GARLIC MARKET CHAIN ANALYSIS IN OMO BEYAM DISTRICT OF JIMMA ZONE, OROMIA REGIONAL STATE, ETHIOPIA

MSc. THESIS

BY

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DEDICATION

This thesis is dedicated for my parents (My Father Shemohammed Aba Bulgu, My mother W/ro Sitina Aba Fita and my beloved wife W/ro KedijaMohammedawel) for their unreserved support for success of this study.

STATEMENT OF THE AUTHOR

First, I hereby declare that this thesis is my own work and that all sources of materials used for this thesis have been exactly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for MSc. degree at Jimma University and to be made available for end users and borrowers at the University's Library under rules and regulation of the Library. I solemnly declare that this thesis should not be submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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BIOGRAPHICAL SKETCH

The author was born in Omo Nada district, Jimma Zone of Oromia Regional State in October 1982. He attended his primary education at Nada elementary school from (1991-1998). He attended his secondary school education at Assendabo Secondary School in Jmma Zone (1999-2002).

After he completed his Secondary school education, he joined Nedjo TVET College of Agriculture in October 2004 and graduated with Diploma in plant Sciecce in June, 2006. Soon after his graduation, he was employed in Omo Nada Agricultural Office, Cooperative Office and Water, Mineral and Energy Office served as full time Head of Organization and Experts for nine years from December 2006 up to October 2014. Since October 2014 up to September 2016 he joined Oromia State University and graduated with BSc. Degree in Agribusiness and Value Chain Management in September, 2016. The author joined the School of Graduate Studies of Jimma University in October 2017 to pursue his MSc degree in Agribusiness and Value Chain Management in regular program.

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LIST OF ABBREVIATIONS AND ACRONYMS

BLUE	Best Linear Unbiased Estimator
BoDARD	Bureau of District Agriculture and Rural Development
CLR	Classical Linear Regression
CACC	Central Agricultural Census Commission
CSA	Central statistic Agency
DIDA	District Irrigation and Development Authority
DRRO	District Rural Road Office
EAP	Ethiopia Agricultural Portal
EHDA	Ethiopian Horticulture Development Agency
EHPEA	Ethiopian Horticulture Producers and Exporters Association
EIA	Ethiopia Investment Agency
GDP	Growth and Development Plan
GTZ	German Technical Cooperation
MVIWATA	A Network of Farmer Groups in Tanzania
OLS	Ordinary Least squares
RACP	Rajasthan Agricultural Competitiveness Project
RMA	Rapid Market Appraisal
TAHA	Tanzania Horticultural Association
UNIDO	United Nations Industrial Development Organization
USAID	United States of America Agency for International Development
VIF	Variance Inflation Factor
WOTMD	Woreda Office of Trade and Market Development

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ABSTRACT

Garlic (Allium sativum L.) is the major cash crop which belongs to the family Alliaceae and genus Allium, and is a shallow rooted vegetable crop. Though garlic is economically important, its market chain have not yet been studied and documented in study area. This study attempted to analyze performance of garlic market chain, analyzing determinants of garlic marketed supplly and assess the constraints and opportunities of garlic productions and marketing in the study area. Primary data were obtained from 152 randomly selected garlic producers and purposively selected 30 traders. Both quantitative and qualitative data were collected using pretested structured questionnaire and checklists. Descriptive statistics, market structure-conduct-performance approach and econometric models were used to analyze the data. Result of this study showed that the main garlic market chain actors in the study area were producers, local collectors, wholesalers, retailer and consumers.Result of profit margin shows that, farmers doing all the work of producing garlic and bearing the associated risks, took 54.89% of the profit margin. This impliedly, garlic producers added 54.89% of the total value of garlic in the woreda; whereas, collectors, wholesalers, retailer are responsible for 8.29%, 15.88% and 20.94% respectively.The result of Multiple Regression Model indicated that experience of garlic production, total land size of household, education level of household, extension service, distance from nearest market and number of oxen owned were significantly influenced the amount of garlic supplied to the market. The major constraints of garlic production and marketing were disease and insect pest, low access to improved inputs, shortage of irrigation water and land, price fluctuation, collateral problem to get credit, poor storage facilities and weak linkage between farmers and traders. To solve these problems increased access to improved inputs, facilitating irrigation technology, strengthening credit institutions, technical trainings on garlic crop husbandry, strengthening the linkage among garlic producer and market chain actors(traders) and strengthening supportive institutions and establishment of storage are recommended.

Key Words: Garlic,Production,Market Chain, Multiple Regression Model

1. INTRODUCTION

1.1. Background of the Study

Agriculture is the most important sector in Ethiopia; it accounts for 46% of GDP, 80% of export value, it provide 73% of employmentand is a means of generating livelihood for about 83% of the rural population (ATA, 2017; Beyero *et al.,* 2015). The sector still remains largely dominated by rain-fed subsistence farming by smallholders who cultivate an average land holding of less than a hectare. Although agriculture has a long history in the country's economy, development of the sector has been hampered by a range of constraints which include land degradation, low technological inputs, weak institutions, and lack of appropriate and effective agricultural policies and strategies (Amsalu, 2015).

Markets are important for economic growth and sustainable development of a given country, but, emphases in development policies in agrarian countries have usually been placed on increasing agricultural production to serve as a base for rural development. In the absence of well-functioning markets, agricultural production can experience several drawbacks (Tegegne *et al.*, 2013).

In developing country farmers are not getting the right share of consumer price because of excessive margin mainly because of inefficient and costly transport. Besides transport problems, majorities of agricultural products in Ethiopia are small holder produces, and are not producing and selling their produce and agricultural inputs in an organized manner so that some of their benefit may transfer to the middlemen. Despite the ecological advantage, horticultural production in the country is very much limited (Mussema *et al.*, 2013).

Garlic (Allium sativum L.),which belongs to Alliaceae family (Allen, 2009), is originated in Central Asia (India, Afghanistan, West China, Russia) and spread to other parts of the world through trade and colonization (Tindal, 1986). It is the most important Allium crop and ranks second next to onion in the world (Voigt, 2004).

According to (FAO, 2010), world production of garlic is estimated approximately to 22.23 million metric ton (MMT). Asia is the largest garlic producing continent in the world, which contributes more than 80% to the total world garlic production. In 2010, China was the leading garlic producing country, which produced 18.56 MMT of garlic, and covers more than 77% of world output followed by India, South Korea, Egypt, Russia, Myanmar, Ethiopia, USA, Bangladesh and Ukraine respectively.In Africa,

Ethiopia was third in area (10,690 ha) after Egypt and Algeria, second in production but fourth in productivity with 9.63 ton ha-1which was far below Egypt (24.36 t ha-1), Kenya (23.87 t ha-1) and Niger (10.64 t ha-1) in 2011 (FAOSTAT, 2013).

In Ethiopia, Garlic is one of the most important vegetable crops, which is used as ingredient of local stew (wot), traditional (local) medicines and used to produce supplements which have enteric coatings. It is the most widely used bulb crop next to onion in Ethiopia. It contributes significant nutritional value to the human diet as a seasoning in many foods.In addition to its flavoring agent in food, it has also been used in many local peoples of Ethiopia as a medicinal value for different diseases (Wodaje *et al*., 2013).

Garlic production requires a growing period of 4.5-6 months, rainfall of 600-700 mm and optimum temperature of 12-24 °C(CSA, 2012). As a cash crop, it is used to earn foreign currency by exporting to Europe, the Middle East, Africa countries and USA (Kilgori *et al*., 2007). At off season the same quantity of garlic is usually sold at twice or three times the value of onion (Getachew and Asfaw, 2000).

The low performance of garlic production both at the country level and regional level can be accounted to the traditional production practices employed by smallholder farmers. One of these practices involve poor application of fertilizer both in terms of rate and type and also lack of evidences on how much to apply for agronomic and economic optimum. Although some farmers are using chemical fertilizers, the rate of application is by far below the national blanket recommendation which is about 105 kg N ha−1 and 92 kg P ha−1 for garlic production (Ethiopian Institute of Agricultural Research) (Emana and Gebremedin, 2007).

The land used for garlic production in Ethiopia during 2018 production year were estimated 19,412.49 hectares and 1,782,218.93 million quintals was produced with productivity of 9.18 ton per hectare of land. In Oromia regional state 8,754.33 hectares of land was allocated for garlic production and 870,684.72 quintals of garlic was produced with productivity of 9.94ton per hectares of land (CSA, 2018). In Omo Beyam district, there are 6,400 households are garlic producer. Land allocated for garlic production during the year (2018) was 298 hectares of land. In the district 21,158 quintals of garlic was produced during current production year and productivity of garlic was 71 quintals per hectar of land which was below national standard (BoDARD, 2018).

Even though garlic is economically important, its market chain have not yet been studied and documented in study area. In light of the above information, this study focused to analyze market chain performance, challenge of production and marketing and determinants of volume of garlic supplied to the market in study area.

1.2. Statement of the Problem

A study conducted by (Haji, 2008), identified that improving farm productivity and market performance of high value crops with export potential, detailed and systematic empirical studies on the production and market performance of vegetables in Ethiopia are scarce or non-existent, this might be due to lack of necessary technical and managerial production skills, poor contract enforcement, imperfections in the marketing chain, and lack of market related institutions and infrastructure. Garlic is perishable commodity having very high post harvest losses estimated to the tune of 20-30 percent (Prdeep, 2015).

Despite its importance and increased production, garlic productivity, in many parts of the world, is low due to genetic and environmental constraints affecting its yield and yield related traits (Nonnecke, 1989). In Ethiopia, small growers in the highlands grow garlic traditionally but due to obsolete cultural practices, yields are generally low (ENAIA, 2003). Diverse crop management problems and the nature of propagation accounted for the low yield of garlic in Ethiopia; major production constraints include lack of proper planting material (improved varieties), inappropriate agronomic practices, absence of proper pest and disease management practices and marketing facilities, and lower soil fertility status in many soil types particularly N and P nutrients (Getachew and Asfaw, 2000).

While other farmers can get up to 60 quintals of garlic in acre, most of the farmers still get the low levels of 5 quintals in acre. This indicates that there are the gaps that limit some farmers to increase their productivity, these are; lack of irrigation technologies, inadequate fertilizer use, low investing in more marketable seeds, low accessing safer and more reliable Pesticides, lack of trainings on garlic, low coordinated water management (Trio *et al.,* 2014).

There is a suitable agronomic situation for producing garlic and high potential arable land in Omo Beyam District. This is an opportunity for smallholder, since garlic is an export potential cash crop with high demand and price at both local and global markets. Given the large production potential to produce large surpluses, garlic producers' intensity of market chain is very low. Farmers produce garlic in small quantity (less than expected potential), and they do not depend on the crop's market signal in their

production system. Garlic production and marketing challenges must be assessed that may be lack of improved input (seeds, irrigation technologies, etc), seasonal price fluctuation and existence of unlicensed retailers, unidentified pests and diseases (BoDARD, 2019).

Producers face so many interlinked problems such as poor market information and infrastructural problems (storage, transport and processing). Furthermore, the demand side is also highly characterized by skyrocketing price of garlic for consumers. So far how and why the consumer price has been skyrocketed and whether the producers benefit from the progressively increasing price of garlic were not studied.

Besides, there were no studies undertaken on garlic market chain analysis in the study area. Therefore, this work is an attempt to fill the research gap and generate evidence for policy makers to realize greater smallholder farmers' of garlic market chain in Omo Beyam District.

Research questions

In this regard, this study attempted to answer the following research questions:

1. Whatare the performance of garlic market chain in Omo Beyam District?

2.What are the determinants of quantity of garlic supply to the market in the study area?

3. What are the existing constraints and opportunities in garlic production and marketing system?

1.3. Objectives of the Study

1.3.1. General objective

To analyze market chains of garlic crops in the Omo Beyam District.

1.3.2. Specific objectives

1. To analyze performanceof garlic market chain in the study area.

2. To identify the determinants of garlic marketed surplus in the study area and;

3. To identify the challenge and opportunities in garlic production and marketing in the study area.

1.4. Significance of the Study

The result of the study would helpful for the garlic growers and traders in the study area in planning and for development planners and policy makers in drafting policies for garlic crops production and marketing. Additionally, the study will generates important information for research and development

organizations, extension service providers, government and nongovernmental organizations to formulate garlic crops marketing development programs and guidelines for interventions that would improve efficiency of the garlic production and marketing system. The other benefit that could be anticipated is its significance as a source for further studies.

1.5. Scope and Limitations of the study

This study was focused on the entire garlic market chain levels, market direction, price discovery and bargaining characteristics of producers, buying and selling strategies, and traders' behavior in the whole marketing process were seen. The limitation of the study being the first in the Woreda is lack many detail investigations which could have reinforced understanding of the whole system especially in relation to production, marketing and consumption studies.

1.6. Organization of the Thesis

This thesis has been organized under five chapters. Chapter one presents introduction (background, statement of the problem, and research questions, objectives, significance of the study, scope and limitation of the study). Chapter two presents review of literature on theoretical and empirical evidences that support the study and conceptual framework. Chapter three presents research methodology. Chapter four presents result and discussions and Chapter five presents the major findings of the study and draws conclusion and recommendations. Finally it includes references and appendices.

2. LITERATURE REVIEW

In this chapter, the basic concepts of market, marketing, agricultural marketing, approaches to the study of agricultural marketing, characteristics of vegetables and its marketing, vegetable production and marketing in Ethiopia, Garlic production and marketing,structure-conduct- performance and analysis of factors affecting garlic market supply are discussed.

2.1. Concepts and Definitions

Market: The word "market" has many connotations. (Bain and Peter, 1988) define "markets" as a single arrangement in which one thing is exchanged for another. A market is also thought of as a meeting point of buyers and sellers, a place where sellers and buyers meet and exchange takes place, an area for which there is a demand for goods an area for which price determining forces (demand and supply) operates. For (Nair and Hansen, 1956), "market is another name for demand". Others define market as a system or an atmosphere or a mechanism that facilitate price fixation and thereby exchange of goods and services.

Marketing: In its simplest form is defined as the process of satisfying human needs by bringing products to people in the proper form, time and place (Branson and Norvel, 1983). Marketing has an intrinsic productive value, in that it adds time, form, 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 (Mendoza, 1995). Kotler (2003) also stated shortly marketing as the task of creating, promoting, and delivering goods and services to consumers and businesses.

Market chain: It is the term used to describe the various links that connect all the actors and transactions involved in the movement of agricultural goods from the producer to the consumer (CIAT, 2004).

Marketable surplus: It is the quantity of produce left out after meeting farmers" consumption and utilization requirements for kind payments and other obligations (gifts, donation, charity, etc) (Thakur *et al.,* 1997).

Agricultural Marketing: It is defined as agriculturally oriented marketing. It embraces all operations and institutions involved in moving farm products from farm to consumers (Pritchard, 1969). It covers all the activities associated with the agricultural production and food, feed, and fiber assembly,

processing, and distribution to final consumers, including analysis of consumers' needs, motivations, and purchasing and consumption behavior (Branson and Norvell, 1983).

It is both a physical distribution and an economic bridge designed to facilitate the movement and exchange of commodities from farm to fork. Food marketing (of branded foods) tends to be inter-disciplinary, combining psychology and sociology with economics, whereas agricultural marketing (of unbranded products) is more mono disciplinary, using economics almost exhaustively (Kohls and Uhl, 1985).

Marketable and marketed surplus: Marketable surplus is the quantity of produce left out after meeting farmers" consumption and utilization requirements for kind payments and other obligations (gifts, donation, charity, etc). Marketed surplus shows quantity actually sold after accounting for losses and retention by farmers, if any and adding previous stock left out for sales. Thus, marketed surplus may be equal to marketable surplus, it may be less if the entire marketable surplus is not sold out and farmers retain some stock and if losses are incurred at the farm or during transit (Thakur *et al.,*1997*).* The importance of marketed and marketable surplus has greatly increased owing to recent changes in agricultural technology as well as social pattern. In order to maintain balance between demand for and supply of agricultural commodities with rapid increase in demand, accurate knowledge on marketed/marketable surplus is essential in the process of proper planning for procurement, distribution, export and import of agricultural products (Malik *et al*., 1993).

2.2. Approaches to the Study of Agricultural Marketing

Different circumstances involved in the demand and supply of agricultural products, and the unique product characteristics, require a different approach for analyzing agricultural marketing problems (Johan, 1988). The major and most commonly used approaches are functional, institutional and commodity approaches.

2.2.1. Functional approach

Functional approach to study marketing is to break up the whole marketing process into specialized activities performed in accomplishing the marketing process (Kohls and Uhl, 1985). 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; and Kebede, 1990). The widely accepted

functions are: exchange (buying and selling), physical (processing, storage, packing, labeling and transportation), and facilitating (standardizing, financing, risk bearing, promoting and market information). The exchange function involves pricing, buying and selling which is a transfer of title between exchanging parties.

2.2.2. Institutional approach

This approach focuses on the description and analysis of different organizations engaged in marketing (producers, wholesalers, agents, retailers, etc) and pays special attention to the operations and problems of each type of marketing institution. 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). An institutional approach for the marketing of agricultural product should be instrumental in solving the three basic marketing problems, namely consumers' demand for agricultural products, the price system that reflects these demands back to producers and the methods or practices used in exchanging title and getting the physical product from producers to consumers in the form they require, at the time and place desired (Johan, 1988).

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 locate specific marketing problems of each commodity and 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. This approach was used in this study as a guideline to identify different aspects of the problem.

2.3. Vegetable Production and Marketing in Ethiopia

Ethiopia has a variety of vegetable crops grown in different agro ecological zones by small farmers, mainly as a source of income as well as food. The production of vegetables varies from cultivating a few plants in the backyards, for home consumption, to large-scale production for the domestic and home markets.

According to (CSA, 2018) the area under these crops (vegetables and root crops) was estimated to be 442,276.04 hectares with a total production of 53,001,366.96 tons in the year 2017/18. Root and tuber crops are by far the dominant product group. Potatoes (32%) stand out as the important products, followed by taro/Godere (19%), garlic (12%), and onions (nearly 12%). Potatoes are mostly found in the Amhara Regional State (51%) and Oromia (33%). Among small-scale producers of vegetables, Ethiopian cabbage (Kale) takes the higher almost 50%, followed by red pepper with a share of 31%, and green pepper 10%.

Smallholder vegetable farms are based on low input – low output production systems. The use of improved seeds and planting material of high yielding varieties and other inputs such as fertilizer and plant protection materials is not common in the smallholder sector. Technical training and extension services on improved crop husbandry techniques are not available. As a result average productivity levels are low in the small scale farming sector (EHDA, 2011).

2.4. Garlic production and Marketing

Garlic grows under a wide range of climatic conditions. However, it grows best at higher elevations ranging from 1800–2800 meters above sea level where cool weather conditions prevail. Mean temperatures in the range of 12–24°C are generally the best growing condition for garlic production (Edwards *et al.,* 1997; Libner, 1989). As garlic is shallow rooted vegetable and has un-branched root system and low nutrient extraction capacity, it requires relatively high amount of nutrients for best growth and development (Brewster and Butler, 1997). Garlic soils should be therefore fertile, rich in organic matter, well drained and capable of holding adequate moisture. Soil pH ranging from 6.8–7.2 is generally for garlic production. According to (Janet, 2008), soil pH below 5.0 can lead to the death of garlic plants.

In Ethiopia garlic production and its area coverage is in increasing trend. For instance, the production of garlic in the year 2000 was estimated to be 52,262 tons produced on 4,797 hectares of land (CSA, 2000). However, currently the annual average production has 178,221.893 tons and 19,412.49 hectares of land with the average productivity of 9.18 t ha−1 (CSA, 2018).

Cost of seed cloves and labor for planting and harvest makes the initial investment for garlic production high in comparison to some other vegetable crops. Garlic returns are highly dependent on how the

produce of crop is marketed. Management and markets will determine the profitability of garlic for the producer (Bachmann and Hinman, 2008).

2.5. Market Chain Analysis

Agricultural commodities are produced by large numbers of farmers and consumed by large numbers of households. With the exception of foodstuffs consumed on-farm or sold locally, they are bought and sold a number of times between the farm gate and the final consumer. While moving between these two points, the commodity is loaded, off-loaded, transported, stored, cleaned, graded and processed. The conduit that runs from a farmer down to a final user, through which the commodity passes and which embodies these transactions and activities is conventionally referred to as a "marketing and processing chain", a "supply chain", or a "value chain" (FAO, 2005a).

An agricultural marketing system consists of a series of activities that feature sequentially or functional integration. Operational sequentially is a characteristic of all activities that use agricultural products and for this reason the first economic analysis of the agricultural markets also attributed greater importance to the study of filiére, or the marketing or distribution channel (Saccomandi, 1998).

A marketing chain is used to describe the numerous links that connect all actors and transactions involved in the movement of agricultural products from the farm to the consumer (Lunndy *et al.,* 2004). It is the path one good follow from their source of original production to ultimate destination for final use. Functions conducted in a marketing chain have three things in common; they use up scarce resources, they can be performed better through specialization, and they can be shifted among channel members (FAO, 2005a).

2.6. Marketing Constraints Facing Smallholder Farmers

The aim of this section is to identify key constraints facing smallholder farmers in the study area, such as lack of physical infrastructure, lack of market, and high transaction costs. Smallholder farmers find it difficult to compete in the new market environment. They face enormous constraints when it comes to physically accessing markets. They also lack market information, business and negotiating experience, and a collective organization to give them the power they need to interact on equal terms with other

generally larger and stronger market intermediaries. The result is poor term of exchange and little influence over what they are offered (Heinemann, 2002).

Producing for the market calls for production resources that include land ,labour force and capital. Poor access to these assets affects the way in which smallholder farmers can benefit for opportunities in agricultural markets, and especially in terms of the volume of products traded and the quality of those products (Bienabe *et al.*2004). Small-scale farmers lack regularity in terms of producing for the markets due to insufficient access to production resources.

High transaction costs are caused, inter alia, by poor infrastructure and communication services in remote rural areas (Mbaiwa, 2004). Transaction costs also result from information inefficiencies and institutional problems such as the absence of formal markets (Moraket, 2001). Transaction costs include the costs of information, negotiation, monitoring, co-ordination, and enforcement of contracts. Smallholder farmers are located in remote areas and are geographically dispersed and far away from profitable markets. Distance to the market, together with poor infrastructure and poor access to asset and information results high transaction costs. Since small holders are poor, they find it difficult to compete in profitable markets due to the high transaction costs.

Traders with higher social capital are better able to enter more capital- intensive marketing activities such as wholesaling and long-distance transport, whereas traders with poor social networks face major barriers to entry into the more lucrative market segments (Kherallah and Kirsten, 2001). Minimizing transaction costs is the key to improving access to high-value markets in developing countries, because high transaction costs was make it difficult for poor smallholder enterprise to market their produce.

Smallholder farmers do not have access to on-farm infrastructure such as store-rooms and cold-rooms to keep their products in good condition after harvest. Lack of access to facilities such as post-harvest and processing facilities constitutes a barrier to entry into agricultural markets, since the emphasis of buyers is more on quality. Access to storage facilities increase farmers' flexibility in selling their products, as well as their bargaining power   (Bienable *et al.*, 2004).

Rural producers, and especially small farmers, have little information about the market demand and price, which is costly to obtain. They may gather information through contact with other actors in the commodity chain, but the accuracy of this information is not certified, since those actors might to be exhibiting "opportunistic behavior" (Bienabe *et al.*, 2004). Smallholder farmers lack information about

product price and times to sell their products, and about potential buyers. This in turn reduces their ability to trade their products efficiently and to derive the full benefit from the marketable part of their production.

Due to their low endowment in production factors, such as land, water and capital assets, the majority of smallholder farmers produce low quantities of products that are poor quality, which leads to their products being neglected by output markets. Increasing concentration in the food value chain is a global trend, caused by increasingly demanding consumers and concerns about food safety, which tend to make it very difficult for smallholder farmers to enter high- value markets in light of the low quantity and poor quality of their products (Bienable *et al*., 2004).

Most small-scale farmers have no means of transport to carry their produce to markets. Transportation problems result in loose of quality and late delivery, which in turn lead to lower prices, and this regarded as the greatest problem faced by emerging farmers (Nor *et al*., 2004). Most smallholder farmers are located in rural areas where there are no formal agricultural markets or agro-processing industries. They are compelled to market their produce to local communities in their areas, sometimes at lower prices, or to transport their products to towns at a higher cost (Kherallah and Kirsten, 2001).

The bargaining power of the small producers is especially low since they have poor access to market information and limited access to financial markets, which prevents them from selling their products at the most profitable time. Their lack of bargaining power may lead them to undervalue their production and obtain a smaller share of the added value created in the commodity chain. Small farmers have particularly low bargaining power when they operate in long supply chain, where the specificity of the product transformation assets leads to the creation of oligopsony (e.g. the oil-palm and cotton sectors in West Africa) (Bienabe *et al*., 2004).

2.7. Framework for Evaluation of Marketing System

Due to the effects of globalization, liberalization and increasing competition in agricultural markets, it is apparent that strategies aiming to reduce rural poverty in developing countries need to move beyond a focus on productivity to include the many other aspects involved in being part of a competitive marketing chain. Service providers implementing agricultural support projects therefore need to incorporate themes such as demand, market opportunities, profitability and competitiveness into their working agenda. Farmers today therefore need to learn not only how to produce but first how to identify

profitable market opportunities, how to adapt and improve their produce and to work with others in a market chain to meet the increasing demands of the ever more globalized consumer. Understanding profitability, competitiveness and being attuned to changing market signals helps in making business decisions (CIAT, 2004).

In the realm of economic growth, markets may provide the incentives to profit maximizing participants to develop new technologies, products, resources of supply, new markets and methods to exploiting them. Markets also have an influence on income distribution, food security, and other important development objectives. Despite its importance, as indicated above, marketing is given little attention or credence in the developing countries, including ours (Kindie, 2007). Efficiency factors can be evaluated by examining marketing enterprises for structure, conduct and performance (Abbott and Makeham, 1981). S-C-P model is one of the most common and pragmatic methods for analyzing marketing system. The framework distinguishes between three related levels; the structure of the market, the conduct of the market, and the performance of the market.

2.7.1. Market performance

Market performance can be evaluated by analysis of costs and margins of marketing agents in different channels. A commonly used measure of system performance is the marketing margin or price spread (Getachew, 2002). Performance of the market is reflection of the impact of structure and conduct on product price, costs and the volume and quality of output (Cramers and Jensen, 1982). Market performance can be evaluated by analyzing costs and margins of marketing agents in different channels. Margin or spread can be useful descriptive statistics if it used to show how the consumer's price is divided among participants at different levels of marketing system.

2.7.1.1. Marketing cost

It refers to those costs which are incurred to perform various marketing activities in the transportation of goods from producer to consumers. Marketing costs includes handling cost (packing and unpacking), costs of searching for a partner with whom to exchange, screening potential trading partners to ascertain their trustworthiness, bargaining with potential trading partners (officials) to reach an agreement, transferring the product, monitoring the agreement to see that its conditions are fulfilled, and enforcing the exchange agreement (Holloway and Ehui, 2002; Ayelech, 2011).

Marketing costs refers to those costs, which are incurred to perform various marketing activities in the shipment of goods from producers to consumers. Marketing cost includes: Handling cost (packing and unpacking, loading and unloading putting inshore and taken out again), transport cost, product loss (particularly for perishable fruits and vegetable), storage costs, processing cost and capital cost (interest on loan), market fees, commission and unofficial payments (Heltberg and Tarp, 2001).

2.7.1.2. Marketing margin

A marketing margin is the percentage of the final weighted average selling price taken by each stage of the marketing chain. The total marketing margin is the difference between what the consumer pays and what the producer/farmer receives for his product. In other words it is the difference between retail price and farm price (Cramers and Jensen, 1982). The marketing margin in an imperfect market is likely to be higher than that in a competitive market because of the expected abnormal profit. But marketing margins can also be high, even in competitive market due to high real market cost (Wolday, 1994). Marketing margin is a commonly used measure of the performance of a marketing system (Abbott and Makeham, 1981).

2.8. Review of Empirical Studies

Verma (2004) reported the determines the costs, returns, profitability and resource use efficiency of garlic production. It also identifies the marketing channels for garlic in the district, and determines the marketing costs, margins and efficiency. Also examined are the compound growth rates of, and the relationship between, market arrivals and wholesale prices of garlic in the Indore Vegetable Mandi over the period 1997/98-2001/02. Finally, constraints in garlic production and marketing in the study area are identified, and measures for improvement are suggested.

Meena *et al.,* (2013) found that gross income per hectare was highest in large farmers followed by small and medium farmers respectively. Net income and farm business income per hectare were decreased with increase farm size. The cost benefit ratio was found to be best on the small size farms followed by the large and medium size farms. The estimation of Garlic is expensive but high profitable.

Transaction costs include the costs of information, negotiation, monitoring, co-ordination, and enforcement of contracts. Smallholder farmers are located in remote areas and are geographically dispersed and far away from profitable markets. Distance to the market, together with poor infrastructure

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and poor access to asset and information results high transaction costs. Since small holders are poor, they find it difficult to compete in profitable markets due to the high transaction costs (Morakat, 2001).

Haque *et al.,* (2013) reported that profitability, input-output relationship, and constraints to garlic production. The cob Douglas production function revealed that human, land preparation cost, manure, irrigation and insecticide had positive effect on the yield of garlic. Non availability of high yield variety garlic seed, lack of technical knowledge about improved cultivation practices of garlic, infestation of insect and disease and low market price were the major problem for garlic cultivation.

Molaei (2014) to studied regression analysis showed that variables of household size, farmers' knowledge, agricultural experience, age, area of cultivated land, and the number of services or operations have done on garlic had a significant effect on garlic marketing obstacles. Regression analysis for the other dependent variable i.e. price of garlic on wholesale buyers' center revealed that garlic production cost, market oriented marketing, the cost processing garlic, accessing loans and total frequency of garlic are significantly effective on this variable.

According to Wolday (1994) market supply refers to the amount actually taken to the markets irrespective of the need for home consumption and other requirements where as the market surplus is the residual with the producer after meeting the requirement of seed, payment in kind and consumption by peasant at source.

Similarly, (Akalu, 2007) in his study of vegetable market chain analysis identified variables that affectmarketable supply. According to him, quantity production and total area owned were significant for onion supply but the sign for the coefficient for total area of land was negative. For tomato supply, quantity of production, distance from Woreta and labor were significant.

Rehima (2006) conducted study on pepper marketing chains analysis in Alaba and Siltie ones in southern Ethiopia using marketing margin analysis found that the gross marketing margin obtained by pepper retailers was 43.08% of the consumer's price. The same study reported that producer's share and net marketing margins obtained by retailers were 50.7% and 29.47% of the consumer's price.

Garlic contains high proportion of sulfur containing metabolites such as organosulfur compounds (Higdon, 2005) which are responsible for its flavor and aroma, as well as for its potential health benefits

(Block, 1985). According to (Trio *et al.*, 2014), the organosulfur compounds prevent as well as treat chronic diseases such as cancer and cardiovascular diseases.

2.9. Conceptual Framework

The conceptual framework consists of different actors; their role, linkage and interaction; attitude, practices and habits of the different actors, enabling environment that affect the capacity and efficiency of actors to innovate across the market chain (Hellin and Meijer,2006)

Demographic, socioeconomic characteristics and institutional factors are the background factors that were affect garlic marketed surplus at farmers' level. Household demographic factors like (educational status, age, sex and family size), socio-economic factors like (land size, garlic farming experience, quantity of garlic produced and other farm income), institutional factors like (credit access, extension services, and road infrastructure) and market factors like (prices, marketing experience, and distance to the market) was supposed to have an influence on marketed surplus. These factors leads the farm household to how much volume of garlic supplied to the market.The volume of garlic sales which maximize their utility in turn lead the farmers to increase household income. Figure 1 below depicts the conceptual framework of the study which reflects possible order of analysis of garlic market chain.

Demographic factors

❖ Age of household
❖ Sex of household
❖ Family size

Marketing factors

❖ Prices of garlic
❖ Marketing experience
❖ Distance to the market
❖ Garlic price information

Garlicquaniti ty supplied

Institutional factors

❖ Access to credit
❖ Frequency of extension contact
❖ road infrastructure

Socio-economic factors

❖ Land size
❖ Transport facilities
❖ Livestock holding
❖ Garlic farming experiance
❖ Quantity of garlic produced
❖ Farm income

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Figure 1 Garlic market chain conceptual framework   Legend

Source:Own design by reviewing related literature (2019)   ⟶product flows

3. METHODOLOGY

This chapter summarizes description of the study areas, data types, and source of data and method of data collection, sampling procedure and sample size. It also describes method of data analysis (descriptive, marketing margin and econometrics).

3.1. Description of Omo Beyam District

Omo Beyam district is located in Oromia Regional State, Jimma Zone, with the capital located at 341 km south west of Addis Ababa. It has an estimated area of 88,762.43 hectares; it is bordered in the South by the Southern Nations Nationalities and people Regional state, in the West by Mancho district, in the North by Omo Nada district, and in the East by Southern Nations Nationalities and people Regional state (BoDARD, 2018).

The district has a total of 16 kebeles of which 15 are rural based kebele administration areas and 1is town kebele. Total household of the woreda was 14,766 and the total population of the district is estimated at 124,495 of whom 58,969 are males and 65,526 females (BoDARD, 2018). The altitude of the district varies from 900 meters to 3,400 meters above sea level. It receives an annual rainfall of 880-1,600 mm, and has an annual temperature range of $25C^0$-$30C^0$. The district has three agro- ecologies which is Dega (30%), WeinaDega (60%) and kola (10%),(BoDARD, 2018).

The soils types in the district are predominantly red and black. The district is characterized by subsistence mixed farming system in which production of both crops and livestock is common economic activity. The total land of the district is estimated to be 88,762.43 ha, out of which 45,304.54 ha is cultivated land, 17,743 ha is grazing land, 8,373.25 ha is forest and 17,341.64 ha is covered with others (BoDARD, 2018).

The district is known for its high production potential of crops and livestock. Crop production takes the lion's share of consumption and income generation of the household. Cereals crops widely produced in the area include teff, wheat, barley and maize, pulse crops like chickpea, haricot bean and faba beans are the major crops grown. Moreover, vegetables and root crops produced in the area include onions, garlic, potato, pepper, cabbage and sweet potato. Annual crops are predominant and rain-fed agriculture is mainly practiced using animal power. Livestock production is also another source of income and food source next to crop production. In addition, it is used as a means of transportation. Farmers keep a

significant number of livestock (cattle, sheep, goat, donkey and horse) for various purposes in the study area (BoDARD, 2018).

Omo Beyam district is suitable for garlic crop production due to its favorable agro-ecology and availability of irrigation water. The area under garlic crops in this District in 2016/17 was estimated 218 hectares with total production of 15,478 quintals whereas in 2017/18 from 298 hectare of land 21,158 quintals of production was obtained within two season of rain and irrigation. This implies the production and coverage of lands by garlic in Omo Beyam district has increased (ODIDA, 2019).

Garlic could commonly produced by irrigation and rain production cycles in Omo Beyam district. Rain fed land is more intensively used in the two production cycle where relatively larger proportion of the farmers are engaged in garlic production during this two cycles in the study area. The first season (by rains) runs from May to October and second round (irrigations) runs from December to April. The peak harvesting months are October to December for the first round and April to June for the second round production period. Regarding the marketing time of garlic and that November, December and January was the time of marketing garlic produced by first cycle and April to June would a time for garlic marketing produced by second cycle (DIA and BoDARD, 2018).
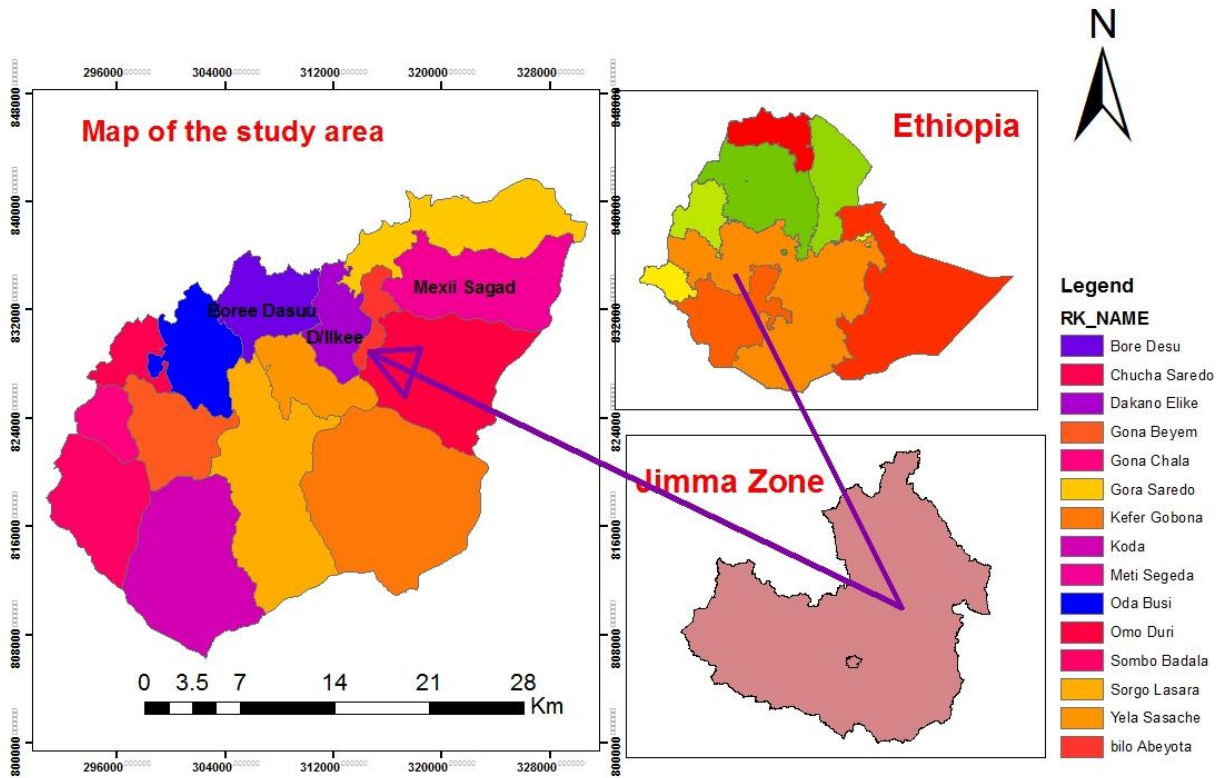
Figure 2 Map of OmoBeyam District.

Source: Ethio GIS

3.2 . Data Types,Sources and Method of data Collection

3.2.1. Data types and sources

For this study both qualitative and quantitative type of data were collected from primary and secondary sources. Primary data sources were smallholder garlic producer farmers randomly interviewed and from purposively selected traders and consumers. Secondary data sources were from district agriculture and rural development offices, primary cooperatives, District trade and industry offices, data taken from CSA, published and unpublished materials either from internet and bulletins.

3.2.2. Methods of data collection

Primary data: The data were collected formally by the method of eight individual interview using pre tested structured questionnaire, while data from three focus group discussion and six key informant interview were collected by using checklists. Before distributing the pre tested questionnaire for

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enumerators, provided training for enumerators on how to collect relevant data from concerned respondents.

Secondary Data: By using checklists data were gathered from published and unpublished materials, district agriculture and rural development offices, District Irrigation and Development Authority, farmers' organizations, input suppliers, marketing agencies, primary cooperatives, districts industry and trade office.

3.3. Sampling Procedure and Sample Size

To select the sample for this study three stage sampling method were employed. In the first stage, the study Woreda is purposely selected due to its high potential production of Garlic and market participation. In the second stage Garlic producing kebeles were identified with the consultation of District Irrigation and Development Authority experts, accordingly from 15 rural kebele administrations only 11 rural kebeles were garlic producers. Out of 11rural kebeles of the District, three potential garlic producer kebeles namely Dasu bore, Dakano ilke, Meti segada were randomly selected.

In the third stage, from 6,200 garlic producers in Omo Beyam district about 152 samples of household heads were selected randomly , using probability proportionality size following a simplified formula provided by (Yemane, 1967). Accordingly, the requires sample size of estimated result was at 95% confidence level with degree of variability of 5% and level of precision equal to 8% were used to obtain a sample size required which represent a true population.

$$\mathbf{n} = \frac{\mathbf{N}}{1+N(e^2)}, = \frac{\mathbf{6200}}{1+6200(0.08^2)} \approx \mathbf{152}(1)$$

Where, n = sample size, N= population size (sampling frame) and e = level of precision considered 8%.Sultan (2016) and Addisu (2016) also used this level of precision.

Table 1:Sample size determination of garlic producers

No.	Kebeles	Total number of garlic producers	Number of sampled households
1	Dakanoilke	580	54
2	Dasu bore	510	48
3	Metisagada	530	50
Total		1,620	152

Source: Own computation, 2018/19.

Data werecollected from traders and consumers. The sites for the trader surveys weremarket towns in which a good sample of garlic crop traders exists. On the basis of flow of garlic's, three markets (Nada,Assandabo and Jimma) were selected as, the main garlic marketing sites for the study areas. Here sampling is the very difficult task due to absence of recorded list of population of traders and the opportunistic behavior of the traders. Hence a purposive sampling method wasused to select wholesalers, rural collectors and retailers from specified markets. 30 garlic traders (7 rural collectors, 20 retailers and 3 wholesalers) were selected for the purpose of the study. Furthermore, 20 consumers had been interviewed in Jimma,Assandabo, and Nada towns which were selected purposively to obtain information related to consumers.

Table 2: Sample distribution of garlic traders

No.	Traders	Nada	Assandabo	Jimma	Total
1	Rural Collectors	7	0	0	7
2	Retailers	8	6	6	20
3	Whole sellers	0	0	3	3
4	Consumers	7	7	6	20
	Totals				50

Source: Own computation, 2019

3.4. Methods of Data Analysis

Three types of data analysis, namely descriptive statistics, (S-C-P) approach and econometric analysis were used for analyzing the collected data.

3.4.1. Descriptive analysis

Descriptive statistics such as frequency, mean, percentage, and standard deviation were used. In addition to this, descriptive tools such as tables were used to present data.

3.4.2 Analysis of Structure Conduct and Performance (S-C-P)

The (S-C-P) model is an analytical approach used to study how the structure of the market and the behavior of sellers of different commodities and services affect the performance of market, and consequently the welfare of the country as a whole (Kizito, 2008). 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.   The Harvard School, also known as Bain's group, established the industrial organization framework based on a paradigm known as Structure – Conduct – Performance (S-C-P) in the early 1950s. The Harvard School framework is sometimes called Traditional Industrial Organization. It is based on the theory that the structure of a market (S) determines market conduct (C), which then determines market performance (P), and that higher concentration ratios generate welfare losses by competition restricting activities.

3.4.2.1 Market structure

 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. The concentration ratio is expressed in terms of CRx, 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 as strong oligopoly; CR4 between 33% and 50% is generally considered a weak oligopoly and a CR4 of less than 33% is no oligopoly at all rather competitive nature of market. Market concentration refers to the number and relative size distribution of buyers/sellers in a market. It is generally believed that higher market concentration implies non-competitive behavior and thus inefficiency.

3.4.2.2.Market conduct

Market conduct refers to the patterns of behavior that enterprises followed in adopting to the markets in which they sell or buy. The principal dimensions of market conduct according to (Raid, 1987) include

price setting, the manner in which the value and quality ranges of products are determined, advertising and marketing strategy, research, development planning, implementation, and legal tactics.

To study market conduct there are no agreed upon procedures for analyzing the elements. The existence of formal and informal producing and marketing groups; the availability of price information and its impact on prevailing prices; and the feasibility of utilizing alternative market outlets pricing, buying and selling practices were assessed.

3.4.2.3.Market performance

Scott (1995) argued that performance as well as the integration of markets is the result of the actions of traders and of the operating environment determined by the infrastructure available for trading and policies affecting the price transmission from one market to another. To analyze the performance of the marketand marketing margin were used.

Market performance refers to the composite of end results which firms in the market arrive at by pursuing whatever lines of conduct they use that results in the dimensions of price, output, production and selling cost, product design, and so forth (Wolday, 1994).

3.4.2.3.1. Marketing margin

A marketing margin is the percentage of the final weighted average selling price taken by each stage of the marketing chain. The total marketing margin is the difference between what the consumer pays and what the producer/farmer receives for his product. In other words it is the difference between retail price and farm price (Cramers and Jensen, 1982).

Estimates of marketing margin are the best tools to analyses performance of market. The cost and price information used to construct marketing cost and margin had been gathered from garlicmarket chain actors such as, producers, collectors, retailers, wholesalers and consumers. Computing the total gross marketing margin (TGMM) is always related to the final price paid by the end buyer and is expressed as percentage (Mendoza, 1995).

$$\textbf{TGMM} = \frac{\textbf{\textit{Final consumer price}} - \textbf{\textit{producer price}}}{\textbf{\textit{Final consumer price}}} \textbf{\textit{X}} \textbf{ 100} \tag{2}$$

Where, TGMM is total gross marketing margin

It had been useful to introduce here the idea of "producer participation", "farmer's portion" or "producer's gross marketing margin" (GMM) which is the portion of the price paid by the end consumer that belongs to the farmer as a producer. It should be emphasized that growers that as middlemen also receive an additional marketing margin. The producer's margin or share in the consumer price (GMMp) is calculated as:

$$\text{GMMp} = \frac{Consumer\ price - Marketing\ gross\ margin}{Consumer\ price} X100 \, or \qquad (3)$$

$$TGMMp = 1 - GMM$$

Where, GMMp is = the producer's share in consumer price

3.4.3 Econometric analysis

For identifying determinant of garlic supply multiple linear regression model (OLS) werechosen over other limited dependent variables due to the nature of data that dependent variable is continuous, all garlic producing sample respondents are market participant and there are more than one independent variable.

However, when some of the assumptions of the Classical Linear Regression (CLR) model were violated, the parameter estimates of the above model may not be Best Linear Unbiased Estimator (BLUE). Thus, it is important to checkthe presence of heteroscedasticity, multicolliniarity and endogeniety problem before fitting variables into the regression models for analysis so that it was cheked.

Multiple linear regression model specification of supply function in matrix notation is given as follows:

$$Y_i = \alpha_i + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots \ldots + \beta_i X_i + \cup_i \qquad (4)$$

where; Y_i = quantity of garlic supplied to the market

α_i = intercept

β_i = coefficient of the ith explanatory/ independent variable

X_i = vector of explanatory variable

$\cup_i$ = disturbance term. Here the estimated coefficient indicates the effect of change in the independent variables on the dependent variable.

For this study, the equations for the quantity of garlic supplied were:

Quantity of garlic supplied $= \alpha_i + \beta_1 \text{sex} + \beta_{2\text{Family size}} + \beta_{3\text{Edu}} + \beta_{4\text{Distance}} + \beta_5 \text{Experience} + \beta_6 \text{Extension} + \beta_7 \text{LPrice} + \beta_8 \text{Actlforce} + \beta_9 \text{credit} + \beta_{10} \text{Information} + \beta_{11} \text{Oxennum} + \beta_{12} \text{Totalland} + \cup_i$

3.5 Definition of Variables and Working Hypothesis

3.5.1. Dependent variables

Quantity Supplied to Market: A continuous variable thatrepresents the actual supply of garlic by individual households to the market during the survey year, which measured in quintals (100kg).

3.5.2. Independent Variables

In order to identify factors influencing garlic volume sales both continuous and discrete variables were hypothesized based on economic theories and the findings of different empirical studies. Accordingly, in order to investigate the determinants of market supplyof garlic crop the following variables were constructed. The explanatory variables that are expected to influence the dependent variable(s) are the following:-

Sex of the Household Head: This is a dummy variable (takes a value of 1 if the household head is male and 0 otherwise). The variable is expected to have either a positive or negative relation with volume of garlic marketed. (Tewodros, 2014) found that household head sex influenced chickpea market supply negatively and significantly.

Family Size: This variable is a continuous explanatory variable and refers to the total number of family member in the household. A household with more number of family members is assumed to supply less amount of garlic to market than those households with relatively less number of family members because of the increase in consumption. However, family size in the study area might negatively affect on marketable surplus of garlic. (Gebremedin, 2010) found out negative relationship between family size and market supply. So it is hypothesized to affect volume of market supply negatively.

Education Level of the Household Head: It is continuous and measured in years of formal schooling.The educational status of the farmer determines the speed with which he/she likely to adopt agricultural technologies. Those who can read and write stand a better chance of understanding things

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faster. Moreover, better educated farmers tend to be more innovative and are therefore more likely to adopt the marketing systems. Therefore, it is hypothesized to affect positively volume of supply of garlic. This is supported by (Girma and Abebaw, 2012).

Total land owned: This is a continuous variable in hectare indicating the total land owned by a farmer. It is expected to take positive sign implying that the larger land size a farmer owns the more land size would allocated for the crop at interest. Increase in size of land assumes direct influence on marketable surplus. Abay (2010) found expanding the area under red pepper increased the marketable supply of the peppers.

Distance from Nearest Market: Distance to the nearest market is a continuous variable measured in km from the household residence to the nearest market. The closer the market, the lesser would be the transportation charges, reduced walking time, and reduced other marketing costs, better access to market information and facilities. Holloway *et al.,* (2000) found that Farmers living closer to markets were found to participate and sell more livestock products. In this study, distance from nearest market is hypothesized to influence volume supply negatively. Therefore, it will also hypothesize to influence the decision of farmers on volume of garlic supply.

Farming Experience: This is a continuous variable measured in number of years. A household with better experience in garlic farming is assumed to produce more amounts of garlic's and, as a result, assumed to supply more amounts of garlic's to market. (Toyiba *et al.*, 2014) found that experience in papaya production had a positive and significant effect on papaya volume marketed.

Active family labor: Active family labor is a continuous variable measured in adult equivalent. Garlic production and marketing is labour intensive activity, since garlic is bulky product in nature. Accordingly, families with active family members tend to have more labor which increase the farmer's participation in the crop farming. That means the higher the number of size tend to have the more lobar which increase volume of supply. Baltenweck *et al.*, (2006) found that the higher the number of adults in the household, the more likely supply the product to the market.

Lagged market prices of garlic: Lagged market prices at all levels (rural and urban markets) were also expected to affect supply positively because of their incentive and disincentive effect in production. This variable is also measured in birr per quintal. Positive relation of lagged prices is expected with marketable supply of garlic. In general, if prices were relatively high in the previous years, there is a

possibility of increasing land for garlic production and hence the amount produced. Abay (2010) found that lagged price increased the marketable supply of the red peppers.

Frequency of Extension Contact: This is continuous variable which is the number of days that farmer was contact with extension agent monthly for agricultural work supervision in that production years. The objective of the extension service is introducing farmers to improved agricultural inputs and to better methods of production. In this regard, extension is assumed to have positive contribution to farm level volume supply of garlic's. Ayelech (2011) found that if fruit producer gets extension, the amount of fruits supplied to the market increases. The number of extension agent visits improves household's intellectual capitals and helps in improving garlic production.

Access to market information: This variable was measured as a dummy variable taking a value of 1 if the farmer had access to market information and 0 otherwise. It has been hypothesized to affect marketable supply of garlic positively. Producers that have access to market information are likely to supply more garlic to the market than that has no informations. (Ali, 2013) found that market information increased the marketable supply of coffee significantly.

Using credit: It is a dummy variable taking the value 1 if farmer uses credit for production and/or marketing activities related to garlic and 0 otherwise. Credit is a key financial instrument to break low level of production and then marketing problem. According to (Sultan, 2016) access to credit had positive and significant influence on volume of wheat supply. So it is hypothesized to affect volume of garlic supplied to the market positively.

Number of oxen owned: It is a continuous variable which is expected to influence production participation then by supply positively. It was expected that participation probability of farmers to supply garlic would increase as farmers increased their number of oxen because even if there is a limited land there will be proper and timely land preparation then by increase in productivity. Kindie (2007) found that the number of oxen owned by the household affected the marketable supply of sesame in Metema woreda.

Definition of variables: 12 variables (9 continuous and 3 dummy) were hypothesized and tested using OLS. The variables used were presented in Table 3.

Table 3 Description of dependent and independent variables used in the OLS

Variable	Description	Types	Expected sighn
QUA SUPP	Quantity supplied in quintal	Continuous	
Lagged PRICE	Lagged Price of garlic in 2017/2018 in Birr	Continuous	+
DNMK	Distance to nearest market in Km	Continuous	_
SEX	Sex of household head	Dummy	+_
TLAOWN	Total land size of household	Continuous	+
OXEN NO	Number of oxen owned	Continuous	+
HHSIZE	Household size in number	Continuous	_
EXP	Experience in garlic production	Continuous	+
EDU	Education of household head	Continuous	+
ALFORCE	Active labor force of household head	Continuous	+
MINFO	Market information	Dummy	+
NEXC	Number of Extension contact	Continuous	+
CREDIT	Using Credit	Dummy	+

Source: own consumption, 2019

4.RESULTS AND DISCUSSIONS

The result and discussion part of this thesis deals with the findings from descriptive statistics and econometric analysis, in garlic production and marketing mainly socio-demographic characteristics of farmers and traders, Structure Conduct and Performance of garlic marketing, challenges and opportunities along production and market chain, marketing channels, marketing costs and margins, and benefit shares of actors in the market chain discussed. Econometric analysis was employed to identify determinants of garlic supply to the market in Omo Beyam Woreda.

4.1. Socio-Demographic Characteristics of Sample Farmers and Traders

This sub-section explains the profile of sampled respondents with regard to their age, sex, religion, marital status, family size, and experience, level of education, access to extension services, access to markets information, distance from nearest market and development agent.

4.1.1. Demographic characteristics of sample farmers

Household characteristics, namely sex, age, marital status, education, family size are believed to influence production and marketing decision of farmers in different aspects. The results of the study revealed that 94.7% of sample households were male headed and 5.3% were female headed.   The mean age of the sample household heads was 40.45 years with the minimum and maximum age of 22 and 82 years, respectively and 64.4% of the respondents' was with an age interval of 22-43 years old. Religion of the sampled farmers indicates 96.7% of the respondents were Muslims and 3.3 % were Christians. The marital status indicates 97.3 % of the sampled respondents were married and 2.6 of respondent were single and widowed (table4). The survey result shows that about 23.7% of the sampled household heads were illiterate. However, 73.6% and 2.6% attended primary school and secondary school, respectively. Distance from nearest market of the farmers was between 22- 34 km far from the market. The mean family size of the total sample households was 7.57 persons ranging from 1 to 18 and this might assist them for a better participation of households in the garlic productions and volume of marketable supply. The detailed result indicated in the (Table 4).

Table 4 Demographic characteristic of sample farmers

Description	Number of HH/members	Percentages (N=152)
Sex		
Male	144	94.7
Female	8	5.3
Educational level		
Lessthan zero (>0)	36	23.7
Grade 1- 8	112	73.6
Grade 9- 12	4	2.6
Religion		
Muslims	147	96.7
Christians	5	3.3
Marital Status		
Single	1	0.7
Married	148	97.3
Widowed	3	1.9
Age of Household head		
22-28	5	3.3
29-33	20	13.1
34-38	49	32.2
39-43	24	15.8
>43	54	35.5
Family size		
1-4	28	18.42
5-7	61	40.1
8-10	33	21.7
>10	30	19.7
Distance from nearest market		
22- 25 km	52	34.2
26- 29 km	48	31.5
30- 34 km	52	34.2

Source: Survey result, 2019

4.1.2. Socio economic characteristics of farmers

The socio economic characteristics of farmers considered so far are land use pattern, cropping pattern, garlic quantity supplied to the market and livestock holding. The survey results indicate that amount of arable land holding ranged from 0.5 to 7 hectars with a mean land size of 2.35 ha and a median of 2.00 ha. In the 2018/19 production year the maximum size of land allocated for garlic was 0.5ha and its mean was 0.14 hek with standard deviation of 0.11. The average amount of garlic supplied to market by each producer was 5.56 quintal with a minimum amount of 0.5 quintal and maximum amount of 24 quintals. As draught power is important source of farm power 81.5 percent of the respondents owned 1-3 oxen and 16.4 percent owned 4-6 oxen owned. As shown in (Table 5).

Table 5 Socio economic characteristic of sample farmers

Description	Number of HH/members	Percentages (N=152)
Total land owner in ha		
0.5-1.5	47	30.9
1.6 – 2.5	75	49.3
2.6 -3	19	12.5
>3	11	7.2
Major crops		
Maize	152	100
Wheat	152	100
Barley	125	16.4
Teff	32	21
Garlic	152	100
Livestock holding		
Oxen		
1-3	124	81.5
4-6	25	16.4
.>6	3	1.9
Quantity supplied to the market		
0.5- 5 quintals	96	63.1
6- 10 quintals	46	30.2
11- 15 quintals	5	3.2
>15 quintals	5	3.2
Lagged price of garlic		
4200- 5000 ET birr	110	72.3
5100- 6000 ET birr	30	19.7
6100- 7000 ET birr	12	7.8

Source: Survey result, 2019

4.1.3. Demographic characteristics of traders

The survey result indicates that the sampled traders were on average 33 years old and 5 years of average experience (minimum 2 and maximum 12 years). Religious of traders were 73.3 % Muslims and 26.6% Christians. Table 6 summarizes the demographic characteristics of traders.

Table 6 Demographic characteristics of garlic traders (% and averages)

Description	Number of Sampled traders	Percentages (N=30)
Sex		
Male	14	46.6
Female	16	53.3
Educational level		
Illiterate	7	23.3
Literate (read and write)		
Grade 1-4	13	43.3
Grade 5-8	5	16.7
Grade 9-12	5	16.7
Religion		
Orthodox	8	26.6
Muslim	22	73.3
Marital Status		
Single	3	10
Married	25	83.3
Widowed	1	3.3
Divorced	1	3.3
Age	30	33a
Years of experience in trading	30	5a

Note: a mean value
Source: Survey result, 2019

4.1.4. Socio economic characteristics of traders

The socio economic characteristics of traders include the physical and financial assets such as store, telephone (fixed or mobile), vehicles, pack animals, and working capital. The survey result indicates that all wholesaler traders store the product on the average for 60 days and the others stores up to 14 days before sale.   From the total respondents only wholesaler have relatively better storage while local assembler and retailer use residence store. The average holding capacity of the store was 100 quintals (minimum 50 maximum 150). To exchange market information 100% of traders use mobile telephone. Traders source of capital was on average 86.7% own capital. Only 13.3% traders use credit access.

Table 7 Starting capitals of traders

Source capital	Frequency	Percent
Owned	26	86.7
Credit	4	13.3
Total	30	100

4.2. Access to services

Access to services such as agricultural extension, credit, transport, market and market information are the most important factors that promote production and productivity thereby increasing marketable surplus and ultimately farm income.

4.2.1. Access to extension service

Extension service: the rural extension services are on the average of a major shift in extension service delivery through the farmer training center system. As a result in the study area in 3 of the rural kebeles 3 FTC's were constructed to give training to farmers based on 70% practical and 30% theoretical training. Accordingly, extension service was mainly delivered by the Woreda office of Agriculture and Natural resource Management. Respondent farmers reported that the average distance they had to travel to development center was 3.60 km (of single trip travel).

Each sampled Kebeles had three development agents assigned to work in crop production, animal science and natural resource. This is because the Regional Agricultural and Rural Development Bureau gives special attention to agricultural sector to technically support the farmers' right from land preparation, seed selection, disease and pest, water management up to post harvest handling.

Respondents reported that the extension frequency of extension visit they had from development agents was put in table 8. Accordingly, from all respondents 2 were visited once in a week, 28 once in two weeks, 37 were visited once in a month, 42 were visited once in a three month, and 34 were visited with no regular program and 9 were not visited at all.

Table 8 Frequency of extension contact of producers with extension agents

Extension contact	Frequency	Percentage of farmers With extension contact
Weekly	2	1.3
Per two weeks	28	18.4
Per month	37	24.3
Per three months	42	27.6
No regular program	34	22.3
Not visited	9	5.9
Total	152	100

Source: survey 2019

4.2.2. Access to availability of credit

Credit is important to facilitate the introduction of innovative technologies and for input and output marketing arrangements. However, the survey result indicated that from the sampled farmers only 48% use credit service this implies; credit service delivery for garlic producer and the nature of production system at the harvest period opened an opportunity for farmers not to request credit. Furthermore, producers develop cash on hand system. There is lack of attention to access and avail credit for garlic producers. Oromia credit and saving institution was the only institution that can legally give credit service to poor farmers with group collateral with annual interest rate of 12.5% (appendix 1).

4.2.3. Access to road and transport

The availability of well functioning transport network is very important because it creates place utilities of the product. It there by allows farmers in surplus areas to profit from better prices from other markets and also consumers in deficit areas benefit from lower prices by transporting from surplus areas. Omo Beyam District has about 54 Km all weather roads, and about 63km dry weather road DRRO (2019).

According to the survey result, 54% the sampled farmers use pack animals , 25% use car, 14% use men and pack animals to transport the product (appendix2).

In the study area, the average distance farmers traveled to transport the product to road access was 4 km. The major markets farmers used to supply the product to the market were Nada.

4.2.4. Access to markets

The survey results reveal that almost all garlic producers sold their product at the District and local market. As the crops (garlic) have short shelf life, it was anticipated to sell the products with in short time. All three kebeles have access of dry weather roads and 66% of producers all weather roads and have relatively easy access for product sale. Retailing of garlic products took place in Nada, Assendabo, Jimma town on daily basis but the amount handled by retailer and number of buyers was small in Nada and Assendabo relative to the market day of the town on Monday and Saturday respectively. Gona and Omo were the other common retail area though the sizes of the market were small (in terms of volume handle and number of marketing actors).

4.2.5. Access to market information

The sampled respondents revealed that the major source of market information were personal observation, friends and neighbors, traders (assemblers) and others. About 63% of garlic producers have got market information from personal observation (Table 9).

Table 9   Source of market information for garlic marketing at OmoBeyam (2019)

Percent of response garlic producer	source of information		
	trader (assembler, wholesaler)	personal observation	others (friends, ..)
N	22	96	34
Percent	14.4	63.1	22.3

Source, Survey result, 2019

4.3. Structure, Conduct and Performance of the garlic Market

The study employed structure-conduct and performance to evaluate degree of competition, behavior of the marketing actors and their achievement in garlic marketing in Omo Beyam Woreda.

4.3.1. Garlic market structure

The salient features of market structure are: the degree of sellers and buyers' concentration, the degree of product differentiation among the outputs of the various sellers in the market, and barriers to entry or freedom to entry and exit from the market. Market structure is analyzed based on the numbers and sizes of enterprises within the system, and the potential access of additional participants to it (licensing procedure, lack of capital and know how, and policy barriers) and the degree of transparency (Pender *et al.,* 2004). In this study, the structure of the garlic market is characterized by garlic market participants, marketing channels and degree of transparency and entry conditions.

4.3.1.1. *Garlic market participants, their roles and linkages*

The main actors involved in garlic marketing were producers, wholesalers, retailers, rural collectors and consumers. Producers supply the product mainly in three markets, Nada, Omo and Gona. The main role played by producers was the consistent supply of garlic in terms of amount and quality.

Producers: Producers are the first link in the marketing chain. Producers have linkage with input suppliers (Ethiopian Improved Seed Agency, Office of Agriculture, cooperative and traders to by inputs), financial institutions such as Oromia Credit and Saving Institution (OCSI) to get a credit, Trade and Industry Office to get market information, Woreda and kebele administration to secure land and solve administrative problems in their localities. The buyers of the garlic product were mainly retailers and assemblers and sometimes wholesalers at harvesting time. The linkage with cooperatives was low and almost nil because the nearby primary and secondary cooperatives focus on non perishable products like teff, maize and wheat to store products in case of price falls.

The average amount of garlic supplied by producers in 2019 was 5.56 quintal (with a minimum 0.5 and maximum amount of 24 quintal). The survey result indicates that 90% of the sampled households use plastic sacks to transport the product to the market using pack animals and car (appendix 2). The buyer and sellers have no any quality measurement rather they develop experience to do this. They measure

quality by its color, odor, shape, absence of foreign matter and origin. As soon as they agreed, weighing and loading would start.

Wholesalers: The wholesale buyers were found in Jimma. They purchased on average 50 quintals of garlic of which the entire product had been sold in the same year. The average capital of wholesalers was 250,000 birr and the source of their capital was totally own capital. They were also serving as retailers in their local area and to a large extent also supply garlic to other retailers in Jimma and other areas. All wholesalers were literate; their educational level ranges from grade eight up to grade eleven. The experience of wholesalers in the business ranges from six to twelve years.

Retailers: These are the final link in the marketing chain who delivers garlic to end users or consumers. All retailers have mobile telephone to exchange current information. The working capital of retailers ranges from 4,000 up to 35,000 birr. The source of capital was 90% own and 10% OCSI with an interest rate of 12.5%. The group lending procedure followed by OCSI was the major challenge retailers faced to use the credit. Retailers use rented and their own store because some traders store is not found in front of the main road to attract sellers. They are very numerous as compared to wholesalers and rural assemblers and their function was to sell to consumer in pieces after receiving larger volumes from wholesalers, rural assemblers or producers.

Assemblers: They mainly used to buy small lots of garlic directly from farmers and sell it to wholesalers and retailers in Nada, Assendabo and Jimma market based on the agreement made prior. These are farmers or part time traders in the assembly markets who collect garlic from farmers in small town markets for the purpose of reselling. Their sources of money and market information are mainly their clients (wholesalers and retailers).

4.3.1.2. *Marketing channels*

A marketing channel is a business structure of interdependent organizations that reach from the point of product origin to the consumer with the purpose of moving products to their final consumption destination (Kotler and Armstrong, 2003). The analysis of marketing channels is intended to know the alternative routes the product follow from the point of origin to final destination. Seven main alternative channels were identified for garlic marketing. The main marketing channels identified from the point of production until the product reaches the final consumer through different intermediaries were:

Channel-1: producer →consumers =3,500 kg

 Channel-2: producer→ retailer →consumers =20,500 kg

Channel-3: producer →local collector →retailers →consumer =5,700 kg

Channel-4: producer →local collector →wholesaler →retailers→ consumers =41,600 kg

Channel-5: producer →local collector →wholesaler →consumers =8,300 kg

Channel-6: producer →wholesaler →consumers =1,400 kg

Channel-7: producer → wholesaler →retailers →consumers =3,600 kg
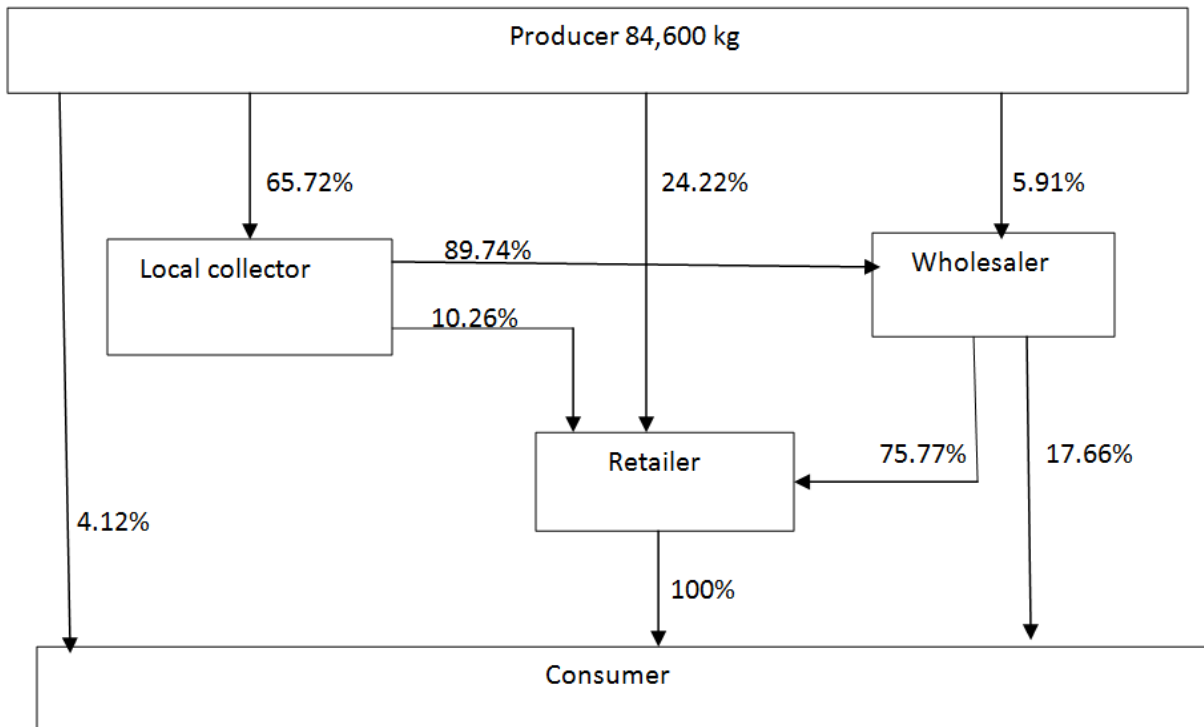
Figure 3 Garlic market channels for different market participants.

Source: Survey result, 2019.

4.3.1.3. The Degree of Market Concentration

According to (Kohls&Uhl, 1985) market concentration, the portion of the industry sales made by the largest firms, is another source of imperfect competition. Successful competitors frequently eliminate their rivals or discourage new firms entry, contributing to more concentrated markets. In general, the higher the level of market concentration, the less perfectly competitive the market is.

In this study the analysis of the degree of market concentration was carried out for all sampled traders in the study area. It was measured by the percentage share of volume of garlic purchased by the largest four traders annually.

Table 10 Concentration ratio of big-4 traders of garlic.

Number of Trader (A)	Cumulative Frequency (B)	% of Traders (C)	Cumulative % of Trader (D=B/30)	Quantity purchased (in No) (E	Total Quantity Purchased (F=A*E)	% Share of Purchase (G=F/81,100)	% Cumulative Purchase
1	1	3.33	3.33	10000	10000	12.33	12.33
1	2	3.33	6.66	8000	8000	9.86	22.19
1	3	3.33	10	6500	6500	8.01	30.2
1	4	3.33	13.33	5000	5000	6.17	36.37
1	5	3.33	16.66	4500	4500	5.55	41.92
1	6	3.33	20	4500	4500	5.55	47.47
1	7	3.33	23.33	4250	4250	5.24	52.71
1	8	3.33	26.66	4000	4000	4.93	57.64
1	9	3.33	30	3500	3500	4.32	61.96
1	10	3.33	33.33	3500	3500	4.32	66.28
1	11	3.33	36.66	2500	2500	3.08	69.36
1	12	3.33	40	2500	2500	3.08	72.44
1	13	3.33	43.33	2500	2500	3.08	75.52
1	14	3.33	46.66	2000	2000	2.47	77.99
1	15	3.33	50	2000	2000	2.47	80.46
1	16	3.33	53.33	1750	1750	2.16	82.62
1	17	3.33	56.66	1750	1750	2.16	84.78
1	18	3.33	60	1500	1500	1.85	86.63
1	19	3.33	63.33	1500	1500	1.85	88.48
1	20	3.33	66.66	1250	1250	1.54	90.02
1	21	3.33	70	1250	1250	1.54	91.56
1	22	3.33	73.33	1100	1100	1.36	92.92
1	23	3.33	76.66	1000	1000	1.23	94.15
1	24	3.33	80	1000	1000	1.23	95.38
1	25	3.33	83.33	1000	1000	1.23	96.61
1	26	3.33	86.66	750	750	0.92	97.53
1	27	3.33	90	750	750	0.92	98.45
1	28	3.33	93.33	500	500	0.62	99.07
1	29	3.33	96.66	500	500	0.62	99.69
1	30	3.33	100	250	250	0.3	100
				81,100	81,100		

Source: Own computation 2019

This is therefore, as a rule of thumb suggested by the above authors the four traders' concentration ratio represents for all garlic traders across the study area. The result in table 10 shows that, the concentration ratio (CR4) of the four largest traders for garlic is found to be 36.37 percent. Therefore, according to (Kohls&Uhl, 1985), garlic market is characterized by weak oligopoly market structure which is relatively less concentrated traders/ or suppliers/or sellers indicating that the market structure is a relatively a competitive one. This means that no single trader or a group of few traders have as such a big impact on marketing of garlic (table 10).

4.3.1.4. Degree of market transparency

There is no well established system of dissemination of market information in the Woreda, the trade and market office disseminate market information, but, it is not consistent and uniform to all garlic traders. And also, there is not a clear licensing and renewal procedure which is uniform to all traders. In the sample markets, all traders had information through different sources (other merchants and using telephone).

4.3.1.5. Barrier to entry and exit

According to the focus group discussion made with trade and market office and Agricultural and Natural resource office there are no restrictions to enter in the garlic markets with respect to license. Even though garlic trade does not require huge investment capital the price of the commodity is highly volatile to be engaged in the business confidentially which is an entry barrier because only those who can take such risks will join the business.

The regulatory action to control unlicensed traders was minimal in the Woreda. Since these unlicensed (local collector) traders do not pay tax they have the opportunity to charge competitive price and discourage the licensed traders. Traders do not blame about the payment for licensing and renewal. But, they claim that the tax rate is unfair and high and very subjective. The survey result indicated that 57% of traders pay tax (appendix 3) much of them were retailer and wholesalers based on the volume of the product handled but there was no continuous and proper counting. Non accessibility of accurate and timely market information mechanisms was also the other barrier to join in garlic trade. Hence, it is possible to generalize that except capital, price fluctuation and market information there were no entry barriers and there are no exit barrier rules and regulations in garlic trade in the study area.

4.3.2. Garlic market conduct

To study market conduct there are no agreed upon procedures. The conduct of the garlic market were analyzed in terms of the availability of price information, price setting, purchasing and selling strategies of producers and traders.

4.3.2.1. Conduct of producers

According to the survey result out of the 152 garlic producers only 21 respondents reported that they produced and supplied to market twice per year. For those producing by irrigation garlic supply starts in

April and reaches its peak in June and sharply decline after Jully and by rain it starts in November and decline after February 69.2% of respondent produce garlic by irrigation. The main market information farmers' used were input and output prices. According to the survey result, all producers supply the product to the market and almost all the sampled farmers had market information before sale. The sources of information were from friends, neighbors and traders through telephone. The price setting strategy producers used to sale the product were 34% through negotiation, 15.78% by rural collectors and buyers, 17.7% by buyer and 9.8% the current market demand and supply based on the market. The detail price setting strategy is indicated in (Table 11). There was no any contractual based marketing system in the area to minimize marketing risks.

The garlic producers in Omo Beyam Woreda have weak or no organizations that could strengthen their bargaining power from input supply up to output marketing. Due to this, weak linkage among themselves they lack the power to negotiate with different actors to obtain normal profit. As a result they are price takers from input purchase to selling their produce and defaulted in weight almost in all the market chain.

Table 11   Price setting strategy of producers to market the product

Who sets garlic price in a market?	Number of sampled Household respondent	proportions
Producer	27	17.7
Buyers	34	22.3
Through negotiation	52	34
Market (demand and supply)	15	9.8
Assembler and buyer	24	15.78
Total	152	100

Source: Survey result, 2019

4.3.2.2. Conduct of traders

Price information: Market information plays a great role for traders because it affects the volume of the product to be purchased, price of purchasing and selling, and time of sales. The market information was not transparent between the different categories of traders that created high price variability and difference among traders. Wholesalers, either with the help of their rural assembler or partners, have got

quick and readily information relative to retailers. As indicated in (Table12). Trader's sources of information were 60% from other traders in their residence and through telephone from other traders.

Table 12 Traders market information source about price

Source of information	Number of sampled traders	Proportion
Other trader	18	60
Telephone	10	33.3
Other trader and telephone	2	6.7
Total	30	100

Source: Survey result, 2019

Buying and Selling Strategies: The sampled traders preferred the local market to purchase the product directly from producers because of the price advantage they got with due consideration of the transportation cost. During buying all traders make a price difference for quality based on their experience. Traders attract buyers (83%) by paying reasonable price and using correct measure. During buying 27% of the sampled traders set price by negotiation and 43% of them by the central market price and 20% based on demand and supply (appendix4).

Traders attract producers by showing their loyalty in providing fair price and proper weighing as mentioned earlier. As the survey result indicated 60.8% of sampled traders do not have permanent customer to supply the product. The buying and selling price of the product was 75% similar and 25% different in between traders. Traders were taxed mainly based on the volume of the product they handled during the year and 10% of traders developed the experience to record the volume of the product transacted (bought, sold and price).

Trade associations that act as a bridge to connect traders with the government institutions are very important for traders. However, discussion made with trade and market office during the focus group discussion mentioned that the absence of trade association had made the market to be disordered that is some traders purchase at a low price that exploit producers and some purchase at high price.

Hence, the trade association that was established earlier due to the opposition of exploiting traders had become non-functional. Traders buy products from different sources and transport from buying to store using (human portage, cars, animal cart, and pack animals).

Table 13 Traders' sources of garlic supply

Sources of product supply	Number of sampled traders	Proportion
From Producers in Nada market	19	63.3
Markets out of Nada town from other traders	3	10
Markets out of Nada town from producers	8	26.6
Total	30	100

Source: Survey result, 2019

4.3.3. Garlic market performance

The garlic market performance was evaluated based on the level of marketing margins and also the level of market integration among the major local markets in the study area. The analysis of marketing channels was intended to provide a systematic knowledge of the flow of goods and services from its origin to final destination. Margin or spread can be useful descriptive analysis if it used to show how the consumer's price is divided among participants at different levels of marketing system (Mendoza, 1995) (Table 14).

Result of trader's profit margin shows that, traders took a total of 45.11% out of the total profit margin; off which 8.29%, 15.88% and 20.94% was simply by buying from the farmers and selling to consumers without changing the form of the product respectively. Specifically, among traders, retailer profit margin constitutes the highest share (20.94%) followed by wholesalers (15.88%). While farmers, doing all the work of producing garlic and bearing the associated risks, took 54.89% of the profit margin. This impliedly, garlic producers added 54.89% of the total value of garlic in the woreda; whereas, collectors, wholesalers, retailer are responsible for 8.29%, 15.88% and 20.94% respectively.

Table 14 Garlic marketing costs and benefit shares of actors (per Qt)

Description	Actors				
	Producer	Local collector	Whole seller	Retailer	Horizontal Sum
Purchasing price	0.0	4800.00	5,400.00	5,600.00	15,800.00
Production cost per Qt	1,175.21	0.0	0.0	0.0	1,175.21
Total Marketing cost/QT	35.00	58.00	61.30	30.77	185.07
Total cost	1,210.21	0.0	0.0	0.0	1,210.21
Selling price	4,800.00	5,400.00	6,500.00	7,000.00	23,700.00
Market Margins	3,624.79	600.00	1,100.00	1,400.00	7,900.00
% share Margins	60.76	7.6	13.92	17.72	100
Profit Margins	3,589.79	542.00	1,038.70	1,369.23	6,539.72
% share of profit	54.89	8.29	15.88	20.94	100

Source: survey 2019

4.3.3.1. *Marketing costs*

The marketing costs in the transaction of garlic by the different marketing agents (wholesalers, retailers, local collector) are presented in Table 15.

Table 15 Marketing costs for different marketing agents (Birr/qt)

Cost items	Urban wholesalers	Retailers	Local collector
Plastic Sack	10.00	10.00	10.00
Load	5.00	5.00	5.00
Unload	5.00	5.00	5.00
Transport	30.00	3.00	30.00
Storage loss	4.5	6.27	6.00
Telephone	0.60	0.25	0.50
Guard	4.00		
Personal Expenses	2.20	1.00	1.50
Total	61.30	30.77	58.00

Source: Survey result, 2019

Storage losses were lower in wholesalers due to a well established and cemented store constructed and store the product for two months and their store was good. Whereas it was higher in local collector and retailer because expecting higher prices to construct the storage and store the product for short period and their store was poor.

4.3.3.2. Marketing margin

As mentioned earlier marketing margin is the difference between the price paid by consumers and that obtained by producers. Based on the reported prices by the different market participants, summarized in Table 16, the gross margins for different marketing channels are calculated as follows.

Without considering channel 1 (producers sell directly to consumer) the total gross marketing margin (TGMM) is the highest in channel IV which is about 31.43 % and lowest 12.73 % in channel II. Local collector and wholesalers have got the highest gross marketing margin whereas retailers have got the lowest marketing margin. Producer's share (GMMp) is highest (87.27%) from the total consumers' price in channel II and lowest in channel IV (68.57) because of the involvement of local collector in this channel that purchase relatively at a lower price from producers in their locality. .

Table 16 Percentage marketing margins for different marketing channels

Marketing Margins	I	II	Marketing III	channels IV	V	VI	VII
TGMM	0	12.73	20.00	31.43	26.15	15.79	23.81
GMMP	100	87.27	80.00	68.57	73.85	84.21	76.19
GMMRE		12.73	11.67	11.43			11.11
GMMWH				17.14	10.77	15.78	11.11
GMMLC			9.43	17.24	17.24		

Source: own computation, 2019

4.4. Profitability of Garlic Production

The profitability of garlic production was calculated by taking the average total income and expenses of all the sample producers' in 2019 production year as indicated in Table 17. The average yield of sampled producers for the production year was 6.54 quintal per household and the average selling price of all producers' marketed surplus was used to estimate profitability per hectare. The gross yield is 42

quintals per hect, this is the average yield obtained from collected data during surveying; but the average yield obtained from the District Agricultural office is 71 quintals per hectares. The mean market rate of the sale is about 5000 Eth. birr per quintal and 50 birr per kg. 210,000 per ha. Net realization about 160,641.36 per ha that means when we do benefit cost ratio one birr investment on garlic will give 3.25 amount of birr in return.

The cost of cultivation is about 49,358.64 birr per ha. Out of this about 40,000 birr is cost of seed which is about ten quintals per hectars of seed were needed; land was ploughed three times and cost of land preparation was 1200 birr, according to the study area one quintal NPS fertilizer and one quintal UREA fertilizer was used and its cost is about 3,958.64 birr, three times weeding operation was done and its cost was around 1,200 birr, while that of pesticide application is 600 birr per ha. Harvesting is done manually and it costs about 800 birr. Transportation cost from farm to home is about 480 birr per ha. The fluctuation in prices of Garlic is between 4,800-7,000 birr.

Table 17Cost structure of garlic production 2018/2019 production year

Cost items	Average cost (Birr/ha)
Land preparation (oxen days and human labor)	1,200.00
Seed and Chemicals	
Fertilizer (NPS and urea)	3,958.64
Seed	40,000.00
Chemicals	600.00
Labour costs	
Sawing	700.00
Weeding	1,200.00
Chemical spray	100.00
Harvesting	800.00
Transport from farm to home	480.00
Packing materials	320.00
Total variable cost (Birr/ha)	49,358.64
Average Selling price of producers (Birr/Qt)	5000.00
Total value of garlic production/year (Birr/ha)*	210,000.00
Gross margin (Birr/ha)	160,641.36

Source: Survey result, 2019

* This is with the assumption that average garlic productivity is 42 quintal per hectare.

4.5. Analysis of Econometric Results

The econometric analysis was planned to investigate factors affecting, volume of supply to market. Garlic is produced mainly for market and it is the main cash crop for producers in OmoBeyam Woreda. The survey result revealed that all farmers supply the product to the market after meeting their household requirement and 86.38% of garlic produced by the sampled farmers in 2018/2019 production year has been supplied to the market. The average amount of garlic sold by producers was 5.56 quintal with a minimum amount of 0.5 quintal and maximum amount of 24 quintal.

Determinants of garlic supply to market: Analysis of determinants affecting farm level volume supply of garlic was found to be important to identify factors constraining garlic supply to market. Prior to fitting multiple linear regressions, the hypothesized explanatory variables were checked for existence of multicolliniarity, heteroscedasticity and endogeniety problem.

Test of multicolliniarity: All VIF values are less than 10. This indicates absence of serious multicollinearity problem among independent variables (Appendix Table 5). If there is presence of multicolliniarity between independent variables, it is impossible to separate the effect of each parameter estimate in the dependent variables. It is thus, important to test multicolliniarity between explanatory variables.

Test of heteroscedasticity: Since there is heteroscedasticity problem in the data set, the parameter estimates of the coefficients of the independent variables cannot be BLUE. Therefore, to overcome the problem, Robust OLS analysis with heteroscedasticity consistent covariance matrix was estimated (appendix 6).

The result of the econometric analysis indicates that among the 12 hypothesized variables six variables (experience of garlic production, total land size of household, education level of household, extension service, distance from nearest market and number of oxen owned significantly affect the household marketable supply as indicated in (Table 18).

The degree of multicollinearity among the explanatory variables has been tested using VIF for continuous variables and CC for dummy variables. The results for all VIF were ranging between 1.11 and 3.76. The result of the contingency coefficient was also less than 0.59. Therefore, Since VIF is less than 10 and CC is less than 0.75 multicollinearity cannot be suspected and would not be a problem.

As depicted in Table18 From hypothesized twelve explanatory variables experience in garlic production, access to extension service, total land size, education level of households, distance from nearest market and number of oxen owned were significantly influence volume sales of garlic. The explanation on the effect of the significant explanatory variables is discussed below.

Table 18Determinants of garlic marketed surplus (OLS result)

Variables	Coefficients	Rabust std. Error	T-Value	P-Value
SEX	0.5883641	0.6244543	0.94	0.348
EXPERIENCE	0.0547532*	0.0327131	1.67	0.096
TLAND OWN	0.4012152**	0.2003395	2.00	0.047
ALFORCE	0.0128875	0.1333167	0.10	0.923
EXTENSION C	0.1206031***	0.0345852	3.49	0.001
EDUC	0.1970348**	0.0782371	2.52	0.013
HHSIZE	-0.0825493	0.0666091	-1.24	0.217
L PRICE	0.0005055	0.0004408	1.15	0.253
DNMK	-0.035236*	0.0211395	-1.67	0.098
ACMINFOR	0.1255254	0.361389	0.35	0.729
CREDIT	-0.4898313	0.3981441	-1.23	0.221
OXEN NO	1.571908***	0.2974876	5.28	0.000
_cons	-3.399556	1.941005	-1.75	0.082
Number of Observation				152
F (12,139)				28.65
Prob>F				0.0000
Adj. R Squeres				80.73

Note: Dependent variable is quantity of garlic supplied to market in quintal in 2019.

***, ** and * are Significant at 1%, 5% and 10% level of probability, respectively.

Source: Own computation from survey result, 2019.

Experience in garlic production: The result showed that garlic farming experience of households has significant effect at 10% significant level for garlic quantity sold with expected positive sign. Thus, the result implied that, as farmer's experience increase by one year, the garlic supplied to market increased by 0.0547 quintals, keeping others factors constant. This means that the farmers with more experience in garlic production and marketing have higher ability to sell more garlic produces in the market than less experience because they have more marketing network and information. This is in line with finding of

Addisu (2016), Abay (2007) and Ayelech (2011) who illustrated as farmer's experience increased the volume of onion, tomato and avocado supplied to the market has increased, respectively.

Total size of land owned: It is a continuous variable refers to the total hectar of land owned by respondent farmers in the study area. So the study result showed that size of land holding affected volume of garlic supplied to the market positively at 5% significance level during current year of 2018/2019. Positive coefficient shows that, the larger the total area of the land that farmer owns, the larger land is allocated for garlic and the higher would be the output that influences large quantity of garlic supplied to the market in study area. According to the study as land holding of the farmer household increases by 1 hectar, the quantity of garlic supplied to the market increases by 0.4012 quintals.This is in line with Abay (2010) found that total land owned of red pepper positively and significantly affect supply of pepper and also Kinde (2007) in his study to analyze factors affecting sesame marketable surplus found that total land owned has a significant effect to the amount supplied

Distance from the nearest market center: It is continuous variable hypothesized to affect volume of garlic supplied to the market negatively and the study result showed that distance from the nearest market center affected volume of garlic supplied to the market negatively at 10% significance level. Negative coefficient shows that as the distance from the nearest market center increases by one kilometer, the volume of garlic supplied to the market decreases by 0.0352 quintals. The same study by Ayelech (2011) indicated that, distance from the nearest market were negatively and significantly influences the intensity of marketed surplus at 10% significant level. When the household is located one Kilometer away from the market, the quantity of Avocado sold decreases by 2%.

Extension service: Frequency of extension contact significantly and positively influences marketable supply of garlic at 1% significant level. An increase in contact by one increases the probability of volume of garlic marketable supply by 0.1206quintals, all other factors held constant. This implies contact with agents improves the household's intellectual capitals, which improves garlic production and post harvest management practices. Therefore, number of extension visits has direct influence on sales volume. This is in line with Ayelech (2011) who shown that visits by extension agent influenceon sales volume of avocado.

Number of oxen owned: Number of oxen owned as it was expected, has positive relationship with household marketable supply of garlic and was statistically significant at 1% probability level. The

positive and significant relation between the variables indicates that a one percent increase in number of oxen increases the elasticity of marketable supply by 1.5quintals.This is inline with previous study by (Gessese, 2009), (Akalu, 2007) and (Kindie, 2007) who found that the number of oxen owned significantly and positively affect market supply of onion, sesame in Alamata, fogera and Metema District respectively.

Education level of household head: Education has showed positive effect on garlic quantity sold with significance level at 5%. On average, if garlic producer gets educated, the amount of garlic supplied to the market increases by 0.19 quintal. The result further indicated that, education has improved the producing household ability to acquire new idea in relation to market information and improved production, which in turn enhanced productivity and thereby increased marketable supply of garlic. This is in line with (Taye *et al.,*2018), Ayelech (2011) who illustrated that if Onion and paddy producer gets educated, the amount of Onion and paddy supplied to the market increases, which suggests that education improves level of sales and thus affects marketable surplus.

4.6. Major Production and Marketing Constrains and Opportunities

Based on frequent rapid field survey and group discussion and key informant survey garlic production and marketing in Omo Beyam Woreda is constrained by so many factors. The major production and marketing problems and opportunities are discussed below.

4.6.1.Constraints of garlic Production

There are a number of factors that affect agricultural productivity in general and garlic production in particular in the district. Disease and insect pests, limitation of improved and high yielder varieties, shortage of irrigation water, inadequate provision of chemicals (insecticides, pesticides), limitation of irrigable land, Storage and post harvest loss, high price of input, inadequate extension services, inadequate credit provision and low soil fertility. According to the respondents survey result analysis 63.2% of the farmers were ranking disease and pest problem was most important constraint of garlic production in the district. Garlic producers were raised these problem as a major problems they faced during production and they loss huge quintals garlic produce because of disease and insect pest damages garlic yield and leads farmers to get below the expected amount of yield for long period of time.

The study result indicated that limitation of improved and high yielder varieties, shortage of irrigation water, shortage of chemicals (insecticides, pesticides), limitation of irrigable land, storage and post

harvest loss and high price of input were raised by producers and ranked as second, third, fourth, fifth, sixth and seventh next to disease and insect pests. Limitation of improved and high yielder varieties was found to be the major constraints hindering garlic production in the district by reducing productivity of this important crop. In study area there were no supply of improved seed and farmers were using local seed repetitively and it is leading productivity of garlic decrease from previous to current year. And also this problem was limiting the volume of garlic production and supplying to the market.

Shortage of irrigation water also found to be the major constraints hindering farmers next to limitation of improved and high yielder varieties because of different factors such as, lack of provision of improved production technologies including supply of relevant varieties and different irrigation technology.

Table 19 Ranking constraints of garlic production

List of constraint	Frequency	Percent	Rank
Disease and insect pest	152	100	1
Lack of improved seeds	124	81.57	2
Shortage of irrigation water	103	67.76	3
Inadequate provision of chemicals	98	64.47	4
Shortage of irrigation land	90	59.21	5
Storage and post harvest loss	85	55.92	6
High price of input	68	44.73	7
Inadequate extension contact	56	36.84	8
Inadequate credit provision	50	32.89	9
Low soil fertility	45	29.60	10

Source: Own computation from survey result, 2019.

Inadequate provision of chemicals (insecticides, pesticides) was also found to be not the minor problem of garlic production. This constraint reduces productivity of garlic and guiding farmers to earn less than national, regional, zonal and district standard. Next to this limitation of irrigable land found to be a major problem of garlic production and ranked next to shortage of chemicals. Especially youth aged farmers were raised this problem than old aged farmers and shortage of irrigable land is a serious problem which needs a great attention from concerned organization.

Storage and post-harvest management is still seen as a challenge to the garlic farmers in the surveyed areas. However, this problem is still not very visible considering the high value of the crop and the existing demand. Farmers who store their produce in their houses take different measures to increase the shelf-life of garlic including hanging the garlic closer to the roofs and subjecting them to some smoke. Next to this constraint high price of input also rose by farmers as major problems and needs serious corrections to enhance productivity of garlic. In the study area high price of input is leading farmers to produces small amount of garlic because of the price of fertilizer, herbicides, pesticide, insecticide, wages, and seed were increasing from year to year.

Inadequate extension service was also limiting farmers to produce garlic in large quantity for both family consumption and supplying for the market and ranked eight next to high price of input. It is obvious that provision of extension service has a significant role in increasing productivity of this important crop to sustain food security and increase amount of garlic supplied to market. But in study area the concerned offices were not functioning well as expected and there were problem of good governance which is leading in limiting garlic production in the district.

Inadequate credit service was also found to be a major problem of garlic production and ranked next to inadequate extension service. So farmers were raised problem of credit provision because of concerned organization were not providing enough credit services for farmers and the way they provides also needs serious correction because of farmer were limited from using credit by different collateral problem and fear of repaying the credited money with interest rates. Low fertility of soil were also not seen as a minor problem because of it is highly reducing productivity of garlic from year to year and asking farmers to incur much expense for production. This problem was occurred due to degradation of land because of farmers were ploughing there land continuously without shifting cultivation.

4.6.2 Opportunities of garlic production

The favorable agro-ecology of the area to produce garlic is a good opportunity to boost production and increase demand in the area. There are improved garlic varieties released by research institutes which have by far high yielding potential than the local once. Hence there is opportunity to have these varieties and increase the productivity of garlic.

The interest of farmers in improved seed varieties, the availability of market for the garlic produce, the diverse use value of the crop; expansion of urbanization; and availability of human resource and

knowledge in the improvement and development of the crop are some of the major opportunities available for the crop improvement and expansion of its production in the study area.

4.6.3. Constraints of garlic marketing

There were a number of factors that affect marketing of garlic in the district. Price fluctuations, absence of standard measurement, inaccessibility of infrastructure, weak linkage between farmers, existence of unlicensed trades, shortage of capitals, mistrust of farmers with garlic traders and lack of market information. The survey result indicates that Price fluctuation was found to be a major constraint hindering garlic marketing and ranked first in study area. The price of garlic was also highly fluctuating and unstable that creates uncertainty among producers to produce more (table 20).

Absence of standard measurements, inaccessibility of infrastructure, weak linkage between farmers and traders, existence of unlicensed traders, shortage of capitals, mistrust of farmers by buyers and lack of market information were constraints of market and ranked second, third, fourth, fifth, sixth, seventh and eight respectively. Low bargaining power also found to be the second constraints of garlic marketing in the district and hindering farmers to earn minimum income from sale of their produce and small contribution of enhancing food security and reducing the amount of garlic supplied to the market in study area.

The absence of standards in measurement is also the major problems especially in rural areas has an adverse effect to provide market information about the price and quality of produce and hence leads to market inefficiency. There were no identified and applied quality standards but traders and producers traditionally identify quality from their experience.

Infrastructure factors Such as rural roads inaccessibility, high transportation cost and lack of means of information communication for efficient flow of goods unsuitable transportation facilities and market information and lack of coordination among producer and traders are the most limiting factors. Most of the rural area is not accessible by vehicle. The products are transported to the road side by donkeys or by people. This requires longer time to reach the market and affects the quality of the products.

Existence of unlicensed traders that do not pay tax charge competitive price and discourage licensed traders. Some licensed traders were forced to return their license due to unfair and prohibited trade practices by the unlicensed traders that purchase relatively at a higher price and sale at a lower price than licensed traders because they do not pay tax. Shortage of capital was also a critical problem for traders.

Retailers 90% source of capital was own capital while others use credit and share capital. The average capital of traders was 17,277 Birr ranging from 4,000-250,000 Birr.

Table 20 Ranking constraints of garlic marketing

Constraints listed	Frequency	Percent	Rank
price fluctuation	112	73.68	1
Absence of standard measurements	96	63.16	2
Inaccessibility of infrastructure	85	55.92	3
Weak linkage b/n farmer and traders	73	48.03	4
Existence of unlicensed traders	65	42.76	5
Shortage of capitals	41	26.97	6
Mistrust of farmers by traders	39	25.65	7
Lack of market information	32	23.02	8

Source: Own computation from survey result, 2019.

Although, almost all producers had access to market information, the quality of market information and timeliness was not uniform. The information was delivered untimely and was not accessed equally among producers. Most farmers obtained market information on the local market from their neighbors, friends and Development Agents. However, the information was not uniformly distributed because there is no well organized institution that provides information to producers consistently.

4.6.4. Opportunities of garlic marketing

Despite the considerable constraints listed above, there are many opportunities for the garlic market in the district. The potential marketing opportunities of the area were urbanization and existences of high demand in the district the major opportunities for garlic marketing in the district. Obviously the increased demand would be followed by better farm price for producers. As a result farmers will have an incentive to expand their output. Furthermore, the rising population number around Jimma town is creating additional demand for agricultural commodities like garlic. Consequently, this contributes for commercialization of rural economy and creates many off-farm jobs opportunities. Furthermore, provision of infrastructure facilities like telecommunication, road and financial institutions (Micro Finance) supports the marketing activities in the study area were creating good opportunity for garlic marketing.

Table 21 SWOT summary analysis

Strengths	Weaknesses
• Garlic is profitable • Input supplier selling fertilizer at farmstead by cooperatives • Farmers skill in preparation of own seedlings	• Weak participation of women in the market chain development • Capital constraints • Poor seed quality • Shortage of irrigation water • Inadequate use of fertilizer • Weak collaboration among actors
Opportunities	Threats
• Favorable agro ecology of the area for garlic production and Market price of garlic • Availability of improved garlic varieties released from Bishoftu research institutes • Availability of infrastructure like mobile phone • Availability of farmer cooperatives	• Infestation of insect-pest & other epidemic disease • Changing weather patterns (climate change) • Decrease in soil fertility due to improper use of land management

Source: Own analysis

The SWOT analysis was conducted to capture internal and external factors that affect the business environment and to design strategies and forward applied recommendation to address the internal and external challenges and constraints encountered producers in the garlic market chain at Omo Beyam district.

Internal strengths and weaknesses as well as external opportunities and threats were identified and analyzed based on SWOT findings. Internal weaknesses include capital constraints, poor seed quality, pest and disease problems, and shortage of irrigation water and weak collaboration among actors and weak participation of women in the market chain development. The main identified opportunities are the favorable agro-ecology of the area, availability of improved garlic varieties released by research institutes, farmers' cooperatives, infrastructure availability and geographical location while the threats identified are changing weather and decrease in soil fertility.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary

This study has analyzed garlic production and market chain in OmoBeyam Woreda, Jimma Zone of Oromia Region. For this study, a total of 202 respondents (152 producers, 30 traders and 20 consumers) were interviewed using structured and semi-structured questionnaires. Rapid market appraisal with focus group discussion and key informant interview was also conducted. Secondary data on basic agricultural activities and population was also collected from different stakeholders and CSA. Descriptive and econometric methods of data analysis were used to analyze the data by deploying SPSS software.The findings of this study are summarized as follows.

Out of 152 total households heads interviewed 94.73% were male headed while 5.27% were female headed households. The results revealed that 76.4% of sampled households had education (read and write) while 23.6% of the sampled household heads didn't have formal education. The survey revealed that the mean land size of sampled households was 2.35 hectares and the mean land size allocated for garlic was 0.14 hectares.

The major actors involved in garlic market chain include producers, rural assemblers, wholesalers, and retailers. Most producers sell their products to the traders while some of them sale for consumers. However, it is also found that wholesalers, retailers and assemblers directly purchase the garlic from the farmers. The producers" position in price negotiation and product quality definition is not good in the study area.

Farmers in the Woreda do not have any distinct/unique standard characteristics to identify the quality of garlic. They usually identify quality of garlic using a mix of attributes like color, pest damage, size and shape, odor and foreign matter. 40% of sampled farmers store garlic for different purpose such as expecting future increase in price (55%), low price during harvest, and for consumption and seeds. Farmers on the average store garlic for 142 days with a minimum of 30 days and maximum of 365 days.

Only 48% of producers used credit at an interest rate of 12.5% from OCSI. The main objectives of the credit were to purchase fertilizer (63%) and use for animal production and purchase industrial goods (25%). The amount of credit ranges from 1500-3000 birr for a production year. 94% of sampled households had extension contact with development agents in relation to garlic production. Almost all

sampled farmers had access to market information from different sources but it is not uniform and continuous. According to the survey result, 54% of the sampled farmers use pack animals to transport the product, 25% of farmers use car,14% use men and pack animals. The major markets that farmers use to supply their products were Nada.

The overall garlic market chains are constrained by a number of factors which hinder the development of garlic production and market chain. At farm level, the major production constraints are shortage of good quality seed, diseases and pest attacks, high cost of inputs, lack of availability of adequate pesticides/herbicides, reduction of irrigation water, low irrigation land, limited knowledge on the proper plantation, harvesting and post- harvest handling activities, lack of storage, and inadequate credit service. At marketing/trading stage, price fluctuation, poor road and transport facility, price setting problem, poor market information, product quality problem, presence of unlicensed traders, lack of product standard and perishability of the product as the major problems of garlic marketing.

Hence the structure of the garlic market was somewhat competitive. Except capital, price fluctuation and market information, there were no entry and exit barrier rules and regulations in garlic trade. The sources of market information for producers were friends and neighbors, and traders through telephone. Producers selling price was determined through negotiation and the market (34%) with traders based on the current market demand and supply and 15.78% based on local assembler and buyers interest. During buying all traders make a price difference for quality based on their experience to identify the quality of the product. The survey result indicates that 63% of the respondent's sources of information were from personal observation, friends and other trades through telephone.

About seven different garlic market channels have been identified with each channels having different marketing margin. The total gross marketing margin (TGMM) is highest in the channel IV that involves producers, local assembler, wholesalers, retailers and consumers which is about 31.43 and lowest (12.73) in channel II where producer, retailer and consumers were participating. Retailers and wholesalers have got the highest gross marketing margin where as rural assemblers have got the lowest margin. The profitability of garlic production was calculated by taking the average total income and expenses of all the sample producers' in the production year. Of all costs seed cost was the highest and transportation cost was the lowest.

Producers earned a gross margin of 160,641.36 Birr/ha. Therefore, garlic production in that particular period was profitable to producers. All producers supply the product to the market during the year. The average amount of garlic supplied to market by each producer was 5.56 quintal with a minimum amount of 0.5 quintal and maximum amount of 24 quintals.

The variables that influenced the marketable supply positively as expected were experience of garlic production, total land size of respondent, distance to nearest market of household, extension service, education status of household and number of oxen owned. Among the significant variables numbers of oxen owned and extension contact were highly significant at less than 1% significant level.

5.2. Conclusion

In this study, the production and marketing structure and problems of the garlic in OmoBeyam District were examined. The results showed that garlic trade**is** somewhat competitive,the concentration ratio (CR4) of the four largest traders for garlic is found to be 36.37 percent. Therefore, according to (Kohls&Uhl, 1985), garlic market is characterized by weak oligopoly market structure which is relatively less concentrated traders/ or suppliers/ or sellers indicating that the market structure is a relatively a competitive one.

In terms of market transparency 63%, 22% and 17% of the sample garlic producers got price information through personal observation, friends and telephone, and traders respectively.Analysis of market conduct was analyzed based on traders price setting, selling and purchasing strategy. Result indicates that 43% of purchasing price was set by central market, 27% negotiation, 20% was set by demand and supply and 6 % was set by the buyers. Market performance was analyzed based on the marketing costs and margins. The results indicated that Transport represented by far the largest component of marketing costs, accounting for more than 50% of the total market cost.

The major determinants of the quantity supply of garlic were analyzed usingmultiple linear regression model**.** Experience , numbers of oxen owned, education , total land owned , distance to nearest market and frequency of extension contact is the most important and significant variable influencing the volume of garlic market supply.The study result indicated that limitation of improved and high yielder varieties, shortage of irrigation water, shortage of chemicals (insecticides, pesticides), limitation of irrigable land, storage and post harvest loss and high price of input were raised by producers and ranked as second, third, fourth, fifth, sixth and seventh next to disease and insect pests.

Generally diversifying land uses, using inputs, getting training, making extension contact with agents, improved seed and chemicals (pesticides and insecticides) were used to increase productivity of garlic which contributes for surplus increment and leads farmers to choose appropriate channel. The financial sector can fund the production of garlic products whilst the government can provide subsidized inputs to the small holder farmer. This multispectral approach will definitely yield the required result of increasing income for the smallholder farmer. The government also incorporates technology in the curriculum of institutions of higher learning and research institutes. The private sector can also contract the smallholder farmer by equipping them with the inputs and credit and thus later buy the products to distribute it for the area where this product has shortage.

5.3. Recommendations

The major factors identified as a problem in garlic market chain analysis were related to both garlic production and marketing. Thus, appropriate interventions are required to alleviate these problems. To solve the production and marketing problems and increase production and marketable supply of garlic, the following recommendations are forwarded:

Continuous training and education in garlic production:The increase in garlic production technique has a significant effect to increase production then by marketed surplus. Hence, continuous education and training that would change the production skill of producers is very important to change the attitude of farmers. Hence, concerned stakeholders need to provide continuous education and training in production and marketing of garlic.

Scaling up irrigation facilities: In order to overcome irrigation water shortage government should give attention to scaled up modern irrigation water and other water sources to expand garlic production and productivity. In the study area the irrigation practices and water management of the farmers are mostly based on instinctive knowledge, with no scientific support from the extension system. So that improving farmers" skill, knowledge and experience in use of the irrigation water efficiency will minimize problem of water shortage and create the capacity to expand production and increase the supply during high price seasons. Therefore, concerned bodies should give attention in introduction of various irrigation water techniques and agronomic practices.

Establishment of storage facilities: Garlic storage facilities are poor in both rural and urban areas. Garlic being bulky and perishable, farmers and traders face storage loss and quality deterioration. So that

constructing modern storage and giving training on post harvest management by concerned body should solve this problems.

Strengthening credit institutions: Access to credit for both production and marketing has considerably affected marketable supply. Hence, it is important to strengthen credit institutions in terms of spatial coverage, amount of credit and timely provision for both farmers and traders. Solving the group collateral procedure and collateral problems of farmers and traders to get a credit from different financial institutions is very important.

Strengthen the interaction between farmers and other actors:The district trade office should have to strengthen the interaction (governance system) between traders and farmers. In the district there was no proper upgrading of garlic market chain. So such problems must get considerations by integration of NGO, BoDARD, primary cooperatives, private institutions and farmer unions, Universities, research institutes and other marketing organizations to realize the benefit of the poor farmers along garlic market chain.

Improve on the Existing Garlic Variety: In order to produce the quality of garlic that is required by the market, it is important to start with the seed. A seed multiplication program is necessary for quicker results to be realized. Therefore, governmental and non-governmental organizations should intervene in multiplying and introducing nationally released varieties of improved garlic seed and proper application of fertilizer, and promote, train and demonstrate improved practices to increase garlic production.

Provision of adequate trading system: The trading problem identified during the study period were presence of unlicensed and seasonal traders, no standard grading of garlic for market and unspecified market site were common. Thus, awareness creation through training on garlic business development and smoothing should be done by responsible organizations (Government). In addition, production and supply, processing and promoting contract marketing of garlic, strengthening the integration between producers and buyers, promoting standardized grading and sorting of garlic, establishing commodity specific and standardized market center should implemented.

Improving rural infrastructure: The distance to the market places has also become important determinants of farmers in the marketing of garlic crops. As a result, improving rural infrastructure in developing market infrastructure in the form of establishing produce collection points across rural areas

would assist poor farmers for faster delivery of farm produces especially perishable commodities of vegetables crops.

Total land allocated have also a positive influence on market supplied of garlic. So concerned bodies should focus on intensification of land to compensate through cash crop production and crop selection is the dominant strategies pursued by farming communities by using irrigation water wisely.

 Finally, further studies on the production and market chain are recommended to identify best upgrading practices agreed by different chain actors so that a well-organized regional and national garlic production and marketing can be implemented.

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7. APPENDIXS

AppendixTable1 Credit use of farmers household head

Description	Frequency	Percent	Cumulative Percent
Farmers that use credit	73	48	48
Farmers not use credit	79	52	100
Total	152	100	

AppendixTable2 Transportation means to take garlic to market

Discription	Frequency	Percent
Pack animals	82	53.94
Cars	38	25
Men and pack animals	22	14.47
Pack animals and car	10	6.57
Total	152	100

Appendix Table 3Trader that pay and not pay tax

Description	Frequency	Percent
tader pay tax	17	56.7
not pay tax	13	43.3
Total	30	100

Appendix Table 4Traders Price setting of garlic

Description	Frequency	Percent
central market	13	43.3
negotiation	8	26.7
demand and supply	6	20.0
buyer	2	6.7
saler	1	3.3
Total	30	100.0

Appendix Table 5 Test for multicollinearity of explanatory variables

Variable	VIF	1/VIF
Alforce	3.76	0.266199
Famsize	3.25	0.308057
EXC	2.14	0.467202
OXN	2.04	0.490876
Tlanown	1.87	0.535733
LPRICE	1.65	0.604637
Educ	1.53	0.652742
Exper	1.33	0.751262
DNMK	1.11	0.898312
Mean VIF	2.08	

AppendixTable6 Factors affecting volume of garlic supply

Variables	Coefficients	Rabust std. Error	T-Value	P-Value
SEX	0.5883641	0.6244543	0.94	0.348
EXPER	0.0547532*	0.0327131	1.67	0.096
TLANOWN	0.4012152**	0.2003395	2.00	0.047
ALFORCE	0.0128875	0.1333167	0.10	0.923
EXC	0.1206031***	0.0345852	3.49	0.001
EDUC	0.1970348**	0.0782371	2.52	0.013
HHSIZE	-0.0825493	0.0666091	-1.24	0.217
L PRICE	0.0005055	0.0004408	1.15	0.253
DNMK	-0.035236*	0.0211395	-1.67	0.098
ACMINFOR	0.1255254	0.361389	0.35	0.729
CREDIT	-0.4898313	0.3981441	-1.23	0.221
OXN	1.571908***	0.2974876	5.28	0.000
_cons	-3.399556	1.941005	-1.75	0.082

Number of Observation	152
F (12,139)	28.65
Prob>F	0.0000
Adj. R Squeres	80.73

Appendix Table 7 Ranking constraints of garlic production

N	challenge	1		2		3		4		5		6		7		8		9		10		Rank
1	Disease and insect pest	96	0.63	23	0.15	17	0.11	9	0.06	7	0.05		0.00		0.00		0.00		0.00		0.00	1
2	Lack of improved seeds	15	0.10	72	0.47	14	0.09	28	0.18	15	0.10		0.00		0.00		0.00		0.00		0.00	2
3	Shortage of irrigation water	8	0.05	17	0.11	67	0.44	22	0.14	12	0.08	7	0.05	3	0.02		0.00		0.00		0.00	3
4	Inadequete provision of chemicals	11	0.07	14	0.09	16	0.11	63	0.41	16	0.11	5	0.03	6	0.04	7	0.05		0.00		0.00	4
5	Storage and post harves loss	10	0.07	6	0.04	10	0.07	13	0.09	54	0.36	12	0.08	14	0.09		0.00	7	0.05		0.00	6
6	High price of input	7	0.05	8	0.05	11	0.07	6	0.04	11	0.07	47	0.31	11	0.07	8	0.05	5	0.03		0.00	7
7	Inadequete extension contact	5	0.03	5	0.03	9	0.06	6	0.04	11	0.07	17	0.11	42	0.28	11	0.07	2	0.01	2	0.01	8
8	Inadequete credit provision			7	0.05	8	0.05	5	0.03	9	0.06	10	0.07	5	0.03	39	0.26	15	0.10	14	0.09	9
9	Shortage of irrigation land									8	0.05	9	0.06	5	0.03	10	0.07	58	0.38	8	0.05	5
10	Low soil fertility									5		6		10		5		19		36	0.24	10
		152		152		152		152		148		113		96		80		106		60		

Appendix 8 Survey Questionnaires

I. General information

District: OmoBeyam
Questionnaire number: _____
Name of Enumerator: _____
Telephone: _____
Date _____/_____ /2011 E.C
OmoBeyam District   Kebele_____
Name of respondent/optional _____
1. Age____
2. Sex of household head: 1=Male____ 2=Female_____
3. Marital status 1= Single ____2 = Married ____3 = Widowed____ 4 = Divorce_____
4. Household size: male _____ female _____Total_____
    4.1. Number of family member of age less than 14: Male _____Female ____ Total _____
    4.2. Number of family member of age 15< x > 65: Male _____Female _____ Total _____
    4.3. Number of family member of age greater than 65: Male _____Female _____ Total ____
5. Education level of household head: 1. Illiterate   2. Basic education   3. _____ grade.

II. Production related information

1. Total land holding suitable for different activities ----------*h/t (timad)*
2. Farming experience of household head: _____ years
3. Total land allocated for cash crops(like chat, coffee, and like)_____ht*(timad)*
4. Land allocated for garlic _____ht*(timad)*
5. Total land allocated for vegetable production _____ht*(timad)*
6. Total land allocated for production of food crops _____ht*(timad)*
7. Total land allocated for plantation like(mango,avocado, bahirzaf etc)_____ht*(timad)*
8. Total land allocated for grazing if any _____ht*(timad)*
9. Irrigated land _____ Hectare, _____ht(timad)
10. If others specify _____

(Note: 1 ha = 4 Fecasa(timad)/kert or 1 timad/kert= 0.25 ha)

Major crops and livestock produced

   1. Did you grown crops?   1. Yes   2. No
    1.1. If yes, what are the crops you grown in Meher and Belg in 2010 E.C.?

Table 1.Types of crops you grown, their main purpose and annual income including their by-products in 2010 E.C.

Crop type	Area planted (Hectare)	Total production (Qt)	Total sold (Qt)	Selling price/Kg	Total income (Birr)	Purpose*
Teff						
Sorghum						
Maize						
Barley						
Wheat						
Peas						
"Enset"(Kocho)						
Garlic						
Onion						
Tomato						
Potato						
Others						
Total						

2. Did you own livestock? 1. Yes   2. No
2.1. If yes, what is the total number of livestock you own in 2010 E.C.?

No.	Livestock type	Total number	Total number sold	Total income (Birr)	Purpose*
1	Oxen				
2	Cows				
3	Calves				
4	Heifers				
5	Goats				
6	Sheep				
7	Horse				
8	Mule				

		Total yield	Total number sold	Total income (Birr)	Purpose*
9	Donkey				
10	Poultry				
	Grand total				
	Livestock products	Total yield	Total number sold	Total income (Birr)	Purpose*
1	Milk (lit)				
2	Butter (kg)				
3	Hide & skin				
4	Egg				
5	Others				
	Total				

III. **Market related information**

1. Did you sell garlic in 2010/11 E.C production season? 1. Yes 2. No
2. If your answer for Q*1 is yes, how did you sale your produce in2010/11 E.C? 1=Direct to the garlic suppliers 2. Through cooperative 3. Direct to consumer 4. Direct to rural collector (sebsabi) 5. Other (specify) _____
3. What is the distance from home to garlic market? in Km_____ in hrs_____
4. Who sets the selling price of garlic? 1. Producer 2. Buyer 3. Negotiated 4. Personal observation 5. Others (specify) _____
5. Are you satisfied with the price settled in the year 2010/11? 1. Yes 2. No
6. Did you know the nearby market price before you transport your garlic to market? 1 =Yes   2 = No
7. If your answer for Q*6 is yes, what is the source of such information? 1. Other producers 2. Media 3. if others specify_____
8. Have you planned for how much to supply to the market in 2010/11 production season? 1. Yes   2. No
9. If your answer for Q*8 is yes, what percent of your total production you planned to supply in 2010/11 production season? _____
10. Have you achieved your plan during the same season? 1.yes2. no

    If you failed to achieve your supply plan what are those factors affected your plan? 1. Market condition

    2. Natural condition   3.Political case   4.Personal case   5. Others

    specify_____

11. Did you think the price you are selling is fair? 1. Yes   2. No
12. If your answer for Q*11 is yes what would be your reaction to supply your garlic produce to the concerned market? _____
13. How much produced amount you sell in 2010/11?
i. Quantity consumed (kg) _____
ii. Quantity sold (kg) _____
iii. Total Quantity Produced (kg)_____

iv. Average selling price (Birr/kg in 2010/11)_____

14. Have you your own transportation facility? 1. Yes 2. No

If your answer is yes for the question above, what type of transportation facility you own? 1.Traditional 2.Modern 3. Both

15. How did you transport your garlic produce from home to market places? 1. Head carrying 2. Own Pack animal 3.Animal cart 4. Public transport 5. Private vehicle 6.Other (specify) _____

16. Who are the major garlic market chain actors? 1. Private trader 2.cooperatives 3. Consumer 4. Rural collectors 5.Others (specify_____

17. To sell your garlic products, which market channel do you use? (Multiple responses is possible) 1. local/private traders 2. Cooperatives 3. Direct sell to end consumers 4. Rural collectors 5. Other (Specify_____

Market information

1. Have you any access to market information? 1. yes 2. no

2. If your answer for Q*1 is yes, what kind of market information you are accessed for? 1. Price 2. Supply 3. Demand 4. Completion 5. Others specify_____

3. What tool you use to have such market information? 1. Radio 2.Phone 3.TV 4. Others specify _____

4. Among the above information tools, for which one you have an access (which one you are utilizing) (multiple response is possible)? 1. Radio 2. Phone 3. Both radio and phone 4. TV 5. All 6. Other specify_____

5. Do you think market information has an effect on supply of garlic? 1.yes 2.no

Marketing cost

Table3 garlic marketing cost

No	Marketing cost	Unit	Cost per Unit	Amount used	Total Cost
1	Packing				
2	Loading and unloading				
3	Transportation				
4	Storing				
5	Commission or brokerage fee				
6	If others specify				
	Total				

Table4. Garlic production input cost related information

No	Inputs	Input supplier	Units	Cost per unit	Amount used in 2010/11 prod season	Total cost
1	Seedling					

2	Farm Equipment						
3	Irrigation						
4	Labor	Family labor					
		Hired labor					
5	Chemical pesticide/insecticides						
6	If others specify						
	Total						

Grading
1. Do you grade your garlic? 1.yes   2.no
2. If you grade your garlic what grading criteria you use? 1. Size 2. Color   3. Variety   4.Matutity 5. quality6. others specify_____

Storage
1. Do you store your garlic? 1. yes 2. No
2. If yes how long did you store? _____
3. Describe your storage facility 1. Own 2.rented

   If your storage facility is rented, what is basis of payment? 1. Monthly 2. Annually

4. How much did you pay for storage per year? _____

MOTOR PUMP OWNERSHIP

1. Do you have your own motor pump? 1. Yes   2. No
2. If no what type of irrigation you used? 1. Traditional 2. Modern irrigation 3. Rent of motor pump 4. If others specify_____
3. If renting, rental cost per month? _____ birr/month

Credit service

1. Did you have access to credit in the year 2010/11 E.C?   1. Yes   2. No

 2. Have you received credit in 2010/11E.C for garlic production purpose? 1. Yes 2. No

 3. If no to question 2 what are the reasons? 1. Lack of collateral   2.Unfavorable bureaucracy   3. Don't

   need/want to take credit 4. Others (specify) _____

 4. If yes, how much did you take for garlic production purpose? _____Birr

 5. For what purpose did you take the credit in relation to garlic production?

1.To purchase fertilizer for garlic 2.To rent in land to extend garlic production 3. To purchase seedlings of

   garlic 4. To purchase transporting animals 5. Others _____

 6. From whom did you get credit for garlic production? (Multiple responses are possible)   1.

   Friends 2. Bank 3.Microfinance institution 4.Traders 5.NGO 6. cooperatives7. Others (specify)

   _____

Extension services

1) Did you have extension contact in relation to garlic production in the 2010 cropping season?   1. Yes

2. No

2) If your answer for Q.1 is No, why? (Multiple responses are possible)

1. No service provider nearby   2 . Possessed the required information 3 . Availability of contact farmers

4. Do not have time to get the service 5. Others_____

3). If yes, how often the extension agent contacted you per week? _____

4).What was the extension advices specifically on garlic production? (Multiple responses are possible) 1.

Fertilizer (compost) applications 2.Harvesting 3. Marketing of garlic   4.Post-harvest handling   5.

Others (specify) _____

5. Who provides the advisory service? (Multiple responses are possible) 1. Development agents 2.NGOs

3.Woreda OARD experts   4. Research centers   5. Neighbors   and friends   6.Others (specify)

_____

Off-farm/Non -farm activities and their incomes

1. Did you participate in non-farm or off-farm activities to generate income? 1.Yes 2.No

2. If your answer for Q1 is yes, what are they?

Table5. Nonfarm activities and their income

No	Off farm/nonfarm activities except garlic production	Yes=1, no=2	If yes any monthly income in birr
1	Petty trade		
2	Salary		
3	Pension		
4	Remittance		
5	Charcoal production		
6	Income from construction work		
7	If others specify		
	Total		

3. What percent of your house hold expenditure was covered by these incomes generating activities? _____ describe in terms of local units.

4. What is the estimated amount of income you obtain from non-farm or off-farm activities annually? _____ Birr.

5. Is your family labor adequate for farm activities? 1.Yes 2.No

6) If no, total amount of hired labor for the production year 2010/11:_____

Challenges and opportunities related with garlic production and marketing

Table6. Challenges and Opportunities related with garlic Production

No	Production related		Marketing related	
	Challenge	Opportunities	Challenge	Opportunities
1				
2				
3				
4				
5				
etc				

QUESTIONNAIRE DEVELOPED FOR TRADER

Checklist for traders (Wholesalers, local collectors, retailers)

I Area information

1.1 Name of Market_____

1.2 .Distance from residence to the market_____Km (walking time in minutes)_____

II Demographic Characteristics

1.1 Name of traders: _____Tel:_____

1.2 Age: _____

1.3 Sex: 1. Male   2. Female

1.4 Marital status: 1. Married   2. Single 3. Widowed 4. Divorced

1.5 Country _____ Region _____ District _____ Kebele _____

1.6 Family Size: Male _____Female _____Total _____

1.7 Type of traders: 1. Wholesaler 2. Retailer 3. Assembler 4. Processor

1.8 Education level of respondent_____

1.9 Position of respondent on the business? 1. Owner 2. Employed manager 3. Relative of business owner 4. Spouse of owner 5. Other specify _____

1.10   How long have you been operating the business? _____

1.11 Did you trade alone or in partnership? 1. Partnership 2. Alone 3. In other

forms(specify)_____

1.12 If in partnership how many are you in number? _____

1.13 Total Number of people employed in your business? 1. Male_____2. Female_____

Total_____

III Capitals
Financial capital
1. What was the amount of initial working capital when you start this business? _____Birr
2. What was the source of the working capital in 2010/11? 1 own 2 loan 3 gift 4 Share 5 others
   (specify)_____
3. If it was loan, from whom did you borrow? 1 Relative/family 2 other traders 3 private money lenders
   4 micro finance institution 5 NGO 6 Bank 7 Friends 8 other, (specify) _____
4. How much was the rate of interest? _____Birr for formal and _____birr for informal
5. What was the reason behind the loan? 1 to build store 2 to purchase a car 3 for working capital 4
   other (specify)_____
6. How was the repayment schedule? 1 Monthly 2 Semi-annually 3 other (specify)

   _____

IV. Purchasing and selling activities

1. Buying

a. What types of garlicdo you purchase? 1. Fresh 2. Dry 3. Mixed

b. Who are the major suppliers of garlic for your purchasing center? 1. Farmers 2. Retailers 3.

Brokers 4. Assemblers 5. Other wholesalers 6. Others(Specify)_____

c. If farmers are the major suppliers where the transaction does takes place 1. Farm gate 2. Village

market 3. District market 4. Others(Specify)_____

d. If farmer takes garlic to your trading center do you help them by paying transportation cost? 1. Yes

2. No

e. If yes how do you help them? 1. By sending track to them 2. Sharing transportation cost 3. By

covering the whole part of transportation 4. Others(specify)_____

f. Is there fluctuation in supply of product to your trading center? 1. Yes 2. No

g. If yes Fill the below table

No	Major Factors(Causes of supply fluctuation)	Rank (1. High Priority, 2. Low priority)
1	Price fluctuations	
2	Variation in production year	
3	Weather fluctuation	
4	Others	

h. Average buying prices of garlic during 2010/2011 production season per 100kg (Average of Bona and Ganna prices) _____

i. Quality parameters considered during buying the produce_____

j.   Do you transfer information on quality considerations for suppliers? 1. Yes   2. No

k.   Is there longstanding r/ship between traders and suppliers (farmers)? 1. Yes   2. No

l.   Do you provide premium price for your permanent suppliers?   1. Yes   2. No

m. If yes how much (What percent of price)? _____

n.   If Q12. if yes for what purpose you pay premium price for suppliers?_____

o.   How many quintals or Kg of garlic you buy in average during high supply season and low supply season? 1. in high season_____ 2. In low season_____

2.   Selling

2.1.To whom do you resell garlic product? _____

2.2.Where do you resell garlic products (place)? _____

2.3.At what average price you resell? _____

2.4 Do you have longstanding customers for reselling garlic they bought? 1. Yes   2. No

2.5. Do you sell on credit?   1. Yes   2. No

2.6.If Q5 is Yes for how long time you wait the payment?_____

2.7.What are the requirements of buyers in terms of quality?_____

2.8.How do you consider the availability of garlic/ volume of marketed of garlic in the market you operated? (Increased, Decreased, The same)_____and reason for such trend?

_____

2.9.Who is a price maker in the market you resell? _____

2.10.   Factors affecting the price of products and services in the area_____

2.11.   Do traders (of garlic) usually have any legally binding contract agreement with their suppliers and buyers? 1. Yes   2. No

2.12.   If yes, is there any problem with enforcement of contracts?   1. Yes   2.No

2.13.   Which market regulations affect your business? _____

2.14.   Major problems in selling your products? _____

3. Transportations

3.1 How do you transport garlic? A. By family labor   B. By packing animal C. By vehicle

3.2 If traders are transporting using Isuzu trucks, how many quintals can they transport in one load? _____quintals

3.3 What are the major problems in transporting? _____

4. Cost

4.1. Indicate all costs you incur for marketing the product including taxes, transportation, labor, packaging, telecommunication etc

Cost of Marketing	Cost per unit in birr	Remark
Packing cost		
Loading/unloading cost		
Transportation cost		
Storage cost		
License and tax		
Telephone Cost		
Other costs(specify)		

5. Market Information

5.1 How do you get market information (source)? _____

5.2 To whom do they transfer this information? _____

5.3 How often do traders get market information? _____

6. Credit

6.1.How often working capital is a problem for traders? _____

6.2.Traders cash sources (own, credit from bank, credit from informal market)? _____

6.3.Any problem related to credit? _____

7. Storage

7.1.Do you own your own storage? 1. Yes 2. No

7.2.If yes capacity of your storage? _____quintal at a time

7.3.If 'no' where do you store? 1. Renting 2. Friends store 3. Others (specify)_____

7.4.If renting, rental cost per month? _____ birr/month

7.5.For how many months do you store products you bought? _____months

8. Value addition

8.1.Do you add value on garlic product? **1**. Yes **2**. No

8.2.If your answer for No1Yes what types of practices you under take? fill the below table

Activities	Tick it
Transporting	

Cleaning & grading	
Storing	
Packing	
Loading/unloading	
Others(specify)	

8.3.If you store garlicwhich type of material you use?

Plastic sack	
Magazine	
Others(Specify)	

8.4.What is your motive to store garlic? 1. Expecting high price 2. For saving 3. Lack of demand 4. For consumption 5. Others(specify)_____

8.5.Value adding activities of actors (fill the below tables) **1**. Cleaning 2. Packaging 3. Storing **4.** Transporting 5. Processing 6. Loading/Unloading 7.Others

Actors	Value adding activities by each actors	Intermedia te cost	Selling price	Buying cost	Value added
Farmer trader					
Local collector					
Wholesaler					
Retailer					
Consumer price					
Cooperatives					