultural productions play a significant role in the local economy as a means of earning livelihoods for smallholder farmers, creating jobs and generating foreign exchange revenues (ATA, 2015; Wolfgang and Muluken, 2016).

However, the sector faces many challenges, making it more and more difficult to achieve its objective-feeding the nation each year. Population growth, urbanization, change in consumption habit, climate change, and other agricultural chain related constraints found at different stage of agricultural products chain

limit the significant share of the sector for most developing countries including Ethiopia (Acham and Rebecca, 2013).

Wheat (*Triticum aestivum*.) is one of the strategic cereal crops for the majority of Ethiopian's population. It plays an important role in the development of the agricultural sector and improvement in the income levels and livelihood situations of the farmers in developing countries. The contribution of wheat crop to national income was so large about 64% growth in total volume production in less than a decade (2006-2013) was achieved because of the wheat production sector (CSA, 2014). Moreover, the crop is high in terms of its contribution to food security and to the agricultural economy. It is the fourth importance crop in term of total gross value production and the second importance food next to maize in Ethiopia (FAO, 2015; ATA, 2015). With regard to the area of cultivation, wheat is the fourth most widely grown crop after *teff*, maize, and sorghum (CSA, 2017).

Wheat production and its marketing in Ethiopia is increasingly becoming as the means of livelihood for a million of smallholder households in Ethiopia and has grown significantly in the country in the past decade; represent an average annual growth of 7.5%. With respect to marketing, wheat production is the largest sub-sector in the economy and nearly 20% of the productions are marketed annually, which makes it second next to *teff*.

However, the production level of wheat and its value chain in Ethiopia are focused on the domestic level. Due to this reason wheat production level in not adequate enough and local consumption of wheat exceeds production and the country imports wheat for domestic demand. Between 25 and 35 percent of wheat is imported per annum for domestic consumption. Moreover, wheat manufacturing sub-sectors in the country performs below their capacity due wheat supply problem at the national level (Addis Ababa chamber of commerce and Sectoral Association) ACCSSA, (2017).

Smallholder farmers are the dominantly wheat producer, and accounts more 92% of the country wheat land. These farmers are characterized as subsistence oriented, low productivity, entirely dependent on weather with little investment in irrigation and characterized by the traditional market system (USAID, 2016). Regardless of the many promises held via decision makers to support these smallholders to solve their farming constraint, they still talk of dissatisfaction to the extent of support delivered to their pressing issues including; lack of adequate improved seed supply from seed enterprises, insufficient credit facilities, delayed pesticide delivery, lack of sufficient farm mechanization service provider, impracticality of research outcomes to growers first hand challenges.

Value chain analysis has attracted

considerable attention in recent years as a means to increase stabilize farm income and increase production, productivity and marketing agricultural product including wheat. It is also considered as a key strategy to improve market structure, and to reduce exposure to volatility of product supply and help to set coordinated linkages during product movement (Kirimi *et al*., 2011; ILO, 2012). It helps to improve a given chain through coordinating value chain participants and a helpful instrument for serving the needs of a particular market sector. This helps to create buyer-driven value chains which characterized by knowledge intensity and market pull, relatively higher levels of technology or skills, customer order, or capital-intensive production practices (Efa *et al.,* 2016).

Lack of relevant market information, poor marketing alternatives, limited marketing institutions, and limited/absence of vertical or horizontal integration, absence/limited trust among value chain actors, inadequate or nonexistence coordination among chain actors and lack of marketing infrastructure such as storage, transportation services limits wheat value chain development (Yami *et al.,* 2012). Therefore, well-performing value chain and marketing system which satisfies consumer demands with the minimum margin between producers and consumer prices is essential to become competitive in this days business (Sultan, 2016). The existing bottlenecks/constraints had not yet been studied and documented. This study, therefore, attempted to investigate the value chain of wheat, with a view to filling the existing gap, in Dembecha district of North Western Ethiopia specifically on identifying wheat value chain actors and their roles and also to analyze the structure, conduct and performance of wheat market in the study area.

Research Methodology

Description of the Study Area

Particularly the study was undertaken in Dembecha district. The district is one of the 15 districts of the western Gojjam zone in Amhara National Regional State. Dembecha is the name of the district as well as administrative center of the district and it is located at 205 km away from Bahir Dar town, Amhara regional state capital in Western direction on the main road from Bahir Dar to Addis Ababa. Dembecha is bordered in west by Bure, in the northwest by Jabi Tehnan*,* in the north by Dega Damot, and on the east and south by Misraq Gojjam. Towns in Dembecha district include Addis Alem, Dembecha , Zeleka and Yechereka. The district has 29 *kebeles* of which, 25 are rural while 4 are urban *kebeles* (Dembech District Livelihood report, 2017).

Agricultural production is the main means of livelihoods in the district. The main crops produced in the area include maize, wheat, sorghum, *teff* and pepper. Livestock husbandry is

dominated by cattle, sheep, goats, horse and donkey. The altitude of the district ranges from 1500 to 2999 meter above seas level. The agro ecological condition of Dembecha district is suitable for the production of cereals and grain legumes. About 87% of land area in the district lies in mid-highland (*Woinadega*) whereas the remaining 12 % is high land (*dega*) and less than 1% is low land (*kolla*). The districts have monomodal rainfall distribution with average annual rainfall reaching 1006 mm (Dembech District Livelihood report, 2017).
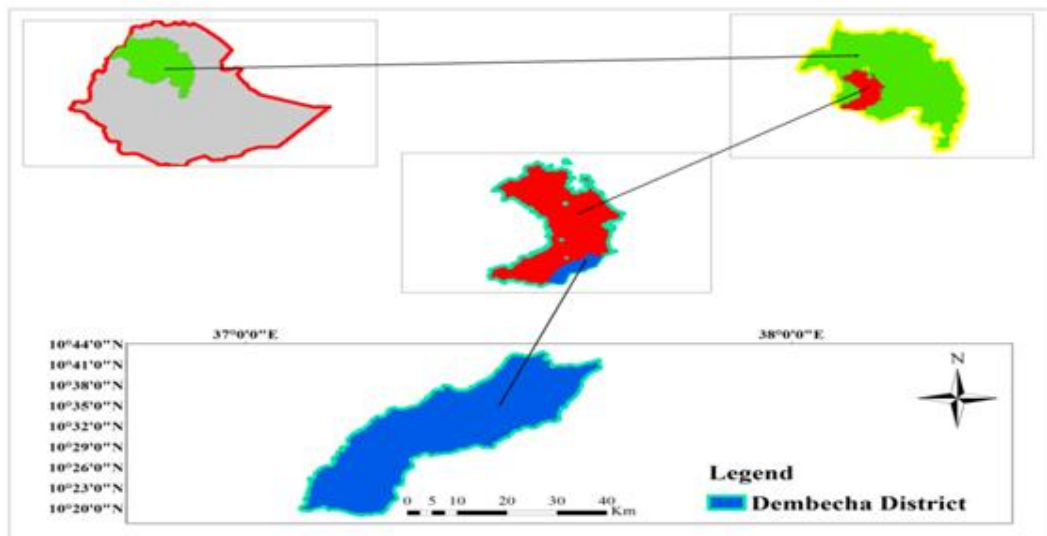

Figure 1. Location Map of Dembecha district

Sampling method and sample size

Two stage-sampling techniques were employed to select sample wheat producer households. In the first stage, out of twenty-five wheat producers 'rural *kebeles* in Dembecha district, four *kebeles* namely Zeleka, Egziabherab, Jajjirab and Wad were selected randomly. Then, in the second stage wheat producers from the sample *kebeles* with the intended sample size were selected randomly using probability proportion to population size sampling technique.

There is no common consensus on formula or rule of thumb that yields optimal sample size and the controversy is still unsettled. So, scholars have failed to reach common consensus, which leads various researchers to use various methods to determine sample size. Thus, based on the above justifications, a sample size of 130 sample households was drawn from the total of 4527 wheat producing households in the survey and therefore a sample size of 130 in

this case is adequate enough for generalizing findings. Hence, value chain research needs additional sample from chain participants a total of 30 traders, a census of 2 bakeries, a census of 1 processor and 4 cooperatives and also 10 consumers that purchase wheat from farmers in 2016/17 were used for the study.

Data sources and collection methods

The study used primary and secondary data source to collect data. The primary data were collected by using of pre-tested semi structured interview schedule from selected farmers, traders, processor, bakers and consumers. The primary data collected from farmers include demographic and socio-economic characteristics, cost of production, quantities produced and sold, potential buyer of their product, and price related information, quantity sold to different alternatives, main input source experience in wheat farming and quantity of improved seed varieties used in 2016/17 production year.

Data from traders includes socio-demographic characteristics, type of trade, experience in wheat trade business, cost of transport used, selling and buying price of wheat, potential customers, accessibility of storage facilities, quantities purchased and sold, initial and current working capital, the amount of credit, purchasing strategy, sources and destinations of wheat and number of collection points. Secondary data required for the study were taken from the Central Statistical Agency, published and unpublished sources, district agricultural and natural resource office, and trade and industry office of the Districts. To triangulate the answers provided by sample respondents, key informant interviews and focus group discussions were held with farmers, development agent and traders by using checklists.

Data Analysis
Functional and Institutional Approach of Value Chain Analysis

Value chain analyses (VCA) provide an overview of the actors, their activities, and flows of commodities, money and information and can identify challenges and suggest interventions (Kaplinsky and Morris, 2001). Functional and institutional approach of value chain analysis was used to study value chain actor, their roles and linkages. The following steps of value chain analysis were applied in this study. In first stage, the main value chain actors and their roles were identified and mapped. Then, based on the direction and volume of product flow the existing market channels and its performance were analyzed.

Structure-Conduct-Performance of Approach of market Analysis

For this study, concentration ratio, market transparency (information) and entry barrier were used to measure the structure of the wheat market over Gini coefficient and Herfindahl Index

(HHI) because of both Gini Coefficient and Herfindahl Index require more data and it is difficult to achieve such full data in developing country like Ethiopia (Kotler, 2009).

$$CR \ 4 \ = \ \sum_{1}^{4} S_{i} \qquad i= 1, 2, 3, 4$$

Where Si = the percentage market share of ith firm and i = four largest traders for which the ratio is going to be calculated.

In addition, the numbers of buyer and sellers (one or many), price setting strategy (trader, market and negotiation), quality determiner (standardize), bargaining power and the impact of physical location of the market on prices and marketing arrangements were taken for evaluating conduct of wheat market. Moreover, this study used marketing cost, margin and market return (profit) as a measure of wheat market performance across different channel.

Estimates of the marketing margins are the best tools to analyze performance of market and marketing margins of market actors were calculated by taking the difference between producers and retail prices. The producers share is the commonly employed ratio calculated mathematically as, the ratio of producers' price to consumers' price. Mathematically, producers 'share can obtain as follows:

$$PS \ = \ \frac{PP}{CP} \quad \text{and} \quad PS \ = 1 - \frac{MM}{CP}$$

Where: PS = Producer's share, PP = Producer's price, CP = Consumer price and MM = marketing margin

$$TGGM \ = \ \frac{CP \ - \ PP}{CP} * 100$$

Where, TGMM = gross marketing margin, CP =consumer price, PP= producers price.

$$GMMT \ = \ \frac{CP \ - \ TGMM}{CP} * 100$$

Where, GMMT = marketing margin of traders, Sp = Selling price, Bp = Buying price

Result and Discussion

Map of wheat value chain

Value chain mapping enables to visualize the flow of the product from conception to end consumer through various actors. In this study, value chain analysis helps to identify the different actors involved in the wheat value chain, and to understand their roles and linkages. Consequently, the current value chain map of wheat is depicted in Figure 2. Based on this function, potential value chain actors were identified; their roles, functions, value adding processes, marketing and relationship were sorted out.

As depicted below, the map lists functions vertically along the left-hand side with the final markets across the top. The participants or actors of the value chain are designated by boxes at the middle. The enablers /supporters of wheat value chain are at the right-hand side of the chain. Product, information and financial flows are represented by single solid, double solid and single broken line arrows, respectively.
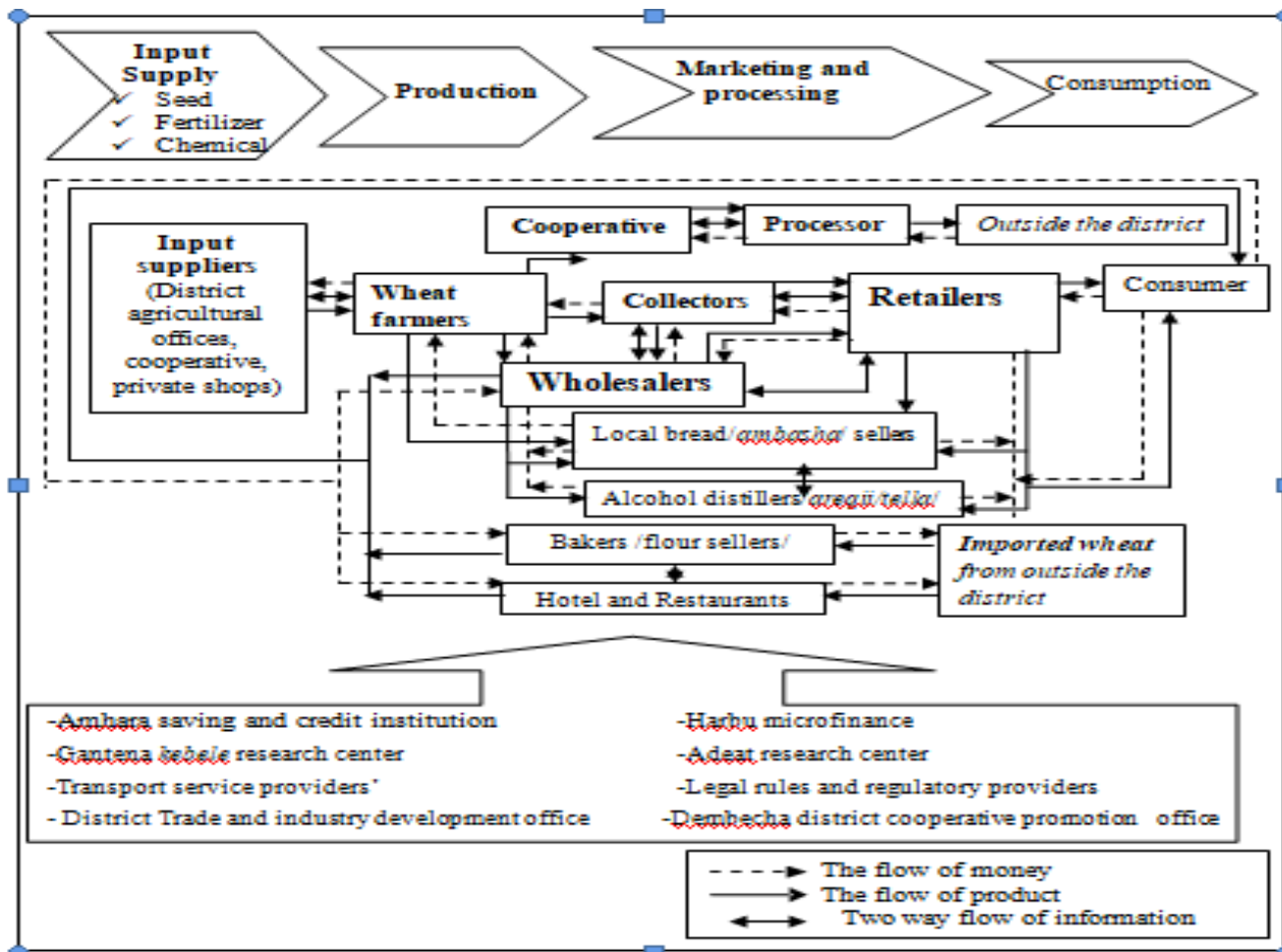
Figure 2: Value chain map for wheat

Value chain actors and their roles

Value chain actors highlighted as those participants who are participated directly or indirectly in the value chain development of wheat. These actors may participated in either of input provision, production, marketing, processing, consuming or involved the one who involved in participating to the above listed activities. In this study, value chain actors of wheat include direct actors (input suppliers, producers, traders, consumers) and indirect actors are those that provide financial or non-financial support services, such as credit agencies, business service providers, government, cooperatives, researchers and extension agents.

Input suppliers: Input application is one of the most important farming activities that are used by wheat growers to produce and market in the study area. Among other input; seeds, fertilizer (Urea and DAP), chemicals (2, 4-D and Pallas) and farm implements are the major ones that wheat producers used to produce. These inputs were provided by different wheat value actors. Primary cooperatives, district agricultural developments office and individuals and private shops are the major input sources in the district. Cooperative unions of the zone indirectly participated input provision through its branch at district level.

Wheat producers: They are smallholder farmers of the district who produce wheat for market and/or consumption. Wheat producers are important actors who perform most of the value chain functions right from farm inputs preparation on their farms or procurement of the inputs from other sources to post harvest handling and marketing. They are the main actors of the chain by participating both in the product market to supply their output and factor market in purchase basic inputs from input suppliers. Among others activities ploughing, sowing, fertilization; weeding, pest/disease controlling, harvesting, post-harvest handling and marketing are mainly undertaken by wheat farmers.

Collectors: These are actors in the wheat value chain who collects wheat from smallholder farmers in village markets or at the farm gate and reselling it to wholesalers and retailers in district market (Dembecha). Collectors facilitate transaction by serving as an intermediary among wheat producers, wholesalers and retailers. Buying, assembling, transporting, packing and selling to wholesalers and retailers are some of the important activities done by them.

Wholesalers: They are key actors in wheat value chain and participated in buying relatively large volume of wheat from collector or producers and selling it to retailers and consumers. Wholesalers have relatively strong working capital, better storage house, and communication access than any

other traders of the district. They govern the value chain of wheat in the study area as most of the time they determine quantity, price, quality of wheat that the upstream and downstream actors are selling or buying from them.

Retailers: Retailers delivers wheat to consumers. In the present study, they are all located in the district town. They own and handle wheat for a short period and incur relatively small marketing cost to the product. They purchase from collectors and wholesalers at district market and resale it to consumers. They have limited working capital and operate in small scale compared to other wheat traders of the district.

Cooperatives/unions*:* They play significant role for wheat value chain development by promoting producers to produce more by providing input and buying output at relatively good price. Most cooperatives in the study area located near the village market (*kebeles*) and this helps wheat farmers to become more informative on production and marketing strategy. Besides, the cooperatives also distribute sugar and oil mainly to members. They purchased from wheat farmers and resale to the union processors.

Processors: Millers/flour factory are also another wheat value chain actors that process wheat purchased from district cooperatives and distribute the processed flour to flour wholesalers, retailers, hotels/restaurants, bakers,

and also directly to consumers. It is located outside the district. Potential customers for the processors are also found in different parts of the zone.

Local alcohol processers: They are important value chain actors that purchase wheat from retailers and wholesalers and process wheat in to local alcohol which is locally named as *areqi* and *tella*. Buying, grading, sorting, milling, processing and selling alcohol is the most important task of alcohol processors. Local alcohol processing recently becomes as an important business that creates multi-dimensional job opportunities like fattening of oxen.

Local bread/ ambasha/ sellers: Those actors engaged in the marketing of bread prepared from wheat. They purchased from wheat grower farmers, retailers and wholesalers.

Hotels/Restaurants/Bakers: They are also actors of wheat value chain that take wheat flour from processors or flour sellers outside the district and provide to district consumer. Those groups of respondents were complaining the absence of flour factory near to them and the main reason for the relatively high cost of bread and other wheat products.

Consumers: They are the end actors in wheat value chain. Wheat is consumed in the form of bread, *kollo*, *enjera* and alcohol (*tella*, *areqi*). Therefore, the marketed wheat reaches consumers through direct purchasing from farmers or from wholesalers,

retailers, hotels and restaurants as food and alcohol. Residents of the rural and urban, peoples visiting markets, travelers, etc. are the major consumers of wheat and wheat product in the study area.

Chain supporters/enablers*:* Those are either individual or institution that are engaged either in financing or supporting main actors of wheat value chain to perform different value chain activities. They do not participate directly in the wheat value chain, but indirectly facilitate major actors in wheat in the chain to make their task effective and practical. District agricultural and natural development office, cooperative promotion office, micro finance (Harebu micro finance), Amhara Saving and Credit Institution, district trade and market development office, transport service providers are the major supportive institutions playing a central role in the provision of such services.

Marketing channels of wheat

Wheat market channel for this study were designed based on volume of flow of product (wheat) passing through different routes during the 2016 /17 cropping season. Seven wheat-marketing channels were identified to deliver the product from producer to consumers. A total of 3516 quintals of wheat was produced by the sampled wheat producers' households. As depicted below, the major identified channels from the survey were listed as follows:
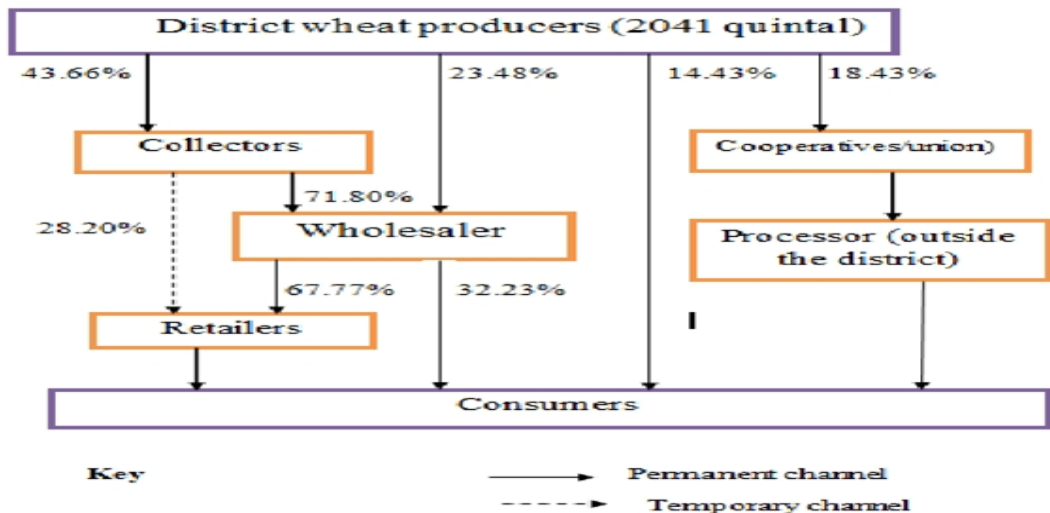
Structure-conduct and performance of wheat market

Structure of wheat market

Market concentration, degree of transparency (market information) and entry conditions such as licensing procedure, lack of capital and managerial know how was used to evaluate wheat market structure.

Four firms' concentration ratio:

CR4 for four largest firms at district level was found to be 39.78. This implies wheat market in the study area is characterized by weak oligopoly market structure, indicating the existence of market imperfection. Four wheat traders handled annually 39.78 % of the total volume of wheat purchased by the sample traders and thereby wheat market at district level is inefficient and noncompetitive.

Market Transparency (information):

the availability of accessible and timely information on price is a crucial for market participants. All wheat traders were get market information, but wheat producers were affected by lack of clear and reliable market information. Focus group discussion and key informants support the existence of information asymmetry among participants. This implies the market deviates from competitive norms as result of poor information flow.

Barriers to entry: Capturing data from traders were difficult due to the reason that sampled traders are already in the business. However, dealing on traders characteristics like educational level, trade experience, working capital requirement and legal licenses was considered to get such information. Education background, working capital and license were barriers to enter wheat market. The focus group discussion and key informants showed that a means acquiring customer is one barrier to enter in wheat trade business.

Conduct of wheat market

The agricultural loan collection schedule, governmental taxes, the existence of many religious and cultural festivals and the easement time for farmers following the harvest season makes farmers to supply more and traders to cut the market prices. Moreover, distance of the market from their residence, absence of storage house near to market center and competition among traders are some of the determinants that makes traders in unusual way in the study area. Therefore, conduct of wheat market showed wheat traders behave in unusual way to maximize their profit.

Performance of the wheat market

The performance of wheat market was evaluated by considering associated costs, returns and marketing margins. The Ethiopian Birr (ETB) per quintal was used as a standardized unit of measurement for performance analysis.

Marketing cost: wheat producers incur production costs for production prior to marketing. Most households used their family labor, oxen and land for wheat production, opportunity costs were used to compute costs of production. The average cost of wheat production was 375.63 Birr/qt, of which 37.6 percent were spent for purchasing inputs and about 31.68 percent costs were used for land rent.

The processors cost is highest (ETB 156.60 per quintal) from other actors. This is may be due to additional cost for processing. The cost is followed by cooperatives (59.50 Birr/qt) and collectors (41.71 Birr/qt) as they undertake more value adding activities as they directly received from farmers and needs more transportation cost to transport to their potential customers. Similarly, the structure of marketing cost revealed that transportation cost is the highest cost for all other market actors except processors.

Marketing margin: The marketing margin of an agent was calculated using the average price of wheat for that particular agent. However, there are situations that one market agent sold at different price to the next actors. The result from focus group discussion and key informants interview also showed that quantity, transportation cost and quality are among the important factors that were considered to differentiate price.

Total gross marketing margin (TGMM) is highest in channel VII (46.62 percent) and followed by channel VI and II which accounts for 17.72 percent of the consumer price and lowest which accounts 8.06 percent of consumer prices and producer share (GMMp) is uppermost (91.94 percent) of consumer price in channel V. This result shows as number of marketing agents decreases the producers share increases and vice versa. The higher number of middlemen in the commodity market, the more profit they retain for their services. However, the existence of a high market share does not necessarily mean that the market is performing well and wheat traders or the smallholder producers are getting fair benefits from the wheat marketing.

Table 1: Wheat marketing margin for different channels (Birr/qt)

Channel	GMMp	GMM col	GMM cop	GMMpr	GMMwho	GMMrt	TGGM
I	100						0.00
II	82.28	7.34				10.38	17.72
III	85.63	6.58			7.79		14.37
IV	82.28	6.32			6.90	4.49	17.72
V	91.94				8.05		8.06
VI	88.35				7.45	4.49	11.65
VII	53.38		6.88	39.72			46.62

Moreover, processors obtain relatively highest gross marketing margin (39.72%) of consumer price in channel VII followed by retailers which was 10.38 % in channel II among wheat traders. Retailers also obtain lowest market margin (4.49%) from other traders as they purchase from wholesalers. This implies share of market intermediaries from consumers' price was substantial and thereby it reduces producers' share from consumers' price.

Profitability Analysis:: The profitability analysis results showed that wheat producers' market profit was highest when they directly sell to consumers in channel I which is 265.62 birr/qt and cooperatives in channel VII which is about 258.49 birr/qt while taking lowest market profit when they sell to collectors which accounts 234.27 birr/qt. Among traders processors shared the highest profit 339.97 birr/qt in channel VII. Retailers gained the second highest profit of 60.44 birr/qt from channel II, when they bought from collectors and sold to consumers. The profitability analysis showed that all wheat market actors are profitable. Cost-benefit analysis reveled that traders receive relatively high profit by adding relatively small cost. Additionally, producers are relatively disadvantaged from wheat market due to disproportionate share of profit relative to cost. The result is in line with study by Abrham (2009).

Conclusion and Recommendation

Value chain actor's relationship, information flow, pie growing mechanisms is very weak among value chain of wheat in the study area. Traders and producers did not cooperate and work together to enhance production rather they try to cheat each other to maximize their own benefit. This makes wheat value chain to be ineffective in the study area. The structure-conduct-performance paradigm of wheat market in the study area appeared to be poor structured (weak oligopoly), and deviating from competitive norms. Due to this reason producers are the most disadvantaged from wheat market and thereby the market area is not performing well.

Based on the finding of this study the following recommendations are necessary drawn: facilitate agro-processing establishment, supporting farmers, increase production through practical research, providing pie-growing mechanisms, increase farmers bargaining power and providing infrastructural facilities, designing advance way of disseminating market information, determining appropriate pricing strategies based on true costs of production should be done by government or any other stakeholder to strength the value chain of wheat in the study area.

Acknowledgements

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