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DEPARTMENT OF COOPERATIVE STUDIES

**Analysis of Grain Marketing in Southern Zone of
Tigray Region, Ethiopia**

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DECLARATION

This is to certify that this thesis entitled “**Analysis of Grain Marketing in Southern Zone of Tigray Region, Ethiopia**” submitted in partial fulfillment of the requirements for the award of the degree of M.A, in Cooperative Marketing to the School of Graduate Studies, Mekelle University, through the Department of Cooperative marketing, done by Mr. Ashenafi Amare, Id.No. FDA/PS0015/00 is an authentic work carried out by him under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

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Abstract

An efficient agricultural marketing is crucial for effective agricultural and rural development, particularly with regard to sustained increase in agricultural production, and farmer's income. The market for grain is the largest of all markets in Ethiopia in terms of the volume of output handled, the number of market participants involved, and the vastness of the geographical area of operation. This study examined grain marketing in Ofla and Endamohoni wereda with the specific objectives of identifying marketing channels, organizational structure and coordination of the grain markets, and identifying factors affecting grain supply in the weredas. A total of 145 head of households were selected randomly using probability proportional to sample size (PPS). Data from 24 traders was also collected from the two markets. This particular study revealed that 41% of the total grain production in the sample area was supplied to the market. According to the results of the study in 2009/10, 30% and 23% of farmers' production was purchased by cooperative unions and directly by consumers, respectively. The measures of market concentration indicated that the grain market structure in the study area is fairly competitive; however the existence of barriers to entry, and the constraints facing traders have a negative impact on the performance of the grain marketing system. The major barriers to entry in to grain trade in the study areas included lack of working capital, market information and high competition with the cooperative unions and unlicensed traders. The major determinant factors affecting market participation decision and quantity of grain supply were estimated by Tobit and Heckman two stage econometric models. Among the variables included in the analysis, 5 variables such as nonfarm income, total livestock unit, oxen number, market information and yield influence the quantity of grain supply positively significantly and family size affected negatively the supply of grain at 5% significant. Transport cost was identified as the major cost component of marketing costs which accounted 44.19% and 45.13%, for wholesalers and assemblers respectively. The main grain marketing constraints for traders are shortage of capital, shortage of supply, lack of timely and accurate market information, poor access to credit and competition with unlicensed traders were few of the inherent problems. The possible recommendations forwarded are support formal access to credit for traders and farmers, strengthen access to market information encourage licensing of traders, intervention to increase production by using improved agricultural inputs, strengthen cooperatives and their unions and conduct a research on the different components of the marketing system.

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ACRONYMS AND ABBREVIATIONS

| | |
|-------|--|
| ADLI | Agricultural Development Led Industrialization |
| BoARD | Bureau of Agriculture and Rural Development |
| CIA | Central Intelligence Authority |
| CSA | Central Statistics Authority |
| CC | Contingency Coefficient |
| Coop | Cooperative |
| DECSI | Dedebit Credit and Saving Institute |
| ECPA | Ethiopian Cooperative Promotion Agency |
| ECX | Ethiopian Commodity Exchange |
| EGTE | Ethiopian Grain Market Trade Enterprise |
| GDB | Gross Domestic Product |
| GMM | Gross Marketing Margin |
| IML | Inverse mills ratio |
| LDC | Less Developed Countries |
| NGO | Non Governmental Organization |
| OLS | Ordinary Least Squares |
| PAs | Peasant Administrations |
| PPS | Probability Proportional to Sample size |
| SCP | Structure -Conduct - performance |
| TLU | Tropical Livestock Unit |
| VIF | Variance Inflation Factor |

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1. INTRODUCTION

1.1. Back ground

Rural Development is a corner stone for development in Ethiopia, and its success is mainly dependent on the performance of the agriculture sector. Contributing to 49% of the total GDP, 60% of foreign exchange earnings and absorbing 84% of the labour force, agriculture remains to be the mainstay of the economy (CSA, 2007). However, recurrent drought, population pressure, environmental degradation and other manmade factors have seriously been affecting its contribution to the economy.

Ethiopia's agriculture is small scale farming. Most agricultural producers were subsistence farmers with small holdings, often broken into several plots. As Enrique (1999) stated small farmers are the backbone of agricultural industry. They produce the staple crops such as cereals, oil crops, vegetables and animal products, which contribute significantly to import substitution.

About 90 percent of the agricultural output is produced on subsistence small holder farmers in the highlands. In the countries long term economic development strategy 'Agricultural development led industrialization' has been designed to target small holder private agricultural economy with aim of maintaining food security and strengthen economic growth (Asefa, 2005).

The economy of Ethiopia is based on agriculture and many other economic activities depend on agriculture, including marketing, processing, and export of agricultural products. A large part of exports commodity are provided by the small agricultural cash-crop sector. Exports are almost entirely agricultural commodities, and coffee is the largest foreign exchange earner (Ayen, 2004). Ethiopia's livestock population is believed to be the largest in Africa.

As Tesfay (2005) stated Ethiopia has a potential in agriculture, for self-sufficiency in grains and for export development in livestock, grains, vegetables, and fruits. However, as many as 4.61 million people need food assistance annually. In Ethiopia most farm households are engaged in crop-livestock mixed farming diversifying in different crops

and animals. They diversify in order to cope with the risks inherent in the agriculture related to weather diseases, pests, prices and so on.

Understanding the role of agriculture as the source of all development endeavors, the government of Ethiopia designed agricultural development strategy known as Agricultural Development Led Industrialization-ADLI (2001). The government of Ethiopia, in its guiding policy document, ADLI strategy, has explicitly stated that the goal of industrialization in Ethiopia would not be achieved without increasing substantially the agricultural production and productivity and strengthens the linkage of agriculture with market. The strategy considers agriculture as the engine of growth on account of its potentiality to linkages, surplus generation, potential market creation, provision of raw materials and foreign exchange earnings. The strategy further pointed out that the success of ADLI could be assured mainly by improving the performance of agricultural marketing. At present the Federal and Regional governments are doing their level best to transform the existing subsistence agriculture into market oriented commercial production system.

The transformation of the production system both for major domestic and export agricultural commodities requires the existence of efficient marketing system that can transfer the produced agricultural commodities from the point of production to the required market for both domestic consumption and export the required quantity and quality at the required time at the least possible cost. Thus, scientific investigation to identify the marketing constraints and opportunities for the sector as whole and by sector and commodity in particular is important to tackle the constraints and also to utilize the opportunities.

According to Wolday (1994), in Ethiopia the performance of agricultural marketing system is constrained by many factors such as: poor quality of agricultural produce, lack of market facilities, weak extension services which ignored marketing development, poor linkage of research and extension, absence of marketing information and intelligent services, excessive price and supply fluctuations, limited access to credit, inefficient handling including, storage, packaging and transportation problems.

Farmers in Ethiopia in general are affected by low producers' price, on the one hand and high consumer price on the other hand. One of the reasons for this dilemma, according to Wolday (1994), is lack of proper transportation facilities and other infrastructural services. Transportation costs accounts for about 66% of the marketing cost. In addition, most farmers are not in a position to take advantage of seasonal price differences because of limited income to cover their financial commitments, which in most cases have to be settled soon after harvest.

Market development is considered as one of the priorities for boosting agricultural production. Marketing activities also have an intrinsic productive value, in that it adds time, place and possession utilities to products and commodities. Through the technical functions of storage, processing, and transportation and through exchange, marketing increases consumer satisfaction from any given quantity of output. An efficient agricultural marketing is crucial for effective agricultural and rural development, particularly with regard to sustained increase in agricultural production, farmer's income and improvement of the food security capabilities (Arora, 1997).

Farmers' organizations can also play an important role in processing and marketing. The government considers the creation and improvement of Cooperatives and their Unions as a tool for the improvement of agro-processing and marketing (Eleni et.al, 2007).

Marketing cooperatives are increasingly growing in number and capacity in many regions of Ethiopia and handle many types of farm products. A marketing cooperative is a business organization owned by farmers to collectively sell their products. It allows farmers to accomplish collectively functions they couldn't achieve on their own. Most agricultural producers have relatively little power or influence with traders that purchase their commodities. Joining with other producers in a cooperative can give them greater power in the marketplace. In addition, cooperatives can give producers more control over their products as they make their way to consumers by allowing them to bypass one or more middlemen in the market channel. Farmers capture more of the returns that would otherwise go to others.

Agricultural marketing cooperatives perform many functions. They may assemble the products of a number of producers into larger lots to facilitate more efficient handling and more competitive sales. It enables farmers to correct market failure where prices are too low, gain market power (negotiating power) against much larger buyers, spread risks and costs; and, have enough volume to operate a processing plant efficiently or enough to meet the demands of buyers.

1.2. Statement of the Problem

Production decisions are guided by subsistence orientation of farmers and there is limited marketable surplus. The market conditions are far from perfect and the information available to farmers is highly inadequate to generate any response to the market stimuli. Measures to increase production are incomplete without steps to increase market supply. The cash needed to purchase production inputs depends on the income earned from the sale of farm products.

In the rural areas of Ethiopia, farmers do not have the opportunity to sell their products at competitive prices. Important inputs, such as fertilizer, improved seed and chemical, are either unavailable or their prices are usually high making them very expensive and unprofitable to farmers to use. Limited resources, low levels of adoption and use of improved technologies and lack of adequate infrastructure and institutions that support agricultural development are the major factors behind low productivity of small scale agriculture in Ethiopia that lead to production patterns dominated by the satisfaction of subsistence requirements and food insecurity at both household and national levels (Bekabil, 2004).

For the past two decades, recognition of critical role of markets in economic development led to sweeping market reforms across a number of developing countries. In spite of these reforms, symptoms of poorly functioning markets in much of Sub-Saharan Africa are evident in the segmentation of markets, low investment in the market infrastructure and the persistence of high margin (Eleni, 2001).

The dynamic role of marketing in economic development cannot be overemphasized. Marketing not only bridges the rural supply/demand with the urban demand/supply, but

through this process it also makes an active and positive contribution to economic development. Price information helps producers to make production decisions, which are allocatively efficient (White, 1995 cited in Gebremeskel, 1998).

As Gebremeskel (1998) stated the market for grain is the largest of all markets in Ethiopia in terms of the volume of output handled, the number of producers, consumers and other market participants involved, and the vastness of the geographical area of operation. Million of farmers and consumers as well as a number of marketing agents are engaged in the production and consumption of grain and in the provision of diverse marketing services, namely, buying, selling, transporting, storing, processing, retailing, etc. Therefore any improvement in grain marketing in Ethiopia would stimulate agricultural development and overall economic growth. A well-functioning grain marketing system would significantly improve incentives for rural productivity and would reduce substantial costs for low income urban consumers. Access to timely and accurate grain market information is also crucial for policy makers and implementers to allow them to understand and effectively address market problems in Ethiopia.

The proper use of the forces of marketing for economic development requires critical evaluation of the existing marketing system, introduction of appropriate marketing policies and procedures with the aim of conceiving and formulating practically workable solutions to the marketing problems. Introduction of appropriate marketing policies and procedures calls for an understanding of whether the system is performing well or not. To ascertain this there is a need to evaluate and control the existing marketing (Elias, 2005).

The well functioning of the grain marketing system depends on its organizational structure and vertical-spatial integration of the marketing system (Abrham, 2009). However, there is a little empirical information on the structural organization of the grain market, the nature of different market participants and the subsequent impacts on the performance of the grain market. As Abrham (2009) stated an informed policy decision in regards of improving the performance of the agriculture marketing system needs an updated information on the – existing structure, conduct, and performance – of the market/

Some attempts were made by some scholars on the subject reflecting the conditions prevailing after the introduction of country's economic reform and market liberalization. They provide useful information on the organization and functioning of the grain market system. However, the impacts of the growing role of cooperatives and improving infrastructure were not grasped in these studies, and they do not represent the situation in all regions. These new developments might have introduced a new organizational structure in the marketing system. Thus, this study attempted to bridge the current information gap on the grain marketing system, structure and conduct in grain marketing, factors affecting grain market supply and major constraints and problems of grain marketing in Ofla and Endamohoni weredas.

1.3. Objectives of the Study

The major objective of this study is to analyze the grain marketing performance in Ofla and Endamohoni weredas and identify the major problems and constraints with the following specific objectives:

1. To identify grain marketing channels and the linkage of marketing actors.
2. To assess the organizational structure of the grain market in the study area.
3. To describe factors affecting supply of grain in Ofla and Endamohoni wereda.
4. To identify major constraints of the grain marketing.

The major questions of the study are the following:

- What potential of grain supply do the study areas have and what are the factors that determine the level of farm households' grain supply?
- How is the grain marketing system organized?
- What are the major problems and constraints in grain marketing?

1.4. Significance of the Study

Information generated through the evaluation of grain marketing system, its components, marketing facilities, services and intermediaries, and understanding factors affecting variation in grain price could be a critical input in designing appropriate grain marketing policies and procedures. The same information could also be of valuable to extension

agents, farmers, marketing intermediaries and consumers who can use these pieces of information in making their respective decisions.

1.5. Scope and Limitation of the Study

This study is carried out in Southern zone of Tigray region in Ofla and Endamohoni wereda. Due to time and budget limitations and accessibility problems, the study is conducted only in 10 kebeles of the two weredas and two market towns. The study focused on factors affecting grain supply and the organizational structure of the market. More specifically, it has focused on the different market levels, roles of marketing actors in the marketing channel, market direction and bargaining characteristics of producers, traders' purchasing and selling strategies, traders' characteristics, and the process of competitions. Furthermore, institutions involved directly or indirectly in grain marketing has been examined to generate relevant data.

2. LITERATURE REVIEW

2.1. Market and Marketing Concepts

A market is traditionally defined as a specific geographical area where buyers and sellers meet for exchange of goods and services. The most common way we obtain goods and services we do not produce ourselves is to buy them from others who specialize in producing them. To make such purchases, buyers seek out sellers in markets. Markets are ways in which buyers and sellers can conduct transactions resulting in mutual net gains that otherwise would not be possible (Hyman, 1989 cited in Andargachew, 1990).

Modern definition considers market as an arena for organizing and facilitating business activities and for answering the basic economic questions (Kohls and Uhl, 1985) described market as how much to produce? What to produce? How to distribute production? A location, a product, a time, a group of consumers, or a level of the marketing system may define it. The choice as to which market definition to use depends on the problem to be analyzed. (Bain and Howells 1988, cited in Andargachew, 1990) described market as simple arrangements to facilitate exchange of one thing for another.

The most observable features of a market are its pricing and exchange processes. This investigation adopts the product definition of market. A market is also defined to include people, money and willingness to buy (Stanton and Futrell, 1987). In this context, market is another name for demand (McNair and Hansen, 1956, cited in Andargachew, 1990).

Another basic concept that is closely related to market is marketing. This term came into use with division of labor and specialization and became common with urbanization and industrialization over many years. The term marketing has been a very debatable concept and defined in so many different ways by different scholars. This is because marketing, or more specifically agricultural marketing, projects different impression to different groups of people in a society, like farmers, traders and consumers (Kohls and Uhl, 1985).

Kohls and Uhl (1985) described marketing as the performance of all business activities involved in the flow of food products and services from the point of initial agricultural production until they are in the hands of consumers.

Market definition has taken different meaning along its evolutionary development process; from merely product oriented to market oriented definition. In an economy dominated by scarcity, the focus of the business is often to produce and supply goods through maximum use of technical capability (Crawford, 1997). Marketing is basically defined as the process of satisfying human needs by bringing products to people in the proper form, at proper time and place. The definition refers to the economic satisfaction of products in terms of form, time and place. Having products and services available at a proper time and place is crucial for a given market system. This in turn depends on the nature of the products, the goods and services involved in each particular case.

The definition of marketing as a process by which individuals and groups obtain what they need and want by creating and exchange products and values with others involves work. Marketing means different things to different people: to the house wife it means shopping for food; to the farmer it means the sale of his produce; to the fertilizer distributor it means the selling to the farmer (Abbot and Makeham, 1981). According to Kotler and Armstrong (2003), marketing is managing markets to bring about profitable exchange relationships by creating value and satisfying needs and wants.

2.1.1. Marketing System

Marketing system is another basic concept of marketing. Literature in the area defines the marketing system as the sequential set of kinds of business firms through which a product passes during the marketing process (Branson and Norvel, 1983). The system comprises several, usually; stable, interrelated structures that, along with production, distribution, and consumption, underpin the economic process (Mendoza, 1995). A marketing system can be regarded as a multi-layered sequence of physical activities and of transfers of property rights from the farm-gate to the consumer (White, 1995, cited in Elias, 2005). More concisely, marketing system is a collection of channels, middlemen and business activities, which facilitate the physical distribution, and economic exchange of goods (Kohls and Uhl, 1985). The efficiency with which a marketing system in an area or country operates can influence the living standards of people. Improvement in marketing efficiency, thus, attracts the utmost attention of any country.

2.1.2. Marketing Functions

Marketing Function is defined as a fundamental physical process or service required to give a product the form, time, place and possession utility to meet consumers' desire (Branson and Norvel, 1983). Identifying the different functions is important to determine the different activities required to transfer goods and services from points of production to consumption. There are a number of activities between two extreme points in a given marketing system of which the most important functions are assembling, storing, transporting, processing, grading, financing and risk bearing and market information.

2.1.3. Marketing Channel

Marketing channels are the sequence of intermediaries and markets through which goods pass from the producers to consumers (Abbot, 1958). They are alternative routes of product flows from producers to consumers (Kohls and Uhl, 1985). Marketing channels are pathways taken by goods as they flow from points of production to points of consumption. Depending on the state of a given economy, the pathways could be direct and short or indirect and long. The decision to use direct or indirect distribution is affected by the number and concentration of potential customers in the market, the volume of the product and costs associated with distribution operations and warehousing. The analysis of marketing channels is intended to provide a systematic knowledge of the flow of the goods and services from their origin (producer) to their final destination (consumer). This knowledge is acquired by studying the participants in the process, i.e., those who perform physical marketing functions in order to obtain economic benefits.

2.1.4. Marketing Efficiency

Efficiency in marketing is the most commonly used measure of market performance. Improved marketing efficiency is a common goal of farmers, marketing organizations, consumers and society (Kohls and Uhl, 1985). Higher efficiency means better performance, while lower efficiency denotes poor performance. Most of the changes proposed in marketing are justified on the grounds of improved efficiency.

The meaning of marketing efficiency ranges from the seemingly simple notation of the ratio of output to input to the complex esoteric notion of the maximization of total

welfare allegedly flowing from an economy meeting the conditions of the perfect market idea (Shaffer, 1987).

However, efficiency of agricultural marketing according to Scarborough and Kydd (1992) refers to the efficiency with which resources are used in marketing, in terms of physical input and output ratios. As Crawford (1997) stated an efficient marketing system creates movement of goods from producers to consumers at the lowest cost consistent with the provision of services that consumers demand.

Efficiency is an important index of performance of agricultural marketing. The usefulness of a particular method to estimating marketing efficiency mainly depends upon the purpose for which evaluation is being made. There are numerous ways of estimating the performance of agricultural marketing. The characteristics of performance vary based on the measurability and in the implicit weighting given to each society (Scarborough and Kydd, 1992). However, marketing efficiency is usually measured in two ways, operational efficiency and pricing efficiency.

The marketing efficiency is measured in terms of price integration of markets. In Ethiopia grain markets are relatively integrated after the reform (Wolday, 1994). The study of Asfaw (1998) indicated that the grain markets in Ethiopia are integrated spatially. However, although the grain markets have become more integrated, there were high spatial price differentials indicating the inefficiency of the entire grain marketing system (Gebremeskel et al., 1998).

2.2. Approaches to the Study of Agricultural Marketing Problems

Marketing studies adopt different viewpoints and approaches in order to study agricultural marketing problems (Mendoza, 1995). The functional, institutional (organizational) and the commodity approaches which combine the previous two approaches, and the mixed systems approach are a few examples of the different ways of analyzing (understanding) marketing (Mendoza, 1995).

2.2.1. Functional Approach

One approach to study marketing is to break up the whole marketing process into functions - specialized activities performed in accomplishing the marketing process (Kohls and Uhl, 1985). Regardless of how the marketing system is organized, the economic functions necessary for the production of form, time, and place utilities must be performed. The efficiency with which the various economic functions are performed is important (Andargachew, 1990). The approach helps to evaluate marketing costs for similar marketing middlemen and/or different commodities and costs and benefits of marketing functions (Kohls and Uhl, 1985; cited in Andargachew, 1990). The approach promotes careful identification of corrective measures as it pays special attention to particular functions. At the same time it has drawbacks as the improvement measures formulated in isolation may not necessarily fit very well into the rest of the marketing system (Kohls and Uhl, 1985; Purcell, 1979). Since the focus on the functions performed usually leads to consideration of institutions and a particular commodity, the functional approach provides the skeletal framework for a more encompassing approach to the study of marketing problems. Most contemporary marketing texts follow to varying degrees functional approach.

2.2.2. Institutional Approach

The institutional approach to the studies on agricultural marketing problems pays attention to the nature and characteristics of the various middlemen and related agencies and organization of marketing machinery (Kohls and Uhl, 1985). The institutional analysis is based on the identification of the major marketing channels and it considers the analysis of marketing costs and margins (Mendoza, 1995). The human element receives primary emphasis in this approach. There can be no change and no adjustment without action by the institutions. But emphasis on mere institutions is not sufficient. In the final analysis, it will be the interactions along the marketing continuum from producer to consumer that determines the degree of co-ordination and total system efficiency achieved. Neither detailed descriptions of the institutions involved, nor in-depth analysis of the actions of the institutions will contribute in any significant way

toward increased efficiency in marketing unless the focus of attention is extended to include the inter-stage actions and interactions.

2.2.3. Commodity Approach

In a commodity approach, a specific commodity or groups of commodities are taken and the functions and institutions involved in the marketing process are analyzed (Kohls and Uhl, 1985). This approach is said to be the most practical as it helps to pin point the specific marketing problems of each commodity as well as improvement measures. The approach follows the commodity along the path between producer and consumer and is concerned with describing what is done and how the commodity could be handled more efficiently.

2.3. Methods of Evaluating Efficiency of Agricultural Marketing System

Evaluation of the efficiency with which the agricultural marketing system operates forms the crux of analysis of marketing problems (Kohls and Uhl, 1985). At the same time, the analysis of market structure as well as behavior and quantitative evaluation of the efficiency of the marketing system requires concepts, theories, methods, data and workable frameworks and extremely difficult tasks (Branson and Norvell, 1983). In order to study the functioning of markets many researchers have applied the Structure-Conduct-Performance (SCP) paradigm.

2.3.1. Structure-Conduct-Performance Model

Social, political, economic, and physical environments in different societies influence the operation of the marketing system. The interrelationship between these factors and their influence on firm's behavior vary within the society and will change through time. Thus an implicit goal of public policy has been to protect and promote a setting that approaches the conditions of pure competition. Consistent with this position is the structure-conduct-performance model (SCP), which appears to provide significant part of the theoretical support for the policy formulation. The structure-conduct-performance (SCP) approach was developed in the United States as a tool to analyze the market organization of the industrial sector and it was later applied to assess the agricultural marketing system (Meijer, 1994; cited in Wolday, 1994). The S-C-P approach analyses

the relationship between functionally similar firms and their market behavior as a group and is mainly based on the nature of various sets of market attributes, and relations between them and market performance (Scarboroug and Kydd, 1992). It examines the relationship between institutions and behavior of market participants and in turn can be related to performance (Shaffer, 1983).

Wolday (1994) applied the neo-classical theory and the structure-conduct-performance paradigm to explain the efficiency of the food grain marketing system in Ethiopia. The relationships between the structure -conduct-performance (SCP) parameters can be explained:

Structure: shows trends in the number and size of firms relative to each other and to the number of consumers and producers in a particular time and place. It explains about presence /absence of the levels and the nature of entry barriers, distribution of market information and its adequacy in sharpness, price and quality comparisons and individual risk.

Market structure can also be defined as characteristics of the organization of a market, which seem to strategically influence the nature of competition and pricing behavior within the market (Bain, 1968). Structural characteristics may be used as a basis for classifying markets. Markets may be perfectly competitive; monopolistic; or oligopolistic.

The organizational features of a market should be evaluated in terms of the degree of seller concentration, entry barriers (licensing procedure, lack of capital, know-how, and policy barriers), degree of transparency and degree of product differentiation that condition or influence the conduct and strategies of competitors (Wolday, 1994).

Conduct: refers to the patterns of behavior that firms follow in adopting or adjusting to the markets in which they sell or buy. Such a definition implies the analysis of human behavior patterns that are not readily definitable, obtainable, or quantifiable. It explains price policy, advertising policy, output policy, legal tactics, etc.

Performance: depends on conduct of (sellers and buyers) which in turn is strongly influenced by the structure of the relevant market. It also shows allocative efficiency, technical efficiency, equity, innovation, etc.

According to Bain (1968), the S-C-P model postulates a predictable relationship between the structure of the industry and the conduct (behavior) of firms within that industry, and the performance of the firms or industry sub-system. For our purposes, it will suffice to define structure as the organizational characteristics of the industry or economic subsystem in which we are interested. Several characteristics of market structure could be identified. The most widely used is seller concentration, which refers to the extent to which the economic activity is concentrated in the hands of a few large firms (Hays, 1976 cited in Kindie, 2007). Other major characteristics of structure are buyer concentration, barriers to entry, and the degree of product differentiation.

Zubaidi et al (1994) described S-C-P as follows. In a competitive market with free flow of information, the price differences between any two markets will be equal to or less than transport costs between the two markets. The authors also explained that under perfect competition, a market would be distinguished by features such as large number of buyers and sellers, perfect knowledge about market conditions (particularly, prices), homogeneity of product and free mobility of buyers, sellers and products. Single price will thus prevail in all markets. The price differential for a particular commodity arising from place, time and form differences would correspond closely to the costs incurred in providing the respective transportation, storage and processing facilities. The market will perform efficiently and there will be no scope for traders to make excessive profits. The pricing system would facilitate exchange and fully reflect the underlying supply and demand conditions. However, imperfections in the market particularly, those arising from activities of traders are generally taken as important causes for the existence of differential price movements in different markets. Therefore, if there are imperfections in the form of either oligopoly power among sellers (for example, basing -point pricing system) or unequal information among sellers, then it is expected that buyers will be able to reap abnormal returns and subsequently, we wide intra-regional price differentials exist in the market Zubaidi et al. (1994)

There are basically two purposes of investigating the issue of competitiveness in a market (Zubaidi et al.1994).

- 1) To establish whether the structure of the market tends to conform to the general criteria for a competitive market.
- 2) To determine whether price movements reflect a state of competitiveness in the market.

If high level concentration (structure) causes collusion among the traders (conduct) which in turn causes inflexible and high prices (performance), then it follows that the level of concentration should be reduced or at least kept in check. The recognition and awareness that agricultural markets have a positive impact on the economic development evokes the necessity of an analytical tool that evaluates the performance and efficiency of marketing system. In developing the method or conceptual framework to study the performance of the entire marketing system, we need to develop indicators of performance (Zubaidi et al.1994). The main indicator of performance of marketing used by many economists is perfectly competitive market, i.e., the market under study is compared with a perfectly competitive market. The entire exercise here will be to examine whether elements, which are characteristics of competitive in market, are present in the marketing system under study.

According to the economics rules, conduct and performance include the following sets of conditions. Performance results are used here to mean attributes of general well being. Some of these variables studied by economists include production and marketing efficiency, technological progressiveness, product suitability, costs of sales promotion, participant rationality, etc.

The structure of the exchange system largely defines those who can participate in certain kinds of transactions in what is often referred as the conditions of entry. Thus the question of access to the market is really a problem of discrimination. Here we are assuming that competition is important for the efficient allocation of resources in order to understand the kinds of efficiency, which result from competitive conditions in the markets.

2.4. Review on Empirical Studies of Grain Market in Ethiopia

Food grain markets in less developed countries (LDCs) are seasonal and highly unstable. These features are primarily responsible for market failures in physical and economic access to food. However, physical access has improved with investment in market infrastructure, market regulation and adoption of new seed- fertilizer technology since the mid- 1960s. Nevertheless mass poverty, frequent droughts with temporal fluctuations in prices and production, and regional differences in food grain production have affected economic access to food in LDCs (Welelaw, 2004).

In spite of its considerable share in the GDP, researches pertaining to the subsistence agricultural sectors are limited in Ethiopia. Particularly studies on the response of farmers to economic incentives are highly limited. Some related works that may be worth mentioning are summarized below.

Rehima (2006) and Astewel (2009) studied the market participation and volume of sale of pepper and rice marketing in Siltie Zone and Fogera wereda, respectively. Both authors used the tobit and Heckman two step selection models to identify the factors that affect the market participation and volume of sales. According to Rehima's (2006) the decision to participate in the paper market was estimated by probit maximum likelihood method. Participation of market was affected by the size of pepper output only. Production of pepper, extension contact, and inverse Mill's Ratio (LMBDA), had positive significant effect on quantity of pepper supplied, however non farming income and livestock (TLU) had negative significant effect.

Similarly in Astewel (2009), quantity of paddy produced, access to market information, extension contact and total livestock values had affected positively the decision to participate in rice marketing. For the second-stage OLS results, the inverse mills ratio (λ) for the level of rice sales was significant, implying that selection bias would have been resulted if the level of sales in rice had been estimated without taking into account the decision to participate. Quantity produced and Education level were positively associated with the level of rice sales, and family size is associated negatively.

Wolday (1994), identified the major factors that affect the marketable supply of grain (teff, maize and wheat) of farm households at Alaba-Siraro district. He examined the relationship of marketable supply and the determinant factors using cross sectional data. Factors that have been identified to affect the household level of grain marketable supply include; size of output, family size, and market access. The method adopted to capture the influence of the above variables on the marketable supply of food grain was the multiple regression analysis. Distance to market negatively affected marketable supply of food grain.

Elias (2005), estimated supply of coffee by regressing sales quantities of sun dried coffee on explanatory variables. Each of the regression coefficients estimated the amount of change in sales quantity of sun-dried coffee for one percent change in the explanatory variables. Variables with positive effect on coffee supply were stumped coffee area, cost of farm labour, age of plantations and yield of sun dried coffee. An increase in cost of farm labour by one birr was associated with increase of coffee supply by 0.01 quintals. The study by Welelaw (2005) showed that the principal determinant of market supply of rice were the level of output Lagged and current price, weather and consumption. All affected rice market supply positively, but consumption.

Since the market liberalization of 1990, few studies were conducted for examining the organization and behavior of Ethiopia's grain marketing system.

The study of Wolday (1994) stated that grain trade was highly concentrated in the hands of few licensed wholesalers but an increasing participation of un-licensed traders helped improved competition. The study also found that spatial price spreads were higher compared to the estimated transfer costs and cost of transporting grain from rural to urban markets were particularly high for small trucks. He stated the high market concentration, barriers to entry in terms of capital and credit, evidence of collusion in the rural market, high marketing margin and high seasonal price variation in his study area revealed the inefficiency of the food grain marketing.

The study of Rehima (2005), Kindie (2007) and Astewel (2009) indicated that pepper, sesame and rice market in Silte zone, Metema and Fogera wereda respectively was

dominated by few traders. This indicates the market was strongly oligopsonistic. This suggests that there is market imperfection because a few traders seem to have monopolized the market. The most important barrier to entry was lack of investment capital in three of them.

The study by Abrham (2009) in Lume wereda, the structural organization of the grain marketing system appeared to be competitive for teff and wheat. The study found the market conduct, the behavior that traders manifest in issues like price setting, was found to be influenced by factors like timing of loans return by farmer, the presence of informal traders, and uncertainties created by price fluctuations in the terminal markets. Contrary to Wolday (1994), he stated that the competition from the informal traders also did not result in a real increase in income of producers'; but has just made the market unstable and created unprofitable environment for all.

Gebremeskel et.al (1998) stated in his study on constraints of performance in the Ethiopian Grain market, the degree of inequality in market share at the local market level varies from market to market and from crop to crop; the computed Four-firm Concentration Ratio (CR4), however, does not indicate a high degree of market domination by large traders. For most markets and crops the CR4 is less than 33%.

The above mentioned studies provide useful information on the organization and functioning of the grain market system. However, the previous studies did not give a complete picture, because of their limited area coverage. Thus further studies are required. This study attempted to bridge the current information gap on the grain marketing system, and the factors affecting grain market supply in Ofla and Endamohoni weredas.

2.5. Policy and the Grain Market in Ethiopia

In the 1980s Ethiopia's demand for grain continued to increase because of population pressures, while supply remained short, largely because of drought and government agricultural policies, such as price controls, which adversely affected crop production. Consequently, Ethiopia became a net importer of grain worth about 243 million birr annually from 1983/84 to 1987/88(Theresa, 2001). In 1976, the Ethiopian government established the Agricultural Marketing Corporation (AMC) with the aim of managing

domestic grain markets by controlling the volume of crop production, consumption and grain prices. The AMC imposed production quotas on producers, fixed the grain prices that producers received, and engaged in marketing (Mullen et.al, 2005). This provided farmers with less incentive to produce and, consequently, the total volume of grain production declined, leading to a renewed call for market liberalization.

In 1991 the government has fully liberalized the market. State-owned enterprises have been privatized and the role of government in the economy has gradually declined with increasing participation of the private sector. Agricultural Development Led Industrialization (ADLI) was designed as a central government policy. The Agricultural Marketing Corporation (AMC) was also reoriented to fit into the free market economy with a new name: the Ethiopian Grain Market Trade Enterprise (EGTE), which focuses more on market stabilization to improve market gains for smallholder producers and protect urban consumers from grain price inflation (Asfaw, 1998).

Due to the decreased involvement of the government in agricultural input supply, farmers considered organizing themselves into cooperatives. These cooperatives are increasingly playing a significant role in some parts of Ethiopia in terms of input supply to their members and searching for markets for farmers' agricultural output (Mulat et al., 2007 cited in Abrham, 2009). The agricultural development policy emphasizes the importance of cooperatives and cooperative unions in the transformation of the rural economy. A government agency, the Ethiopian Cooperative Promotion Agency (ECPA) was also established in 2002 to promote cooperative development at the national level.

The grain market in Ethiopia is characterised by high transaction costs, low access to market information by producers and traders, lack of quality standards and poor physical infrastructure (Abrham, 2009). To help reduce the problems of market information, quality standards, provision of storage facilities and coordination of the marketing of agricultural commodity, a marketing platform known as the Ethiopian Commodity Exchange (ECX) was established in 2007. The aims of ECX were to create a platform where market information, grades and standards, contract enforcement, regulation, and trade and producer groups, mutually reinforce each other (Eleni et.al, 2007).

3. METHODOLOGY

3.1. Description of the Study Area

The study was conducted in the southern zone of Tigray region, Ethiopia. Southern zone of Tigray is one of the seven administrative zones in the Tigray National Regional State. Southern zone is located in the southern most boundary of Tigray Region. There are five woredas in the zone and has a total population of 613,563 of which 51 percent are female (CSA, 2008). The zone has bimodal with erratic rainfall pattern of rain fall. “Belg” rain is the small rain occurring usually from February to April. The second rainy season “keremt” is from June to early September. Despite the shortage and variability in its occurrence, the bimodal pattern of rainfall has allowed the production of two cropping seasons in some woredas of the zone (Southern zone BoARD, 2009). Southern zone of Tigray was purposively selected for its market oriented commodities' potential. Out of the five woredas of southern Tigray zone; two woredas Endamehoni and Ofla were randomly selected for the study.

Map Of Southern Zone

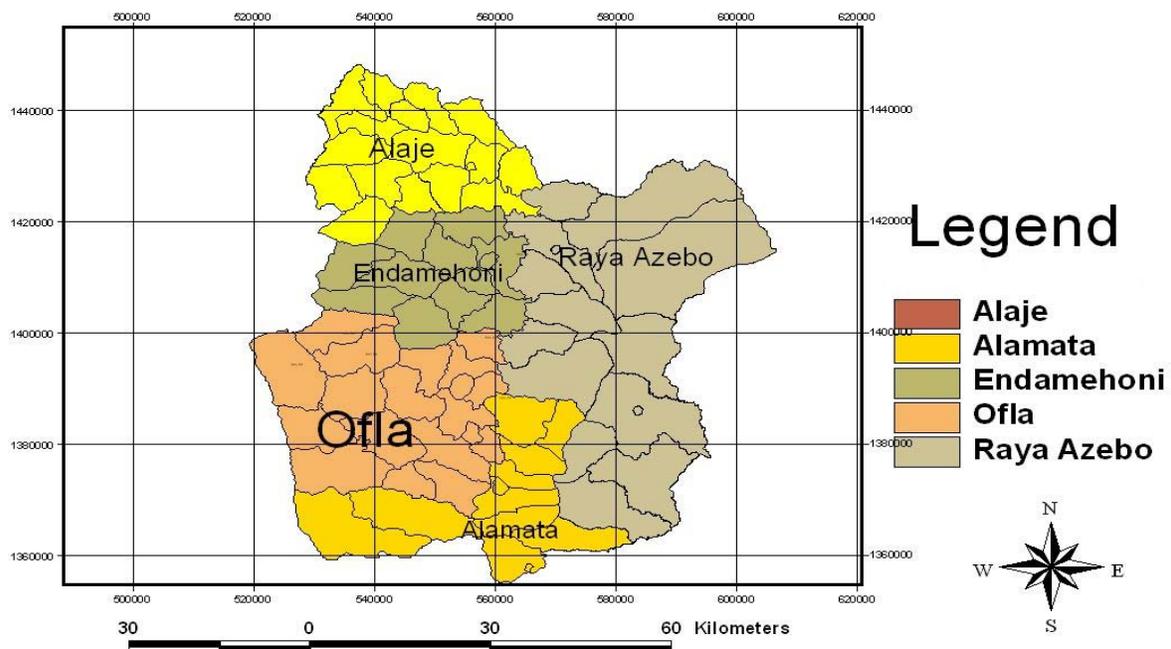


Figure 3.1: Map of Southern Zone of Tigray

3.1.1. Description of Endamohoni Wereda

Endamohoni wereda in which the study was conducted is located about 660 km North of Addis-Ababa and 120km south of Mekelle. It has an estimated area of 50,718 hectar, bordering with Weredas of E/Alage, Ofla, Raya Azebo and Amhara region in the South. The Wereda has a total of 18 Kebeles administrations (PAs) (Endamohoni Wereda BoARD, 2009).

The wereda's total population and households were estimated to be 84,726 and 20,480 respectively. Of the total rural agricultural households, 6,820 were female headed households (CSA, 2008). The wereda's altitude is estimated to range from 1800 to 3250 meter above sea level, the average annual temperature ranges from 22 – 28 °C, and the maximum temperature reaches as high as 30 degree centigrade and the mean annual rain fall ranges from 850 to 1110 mm (Endamohoni Wereda BoARD, 2009).

Endamohoni wereda is known for its high potential for wheat, barley, faba bean and maize production and it is rich in livestock. Except for the very small areas under vegetables and fruits, crops in all farms are grown under rain fed condition. In 2009 there are about 15 primary agricultural cooperatives and one union in the wereda (Endamohoni Wereda BoARD, 2009) in which producers potentially could exploit the advantages of being a cooperative member.

Table 3.1: Total Crop Production of Endamohoni Wereda in 2009 Crop season

| No | Crop type | Production in Qt. | Rank in production |
|----|--------------|-------------------|--------------------|
| 1 | Wheat | 181,547 | 1 |
| 2 | Barley | 139,531 | 2 |
| 3 | Fababean | 15,096 | 3 |
| 4 | Field pea | 11,577 | 4 |
| 5 | Linseed | 1056 | |
| 6 | Millet | 998 | |
| 7 | Maize | 4770 | |
| 8 | Sorghum | 696 | |
| 9 | Lentil | 2,067 | |
| 10 | Others | 1,828 | |
| | Total | 359,166 | |

Source; Endamohoni wereda BoARD, 2009

3.1.2. Description of Ofla Wereda

Ofla wereda is one of the five weredas of southern Tigray zone. Ofla is located about 620 kms away from Addis Ababa and about 160 kms from Mekelle. The wereda has a total of 20 Peasant Kebele administrations. The total area of the wereda is about 133,300 ha, of which 42% of the area is Woina Dega (55,986 ha) and the rest are Dega and Kolla which accounts for 29% each and 77,314 ha in total. It is bordered with Weredas of Alamata, Endamohoni, Raya Azebo and Amhara region in the South. (Ofla wereda BoARD, 2009).

Ofla wereda has two (Bimodal) rainy seasons namely; Keremt where the main wet season is from June to September and Belg, the small wet season extends from February to March. The rainfall distribution of the study area is characterized by heavy and erratic in nature, like most highlands of the country. The annual rainfall varies from 450mm to 1000mm during keremt and 18mm to 250mm during Belg season (Ofla wereda BoARD, 2009). The mean annual temperature of the study area is 22°C with minimum and maximum temperature of 6°C and 30°C respectively (Ofla wereda BoARD, 2009).

The average land holding in the Wereda is about 0.5 hectare per household. Ofla Wereda has an estimated total population of 126,953 of which 62,311 are male and 64,642 are female. From the total 30,513 rural household heads, male headed households account for about 68 percent while female-headed households account for about 32 percent (CSA, 2008). Ofla wereda is characterized by a mixed farming system where the livelihood of the rural community depends both on livestock and crop farming. Crop production is mostly rainfall dependent. Wheat, barley, field pea, faba bean, lentil, sorghum and maize are the dominant crops grown in Ofla Wereda. Wheat and barley are the major sources of daily foodstuffs. The altitude varies between 1700-3100 m.a.s.l and the slope ranges to more than 15 percent. (Ofla Wereda BoARD, 2009).

Table 3.2: Total Crop Production of Ofla Wereda in 2009 cropping season

| No | Crop type | Production in Qt. | Rank in production |
|----|--------------|-------------------|--------------------|
| 1 | Wheat | 239,685 | 1 |
| 2 | Barley | 124,296 | 2 |
| 3 | Fababean | 50,014 | 3 |
| 4 | Field pea | 21,703 | 4 |
| 5 | Teff | 4,336 | |
| 6 | Millet | 17,230 | |
| 7 | Maize | 17,829 | |
| 8 | Sorghum | 12,923 | |
| 9 | Lentil | 6,193 | |
| 10 | Others | 18,169 | |
| | Total | 512,378 | |

Source; Ofla wereda BoARD, 2009

3.2. Sampling Procedure

For the study of grain marketing Souther zone of Tigray is selected purposively because the zone is among the highly productive areas in Tigray region. From southern zone of Tigray region, Endamohoni and Ofla weredas were selected randomly.

A three-stage random sampling procedure was adopted for the selection of the sample farmers from the study area (fig. 2). In the first stage, two weredas Endamohoni and Ofla were randomly selected out of the 5 weredas found in southern zone of Tigray. In the second stage, considering the total number of 38 kebeles (18 in Endamohoni Woreda and 20 in Ofla Woreda), ten PA's were randomly selected from the two study weredas (five from Endamohoni Wereda and five from Ofla Wereda) (Table 3). In the third stage, given the available resource and time at the disposal of the researcher, a total of 145 head of households (68 farmers from Endamohoni Wereda and 77 farmers from Ofla Wereda) were selected randomly using probability proportional to sample size (PPS).

Table 3.3: Sample size of farmers

| No | Name of wereda | Name of sample kebele | Total number of house holds | No of sample house holds |
|-------|----------------|-----------------------|-----------------------------|--------------------------|
| 1 | Endamohoni | Shiwta | 1371 | 14 |
| 2 | | Mekan | 1249 | 13 |
| 3 | | Tahtay haya | 1298 | 13 |
| 4 | | Hizba T/haymanot | 1036 | 10 |
| 5 | | Meswaeti | 1840 | 18 |
| 6 | Ofla | Hashenge | 1977 | 20 |
| 7 | | Menkere | 1378 | 14 |
| 8 | | Adigolo | 1984 | 20 |
| 9 | | Fikrewelela | 792 | 8 |
| 10 | | Fala | 1490 | 15 |
| Total | | | 14434 | 145 |

Source; Ofla and Endamohoni wereda BoARD

The sites for the trader surveys were market towns in which a good sample of grain traders exists. There are two major town markets in the study areas, Maichew and Korem. Data from traders were collected from both of the markets.

The objective of the research was to empirically capture the actual practice and behavior of the grain traders. A list of 75 and 82 registered grain traders in Maichew and Korem towns respectively were collected from the bureau of urban development, trade and industry in both weredas. A sample of 24 grain traders were randomly selected from the two markets in Maichew and korem towns. An attempt was made to incorporate licensed and un-licensed traders, and to include respondents from each of the following categories: wholesalers (urban and rural) assemblers (urban and rural) and urban retailers.

Table 3.4: Sample size of traders

| Market Town | Assemblers | Wholesalers | Retailers | Total |
|-------------|------------|-------------|-----------|-------|
| Maichew | 4 | 4 | 4 | 12 |
| Korem | 4 | 4 | 4 | 12 |
| Total | 8 | 8 | 8 | 24 |

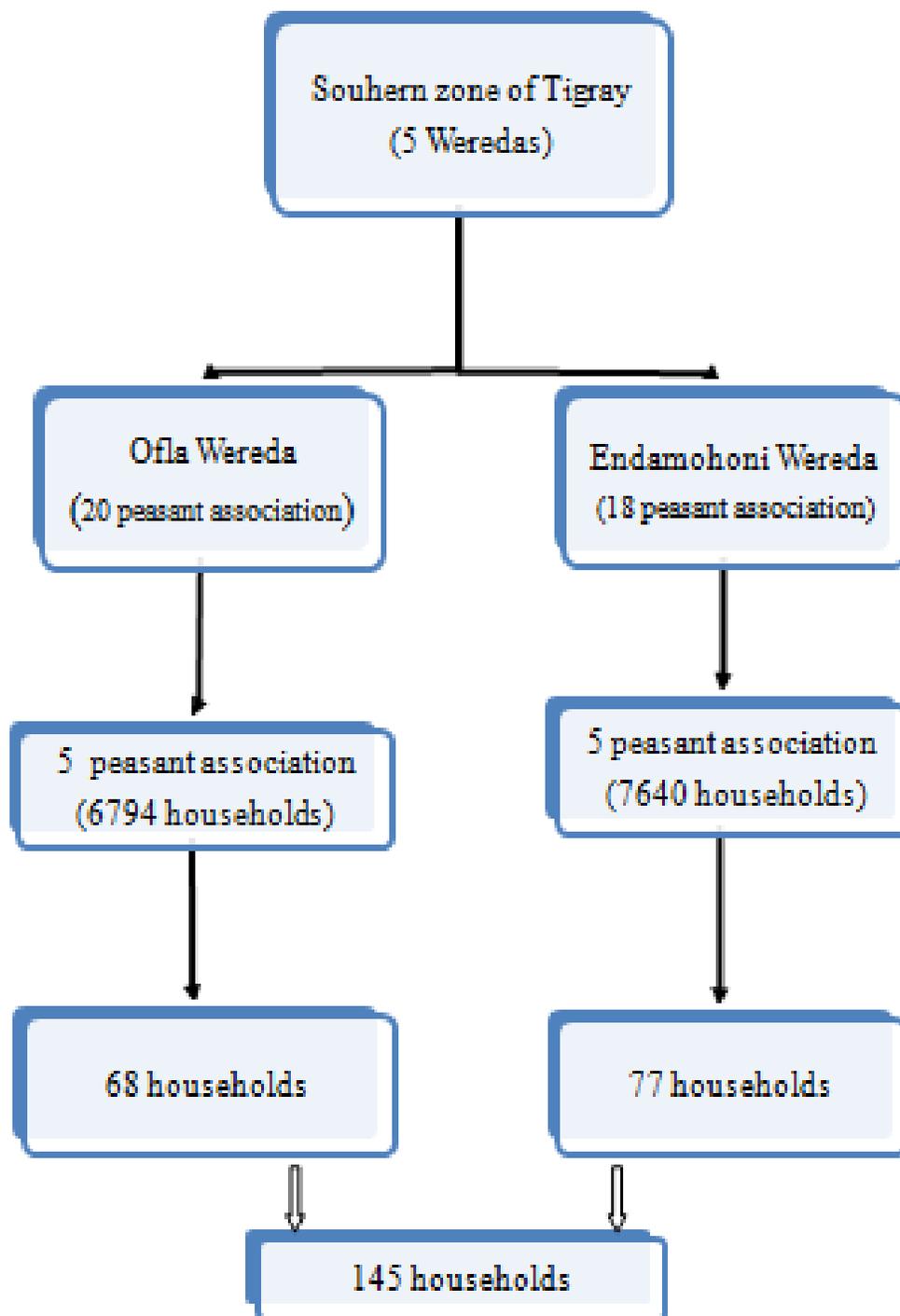


Fig 3.2: Flow chart of farmers sample selection

3.3. Methods of Data Collection

Both primary and secondary data were collected for the study. Primary data was collected from household head farmers of selected kebeles and traders. Primary data was collected using two types of questionnaire, one for farmers and the other for traders. A checklist was also used to guide the informal discussion conducted to generate data that could not be collected from individual interviews. Primary data was collected from farmers focused on factors affecting market supply, size of output, access to market, market information, and annual income from non farming activities, livestock ownership, land holding, extension service contact, credit access, family size, volume of grain production, etc. from farmers using pre-tested questionnaire.

Moreover, the questionnaire for traders has covered the following main areas: trader characteristics, trading activities and marketing costs and annual volumes of purchases and sales. Moreover, in contrast to typical market surveys which focused on business assets, initial capital and the 2009/10 working capital, source of market information, and other data were collected.

Secondary data were gathered to support the information to be collected from primary sources. Secondary data sources were wereda agricultural cooperatives union, wereda Bureaus of agriculture and rural development, Wereda office of small scale trade and industry, CSA etc.

3.4. Method of Data Analysis

Generally in this study descriptive statistics and econometric models were used. To analyse the data SPSS version 15 and STATA 11 were applied.

3.4.1. Descriptive Statistics Analysis

This method of data analysis refers to the use of ratios, percentages, means, variances and standard deviations in the process of examining and describing marketing functions, farm household characteristics, resource ownership, institutional services, market and traders characteristics. The indicators used in this part of the analysis were as follows:

3.4.1.1. Structure Conduct and Performance (SCP) model

The model examines the causal relationships between market structure, conduct, and performance, and is usually referred to as the structure, conduct, performance (S-C-P) model. In agricultural economics, the most frequently used model for evaluating market performance is based on the industrial organization model. Wolday (1994), Rehima (2005), and Astewel (2010) used this model to evaluate food grain market in Alaba Siraro district, pepper marketing in Alaba and Silti zone and rice marketing chain in Fogera wereda respectively. The study used S-C-P model to evaluate grain market.

3.4.1.2. Measures of Market Concentration

Market concentration refers to the number and relative size distribution of buyers and sellers in a market. Concentration is felt to play a larger part in the determination of market behavior within a market since it affects interdependence of action among firms. The greater the degree of concentration, the greater the possibility of non-competitive behavior exists, such as collusion in the market. There are a number of measures of market concentration. The most common market concentration measuring methods are Hirschman Herfindahl Index, Gini-Coefficient and concentration ratio.

Market Concentration Ratio

Considerable attention has been focused on market concentration as a measure of competition in marketing. Concentration refers to the proportion of industry sales made by its largest firms. In general, the more concentrated the industry sales, the more likelihood that the market will be imperfectly competitive (Khol and Uhl, 1985). Concentration ratio is one of the commonly used measures of market power, which in other words, refers to the number and relative size of distribution of buyers or sellers in a market. Concentration ratio measures the per cent of traded volume accounted for by a given number of participants and is designated by the formula:

$$C = \sum_{i=1}^r S_i \quad i = 1, 2, 3 \dots r$$

Where: C = concentration ratio,

S_i = the percentage market share of i^{th} firm, and

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

Khols and Uhl (1985) suggest that as a rule of thumb, a four enterprise concentration ratio of 50 percent or more is indicative of a strong oligopolistic industry; of 33-50 per cent ratio denotes a weak oligopoly, and less than that an unconcentrated industry.

Despite wide application of concentration ratio as a measure of the ratio of market concentration, there are limitations against the index. Scarborough and Kydd (1992) suggest that calculating and using concentration ratios as a measure of market structure is subject to empirical, theoretical and inferential problems. In most LDCs, where firm records are usually not available publicly, it would be difficult to determine such ratios on anything, but the most local of scales. Another problem associated with concentration ratio is the arbitrary selection of r (the firms that are taken to calculate the ratio). The ratio doesn't indicate the size distribution of r firms. However, when the numbers of participants in an industry is large it will be difficult to organize oligopolistic modeled. Under such local circumstances, the concentration ratio given above can be usefully determined (Scarborough and Kydd, 1992).

3.4.2. Econometric Analysis

There are several occasions where the variable to be modeled is limited in its range. Because of the restrictions put on the values taken by the regressand, such models can be called limited dependent variable regression models (Gujarati, 2003). "When information on the regressand is available for some observations, using OLS may result in a biased and inconsistent parameter estimates even asymptotically. The bias arises from the fact that if we consider only the observable or n_1 observations (i.e. only observations for which the values of the dependent variable are observed) and omit the others, there is no guarantee that the expected value of the error terms, $E(u_i)$, will be necessarily zero. And without $E(u_i) = 0$ we cannot guarantee that the OLS estimates will be unbiased. It is intuitively clear that if we estimate a regression line based on the n_1 observations only; the resulting intercept and slope coefficients are bound to be different than if all the (n_1+n_2) observations were taken into account" (Greene, 2000).

According to Greene (2000) there are three types of regression models under the limited dependent variables models. These are Censored or Tobit regression, truncated regression and sample selected regression models. Inferring the characteristics of a population from a sample drawn from a restricted part of the population is known as truncation. A truncated distribution is the part of untruncated distribution that is above or below some specified value. Whereas a sample in which, information on the regressand is available only for some observation is known as censored sample. Hence, a Tobit model answers both factors influencing the probability of selling and factors determining the magnitude of sale. The use of Tobit models to study censored and limited dependent variables has become increasingly common in applied social science researches. Tobit is an extension of the Probit model and it is one approach to dealing with the problem of censored data (Gujarati, 2003).

Statistically, we can express the tobit model as

$$Y_i = \beta_0 + \beta_i X_i + U_i \quad \text{if RHS} > 0$$

$$Y_i = 0 \quad \text{otherwise}$$

Where RHS = right-hand side. *Note:* Additional X variables can be easily added to the model.

Where Y_i = market supply of grain (dependent variable)

β_0 = an intercept

β_i = coefficients of i^{th} independent variable

X_i = independent variable

U_i = unobserved disturbance term

Estimation of the whole system of supply function would give more efficient estimates, but excluding inconsistencies or biases. In this context, the dependent variable of the supply function is censored by unobservable latent variable influencing the decision of whether or not to supply grains standard OLS estimates biased. The assumption underlying a Tobit estimation is that farmers are unconstrained which is untenable in light of the fact that supply is below the saturation point. Hence, it is necessary to use the Heckman selection model to account for sample selection bias (Greene, 2000).

Different studies employed different models in order to identify the factors that determine market supply. The commonly used ones are the well known Tobit and Heckman's sample selection model. The disadvantage of the Tobit model is the assumption that both the decision to participate and the amount of product marketed given participation are determined by the same variables, and that a variable that increases the probability of participation also increases the amount of product marketed. This problem can be overcome using the Heckman's sample selection model where a Probit model for the participation or 'selection' equation is estimated and a regression model, which is corrected for selectivity bias, is specified to account for the level of the amount marketed.

In this study, the Heckman's sample selection was also employed. First, the probability of participation was modeled by Maximum Likelihood Probit, from which inverse Mill's ratios were estimated. In the second-stage, the estimated Inverse Mill's Ratio (IMR) was included as right-hand variable in the corresponding grain supply function.

The Probit model is specified as:

$$Y_i = \beta_i x_i' + \varepsilon_i, \quad i = 1, 2, \dots, n$$

Where: Y_i is a dummy variable indicating the market participation that is related to it as

$$Y_i = 1 \text{ if } Y_i > 0, \text{ otherwise } Y_i = 0$$

β_i are the variables determining participation in the Probit model,

x_i' is unknown parameter to be estimated in the Probit regression model,

ε_i is random error term

Then the parameters can consistently be estimated by OLS over n observations reporting values for Y_i by including an estimate of the inverse Mill's Ratio, denoting λ_i , as an additional regressor. Selection model is specified as:

$$Y_i = \beta_i x_i' + \mu \lambda_i + \eta_i$$

Where Y_i is the volume of supply in the second-step,

β_i are the explanatory variables determining the quantity supply,

x_i' is unknown parameter to be estimated in the quantity supply,

μ is a parameter that shows the impact of participation on the quantity supply,
 η_i is the error term

3.4.2.1. Multicollinearity Test

The situation where the explanatory variables are highly intercorrelated is referred to as multicollinearity, i.e when two explanatory variables are highly intercorrelated it becomes difficult to disentangle the separate effects of each of the explanatory variables on the dependent variable (Maddalla, 1977). The existence of this situation in this study is tested using the methods of variance inflation factor and contingency coefficients.

Tolerance (TOL) and Variance Inflation Factor (VIF): this method is used to detect multicollinearity of continuous variables. As R_i^2 increases towards one that is as the collinearity of regressor X_i with other regressors increases its variance inflation factor (VIF) also increases and in the limit, it can be infinite. The larger the value of VIF, the more troublesome or collinear is the variable X_i .

$$TOL = (1 - R_i^2) = \frac{1}{VIF}$$

As a rule of thumb, if the VIF of a variable exceeds 10 (this will happen if R_i^2 exceeds 0.90), that variable is said to be highly collinear (Gujarati, 1995). Tolerance (TOL) can also be used to detect multicollinearity. Clearly, TOL_i is one if X_i is not correlated with the other regressors, whereas it is zero if it is perfectly related to other regressors.

Contingency Coefficient: is a symmetric measure which indicates the strength and significance of the relation between the row and column variables of a cross tabulation. This measure of association is based on chi-square. The value ranges between zero and one, with zero indicating no association between the row and column variables and values close to one indicating a high degree of association between the variables. Contingency coefficient analysis was carried out to check for the strength of relationship among discrete variables. The decision criterion is that variables with contingency coefficient closer to one would be avoided from further consideration in the multivariate analysis.

3.4.3. Variables Selected and their Definition

In the course of identifying factors influencing grain supply, the main task is to analyze which factor influences and how? Therefore, potential variables, which are supposed to influence the decision to participate and quantity of grain supply, need to be explained. Accordingly, the major variables expected to have influence on the decision to participate and on volume of supply are explained as follows:

The Dependent Variables

Quantity Supplied (Y_1): It is the dependent variable, and it is the actual supply of grain by household to the market in 2009-10 harvest seasons which is measured in quintals.

Market Participation Decision (Y_2): The dummy participation decision variable is the dependent variable that is regressed in the first stage of the Heckman two stage estimation procedures. For the respondents who participate in grain market = 1, and = 0 for the respondents who did not participate.

The Independent Variables:

Yield (X_1): It is an economic factor and continuous variable that can affect the household level of marketable supply and measured in quintals per hectare. As Tomek and Robinson (1985) argued, yield is assumed to affect the marketable supply positively, because a farmer that obtains high yield can supply more to the market than a farmer who has fewer yields.

Education (X_2): This variable will be measured using formal schooling of the household head and hypothesized to affect marketable supply positively. It will take dummy values 1 if the household attend any formal education and 0 otherwise. This is due to the fact that a farmer with good knowledge can adopt better practices than illiterates that would increase marketable supply.

Family Size (X_3): It is a continuous variable, measured in man equivalent i.e. the availability of active labour force in the household, which affects farmer's decisions to participate in market. Since production is the function of labour, availability of labour is

assumed to have positive relation with volume of supply. However, family size is expected to have positive impact volume of sales, but larger family size requires larger amounts for consumption, reducing marketable surplus. In this context family size is expected to have positive or negative impact on volume of supply

Size of Land Holding (X_4): This variable is a continuous variable measured in terms of number of hectares the farmer has and is expected to affect the household level of grain supply positively (Tomek and Robinson, 1985). This is because, producers who own big area holding can produce more than a producers who own less area and thus to supply more to the market.

Ox Ownership (X_5): This is a continuous variable that is measured with the number of oxen owned by the head of the household and expected to affect the supply of grain positively. This is due to the fact that producers who own oxen are more likely to till in time than producers who own no oxen. Thus, they produce more which can be reflected on marketable supply.

Number of Livestock Owned (X_6): This is a continuous variable defined in terms of tropical livestock unit (TLU), which excludes oxen. Farmer could sell more grain when he/she produces more. On the other hand, when the household has less production, it must either borrow money or sell his livestock to meet household needs. Farmers who have low production need to specialize in livestock production. Therefore it is expected to have negative relationship with marketable surplus.

Use of Improved Production Inputs (X_7): This is a dummy variable taking a value of 1 if the farmer use improved production input and 0 otherwise. This variable will be expected to affect the household marketable supply of grain positively due to the fact that if a producer use improved seed and fertilizers, this will increase production and productivity thus, increase the marketable supply.

Extension Service (X_8): This is a dummy variable taking value of 1 if the household head has contact with a development agent and 0 otherwise. Extension is expected to have positive effect for quantity supplied through its stimulation of production and

productivity. Farmers that have frequently contact with DAs will have better access to information and could adopt better technology that would increase their marketable supply of grain.

Access to the Market (X_9): It is a continuous variable that will be measured in kms from the household residence to the market centre. The closer to the market the lesser would be the transportation cost and time spent and the more is the quantity of marketable supply

Access to Credit (X_{10}): Access to credit is measured as a dummy variable taking value of 1 if the farmer has access to credit and 0 otherwise. This variable is expected to influence the marketable supply of grain positively on the assumption that access to credit improves the financial capacity of farmers to buy modern inputs, thereby increasing production which is reflected in the marketable supply of grains.

Access to Market Information (X_{11}): It is a dummy variable. Farmers marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movement. Therefore, it is hypothesized that market information is positively related to marketable surplus.

Nonfarm Income (X_{12}): It is a continuous variable which refers to part of the total amount of income measured in birr that is earned from nonfarm activities which are not related to agriculture. Therefore, in this study it is hypothesized that non-farm income affects grain supply to the market.

Membership in a Cooperative (X_{13}): This is a dummy variable which can take the value of 1 if the farmer is a member of a cooperative and 0 otherwise. This variable is expected to affect the supply of grain positively. Because, producers who are members of cooperatives are likely to get inputs and market information, thus could supply more grain to the market than non members

4. RESULTS AND DISCUSSIONS

4.1. Socioeconomic Characteristics of Sample Farmers

4.1.1. Personal and Household Characteristics

In an agrarian society, household members are the major source of labour for agricultural activities. The household characteristics such as age, sex, educational levels etc. differ from one household to the others. The details of these characteristics for the sampled households in the study areas are depicted in Table 4.1.

Out of the 145 sample respondents 130 (89.7 per cent) were males and the rest 15 (10.3 per cent) were female. The proportion of male headed household to female headed household was similar in both weredas. There was no significance difference between the two weredas in sex distribution.

Table 4.1: Household Characteristics (Per cent and Mean)

| | | N= 68 | N= 77 | N= 145 | |
|-----------------|--------------------------------|-----------------|-----------------|-----------------|---------------------|
| | | Endamohoni | Ofla | Total | χ^2 / t -value |
| Sex | Male | 89.7 | 89.6 | 89.7 | 0 |
| | Female | 10.4 | 10.4 | 10.3 | |
| Religion | Muslim | 0 | 16.9 | 9 | 10.63*** |
| | Orthodox | 100 | 83.1 | 91 | |
| Marital status | Married | 86.8 | 87 | 87 | 3.07** |
| | Divorced | 7.4 | 7.8 | 7.6 | |
| | Widow | 5.8 | 5.2 | 5.4 | |
| Education level | Illiterate and religios school | 41.2 | 57.1 | 49.7 | 3.07* |
| | Literate in formal school | 58.8 | 42.9 | 50.3 | |
| Age (years) | | 42.62 (9.89) | 43.42 (7.99) | 43.04 (8.91) | -0.53 |
| Family size | Mean | 6.22 (2.42) | 5.97 (1.86) | 6.09 (2.14) | 0.68 |
| | Minimum | 3 | 2 | 2 | |
| | Maximum | 15 | 10 | 15 | |

N=sample size, ***, ** and * significantly at less than 1%, 5% and 10% significance level

Figures in parenthesis indicate standard deviation

Source: Field Survey, 2010

With regard to marital status from the total sample respondents 87 per cent, 7.6 per cent and 5.4 per cent were married, divorced and widow respectively. The marital status in Endamohoni were 86.8 per cent married, 7.4 per cent divorced and 5.8 per cent widow, while in Ofla it was 87 per cent, 7.8 per cent and 5.2 per cent in the same order. Regarding religion 91% of the respondents are Orthodox Christians and 9 per cent Muslims. However there is a statistically significant difference in religion in the two weredas at less than 1 per cent. In Endamohoni wereda all the sample respondents were Orthodox Christians while in Ofla wereda 83.1 per cent were Orthodox Christians and 16.9 per cent were Muslim.

With respect to the Educational status, 49.7 per cent of the sample respondents were illiterate and 50.3 per cent of the sample respondents were who attended formal schooling. But there is a significant difference between the two weredas at 10 per cent. In Endamohoni wereda 58.8 per cent attended formal schooling and in Ofla wereda 42.9 per cent attended formal schooling.

The average age of sample respondent was 43.04 years with a standard deviation of 8.91. Age of sample households ranged from 25 to 70 years. The mean age of respondents in Endamohoni was 42.46 years with a standard deviation of 9.89 and in Ofla 43.42 years with a standard deviation of 7.99. The independent sample T test revealed that there is no significant difference on the mean age of farmers in the two wereda. Family size of the sample respondents ranged from 2 to 15 persons and an average family size of 6.09 with a standard deviation of 2.14.

4.1.2. Farm and Nonfarm Experience and Income

As shown in table 4.2 the average years of farming experience for total sample households were 21.66 years with a standard deviation of 8.88 and a minimum of 4 and maximum 46 years. Farming experience in Endamohoni and Ofla wereda were 22.44 and 20.96 with a standard deviation of 10.72 and 6.85 years respectively. There is no significant difference on the mean years of farming experience in the two wereda.

There is enormous demand for cash to cover household expenses as education, clothing, social contributions, tax, purchasing of cattle, health service, and other emergency

situations. To spend for these expenses, the households need additional income. It is possible only when the household member contribute family labor to earn income from nonfarm sources. Out of the total sample households 43.4 per cent were involved in nonfarm activities. 41.2 per cent and 45.5 per cent of the sample respondents in Endamohoni and Ofla wereda respectively participate in nonfarm activities. On average 0.66 per cent of family members per household were found to participate in nonfarm activity. The main nonfarm activities that the sample respondents participated in were petty trading, Safety net, Guarding, daily laboring and other activities.

Table 4.2: Experience and Income of Farmers (Per cent and Mean)

| Livestock type | N= 68 | N= 77 | N= 145 | χ^2 / t -value |
|-------------------------------|--------------------|----------------------|---------------------|---------------------|
| | Endamohoni | Ofla | Total | |
| Farming experience (years) | 22.44 (10.72) | 20.96 (6.85) | 21.66 (8.88) | 0.69 |
| Nonfarm participation (yes %) | 41.2 | 45.5 | 43.4 | 0.26 |
| Annual non farm income (birr) | 658.68 (1052.7) | 1036.23 (1503.83) | 859.17 (1320.96) | 1.73* |

N=sample size, * significant at less than 10% significance level
 Figures in parenthesis indicate standard deviation
 Source: Field Survey, 2010

In general the sample households earned 859.17 birr with standard deviation of 1320.96 from nonfarm income during 2009 cropping season. Furthermore the average nonfarm income earned in Endamohoni and Ofla wereda of the sample respondents was 658.68 birr with standard deviation of 1052.7 and 1036.23 birr with a standard deviation of 1503.83 respectively. The analysis of independent sample T test revealed that there is significant difference on the mean of nonfarm income between the sample households of the two weredas at less than 10% level of significance.

4.1.3. Livestock Ownership and Income

Farm animals have an important role in rural economy. They are source of drought power, food, animal dung for organic fertilizer and fuel and a means of transport. In addition in the rural area the number of cattle owned or held is a measure of wealth. The livestock species found in the study area are cattle, goat, sheep, donkey, horse, poultry

and bee colony. To assess the livestock holding of each household the livestock number was converted to tropical livestock unit (TLU). Conversion factor used were based on Gryseels (1998) indicated in appendix table 1.

Farmers in the study area owned different species of livestock. Of the total sample household 93.8 per cent of respondents owned cattle, 34.5 per cent owned sheep, 14.6 per cent owned goats, 42.1 per cent owned Donkey and 58.6 per cent owned poultry (table 4.3). The average livestock holding of sample households was 4.24 with a standard deviation of 3.19. The mean livestock holding in Endamohoni wereda was 3.17 with a standard deviation of 1.71, while in Ofla it was 5.19 with standard deviation of 3.84. The study indicated that there was a significant difference in livestock holding between the two weredas at less than 1% significant level. The average annual income from the sale of livestock by the sample households was 1601.1 with a standard deviation of 2615.75.

Table 4.3: Distribution of Sample Farmers by Number of Livestock (Per cent and Mean)

| Livestock | N= 68 | N= 77 | N= 145 | χ^2 / t value |
|-----------------------|------------|-----------|-----------|--------------------|
| | Endamohoni | Ofla | Total | |
| Cattle | 97.1 | 90.9 | 93.8 | 2.04 |
| Sheep | 16.2 | 50.6 | 34.5 | 17.5*** |
| Goat | 16.4 | 13 | 14.6 | 0.34 |
| Donkey | 51.5 | 33.8 | 42.1 | 3.95** |
| Horse | 0 | 3.9 | 2.1 | 2.70 |
| Poultry | 57.4 | 59.7 | 58.6 | 0.08 |
| TLU (mean) | 3.17 | 5.19 | 4.24 | 4.17*** |
| | (1.71) | (3.84) | (3.19) | |
| Oxen (mean) | 1.62 | 2.62 | 2 | 2.94*** |
| | (0.86) | (2.32) | (1.99) | |
| Income from livestock | 824.75 | 2209.71 | 1560.21 | 3.36*** |
| | (1184.66) | (3215.48) | (2567.27) | |

N=sample size, ***, ** and * significantly at less than 1%, 5% and 10% significance level
 Figures in parenthesis indicate standard deviation
 Source: Field Survey, 2010

The number of oxen owned by the sample households ranged from 0 to 7 with mean holding of 2 and standard deviation of 1.99. The average number of oxen owned by sample respondents in Endamohoni wereda was 1.62 with a standard deviation of 0.86 where as in Ofla wereda it was 2.62 with a standard deviation of 1.99. The mean difference in oxen holding was found to be statistically significant at 1%.

4.1.4. Farm Characteristics

4.1.4.1. Landholding and Leasing of Sample Households

Adequate size of landholding is a basic factor in the process of boosting productivity and production. As elsewhere in Ethiopia the farmers in the study area have a land fragmented and small in size. The land size of sample households varies from 0 to 2.8 hectares with an average land holding of 0.54 hectare and standard deviation of 0.43. The average land size of the sample households in both weredas is similar.

Table 4.4: Distribution of Respondents by Land Holding and Leasing (Per cent and Mean)

| | N=68 Endamohoni | N=77 Ofla | N= 145 Total | χ^2 /t value |
|--------------------|--------------------|----------------|-----------------|-------------------|
| land size | 0.54 (0.24) | 0.54 (0.54) | 0.54 (0.43) | -0.006 |
| Land leas (yes %) | 60.3 | 70.1 | 65.5 | |
| Mean | 0.36 (0.39) | 0.41 (0.61) | 0.38 (0.52) | -0.523 |

N=sample size

Figures in parenthesis indicate standard deviation

Source: Field Survey, 2010

The survey result revealed that about 65.5 per cent of the sample households leased in land during 2009 cropping season. The average leased in land was 0.38 hectare with a standard deviation of 0.52.

4.1.4.2. Type and Quantity of Crops Grown and Sold by Households

Crop production was the most important farm activity in the study area. The major crops grown in the study area are wheat, Barley, Maize, Teff, Sorghum, Faba bean, Field pea, Lentil and Linseed. To some extent oil Crops and vegetables are also grown for

consumption and to meet immediate cash requirements. Table 4.5 showed that from the total sample households 95.2 per cent of the households grew Wheat, 63.4 per cent Barley, 18.6 per cent Maize, 18.6 per cent Faba bean, 13.8 per cent Teff, 12.4 per cent Field pea, 5.5 per cent Sorghum and 12.4 per cent other types of crops. The analysis of independent T test revealed that there is a high significant difference in the crops Teff, Barley and Maize between the two wereda at 1%.

Table 4.5: Distribution of Sample Household by types of Crops grown in 2009(Per cent)

| | N=68 Endamohoni | N=77 Ofla | N= 145 Total | χ^2 |
|-----------|--------------------|--------------|-----------------|----------|
| Wheat | 97.1 | 93.5 | 95.2 | 0.99 |
| Teff | 27.9 | 1.3 | 13.8 | 19.37*** |
| Barley | 77.9 | 50.6 | 63.4 | 10.45*** |
| Maize | 5.9 | 29.9 | 18.6 | 12.17*** |
| Sorghum | 2.9 | 7.8 | 5.5 | 1.63 |
| Faba bean | 22.1 | 15.6 | 18.6 | 0.99 |
| Field pea | 13.2 | 11.7 | 12.4 | 0.08 |
| Others | 11.8 | 13 | 12.4 | 0.05 |

N=sample size, *** significant at less than 1% significance level
Source: Field Survey, 2010

Table 4.6 showed the area covered by crops, production and grain sold by sample households. From the total sample households 89.7 per cent of the respondents have supplied grain to the market. The major grain sold by sample households was wheat. The average wheat sold by sample households was 5.06 quintal with a standard deviation of 5.02 and 9.15 quintal with a standard deviation of 13.04 in Endamohoni and Ofra wereda respectively.

On average wheat, faba bean and field pea were sold by sample households 52 per cent, 57 per cent and 56 per cent of their produce respectively, and overall 41% of the total production was supplied to the market. Sample farmers in Ofra wereda sold more than sample farmers in Endamohoni wereda. Farmers produce pulses for marketing and cereals more for consumption and some for market depending on the quantity they produced.

Table 10: Area cultivated in hectare, production in quintal and grain sold in quintal for major grains (mean)

| Grain Type | Endamohoni | | | Ofla | | | Total | | | |
|-------------|----------------|------------------|----------------|----------------|------------------|------------------|----------------|------------------|-----------------|-------|
| | Area | Production | Sold | Area | Production | Sold | Area | Production | Sold | |
| Wheat | 0.47 (0.27) | 13.98 (7.97) | 5.06 (5.02) | 0.42 (0.38) | 13.79 (15.37) | 9.15 (13.04) | 0.45 (0.33) | 13.88 (12.42) | 7.22 (10.26) | 52.00 |
| Barley | 0.24 (0.17) | 5.43 (4.79) | 0.68 (1.23) | 0.13 (0.16) | 2.97 (4.44) | 1.06 (2.59) | 0.18 (0.18) | 4.12 (4.76) | 0.88 (2.07) | 21.00 |
| Faba bean | 0.05 (0.09) | 0.80 (1.60) | 0.44 (1.03) | 0.04 (0.09) | 0.70 (2.25) | 0.43 (1.41) | 0.04 (0.09) | 0.75 (1.97) | 0.43 (1.24) | 57.00 |
| Field pea | 0.03 (0.07) | 0.37 (0.99) | 0.13 (0.56) | 0.02 (0.07) | 0.42 (1.29) | 0.29 (0.92) | 0.03 (0.07) | 0.39 (1.16) | 0.22 (0.76) | 56.00 |
| Total grain | 0.89 (0.44) | 22.42 (11.09) | 6.66 (5.79) | 0.79 (0.70) | 21.36 (20.64) | 10.80 (14.07) | 0.83 (0.59) | 21.86 (16.80) | 8.86 (11.15) | 41.00 |

Figures in parenthesis indicate standard deviation
Source: survey result, 2010

4.1.5. Institutional Characteristics

The institutional services are required to increase agricultural productivity through the adoption of new technology and providing updated information. Extension services, input availability and access to credit are among the institutional services which support farmers in boosting productivity and production.

4.1.5.1. Access to Extension Services

The survey showed that the sample households have a better access to extension services by frequent visit of development agents and having built farmers training centers in nearby. Table 4.7 revealed that 92 per cent of the sample households had contact with the extension agent during the 2009 cropping season. With regard to the frequency of extension contact among the total respondents 32.1 per cent had one contact per week, 17 per cent had twice contact per month, 8 per cent one contact in a month and the rest 43.7 per cent had contact any time they wanted. The average distance to the nearest farmers training center was 1.9k.m with a standard deviation of 1.08.

Table 4.7: Distribution of Sample Households by Access to Extension Services (Per cent)

| | N=64 Endamohoni | N=73 Ofa | N= 137 Total | χ^2 / t -value |
|--------------------------------|--------------------|----------------|-----------------|---------------------|
| Extension contact (Yes %) | 93.7 | 90.5 | 92 | 0.53 |
| Frequency of Extension Contact | | | | 5.87 |
| Weekly | 34.9 | 31.1 | 32.8 | |
| Twice in a month | 20.6 | 10.8 | 15.4 | |
| Monthly | 6.4 | 9.5 | 8 | |
| Any time | 38.1 | 48.6 | 43.8 | |
| Distance to the nearest FTC | 1.47 (0.79) | 2.29 (1.15) | 1.9 (1.08) | 5.79*** |

N=sample size, *** significant at less than 1% significance level,
 Figures in parenthesis indicate standard deviation
 Source: Field Survey, 2010!

4.1.5.2. Access to Credit

Credit is an important institutional services to finance poor farmers for input purchase and ultimately to increase production. However some farmers have access to credit while others may not. The sample households were asked whether they need credit or not and if they took credit in 2009 cropping season. 85.3% and 79.2% of the sample households in Endamohoni and Ofla wereda had a need for credit respectively. Out of the total respondents 80.9% in Endamohoni and 75.3% in Ofla of the sample households had taken credit. The sources of credit were 85% from cooperatives and 15% from DECSI. The average amount of credit taken by the 77.9% of the total sample households was 1188.21 with a standard deviation of 1486.51 (table 4.8).

Table 4.8: Distribution of Sample Household by Access to Credit (Per cent and Mean)

| | N=68 | N=77 | N= 145 | χ^2 / t-value |
|---------------------------|---------------------|----------------------|----------------------|--------------------|
| | Endamohoni | Ofla | Total | |
| Credit need (yes %) | 85.3 | 79.2 | 82.1 | 0.90 |
| Credit taken (yes %) | 80.9 | 75.3 | 77.9 | 0.65 |
| Credit amount in birr | 1204.44 (574.12) | 1172.83 (2007.27) | 1188.21 (1486.51) | 0.11 |
| Credit source Cooperative | 80 | 89.7 | 85 | 2.06 |
| DESCI Microfinance | 20 | 10.3 | 15 | |

N=sample size, Figures in parenthesis indicate standard deviation
Source: Field Survey, 2010

Farmers have used the credit for different purposes. Among the credit users 43.8 per cent has taken credit for fertilizer use only, 13.1 per cent for seed only, 29 per cent for both seed and fertilizer use and the rest 14.1 per cent for other purposes.

4.1.5.3. Access to Improved Input

Improved agricultural inputs help to increase productivity and thereby increase production and supply. The survey revealed that 84.8 per cent, 88.3 per cent and 65.5 per cent of the total sample households have used Urea, DAP and Seed respectively. Table.8 indicated that there is a significant difference at 10% in the use of urea and DAP between the two weredas.

Table 4.9: Distribution of Sample Households by Access to Input (Per cent and Mean)

| | N=68 Endamohoni | N=77 Ofla | N= 145 Total | χ^2 |
|-----------------------|--------------------|----------------|-----------------|----------|
| Urea (yes %) | 82.4 | 87 | 84.8 | 0.61 |
| Quintal | 0.35 (0.22) | 0.47 (0.44) | 0.41 (0.36) | 1.94* |
| DAP (yes %) | 86.8 | 89.6 | 88.3 | 0.28 |
| Quintal | 0.37 (0.21) | 0.47 (0.43) | 0.43 (0.35) | 1.71* |
| Improved Seed (Yes %) | 72.1 | 59.7 | 65.5 | 2.42 |
| Quintal | 0.41 (0.32) | 0.46 (0.65) | 0.44 (0.52) | 0.59 |

N=sample size, * significant at less than 1% significance level

Figures in parenthesis indicate standard deviation

Source: Field Survey, 2010

4.1.5.4. Access to Market and Market Information

Most of the sample farmers have to walk a long distance from home to the nearest market center to sell their agricultural products. Access to physical market infrastructure is fairly low in the villages thus farmers have to take their commodities to the wereda market centers. Table 4.10 showed that the average distance from home to the nearest market center was found to be 8.9k.m, with a standard deviation of 6.47 for sample households. In Endamohoni wereda the average distance to the nearest market was 4.03k.m with a standard deviation of 2.74 and in Ofra it was 13.22k.m with a standard deviation of 5.71.

Access to market information is extremely limited in the Ethiopian grain market. At the producer level, farmers have very limited information on price prevailing even in nearby markets (Wolday, 1994). It is assumed that producers and traders who have market information can decide how much to produce and market. However, Table 9 revealed that only 40.79 per cent of the total sampled households had price information about the nearby market price before they sold their grain. From the table one can see that both weredas had similar nearby market information.

Table 4.10: Access to Market and Market Information (Per cent and Mean)

| | N=60 | N=73 | N= 133 | χ^2 / t - |
|----------------------------------|----------------|-----------------|----------------|----------------|
| | Endamohoni | Ofla | Total | value |
| Distance to the nearest market | 4.03 (2.74) | 13.22 (5.71) | 8.91 (6.47) | 12.58*** |
| Market price information (yes %) | 41.7 | 40.3 | 40.79 | |

N=sample size, *** significant at less than 1% significance level,

Figures in parenthesis indicate standard deviation

Source: Field Survey, 2010

The chart shows the major sources of information for farmers. Farmers obtained marketing information from multiple sources. However, most respondents reported that their main sources of information were 30.8 per cent traders and 44.4 per cent other farmers. 14.3 per cent Of the sample respondents got information on market price from their cooperatives and 7.5 per cent through media (Radio). The marketing information received was mainly on grain prices.

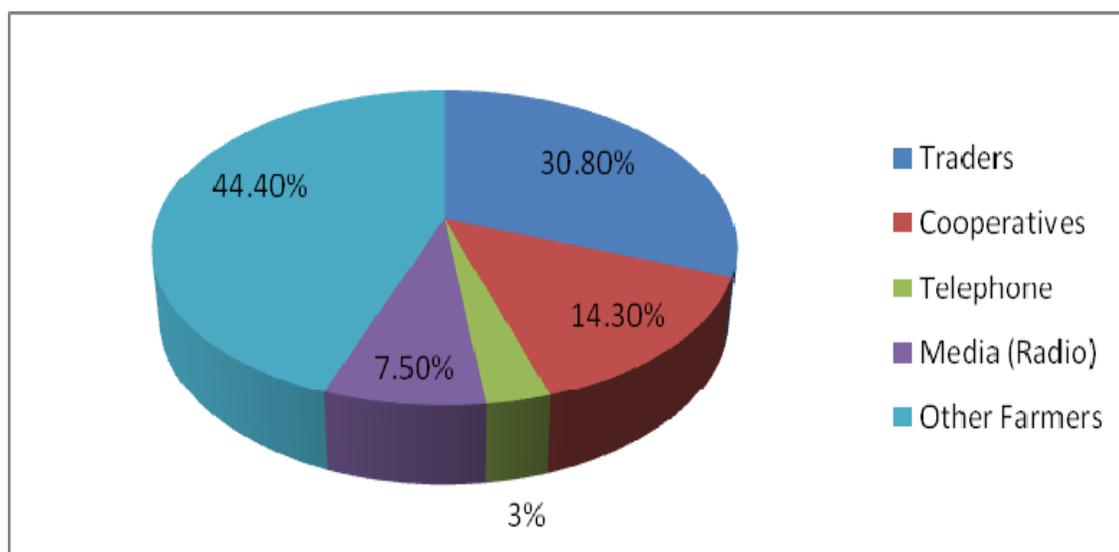


Fig. 4.1: Sources of market information

Source: Field Survey, 2010

The information the farmers had from traders and other farmers was through personal contact by word-of-mouth. Therefore, there is a need for a system of generating and disseminating timely market information for a greater number of farmers.

4.2. Analysis of Marketing Structure and Conduct

4.2.1. Marketing Channels

The grain marketing chain in the study area connects farmers, traders and consumers. The markets in both wereda are open air markets. The grain market channel was drawn based on the data collected from the interview. The grain flow begins with the farmer who after harvest decides how much he wants to store for consumption and seed and sells the remaining grain to traders or consumers. The routes that grains pass through from producer until it reaches the ultimate consumers represent the organizational structure of the grain market.

The actual marketing channel is more complicated, but the main marketing channels of the grain markets in terms of quantity flow from producer to consumer through different intermediaries are:

1. Farmer→ Assemblers → Wholesalers→ Retailers→ Consumers
2. Farmer→ Assemblers→ Wholesalers → Out of wereda
3. Farmer→ Assemblers → Wholesalers → Consumers
4. Farmer→ Wholesalers →Out of wereda
5. Farmer→ Wholesalers →Consumers
6. Farmer→ Wholesalers → Retailers→ Consumers
7. Farmer→ Assemblers →Retailer →Consumers
8. Farmer→ Assemblers → Out of the wereda
9. Farmer→ Retailers→ Consumers
10. Farmer→ Primary cooperatives →Coop unions→ Consumers
11. Farmer→ Primary cooperatives →Coop unions → NGOs and GOs →Farmer users
12. Farmer→ Consumers

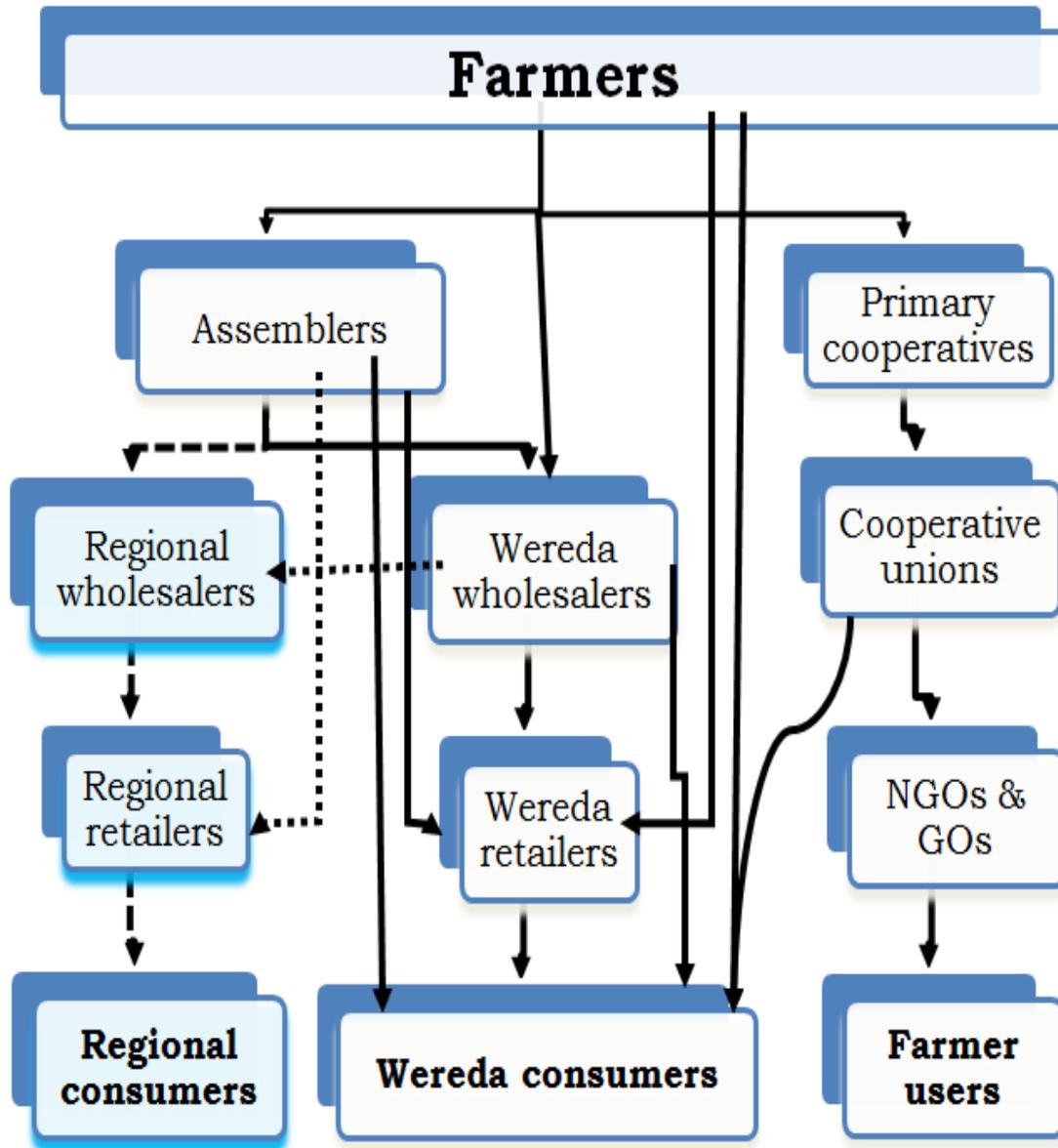


Fig. 4.2: Grain marketing channel in the study area

4.2.2. Grain Market Structure

The structural organization of the grain market in the study area was assessed to identify if it is competitive enough to fairly benefit both producers and the grain traders. Market structure includes the characteristics of the organization of a market that appear to exercise a strategic influence on the nature of competition and pricing within the market (Bain, 1968, in Wolday, 1994). The most salient aspects of market structure are; marketing participants, degree of sellers and buyers concentration and barriers to entry.

4.2.2.1. Major Actors and Roles of Grain Market Channel Participants

A variety of market actors are involved in moving grains from producers to consumers. The most important actors of grain marketing in Endamohoni and Ofla woredas in particular and in Tigray region in general are listed as: producers(farmers), cooperatives(primary and Union), traders and consumers. Primary actors include farmers, who produce and sell grains; cooperatives, which collect members produces' and sell to other traders, government organizations and NGOs; traders, including retailers, assemblers and wholesalers; and consumers who purchase the final good in rural or urban markets.

Producers are the first link in the marketing chain. Farmers produced and harvest their crops. They transport grain to the nearest markets on head/backload, or using pack animals over a distance. They had several marketing options, selling directly or selling to assemblers and wholesalers. Alternatively, Farmers also sell their products directly to cooperatives and retailers. Farmers sell their grain through different channels or roots. In the study area, the channels were cooperatives, wholesalers, assemblers, retailers and consumers.

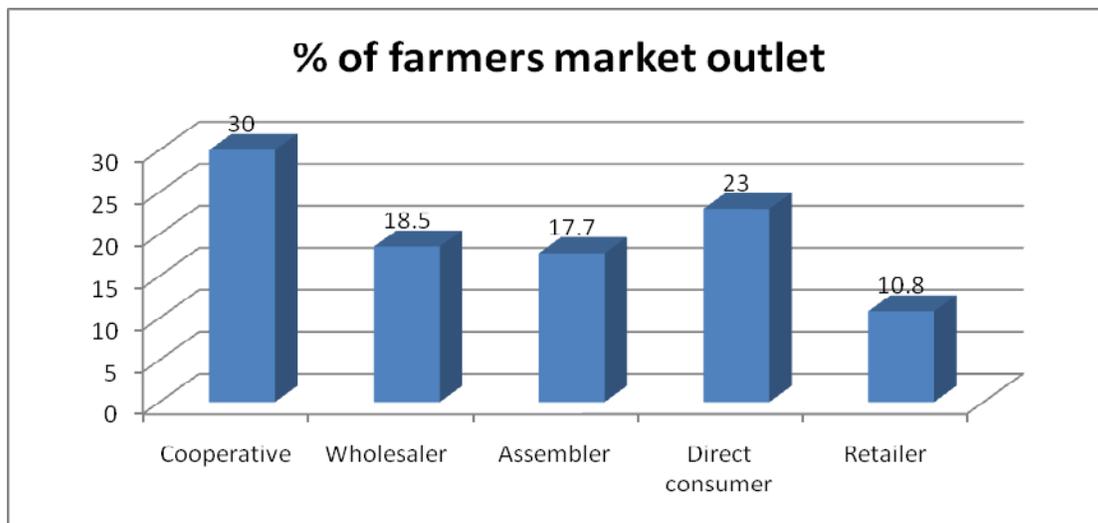


Fig. 4.3: Farmers market outlet
Source: Field Survey, 2010

Assembler: The assemblers play important role in the system of assembly. It is the first link between producers and other traders. Assemblers in the study area purchased 17.7% of the farmers' marketed grain in 2010. The assemblers, mainly consisting of farmer-

traders, buy grain from farmers at rural markets or in the town markets during market days collecting directly from farmers with the purpose of reselling it to wholesalers or directly to consumers in the study area or take it to regional market (Mekelle) to resell to consumers, retailers and/or regional wholesalers.

Brokers: Brokers are agents who work for a commission on behalf of other participants. They specialize in bringing the buyers and sellers together. They disseminate price and other information to the market participants. In the study area only the whole sellers use brokers for buying and selling. 20.8% Of the sample traders use brokers. The benefit of brokers for the traders in the study area was for saving time and for buying grain at lower price.

Wholesalers: These are licensed grain traders who store large bulk and assemble grains in either direction. Wholesalers are traders who have permanent market place or stores and may or may not move from one market to another to buy and resale grains. Some wholesalers in the study area collect grains directly from the farmers in the market and some used to buy grains from central Ethiopia and brought to resale in the study area.

Cooperatives: Cooperatives as a form of business organization are distinct from the more common investor-owned firms (traders). Cooperatives help to sell their members' farm products and maximize the return that they receive for these goods. Marketing cooperatives can serve their members in many ways, including bargaining for better prices, storing and selling members' grain. Thirty agricultural primary Cooperatives and two unions are present in both woredas with the objective of increasing farmers bargaining power and to benefit them from economies of scale. The two unions in both wereda (Bokra multipurpose cooperative union of Endamohoni and Hashenge multipurpose cooperative union of Ofla wereda) are very strong cooperative unions in Tigray region and highly participate in grain marketing. As the sample households explained in 2009 crop season unlike the past years the cooperative unions used to purchase grains directly from members and non members in their locality. According to the study result, in 2009/10 the grain marketing share of both unions at local market level was 26.8% and 33.3 % in Endamohoni and Ofla wereda respectively and this can testify the strength of the unions.

Retailers: Retailers are persons or company that sells commodity to end users. The majority of grain retailers in the study area are characterized by, no stores and weighing scale, often trading grains purchased from wholesalers or urban assemblers and some from farmers at the local market. Because of shortage of financial credit and lack of storage, retailers are subjected to low capital turn-over. These problems have a negative effect on the competitiveness of the market.

4.2.2.2. Degree of Market Concentration

Market concentration refers to the number and relative size distribution of buyers and sellers in a market. Concentration is felt to play a larger part in the determination of market behavior within a market since it affects interdependence of action among firms. The greater the degree of concentration, the greater the possibility of non competitive behavior occurs such as collusion existing in the market.

There are a number of measures of market concentration but the most commonly used is the market concentration index, which measures the percentage of traded volume accounted for by a given number of participants. The concentration ratio is expressed in the terms CR_x, which stands for the percentage of the market sector controlled by the biggest x firms. Four firms (CR₄) concentration ratio is the most typical concentration ratio for judging the market structure (Kohls & Uhl, 1985). A CR₄ of over 50% is generally considered a tight oligopoly; CR₄ between 25 and 50 is generally considered a loose oligopoly. A CR₄ of fewer than 25 is no oligopoly at all.

The degree of market concentration was estimated for the licensed grain traders in Maichew and Korem using the four firm concentration ratios. The four firm concentration ratio was computed using the equation

$$C = \sum_{i=1}^F SC_i \quad i = 1, 2, 3, \dots, F$$

The information for the total grain traded in the markets was collected from the bureau of agriculture and rural development estimated prices and amount of grain traded weekly market report, from the wereda finance bureau the estimated sales of grain traders for tax

payment and from the interviews conducted with the sample traders. The degree of inequality in market share at the local market level varies from crop to crop.

Table 4.11: Concentration Ratio for Maichew Market in 2009

| No of traders | % of total traders | % of cumulative traders | % of all grains offered | Cumulative % |
|---------------|--------------------|-------------------------|-------------------------|--------------|
| 63 | 84 | 84 | 78.92 | 78.92 |
| 8 | 10.67 | 94.67 | 12.26 | 91.18 |
| 4 | 5.33 | 100.00 | 8.82 | 100.00 |

Table 4.12: Concentration ratio for Korem Market in 2009

| No of traders | % of total traders | % of cumulative traders | % of all grains offered | Cumulative % |
|---------------|--------------------|-------------------------|-------------------------|--------------|
| 70 | 85 | 85 | 77.2 | 77.2 |
| 8 | 10 | 95 | 12.31 | 89.51 |
| 4 | 5 | 100.00 | 10.49 | 100.00 |

Source: Field Survey, 2010

Taking the four largest traders from the survey the concentration ratio was computed. As indicated in tables 15 and 16, below, the level of market concentrations (CR₄) for total grain was found to be below the level that would be considered as a noncompetitive market. The largest grain traders handled annually only 10.5% and 8.8% of the total volume of the grains purchased by the sample traders in Korem and Maichew respectively. The result was similar to G/meskel et.al (1998) in which he stated that at the local market level, for most markets and crops the CR₄ is less than 33%.

4.2.2.3. Barriers to Entry

The barriers to entry into the grain market reflect the competitive relationships between existing traders and potential entrants. If the barriers to entry are low, new traders can easily enter into grain markets and compete with established traders. Trade barriers have often laid the groundwork for market imperfection. Whether by intent or not, many regulatory actions by state or local units have the result of restricting freedom to entry

and the free flow of goods and services (Kohls and Uhl, 1985). The major barriers to entry in to grain trade in the study areas included lack of working capital, price information and high competition with the cooperative unions.

Lack of Capital

Lack of capital is the major problem in grain marketing. It is the real barrier to enter into the grain markets. Lack of working capital was reported to be an important barrier to entry thereby resulting in imperfection of food grain, pepper and rice markets in Southern and North East Ethiopia (Wolday, 1994; Rehima, 2005; Wolelaw 2005).

In the survey about 96% of the sample traders respond that major problem to run their business was lack of capital. Although the working capital required was reported to vary depending upon the price level and quantity of grain to be purchased, high amount of initial working capital was required to compute with wholesalers, collectors and the emerging marketing cooperatives. To enter in to the market more capital is needed because they have to purchase more grain and they have to pay cash on hand at the time of purchase. In addition high capital is required for store construction and for appropriate and adequate storage facilities. In these cases, capital requirement discourage entry into grain trading. Even if there was credit access from microfinance the amount given was very small for the wholesalers and assemblers.

Market Information

Marketing information can help predict, strategize, plan and act expediently, rationally and efficiently, thus reducing business risk, transaction costs and enabling market participants to explore business opportunities (Odeno and De Groote, 2007). About 87% of the sample traders stated willingness to pay for information cost, if there are well organized and transparent information centre. However, in the sample markets, all traders had information through different sources. Grain traders rely on contact with brokers and other traders to obtain market information regarding price in other markets.

Survey result indicated that 38% of the sample traders got price information from other traders. About 31% and 21 % of the traders knew price through telephone and brokers respectively, and 6% by personal observation. Regarding farmers, 44% and 30% of their

main source of information were other farmers and traders respectively. Radio was main source of information for only 8% of farmers and 4% of traders.

4.2.3. Grain Market Conduct

Market conduct refers to the patterns of behavior that firms follow in adopting or adjusting to the markets in which they sell or buy (Bain, 1968). In this report conduct of the grain market is analyzed in terms of the traders' characteristics, price setting and purchasing and selling strategies.

4.2.3.1. Characteristics of Traders

The characteristics of sample traders are presented in Table 17. Only 4 of the 24 traders were female, and all the female traders are retailers. The average age of sample traders was 37 years old with a standard deviation of 8.96.

Table 4.13: Characteristics of Sample Traders (Per cent and Mean)

| | | Wholesalers | Assemblers | Retailers | Total | χ^2 / t-value |
|--------------------|-------------------|-------------|------------|-----------|-------|--------------------|
| Sex | Male | 100 | 100 | 50 | 83.3 | 9.6** |
| | Female | | | 50 | 16.7 | |
| Marital status | Married | 100 | 100 | 75 | 91.7 | |
| | Divorced | 0 | 0 | 25 | 8.3 | |
| Education | Illiterate | 0 | 50 | 37.5 | 29.2 | 11.76* |
| | Primary school | 62.5 | 50 | 37.5 | 50 | |
| | Secondary school | 25 | 0 | 25 | 16.7 | |
| | College education | 12.5 | 0 | 0 | 4.2 | |
| Age | | 37 | 44.63 | 31.5 | 37.71 | -2.22* |
| | | (5.81) | (7.78) | (8.35) | (8.9) | |
| Family size | | 4.38 | 5.38 | 3.5 | 4.42 | |
| | | (1.99) | (1.41) | (1.77) | (1.8) | |
| Trading Experience | | 8.5 | 6.75 | 5.63 | 6.96 | |
| | | (6.5) | (2.55) | (5.26) | (4.9) | |

N=sample size, ** and * significant at less than 5% and 10% significance level

Figures in parenthesis indicate standard deviation.

Source: Field Survey, 2010

With respect to the educational status 29.2% of the sample traders were illiterate, 50% of the traders have attended primary school and the rest 29.2% were secondary school and college complete. The survey indicated that there was a significant difference in education level among wholesalers, assemblers and retailers. The average years of trading experience were 8.5, 6.5 and 5.6 years for wholesalers, collectors and retailers respectively.

As the major agricultural production is based upon the summer rainy season, storage plays an important role in grain market performance and traders' marketing operations. About 58% of the sample traders used to store when supply was high, with a higher percentage of wholesalers store more. From the sample traders 42% of the traders own store and 12% rented store permanently. The rest of the traders used to rent storage space temporarily. All of the wholesalers own weighing scale, cell phone and radio. Out of the 24 traders only 4 wholesalers have their own vehicle for transportation. The average initial capital and current working capital of the traders was 8,400 and 110,333 birr respectively and the average capital of wholesalers was the highest of all (Table. 18).

Table 4.14: Resource Ownership and Capital of Traders (Per cent and Mean)

| | Wholesalers | Assemblers | Retailers | Total | χ^2 / t-value |
|-------------------------|-------------|------------|-----------|-----------|--------------------|
| Store | 87.5 | 12.5 | 25 | 41.5 | |
| weighing scale | 100 | 87.5 | 50 | 79.2 | |
| Vehicle | 50 | 0 | 0 | 16.7 | |
| Cell phone | 100 | 87.5 | 50 | 91.7 | |
| Radio | 100 | 100 | 50 | 83.3 | |
| Initial working capital | 14500 | 4937.5 | 5762.5 | 8400 | 2.14* |
| | (9591.66) | (3167.21) | (6680) | (8010.37) | |
| Current working capital | 208750 | 86625 | 35625 | 110333 | 4.43*** |
| | (106695) | (53256) | (28213) | (100379) | |

N=sample size, *** and * significant at less than 1% and 10% significance level

Figures in parenthesis indicate standard deviation

Source: Field Survey, 2010

4.2.3.2. Traders' Price Setting Strategy

The method of price formation is critical importance. About 58 per cent of the sampled traders set purchasing and selling price themselves, 33 per cent of sample traders reported that they set price by colluding with other traders and 9 per cent of the traders set price by negotiation. Consequently, price information is important information for traders' grain marketing strategies. In order to obtain market information on prices, supply and demand, traders follow an average of 2 markets on a weekly basis.

In light of traders' reliance upon personal and commercial contacts for obtaining market information, recent telecommunication changes have played an important role in traders' access to information. Among those traders who own cell phones, all traders reported that their cell phones have had an important impact upon their commercial operations. It enables traders to search for prices over a greater number of markets and to have more market contacts and sell in more markets.

4.2.3.3. Traders Purchasing and Selling Strategy

Traders in the study areas respond to changes in local supply and demand in deciding where to buy and sell grains. A large percentage of traders focus their marketing strategies on their permanent market place, known as the "principal market". Over 60 per cent of traders' total purchases and sales occur on the traders' principal market (Korem and Maichew) only. This suggests that the majority of traders' operations occur on their principal markets, with a more limited number of traders trading between markets. Of all the traders, assemblers change their purchase and sales markets the most frequently, followed by wholesalers.

Major suppliers in the study areas were farmers. The major grains purchased by the sample traders surveyed were 29 per cent wheat, 18 per cent fababean, 12.5 per cent barley and 12 per cent field pea from farmers. The reason for purchasing the major grain was the high supply. 70 per cent of the sample traders revealed that their purchasing choice was based on the supply on their principal market. The critical period for grain purchase was immediately after harvest during December and January. Wholesale traders primarily use intermediaries to purchase from farmers and other traders out of the wereda,

rather than purchasing directly. 75 per cent of the wholesalers in the study area used brokers and commission agents for purchasing grains. According to the survey intermediaries are important for saving time to the traders, for buying at lower prices and to get higher quality grains.

Traders use a variety of criteria to choose their suppliers and clients, 54 per cent respond that the purchase or sales price offered, 12 per cent the type of payment mechanism, and 29 per cent commercial and social relations. This suggests that, while profits are important for traders' marketing behavior, social networks play an important role in these decisions as well. 29.2 per cent of the traders revealed that their purchasing price of grains was higher than competitors in order to buy more quantity and resale it in other markets. 87 per cent of the sample traders claimed that prices of grains in 2009 decreased compared to the previous year and to the contrary supply increased.

4.2.4. Marketing Margins

Market efficiency assesses whether profits are too high for different market actors. To test market efficiency, we calculate the net marketing margins, i.e., comparing the difference in prices between two prices, minus marketing costs. Payments to transporters and market taxes are the highest marketing costs of traders, followed by loading and unloading, personal travel to markets, labour and storage costs. Of all the marketing costs, transport costs and market taxes represent more than 85 percent of traders' total marketing costs. Marketing costs (in total) represent 10-15 per cent of traders' final sales price, depending upon the markets and the period of year. The calculations of traders' profits observed during the 2009/10 marketing season's show that marketing margins are similar for wholesalers and assemblers and profits are higher for assemblers.

Table 4.15: Marketing Margin of Traders (Mean)

| Traders | Wholesalers | Assemblers | Retailers | Total |
|----------------------------|-------------|------------|-----------|-------|
| Purchasing price | 456 | 450 | 460 | 452 |
| Labour cost | 4.25 | 3.75 | 2 | 3.33 |
| Loading and unloading cost | 4.35 | 3.75 | 2 | 3.37 |
| Transport cost | 27 | 22 | | 16.33 |
| Storage cost | 1.5 | 1.75 | 2 | 1.75 |
| Other costs | 4 | 17.5 | 3 | 8.17 |
| Tax | 20 | | | 6.67 |
| Total marketing costs | 61.1 | 48.75 | 9 | 39.62 |
| Selling price | 555 | 548 | 485 | 526 |
| Gross marketing margin | 99 | 98 | 25 | 74 |
| Net Profit | 37.9 | 49.25 | 16 | 34.38 |

Source: Own survey result, 2010

The analysis clearly showed that the net earnings of assemblers are greater than the earnings of wholesalers and retailers. The net benefit calculated for wholesalers, assemblers and retailers were Birr 37.9/quintal, 49.25/quintal and 16/quintal, respectively. Of all the marketing costs of wholesalers and assemblers, transport cost was the major component which constituted 44.19% and 45.13%, respectively. Particularly the transport cost ratio was similar to the findings of Wolday (1994) and Kindie (2007) which was 66% and 31.51% respectively. There were not transportation costs for retailers for they used to purchase and sell in the same market and their earnings are lesser than wholesalers and assemblers because of the competition with producers when they sell directly to the consumer in the open market. In general, traders' profits vary greatly over the course of the year and between years, with higher net marketing margins during low-production and high-price years

4.3. Factors Affecting Grain Market Supply

The hypothesized determinants of grain market participation and marketable surplus are summarized in Table 20, where 7 variables are continuous and the remaining 6 are dummy variables. The Probit, Selection models and Tobit results are depicted in table 20, 21 and 22 respectively.

Table 4.16: Description of Variables used in Econometrics Model

| Variable | Description | Types | Expected sign |
|-----------|------------------------------------|------------|---------------|
| SUPPLY | Quantity supplied in quintal | Continuous | |
| MKT.DIS | Distance to the nearest market | Continuous | - |
| NF.INCOME | Income from non-farming | Continuous | - |
| YIELD | Size of output quintal per hectare | Continuous | + |
| T_LAND | Size of land holding in hectare | Continuous | + |
| FAM_SIZE | Family size in man equivalent | Continuous | -/+ |
| TLU | Number of livestock without oxen | Continuous | - |
| OX | Number of oxen owned | Continuous | + |
| MKT_PART | Market participation | Dummy | |
| CREDIT | Credit access | Dummy | + |
| EDU | Education of household head | Dummy | + |
| INPUT | Use of improved inputs | Dummy | + |
| COOP | Membership in cooperative | Dummy | + |
| EXT.C | Extension service | Dummy | + |
| MARK.INFO | Access to market information | Dummy | + |

Before running the Tobit model and Heckman selection models, the hypothesized explanatory variables were tested for the existence of multicollinearity problem that is the situation where the explanatory variables are highly intercorelated (Maddala, 1983). Variance Inflation Factor (VIF) and contingency coefficients were computed to check association between continuous and discrete variables, respectively by using SPSS statistical package. The VIF values shown in appendix, table 4 indicate that all the continuous explanatory variables have no serious multicollinearity problem. But the contingency coefficients computed for dummy variables were found to be multicollinear as shown in appendix, table 3. Thus, two variables were omitted. Hence, 11 of the hypothesized continuous and dummy variables were included in the estimation of the econometric models.

4.3.1. The Heckman Two Step Results

The Heckman model was estimated by using a two step procedure. In the first step the probit model was estimated to identify factors affecting decision to participate. In the second step the OLS adjusted for selectivity bias model was estimated to identify the significant factors for the level of volume of supply.

4.3.1.1. Determinants of Grain Market Participation

The parameters of the potential variables that were expected to influence the decision to participate in the grain market supply were weighted and estimated by the help of the maximum likelihood method. That is a total of 11 potential predicted variables (7 continuous and 4 dummy) were selected and entered in to the probit model, out of which 4 variables were positively and significantly influencing the decision to participate in grain marketing. As it is shown on Table 21, the variables having significant relationships with the decision to participate in grain supply were yield, Market distance, credit taken and market price information.

Table 4.17: Maximum Likelihood Estimates of Probit Model

| VARIABLE | Coef. | Std. Err. | Z – Value |
|-----------------------|-----------|-----------------------|-----------|
| EDU | 0.081 | 0.472 | 0.17 |
| FAM.SIZE | -0.164 | 0.133 | -1.24 |
| NF.INCOME | 0.000 | 0.000 | 0.7 |
| OX | 0.304 | 0.400 | 0.76 |
| TLU | 0.154 | 0.258 | 0.6 |
| T.LAND | 1.262 | 1.471 | 0.86 |
| YIELD | 0.108 | 0.046 | 2.36** |
| MKT.DIS | 0.106 | 0.050 | 2.11** |
| CREDIT | 1.206 | 0.577 | 2.09** |
| COOP | -0.429 | 0.567 | -0.76 |
| MARK.INFO | 2.560 | 0.780 | 3.28*** |
| CONS | -4.004 | 1.694 | -2.36 |
| Number of observation | = 145 | LR Chi-square (11) | = 45.48 |
| Log likelihood | = -21.011 | Prob> Chi-square | = 0.000 |
| | | Pseudo R ² | = 8.675 |

*** and ** significant at less than 1% and 5% significance level

The likelihood ratio chi-square of 45.48 (df =11) with a p-value of 0.000 tells us that our model as a whole fits significantly better than an empty model (i.e., a model with no predictors).

Yield influenced the farmers' decision to participate in grain marketing positively. The quantity of grain produced has affected market participation at 5% significant level. The higher the output is, the higher the probability of farmers to participate in the market. Similar results were reported by Wolday (1994) and Astewel (2009).

Distance to the nearest market was statistically significantly at 10% probability level. The model results show that distance of farmers' residence from the nearest market associated with market participation decision positively. This was contrary to the hypothesized that, as the distance to the nearest market increases, the probability of farmers' market participation decreases.

Access to credit influenced farmer's grain market participation positively at 5%. This implies that access to credit improves the financial capacity of farmers to buy modern inputs, thereby increasing production which is reflected in the marketable supply of grains.

Marketing information access was found to influence market participation positively and significantly at 1% level of significance. The farmers with better information are in better position to supply their surplus production to the market. This is in line with the findings of Astewel (2009).

4.3.1.2. Determinants of Quantity of Grain Supplied

The second stage estimation is summarized in Table 22 and it indicates that the decision of how much quantity was sold by households. Each decision has been studied by using a selection model which included the inverse Mill's Ratio calculated from a Probit estimation of the decision to sell into the supply equations. There are 12 potential explanatory variables (7 continuous and 5 dummy) including inverse Mill's Ratio (LAMBDA). Out of these 5 variables, non farming income, oxen number, total number of livestock, yield and market information had significant effect on quantity of grain supplied.

Table 4.18: Regression Model with Sample Selection

| VARIABLE | Coef. | Std. Err. | Z - Value |
|-----------|---------|-----------|-----------|
| EDU | 0.631 | 1.519 | 0.42 |
| FAM.SIZE | -1.030 | 0.609 | -1.69 |
| NF.INCOME | 0.002 | 0.001 | 2.29* |
| OX | 1.692 | 0.673 | 2.51** |
| TLU | 1.306 | 0.498 | 2.62*** |
| T.LAND | 3.026 | 2.371 | 1.28 |
| YIELD | 0.407 | 0.113 | 3.59*** |
| MKT.DIS | 0.087 | 0.138 | 0.63 |
| CREDIT | 2.751 | 2.291 | 1.20 |
| COOP | 2.633 | 1.771 | 1.49 |
| MARK.INFO | 4.357 | 2.106 | 2.07** |
| CONS | -16.049 | 5.483 | -2.93 |
| LAMBDA | 7.782 | 5.009 | 1.55 |

Number of observation = 145

Wald Chi-square = 114.79

Censored observation = 13

Prob> Chi-square = 0.000

Uncensored observation = 132

Sigma = 8.675

***, ** and * significant at less than 1%, 5% and 10% significance level

Yield positively affected quantity supplied and is statistically significant at 1% probability level. As hypothesized when the quantity of grain produced increases, the market supply will increase too. As yield increased by one unit (quintal), the marketable supply would increase by 0.41 quintal. This is in line with the findings of Rehima (2005), Wolday (1994) and Astewel (2009); where size of output had a significant positive relationship with marketable supply. Study by Elias (2005) on coffee, also indicated that an increase in yield of coffee by one quintal/ha will lead to an increase of marketed quantity of coffee by 0.4 quintals.

Nonfarm income positively affects the supply of grain at 10% significance level. It was expected that as non farm income of farmers increase, the sale of grains to decrease, but the analysis showed a positive relationship between supply and nonfarm income. On average if a farmer gets 1 birr of additional income causes a 0.2 kg addition in the

quantity of grain supply. This could be due to the fact that farmers who have additional income would have the chance to buy food for consumption at any time and increase their marketable crops

Market information was statistically significant at 5% level of significance. The model showed that there is a positive association between market information and marketable supply of grain. Better information leads to better decisions, which leads to greater economic growth and to more equitable participation in the market. On average, if a farmer gets market information the amount of grain supplied to the market increases by 4.36 qt. As David et.al (1995) stated farmers, who have broader and timely information, have more negotiating power and the ability to make good planting and marketing decisions.

The number of oxen owned by households had positively affected grain supply at less than 1% significant. As the number of oxen increased by one the quantity of grain supplied increased by 1.69 quintal. This is in line with earlier hypothesis that farmers who own oxen are more likely to till in time and thus, produce more which can be reflected on marketable supply.

Number of livestock owned found to be positively related with the supply of grain, and its coefficient was significant at less than 5% probability level. It was hypothesized that farmer who specialize in livestock production would be expected to have negative relationship with marketable surplus. The result was contrary to Rehima (2005), where total livestock unit influence quantity of pepper supply negatively. The analysis revealed that an increase of 1 unit of livestock (TLU) increased the quantity of grain supplied by 1.31 quintal. The reason might be as livestock ownership is an indicator of wealth in the study area; those who have large number of livestock would consume livestock products and decrease grain consumption that would enable to increase marketable supply.

For the second stage OLS result the inverse mills ratio (LAMBDA) was not significant. This indicated that in Heckman two stage models, the correction for selectivity bias is insignificant. It didn't affect quantity supplied significantly.

4.3.2. The Tobit Model

Tobit model tends to answer the two questions by identifying the factors affecting the decision to participate and the level of participation at the same time. The result of the Heckman two step model showed that the IMR was not significant. That means estimating volume of quantity supplied without considering the decision to participate in grain marketing would not result in selection bias. Thus, using the tobit model will be appropriate to identify the factors affecting the participation and the volume of supply of grain to the market.

Attempts were made to include all theoretically important factors in the tobit model. Among the variables included in the analysis, 6 variables such as family size, nonfarm income, total livestock unit, oxen number, market information and yield influence the quantity of grain supply significantly. The results of the tobit model is similar with the results of the second step of selection model. In addition there is a sixth significant variable in the tobit model which is family size.

Table 4.19: Tobit Model

| Variable | Coef. | Std. Err. | t – Value |
|---------------------------|---------|-----------------------|-----------|
| EDU | 0.282 | 1.455 | 0.19 |
| FAM.SIZE | -1.165 | 0.549 | -2.12** |
| NF.INCOME | 0.001 | 0.001 | 1.82* |
| OX | 1.827 | 0.640 | 2.85*** |
| TLU | 1.250 | 0.483 | 2.59** |
| T.LAND | 3.670 | 2.264 | 1.62 |
| YIELD | 0.383 | 0.107 | 3.59*** |
| MKT.DIS | 0.085 | 0.128 | 0.67 |
| CREDIT | 2.698 | 2.001 | 1.35 |
| COOP | 2.003 | 1.689 | 1.19 |
| MARK.INFO | 4.403 | 1.607 | 2.74*** |
| CONS | -14.307 | 3.899 | -3.67 |
| Number of observation | = 145 | Log likelihood | = -480.99 |
| Left Censored observation | = 12 | LR Chi-square | = 45.48 |
| Uncensored observation | = 133 | Prob> Chi-square | = 0.000 |
| Sigma = 8.507 | | Pseudo R ² | = 0.0907 |

***, ** and * significantly at less than 1%, 5% and 10% significance level

Family size was measured in man equivalent i.e the availability of active labour force in the household. Family size affected negatively the supply of grain at 5% significant. This means that large amount of grain is required for consumption when number of family member increases. An increase in one family member (man equivalent) indicated that a decrease 1.18 quintal. This is in line with the study by Astewel (2009), as family number increases supply of rice to the market decreases

4.4. Major Production and Marketing Constraints

The objective of this section is to highlight some of the more critical problems facing the farmers and traders and to better understand the relative importance of the problems.

4.4.1. Farmers' Production and Marketing Constraints

The common problems perceived by sample farmers in the production and marketing are showed in table 24.

As discussed earlier the average land holding of sample households in the study area was 0.54 hectare and average family size of 6. It would not be enough to feed the whole family by depending on crop farming only. 42 per cent of the sample households reported that shortage of land as a major problem. Access to credit plays an important role in farmers' production and marketing activities. Farm households primarily borrow money to meet their agricultural inputs. Over 78 per cent of sample farmers took credit from their cooperatives in kind, that is for fertilizer and seed in 2008/09. But 52 per cent of the sample reported that there was a credit problem for farming management activities. While microfinance institutions exist, these institutions provide loans to rural farm households in group bases. Since farm households typically do not have access to a bank account, farmers must find other means of obtaining credit. Consequently, farmers rely heavily upon informal credit mechanisms to borrow money, from family members or local moneylenders. Thus farmers are forced to sell their grain immediately after harvest to meet their cash needs for repaying loans.

Weather effects are another problem of production. Farmers reported that the late starting of rain fall and early ceasing of rain fall has affected their production. Input supply (14%) and diseases (11%) were other production problems.

Information on market price, demand and supply was also mentioned as a problem by 37 % of sample households. The information that farmers got in particular did not assist them in deciding what crops to plant and how much to produce. 36 per cent of sample respondents stated that market distance was also a major problem. Since the existing markets in the wereda are in the towns, farmers have to walk long distances to sell their grains. For farmers transportation system is their pack animals, they couldn't take large amount of grains at a time. Lack of standard measures (16%), price setting (22%), access to transportation vehicle (25%) and lack of market (15%) were other marketing problems of farmers.

Table 4.20: Production and Marketing Problems of Sample Farmers (Per cent)

| Problems | N=64 | N=73 | N= 137 Total |
|----------------------------------|------------|-------|--------------|
| | Endamohoni | Ofla | |
| Input supply | 12.5 | 16.44 | 14.6 |
| Shortage of land | 50 | 35.62 | 42.34 |
| Credit | 46.88 | 56.16 | 51.82 |
| Weather | 37.5 | 17.81 | 27.01 |
| Diseases | 14.06 | 8.22 | 10.95 |
| Market information | 31.25 | 42.47 | 37.23 |
| Access to vehicle transportation | 23.44 | 26.03 | 24.82 |
| Price setting | 12.5 | 30.14 | 21.9 |
| Availability of markets | 34.38 | 36.99 | 35.77 |
| Lack of market | 9.38 | 20.55 | 15.33 |
| Measurements | 21.88 | 10.96 | 16.06 |

Source: Survey result, 2010

4.4.2. Traders' Marketing Constraints

Table 25 shows traders' perceived constraints to grain marketing in the study area. In general, many of these constraints confirm the results on the structure and conduct of the grain market. Overall, 95% percent of traders stated that capital shortage is the greatest constraint to grain marketing. High amount of initial working capital was required to compute with the licensed and unlicensed traders and with the cooperatives. 58% of the

traders reported that shortage of financial credit was another limiting factor in operation and business expansion. The main reason given for not taking bank credit was the lack of collateral to be eligible for bank loan. The loan given by microfinance (DECSI) was also very little for grain trading operations.

75 per cent of the traders identified the competition with un-licensed traders as a major problem. Although the law requires traders to acquire a license in order to engage in grain trading, licensed traders allege that this is not well enforced, which provides an un-level playing field in grain trading. As these unlicensed traders do not pay sales tax, profit tax, etc., the licensed traders are at a disadvantage.

Table 4.21: Problems of Traders (Per cent)

| Problems | Wholesalers | Assemblers | Retailers | Total |
|-------------------------------------|-------------|------------|-----------|-------|
| Infrastructure problem | 25 | 12.5 | 25 | 20.8 |
| Shortage of supply | 62.5 | 37.5 | 62.5 | 54.17 |
| Storage problem | 25 | 75 | 12.5 | 37.5 |
| Theft | 0 | 25 | 0 | 8.3 |
| Information flow | 75 | 75 | 87.5 | 79.2 |
| Capital shortage | 87.5 | 100 | 100 | 95.8 |
| Problem of access to credit | 50 | 37.5 | 87.5 | 58.3 |
| Lack of demand (low price) | 0 | 50 | 12.5 | 20.8 |
| Competition with licensed traders | 0 | 25 | 12.5 | 12.5 |
| Competition with unlicensed traders | 100 | 100 | 12.5 | 70.8 |
| Competition with Cooperatives | 75 | 37.5 | 25 | 44.4 |
| Farmers reluctance to sell | 50 | 75 | 75 | 66.6 |
| Telephone expense | 75 | 50 | 25 | 50 |
| Personal travel & other expense | 75 | 37.5 | 25 | 44.4 |

Source: Survey result, 2010

Another problem identified by traders is the involvement of cooperatives in grain market. 44 per cent of the traders reported that the government is making favor to cooperatives. The cooperative unions purchase grains (wheat and faba bean) from farmers in their kebeles by adding 15 per cent of the existing local market price. They are

guaranteed that the bureau of agriculture would buy them by adding 6 per cent of the price they bought. Note; the cooperatives used to buy seeds of wheat and faba bean from farmers which has multiplied seeds in contract agreement with the Ethiopian Seed Enterprise (Ofla and Endamohoni wereda BoARD).

Another major problem is market information. Market information, particularly price information, is an indicator of short run demand and supply conditions in various markets. By indicating what grains are demanded and where, it facilitates the timely and speedy flow of grain from producing to consuming markets, and thereby contributes to market efficiency.

Traders also cited shortage of supply (54.2%), storage problem (37.5), lack of demand (20.8%), competition with licensed traders (10.2%), and farmers' reluctance to sell (66.6%) as additional constraints to marketing.

5. Conclusion and Recommendations

5.1. Summary and Conclusion

Grains do not constitute only the major food crops for the majority of the population but also as source of income at household level. The study has focused on the organizational structure of the grain market and the marketing channels. In addition it identified the factors affecting the supply of grain by households and the major constraints of grain marketing. The study was based on primary data from farmers and traders; and secondary data were generated from wereda bureau of agriculture and rural development, cooperative unions, wereda bureau of small scale trade and industry and CSA.

The study was conducted in southern zone of Tigray region. The zone was purposively selected for its market oriented agricultural commodities potential. A total of 145 farmers and 24 traders were interviewed. Generally in this study descriptive statistics and econometric models were used. To analyse the data SPSS version 15 and STATA 11 were applied. The main findings of this research are summarized as follows.

The average family size of farmers participating in the survey was 6 members, with family labour force of 4 man equivalent per household. The average years of farming experience for total sample households were 21.66 years. Out of the total sample households 43.4% were involved in nonfarm activities. The income generated by the sample households from nonfarm activity was 859.17 birr with standard deviation of 1320.96 during 2009/10 season.

75% of the sample households have taken agricultural inputs in credit from their cooperative. The survey revealed that 84.8 per cent, 88.3 per cent and 65.5 per cent of the total sample households have used Urea, DAP and Seed respectively.

Access to physical market infrastructure is fairly low in the villages thus farmers have to take their commodities to the wereda market centers. The average distance from home to the nearest market center was found to be 8.91 km with a standard deviation of 6.47 for sample households. Only 40.79 per cent of the total sampled households had price information about the nearby market price before they sold their grain.

The marketing channels of the grain markets in terms of quantity flow from producer to consumer passed through different intermediaries. The important grain marketing chains have been identified. Much of the marketed surplus was channeled through cooperatives, wholesalers, assemblers, retailers and direct to consumers.

The structural organization of the grain market in the study area was assessed to identify if it is competitive enough to fairly benefit both producers and the grain traders. The structure of the grain market indicated that the four-firm Concentration Ratio (CR_4), that is, the share of the largest four traders in the total volume of grain purchased was very low. The largest grain traders handled annually only 10.5% and 8.8% of the total volume of the grains purchased by the sample traders in Korem and Maichew respectively.

The major barriers to entry in to grain trade in the study areas included lack of working capital, market information and high competition with the cooperative unions and unlicensed traders. All traders have information from different informal sources; however, the information system is not transparent among traders.

Regarding the conduct of grain market, 17 per cent of the sample traders were female and more than 70 per cent of the traders had attended formal schooling. 80 per cent of the traders buy and sell grain throughout the year suggesting that trading is their primary occupation. The major grains purchased by the sample traders surveyed were 29 per cent wheat, 18 per cent fababean, 12.5 per cent barley and 12 per cent field pea from farmers. Pricing strategy of the traders indicated that 58 per cent of the sample traders set purchasing and selling price themselves, 33 per cent of sample traders reported that their price is set by sellers and 9 per cent of the traders set price by negotiation.

Traders use a variety of criteria to choose their suppliers and clients, 54 per cent respond that the purchase or sales price offered, 12 per cent the type of payment mechanism, and 29 per cent commercial and social relations. This suggests that, while profits are important for traders' marketing behavior, social networks play an important role in these decisions as well. Purchasing strategy of traders indicates that about 75 per cent of traders purchase by themselves, and 25 per cent purchased using brokers.

The analysis clearly showed that the net earnings of assemblers are greater than the earnings of wholesalers and retailers. The net benefit calculated for wholesalers, assemblers and retailers were Birr 37.9/quintal, 49.25/quintal and 16/quintal, respectively. Transport cost was identified as the major cost component of marketing costs which accounted 44.19 per cent and 45.13 per cent, for wholesalers and assemblers respectively.

The major determinant factors for grain market participation and volume of supply were estimated using Tobit model and Heckman two-stage model. The problem with the Tobit model is that it assumes all producers are potential suppliers of a good, and that volume of supply and market participation are influenced by the same variables in the same way. This may introduce a selectivity bias. Hence the study applied Heckman two-stage model. Based on the Heckman two-stage model, the study had identified the determinants of participation decision on grain market and its effect on the quantity supplied.

Attempts were made to include all theoretically important factors in the estimated model. Among the variables included in the analysis, 5 variables such as nonfarm income, total livestock unit, oxen number, market information and yield influence the quantity of grain supply positively significantly and Family size affected negatively the supply of grain at 5% significant.

4 variables were positively and significantly influencing the decision to participate in grain marketing. The variables having significant relationships with the decision to participate in grain supply were yield, Market distance, credit taken and market price information.

The common problems perceived by sample farmers in the production and marketing are shortage of land, access to credit, market availability, market information and access to vehicle transportation. The main grain marketing constraints for traders are shortage of capital, shortage of supply, lack of timely and accurate market information, poor access to credit and competition with unlicensed traders were few of the inherent problems.

The measures of market structure indicated that the grain market structure in the study area is fairly competitive; however! the existence of barriers to entry, and the constraints facing traders have a negative impact on the performance of the grain marketing system.

Generally, southern zone of Tigray region is potential for grain production, the agro ecology is suitable for cereals and pulses, and the farmers are well squinted to the use of improved agricultural inputs. Hence, the region has to explore these opportunities.

5.2. Recommendations

Based on the findings of this study, the following policy measures could be recommended,

- 1 Support formal access to credit for traders and farmers. Without access to financial resources, farmers sell immediately after harvest, when prices are at their lowest point. In addition, with limited access to credit, traders are often unable to purchase sufficient quantities of grains to meet local demand. Improving access to credit for farmers and traders should therefore be a priority for improving grain market performance, in turn, increasing efficiency and improving consumers' welfare.
- 2 Strengthen access to market information including prices, supply and demand for all market actors by strengthening Media's contribution on production and marketing of agricultural products. Market information is essential for the efficient functioning of the marketing system if it provides comprehensive, accurate and timely information to market participants. Market actors (traders and farmers) who have access to information on prices, supply and demand can make better-informed decisions about when, where and how much to buy and sell. Dissemination of relevant market information through the agricultural extension system should also be considered.
- 3 Improve transport system to reduce transport costs. In addition to improving access to information, reducing transport costs can have a significant impact upon producers and traders' profits. High transport costs not only reduce farmers' profits, but also increase the price dispersion between markets, thereby increasing consumers' prices

- 4 Popularize improved species of livestock. The marketable supply analysis result indicated that the numbers of oxen and total number of livestock owned by household heads are directly proportional to the marketable supply of grain. Hence, there is a need to promote the availability of oxen and livestock in the woredas.
- 5 Encourage licensing of traders. Licensed traders are at a disadvantage and could not be competitive in buying and selling because of absence of control on unlicensed traders who do not have the obligation of paying taxes imposed on licensed traders.
- 6 Strengthen cooperatives and their unions; Cooperatives are vital in increasing agricultural production, value addition and retention of members produce, agricultural marketing through providing market information and improving the bargaining power of the farmers. More ever cooperatives play significant role in bringing agricultural transformation through the supply of modern inputs, technologies and marketing skills.
- 7 Conduct a research on the different components of the marketing system; Conduct an appraisal on the impact of the emerging market structure on producers' and traders' incentive.

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APPENDICES

Appendix Table 2. Conversion of Livestock number to Tropical Livestock Unit (TLU)

| Livestock Type | TLU |
|----------------|------|
| Oxen/Bulls | 1.1 |
| Cows | 0.8 |
| Heifer | 0.5 |
| Calves | 0.2 |
| Sheep | 0.09 |
| Goats | 0.09 |
| Donkeys | 0.36 |
| Horses | 0.80 |
| Mules | 0.80 |

Source; Gryseels, G. 1988.

Appendix Table 2. Conversion factors used to estimate man equivalent

| Age group | Male | Female |
|-----------|------|--------|
| < 10 | 0 | 0 |
| 13-14 | 0.2 | 0.2 |
| 14-16 | 0.5 | 0.4 |
| 17-60 | 1 | 0.8 |
| >60 | 0.7 | 0.5 |

Source: Bekele Hundie, 2001

Appendix Table 3. Contingency coefficient for discrete independent variables

| | EDU | INPUT | CREDIT | EXT.CON | COOP | MKT.INFO |
|---|-----|--------|--------|---------|--------|----------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | 1 | -0.025 | -0.070 | -0.132 | -0.034 | -0.020 |
| 2 | | 1 | 0.256 | 0.159 | 0.149 | 0.129 |
| 3 | | | 1 | 0.224 | 0.022 | 0.096 |
| 4 | | | | 1 | -0.120 | 0.116 |
| 5 | | | | | 1 | -0.050 |
| 6 | | | | | | 1 |

Source: own computation

Appendix Table 4. Variance inflation factor for continuous independent variables

| Variable | Tolerance | VIF |
|----------|-----------|-------|
| FAM.SIZ | 0.852 | 1.174 |
| INCOME | 0.701 | 1.427 |
| OX | 0.519 | 1.925 |
| TLU | 0.546 | 1.830 |
| LAND | 0.507 | 1.974 |
| YIELD | 0.702 | 1.424 |
| MARK.DIS | 0.754 | 1.327 |

Source: own computation

Analysis of grain marketing in southern zone of Tigray region

Farmers' questionnaire

- Questionnaire number: _____
- Name of enumerator: _____
- Date: _____
- Wereda _____
- Name of Rural Peasant Administration _____

I. Household Characteristics

1. Name of household head _____
2. Sex of household head 1. Male 2. Female
3. Age of household head _____ years
4. Religion of household head
 1. Muslim 2. Orthodox Christian 3. Protestant 4. Catholic 5. Other (specify) _____
5. Marital status of household head
 1. Single 2. Married 3. Divorced 4. Widows
6. Education level of household head
 1. Illiterate 2. Primary School 3. Secondary School
 4. Religious school 5. College Education
7. Age & Sex of Family members

| Sex | Age in Years | | |
|--------|--------------|-------|------|
| | <16 | 16-65 | > 65 |
| Male | | | |
| Female | | | |

8. Farming experience, since started farming _____ years.
9. How many of your family members do permanently work on farm? _____
10. Did you or your family members participate in Non-farming activities? 1. Yes 2. No
11. If yes, what is the number of family members worked in non farming activities _____
12. Specify the type of activity they are engaged in?
 1. Petty trading 2. Handicrafts 3. Employed
 4. Daily labourer 5. Other (specify) _____

13. Livestock ownership

| No | Type of livestock | Number owned in 2009 | No. of sold | Cash income from sold in (Birr) |
|----|-------------------|----------------------|-------------|---------------------------------|
| 1 | Cows | | | |
| 2 | Oxen | | | |
| 3 | Calves | | | |
| 4 | Bulls | | | |
| 5 | Sheep | | | |
| 6 | Goats | | | |
| 7 | Donkeys | | | |
| 8 | Horses | | | |
| 9 | Mules | | | |
| 10 | Poultry | | | |
| 11 | Bee colony | | | |
| 12 | Other (specify) | | | |

14. Total land holding _____ tsimdi in 2009?

15. Did you involve share cropping in land in 2009? 1. Yes 2. No

16. If you involved in share cropping state in _____ tsimdi.

II. Production

17. Production of grains in 2008/09 belg and in 2009 kiremt cropping season

| No | Type of crop | 2008/09 belg season | | 2009 kiremt season | |
|----|-----------------|---------------------|------------------------|--------------------|------------------------|
| | | Area (tsimdi) | Quantity produced (qt) | Area (tsimdi) | Quantity produced (qt) |
| 1 | Wheat | | | | |
| 2 | Teff | | | | |
| 3 | Maize | | | | |
| 4 | Sorghum | | | | |
| 5 | Barley | | | | |
| 6 | Faba bean | | | | |
| 7 | Field pea | | | | |
| 8 | Others(specify) | | | | |

18. What was the reason for crop choice in 2009? _____

19. What was your input for production & their sources in 2009?

| Type | 1=Yes 2=N0 | Source (code) | Amount use (kg) | Value (Birr) | 1=Cash 2=Credit |
|--|---------------|------------------|--|-----------------|--------------------|
| Fertilize | | | | | |
| Urea | | | | | |
| DAP | | | | | |
| Organic | | | | | |
| Insecticide | | | | | |
| Herbicide | | | | | |
| Seed | | | | | |
| Local seed | | | | | |
| Improved seed | | | | | |
| From: 1. Market 2. Bureau of agriculture 3. Own production | | | 4. Cooperatives 5. Other fellow farmers 6. Other (specify) | 7. NGOs | |

20. How was the weather condition for crop production in the last production season?

1. Good 2. Bad

21. If the answer for Q. 21 is bad, what was the existing problem?

1. Shortage of rain fall 2. Flood 3. others (specify) _____

22. How was the yield of crops in 2009 compared to the previous year(s)?

1. Very high 2. High 3. Low 4. Very low 5. Medium

III. Access to Services

23. Distance of your residence from the nearest market center _____ K.m

24. Distance of your residence to the nearest development center _____ K.m

25. Did you have extension contact in relation to production in the 2009 cropping season?

1. Yes 2. No

26. If yes, how often the extension agent contacted you?

1. Weekly 2. Twice in a month
3. Monthly. 4. Any time when I ask them

27. What was the extension advice on?

1. Crop choice 2. Fertilizer applications 3. Chemical applications
4. Cultivation 5. Post harvest handling 6. Other (specify) _____

28. Are you a member of any cooperative? 1. Yes 2. No

29. What is the role of the cooperative in the production and marketing of your produce?

30. Did you need credit in 2009? 1. Yes 2. No

31. Did you take credit in 2009? 1. Yes 2. No

32. If yes, how much did you take? _____ Birr

33. For what purpose did you take the credit?

1. Fertilizer 2. To purchase farm equipment. 3. To rent in land 4. For Seed
5. To pay tax 6. To purchase chemicals 7. Other (specify)

34. If the answer for Q. 32 is no, what is the reason?

1. I didn't need 3. Not available on time
2. Interest rate on credit is too high 4. Others (specify)____

35. From whom did you get credit?

1. Relative 2. Micro finance institution 3. Cooperatives 4. Bank
5. Traders 6. Friends 7. NGO 8. other (specify)_____

IV. Marketing aspect

36. Have you sold your produce(grain) recently? 1. Yes 2. No.

37. If yes, what is the total amount sold, price you have received and time of sell in 2009 and who purchase you and where did you sell it?

| No | Type of grain | Quantity sold(Qt) | Time of sell | To whom did You sell | Price per shember | Where did you sell | Terms of sell 1.Cash 2.Credit |
|--|---------------|-------------------|--------------|----------------------|-------------------|--------------------|-------------------------------------|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| Code To Whom: 1. Direct to consumers 2. To whole sellers 3. To cooperatives 4. To urban assemblers 5. Village collectors 6. To retailers 7.Others(specify) | | | | | | | |

38. Where do you sell your crop products?

1. At farm gate 2. Taking to Local market 3. In the cooperative store
4. Others (specify)_____

39. Do you think you have received a fair price for your grains sold? 1. Yes 2. No

40. When did you sell your grain in 2009?

1. October - December 2009 2. January - March 2010
 3. April – June 2010 4. Not sold

41. If you produce in 2008/09 belg season, what is the total amount sold price you have received, time of sell, where you sold it and who has purchased you?

| No | Type of grain | Quantity sold(Qt) | Time of sell | To whom did You sell | Price per shember | Where did you sell | Terms of sell 1.Cash 2.Credit |
|---|---------------|-------------------|--------------|----------------------|-------------------|--------------------|-------------------------------------|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| Code To Whom: 1. Direct to consumers 2. To whole sellers 3. To cooperatives 4. To urban assemblers 5. Village collectors 6. To retailers 7. Others(specify) | | | | | | | |

42. When did you sell it?

1. October - December 2009 2. January - March 2010
 3. April - June, 2009 4. July – September2009

43. How was the price of your grains in 2009 compared to the previous year(s)?

1. Increased 2. Decreased 3. No change

44. Did you face difficulty in finding buyers when you wanted to sell? 1. Yes 2. No

45. If yes, in Q 52 is it due to:

1. Inaccessibility of market 3. Lack of information
 2. Low price offer 4. Other (specify)_____

46. What did you do, when the grain you offered to the market was not sold?

1. Took back home 4. Sold at lower price
 2. Took to another market on the same day 5. Sold on other market day
 3. Took to another market on another day 6. Other (specify)_____

47. Who set your selling price in 2009?

1. Yourself 2. Set by demand and supply 3. Buyers 5. Other (specify)_____

48. When did you get the money after your sale?

1. As soon as you sold 2. Other days after sale 3. Other (specify)_____

49. How did you transport the grain _____ from home to market?
 1. Head/back loading 2. Pack animal. 3. Animal's cart
 4. Vehicle. 5. Other (specify) _____
50. Did you know the nearby market price before you sold your grain? 1. Yes 2. No
51. If yes, did you sell your grain as what you expect? 1. Yes 2. No
52. How did you get information on supply, demand & price of grains in other markets?

| | Use code | Source of information |
|--------|----------|---|
| Supply | | 1. Traders 2. Cooperative 3. Telephone |
| Demand | | 4. Personal observation 5. Radio 6. Newspaper |
| Price | | 7. Brokers 8. Other farmers 9. Extension visits |

53. How did you qualify your source of information?
 1. It was reliable 2. It was timely
 3. It was adequate 4. Other (specify) _____
54. Did you face problem in production and marketing? If yes what was the cause & your suggestions to solve each problem?

| No | Problem faced | 1. yes 2. No | If yes, what do you think was/were the cause/s of the problem | What is your suggestion to solve each problem |
|----|---------------------------|-----------------|---|---|
| 1 | Fertilizer supply | | | |
| 2 | Chemical supply | | | |
| 3 | Seed supply | | | |
| 4 | Shortage of land | | | |
| 5 | Disease type of (disease) | | | |
| 6 | Loan repayment | | | |
| 7 | Theft | | | |
| 8 | Transport | | | |
| 9 | Tax | | | |
| 10 | Price setting | | | |
| 11 | Scaling Weighing) | | | |
| 12 | Other (specify) | | | |

Traders' questionnaire

- Questioner number_____
- Name of enumerators_____
- Date_____
- Wereda; 1. Endamohoni woreda 2. Ofla woreda
- Name of Market_____
- 1. Korem 2. Maichew

I. Socio-demographics

1. Name of trader_____
2. Age of trader ____Years old.
3. Sex of trader
1. Male 2.Female
4. Religion of trader?
1. Muslim 2. Orthodox Christian 3. Protestant 4. Catholic
5. Other (specify)____
5. Marital status of trader?
1. Single 2. Married 3. Divorced 4. Widows
6. Total family size_____
7. Educational level of trader?
1. Illiterate 2. Primary School 3. Secondary School
4. Religious school 5. College Education
8. Major businesses in 2009 in order of importance write 1st for the most important, 2ⁿ
d for the next important etc.)
1. Wholesaler_____ 2. Urban assembler _____ 3. village collector)_____
4. Broker ('delala')____ 5. Retailer_____ 6. Other (specify) _____
9. For how long have you been in this business? _____Years
10. With whom you trade grain?
1. Alone 2. With family 3. With partners
11. If you trade with partners, how many are you?
1. Two 2. three 3. four or more
12. Total number of family members in own business_____
13. When did you do your business in 2009?
1. Year round 2. when purchasing price is low and more supply
3. During holidays only 4. Once in a week 5. Other (specify) _____

14. Did you have occupation (s) before becoming grain trader? 1. Yes 2. No

15. If yes, what was it? _____

II. Capital

16. Initial fixed capitals when you have started the business

| Assets | No | Average capacity of each (Qt) | Total Value |
|------------------------|----|-------------------------------|-------------|
| Store | | | |
| Mobile Telephone | | | |
| Telephone land line | | | |
| Vehicle personal truck | | | |
| Motorcycle | | | |
| Weighing Scale | | | |
| Others (Specify) | | | |

17. How much was the amount of initial working capital when you the started the business? _____ Birr

18. How much was the amount of your working capital in 2009? _____ Birr

19. What was the source of the working capital in 2009?

1. Own 2. Loan 3. Gift 4. Share 5. Others (specify) _____

20. If it was loan, from whom did you borrow?

1. Relative/family 2. Private money lenders 3. NGO 4. Friends
5. Other traders 6. Micro finance institution 7. Bank 8. Other, (specify) _____

21. How much was the rate of interest? _____ Birr for formal, _____ birr for informal

22. What was the reason behind the loan?

1. To build store 2. To purchase a car 3. For working capital 4. Other (specify)

23. Is there loan access for grain trade?

1. Yes 2. No

III. Purchase practice

24. What are the major grains you purchased in 2009? Rank 1st, 2nd, 3rd

1. Wheat _____ 2. Barley _____ 3. Sorghum _____ 4. Maize _____
5. Teff _____ 6. Faba bean _____ 7. Field pea _____ 8. Others (specify) _____

25. What was the reason for your crop choice to purchase?

1. High supply 2. High demand 3. Other (specify) _____

26. Who purchase grain for you in 2009?
1. Myself
 2. Family members
 3. Friends
 4. Through broker
 5. Commission agent
 6. Other_____
27. If you used brokers and of commission men, what was the advantage of using brokers and of commission men in 2009?
1. You could get enough quantity
 2. You could get quality grain
 3. Save your time
 4. Reduce transaction cost.
 5. Purchased at low price
 6. Other (specify).
28. How did you attract your supplier?
1. By giving better price relate to others
 - 2 By fair scaling (weighing)
 3. By visiting them
 4. Other (specify)_____
29. How did you attract your buyers?
1. By giving better price relate to others
 2. By providing Quality product
 3. By fair scaling weighing
 4. By visiting them
 5. By giving credit
 6. Other (specify)
30. Who were your major buyers in 2009? Rank
1. Wholesalers _____
 2. Retailers _____
 3. Urban assembler _____
 4. Millers/processors _____
 5. Urban consumers _____
 6. Gov't organizations _____
 7. Other (specify) _____
31. Who were your major suppliers in 2009? Rank
1. Wholesalers _____
 2. Retailers _____
 3. Urban assemblers _____
 4. Village collectors _____
 5. Farmers _____
 6. Gov't organizations _____
 7. Other (specify) _____
32. On average, how many markets did you visit in a week in 2009? _____ Markets
33. Was the price of the same grains the same on the same day in a marketing center in 2009? 1. Yes 2. No
34. How is your usual purchasing price compared to your competitors?
1. Higher
 2. Lower
 3. The same
35. If higher in Q. 38 what was the reason?
1. To attract more supplier
 2. To buy more quantity
 3. To kick out your competitor from the market
 4. To get better quality grain
 5. Others (specify) _____

36. Who set your purchasing price in 2009?
1. Myself 2. The seller 3. By market
4. Other traders 5. Others (specify)_____
37. If you decided on the purchasing price, how did you set the price?
1. Individually 2. Consulted with other traders 3. Other (specify)_____
38. When did you set purchasing price?
1. Early in the morning of the market day 4. At the evening of the market day
2. At midday of the market day 5. One day before the market day
3. At the time of purchase 6. Other (specify)_____
39. Who decided on your selling price in 2009?
1. Myself 2. Purchaser 3. By the market
4. Other traders 5. Other (specify)_____
40. If you decided on the selling price, how did you set the price?
1. Individually 2. Consult with other traders 3. Other (specify)_____
41. When did you set selling price?
1. Early in the morning of the market day 4. At the evening of the market day
2. At midday of the market day 5. One day before the market day
3. At the time of selling 6. Others (specify)_____
42. How was the supply of grain in 2009 compared to the previous year?
1. Increased 2. Decreased 3. No change
43. How was the price of grains in 2009 compared to the previous year?
1. Increased 2. Decreased 3. No change
44. What was the major problem to enter grain trade?
1. License 2. Lack of capital 3. Government policy 4. Other (specify)_____
45. Are there restrictions imposed on unlicensed traders? 1. Yes 2. No

IV. Marketing Services

46. Did you pay tax for the grain you purchase in 2009? 1. Yes 2. No
47. Did you pay tax for the grain you sell? 1. Yes 2. No
48. Is grain trading in your locality needs a trading license?
1. Yes 2. No 3. Not mandatory
49. If yes, how do you see the procedure to get the license?

1. Complicated 2. Easy

50. Did you have grain-trade license? 1. Yes 2. No

51. How much did you pay for grain trade license? _____ Birr

52. Indicate your average cost incurred per quintal for major grains in the trading process in 2009?

| Marketing Cost Compenet in the Chain | Grain type; | Grain type; | Grain type; |
|---|-------------|-------------|-------------|
| | birr/Qt | birr/Qt | birr/Qt |
| Purchased price of grain | | | |
| Labour employed to fill the sack and stitch | | | |
| Loadong | | | |
| Unloading | | | |
| Transport - Vehicle | | | |
| - Cart | | | |
| - head/back load | | | |
| storage cost | | | |
| License fee | | | |
| Taxes and fee | | | |
| Wage for permanent employee | | | |
| Storage loss | | | |
| Electricity | | | |
| Telephone expense | | | |
| Personal travel & other expense | | | |
| Others (specify) | | | |
| Total costs | | | |
| Selling price of grain | | | |
| Purchased from 1. Farmers 2. Urban assembler 3. Farmer collector 4. Whole seller 5. Retailer 6. Cooperatives 7. Others(specify) | | | |

53. How did you get information on supply, demand & price of grains in other markets?

| | Use code | Source of information |
|--------|----------|---|
| Supply | | 1. Other traders 2. Cooperatives 3. Telephone |
| Demand | | 4. Personal observation 5. Radio 6. Newspaper |
| Price | | 7. Brokers 8. Others(specify) |

54. Are you willing to pay for market information in the future? 1. Yes 2. No

55. Was there transportation problem? 1. Yes 2. No

56. If yes what was the problem?

1. No transportation service
2. high fare
3. it was seasonal
4. Other(specify)_____

57. How was this market roads look like in rainy season for vehicle transport?

1. It was difficult
2. No problem

58. What mode of transportation did you use from collection point to store?

1. Head/back load
2. Trucking/Vehicle
3. Pack animal
4. Cart
5. Other_____

59. Are there problems on grain marketing? If yes what are the problems, & your suggestions to overcome each problem?

| N0 | Problem faced | 1. Yes 2. No | If yes, what do you think was/were the cause/s of the problem | What is your suggestion to solve each problem |
|----|--|-----------------|---|---|
| 1 | Infrastructure: Road Telephone Electricity | | | |
| 2 | Shortage of supply | | | |
| 3 | Storage problem | | | |
| 4 | Theft | | | |
| 5 | Information flow | | | |
| 6 | Capital shortage | | | |
| 7 | Access to credit | | | |
| 8 | Lack of demand (low price) | | | |
| 9 | Too much competition with licensed traders | | | |
| 10 | Too much competition with unlicensed traders | | | |
| 11 | Farmers reluctance to sell due to lower price | | | |
| 12 | Telephone expense | | | |
| 13 | Personal travel & other expense | | | |
| 14 | Others (specify) | | | |

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