GARLIC VALUE CHAIN ANALYSIS IN MINGAR SHENKORA WOREDA: AMHARA REGION, ETHIOPIA

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In Partial Fulfillment of the Requirements for: Masters of Arts in Geography and Environmental Studies (specialization in Urban and Regional Development Planning)

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ABBREVIATIONS AND ACRONYMS

CSA ☞ Central Statistics Agency

DEM ☞ Digital Elevation Model

EIAR ☞ Ethiopian Institute of Agriculture

ESS ☞ Ethiopian Statistical Service

Et.al (“et alia") ☞ and others

FAO ☞ Food Agriculture Organization

FDI ☞ Foreign Direct Investment

GVCs ☞ Global Value Chains

JDC ☞ American Jewish Joint Distribution Committee

KGs / kgs☞ Kilo Grams

masl☞ meters above sea level

MSAO ☞MinjarShenkoraWoredaAdministrative Office

MSOoA☞MinjarShenkoraWoredaOffice of Agriculture

N ☞ Nitrogen

NGOs ☞ Non-Governmental Organizations

NTT ☞ New Trade Theory

P☞ Phosphorus

pH☞ Potential of Hydrogen

SNNRS ☞ Southern Nations Nationality Regional State

US ☞United States of America

VC☞Value Chains

ABSTRACT

Growing garlic is becoming an important economic activity and one of development strategies in many countries. Both methods of production and the menses of marketing are improving; as a result there is production boost; but, in Ethiopia, the figure is lagging behind the global standards. In MingarShenkoraWoreda, where garlic is grown as one of the most important commercial vegetables; production is becoming an extraordinary economic activity. This study objectively identified: factors affecting production, value chain actors', actors' relationship and their respective role, marketing channels, and the opportunities and constraints; based on descriptive type of research; qualitative and quantitative methods; primary and secondary data; thus methodologically itdeployed mixed approach. The primary data were collected from 400 sample units from a population of 1,117 households using questionnaire method; and from different stakeholders based on individual and focus group interview. The secondary data were collected from statistical abstracts from Ethiopian Statistical Service, and annual reports from MinjarShenkoraWoredaOfficeof Agriculture, and MinjarShenkoraWoreda Administration Office. Datawasdescribed and analyzed under different statistical parameters such as: mean, standard deviation, coefficient of variation, percentage, and chi-square test both manually and using SPSS. Results of the study show, production is increasing, due to high demand from the market; but productivity is declining, because of traditional farming practices, and less focus and support from the government. Moreover, results of the study also show, total production has been increasing over time, not as a result of improving productivity; but, increasing the cropping land. Thus, this research work critically recommends; focuses to modernize and transform the agricultural sector through designing and implementing new appropriate policy interventions; that encourages and benefits smallholder farmers' in one hand, and conducting more and more research works that could bring better productivity and smooth marketing environment; on the other hand.

Keywords: *Garlic, Value chain analysis, Traditional farming practices, Lack of value chain governance, and Policy interventions.*

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CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Etymologically, the word garlic derived from Old English, garlēac, meaning gar (spear) and leek, as a 'spear-shaped leek Garlic (Allium sativum); a species of bulbous flowering plant in the genusAllium;is native to Central Asia and northeastern Iran, with a history of several thousand years of human consumption and use (Kazakhstan, Kyrgyzstan, Turkmenistan, Tadzhikistan Uzbekistan and northeastern Iran), where it is still growing as wild. But, though garlic originated in areas which described aboveas center of origins, earlier in history it may probably have occurred as wild from China to India to Egypt to Ukraine (Simon, 2020; Petrovska and Cekovska, 2010).

From the center of its origin, garlic then domesticated to the Mediterranean Europe and Egypt, around 5,000 and 2000 years ago, respectively. The use of garlic for medical remedies goes back to 2700 BC; for example that time garlic was recommended for depression, but, the Sumerians were actively utilizing garlic for its medical qualities around 2600 to 2100 BC; which also believed they bring to China, and then to Japan and Korea. Probably expansion occurred in the old world first and then to the new world (Petrovska and Cekovska, 2010).Today, there are 200 species of garlic; but, the most widely distributed types of species are the bottleneck and soft neck garlic; widely grown for fresh market on a small scale for local markets, but, it is produced by few large-scale producers either for processing or fresh sales (FAO 2020 statistical year book).

Garlic is renowned throughout the world for its distinctive flavor as well as its health-giving properties. As indicated by studies around the world, garlic qualifies nutritional, health, and environmental benefits.1st; garlic contains vitamins and minerals which have both nutritional and medical properties. For example, as medically reviewed by Melissa Rifkin, it is an excellent source of vitamins such as vitamin B6 (pyridoxine) and vitamin C, and mineral such as sodium and zinc. It is also highly nutritious; but low in calories and zero in fats & sugar in its content. Furthermore, some scientific journalsasmedically reviewedby Butler and others show, garlic has a therapeutic benefits; including lower the chance of getting different types of cancers, common cold, high cholesterol, high blood pressure, alcohol-induced liver injury, and premature delivery. It is also potentially a powerful antibiotic and well trusted remedy for various epidemics such as: typhus, dysentery, cholera, influenza, and whenever an epidemic has emerged, garlic has been the first preventive and curative remedy, for it contains chemical called sulfur's glycosides (Newman, 2017).

Environmentally, garlic is easy to grow and, if grown properly, it has very few pest and disease problems in the home garden. It requires little space and can be planted in the fall after many other crops have been harvested. Garlic can be grown as a companion crop. As a companion plant, it can be grown with other crops such as: strawberries, spinach, peppers, cabbage, oats, and etc. Furthermore, garlic is one of the easiest and most simple vegetables to grow for it requires low-maintenance and quick and easy to plant (Alice, 2021).

Therefore, as far as garlic has multispectral benefits such as: nutritional, pharmacological, environmental, and economical uses; it should be grown under modern care and scientific management systems; including modern farming practices, modern farming &information technologies, and value chains.

Today, in reality, food security and market imperfections are the main constraints and top priorities of economic development in many developing countries(PawlakandKołodziejczak, 2020). Agricultural transformation including;economic diversification, increase income, and income delocalization is commonly taking place in developing countries. It is, therefore, necessary to examine what the features and mechanisms behind those transformations are, and how the agricultural transformation exerts impacts on rural and urban development and the quality of life. In developing countries, surplus labor from traditional agriculture to the modern one and then to secondary and tertiary economic activities should be transformed step by step through structural adjustment of the farm industry at first, and quickly accelerate the process to other industries. There for, for the developing countries where agriculture is the leading sector, to bring a structural adjustment, agricultural transformation from traditional pattern to modern one should be their prerequisite development strategy (FAO 2021 statistical year book).

One way of transforming the agricultural sector is a value chain; a strategy integrating production and marketing along the chain actors. A ‘value chain’ in agriculture identifies the set of actors and activities that bring a basic agricultural product from production in the field to final consumption; each stage value is added to the product. It might include: development and dissemination of plant and animal genetic material, input supply, farmer organization, farm production, post-harvest handling, processing, provision of technologies of production and handling, grading criteria and facilities, cooling and packing technologies, post-harvest local processing, industrial processing, storage, transport, finance, and feedback from markets (Bayan Et.al, 2014).

Under such realities, increasing yield of productivity and marketing are becoming the major concerns of garlic farmers. As a result, production has been increased from 2.85 million tons in

1970 to 30.75 million tons in 2021.Many countries around the world have been becoming garlic growers for commercial purpose. As a result, growing garlic is becoming an important economic development strategy. The fact that, the Chinese government designed garlic farming as a means of poverty alleviation strategy is related to this reality. Currently, garlic farmers in China have been experiencing many farming practices such as crop rotations, intercropping, and multiple cropping at the expense of labor, high yielding verities, and modern farming technologies (Kong Et.al, 2018).For example, in Eryuan County of Yunnan province, farmers boosted their income more than US$22,547per hectare, annually (Mo, 2017).

On the other hand, though Ethiopia has hugepotential natural resources, good climate and cheap labor force, the sector is not well developed. Though, production and sales of volume has been expanding over time, its lagging behind the global standards (source: based on ESS 2021 report and literature review).The low performance of garlic production can be accounted to the traditional production practices employed by smallholder farmers such as; poor application of fertilizer both in terms of rate and type, lack of better and enriched varieties in the required quality and quantity(Teshome and Durr, 2026), lack of provision of extension services and current farming technologies (Sissay, 2018), lack of market information systems, poor market linkages, low institutional support, andlack of value chain development(Bezabih and Hadera, 2007). Consequently, farmers are restricted to use garlic that is inferior in yield which is prone to most of the diseases and insects;lowand improper application of farming inputs including fertilizer and pesticides with traditional farming practices; and poor actors relationship prevails in the market that could leads to market imperfection which is not benefiting chain actors mutually, especially it brought low price for farmers.

Therefore, improving agricultural production and services through the use of infrastructure and technological development within the opportunities and constraints of its institutional environment, should be the motto for the transformation of agriculture, which is market oriented. Indeed, the main constraints for agricultural transformation in developing countries are related to their value chain gaps such as; problem of market orientation (Trienekens, 2011), lack of available technological resources, lack or absence of physical infrastructures (Porter 1990), and factor conditions called institutions and organizations (Scott 1995).

1.2. Statement of the problem

The performance of garlic production and productivity in Ethiopia is regarded as low; around 10 tons per hectare; as compared to the international standard which is greater than 18 tons per hectare (FAO 2019), greater than 27 and 20 tons per hectare in China and Egypt, respectively, even it is greater than 34and 43 tons per hectare in Uzbekistan and Kuwait (FAO, 2022). According to previous studies conducted, though Ethiopia has favorable conditions: biotic and abiotic factors that are good for garlic production, productivity is among the lowest in the world. Total production is not the required as compared to the potential to grow. According to previous studies, this low performance of garlic is related to factors such as: traditional farming practices (GetachewEt.al, 2010), declining soil fertility (Belay Et.al, 2015), absence of proper pest management practices (Tesfaye and Habtu, 1986), lack of improved varieties (Teweldebrhan, 2009), and climate change (Mahoo et al., 2013). It is also true that, out of vegetables passing through several intermediaries, little value being added before reaching the end users and the market chain is governed by wholesalers and exporters who have capital advantage over other chain actors (Abay, 2007).Furthermore, poor knowhow in product sorting, grading, packing, and traditional transportation affecting the quality in turn the marketability of the product, and it is

also constrained by lack of market information systems, poor market linkages, low institutional support, lack of value chain development to ensure participation and benefit to the smallholders (Bezabih and Hadera, 2007).

From the above information, we can conclude that the problems to the low production and productivity of garlic in Ethiopia are; traditional farming practices, absence of modern farming technologies, and lack of cooperation among chain actors. Good manifestations to such problems are farmers' lack of: supply of selective seeds, agricultural extension service and modern farming technologies, inefficient irrigation practices, and less concern from the government. Furthermore, most of the research works conducted is more focused on the production side, than marketing constraints. The relationship between chain actors as how much they are interdependent to each other and how much they are mutually benefited has not been yet detailed known. The type of governance between chain actors is probably market type; in which transactions are relatively simple, information on product specifications is easily transmitted, and producers can make products with minimal input from buyers.

Even though different studies have been conducted, still there is a gap what affects the production and marketability of garlic, significantly. The quality right from production to harvesting and throughout the entire process of marketing until it is consumed, is not standardized. Therefore, knowing the production status and its constraint in one side, and the marketing condition and the value chain actors on the other; helps stakeholders, partners and policy makers to prepare for the right interventions; it should get priority.

1.3. Objectives of the Study

1.3.1 General Objective of the study

The general objective of this study is to assess the value chain trends in the production and consumption of garlic in MinjarShenkoraWoreda.

1.3.2 Specific Objectives of the Study

- ☑ To investigate factors affecting productivity, production, and price of garlic in the study area,
- ☑ To examine the garlic value chain actors, and their respective role in the study area,
- ☑ To assess the value addition and the marketing situation of garlic at different steps of marketing channels in the study area,
- ☑ To identify the opportunities and constraints of garlic production, value chain, and the remedies required to modernize the garlic sector.

1.4. Research Questions

This research tried to answer the following questions:

- ☑ What factors are affecting the productivity, production, and price of garlic in the study area?
- ☑ Who are the main value chain actors, and what is their respective role along the marketing channel in the study area?
- ☑ What are the marketing channels and market destinations of the study area?

- ☑ What are the value additions and what looks like the marketing situation of garlic in the study area? and;
- ☑ What are the potential opportunities and constraints of garlic production, value chain, and the strategies required to modernize the garlic sector?

1.5. Significance of the Study

This study has the following importance. First, the findings of this research have a contribution to provide the necessary information for decision makers to take appropriate actions. Second, though the study focused on garlic, it has also a contribution to share the experience gained to the horticulture industry. Third, the study has the impact of motivating other researchers conducting similar research development.

1.6. Scope of the Study

This research has the following three delimitations: geographic, thematic, and temporal. Geographically, the study was conducted inMinjarShenkoraWoreda, found in the Amhara Regional State; which alone shares 15.84% national production in 2021 production season and many smallholder farmers have been engaged in garlic farming. Thematically, as crops are potential sources of food, income and health, the horticulture industry is selected 1st and finally, garlic after multi stages of considerations. Temporally, this research was cross sectional in nature; thus, data collected were valid only for 2022.

1.7. Limitations of the Study

There are many research works focused on value chain analysis of vegetables, for example coffee and onion; but little on garlic. For this reason, to fill such a gap, this study shared much lesson from the vegetable family and then tried to align the experiences and the knowledge gained to the garlic sub sector

so as to prepare the literature reviews. It is also true that, Ethiopia has wide range of diverse agro-ecologies and many cultural practices. As a result, results from this study may have limitations to be applicable in other parts of the country. Thus, either to strengthen or reject the findings, further research and development works are recommended.

1.8. Organization of the Thesis

This thesis is organized in five chapters. Chapter one incorporated the introduction part while chapter two is made up of the literature reviews. Chapter three is comprised of research methodology while chapter four is focused on the results and their brief discussions. Finally, chapter five is contained conclusions and their alternative recommendations. Abstract and appendixes are also part of this thesis at the beginning and end pages, respectively.

CHAPTER TWO:

REVIEW OF LITERATURES

2.1 Concepts and Definitions

2.1.1. Value Chain Analysis

Value chain describes the full range of value-adding activities required to bring a product or service through the different phases of production, including procurement of raw materials and other inputs, assembly, physical transformation, acquisition of required services such as transport or cooling, and ultimately response to consumer demand (Kaplinsky and Morris, 2001; Michael Porter, 1985). According to Barbon (1969), it is made up of two words “value” and “chain”; a chain represents all of a product's stages of development, from its design, to its sourced raw materials and intermediate inputs, marketing, distribution, and support to the final consumer, while value refers to the price what anything is worth to be sold.

2.1.2. Value Chain Mapping

Value chain mapping is a conceptual process of identifying the main activities associated with a company's service or product line often used in corporate strategy in order to identify performance improvement opportunities. It is the creation of a visual representation and illustrative way of describing the connections between businesses in value chains and the market players (Mooney, 2014).

2.1.3. Value Chain Governance

Governance is the ability to make and enforce rules to deliver services, regardless of whether that government is democratic or not (Fukuyama, 2013).It refers to structures and processes that are

designed to ensure accountability, transparency, responsiveness, rule of law, stability, equity and inclusiveness, empowerment, and broad-based participation. While value chain governance is referring to the relationships among the buyers, sellers, service providers and regulatory institutions that operate within the chain or influence the range of activities required to bring a product or service from inception to its end use (Tardi, 2022).

2.1.4. Value Chain Upgrading

Is “the process by which economic actors; nations, firms and workers move from low value to relatively high value activities in global production networks” (Gereffi, 2019). Value chain upgrading is the action of “innovating to increase value of a product / service” (Giuliani et al., 2005). Therefore, according to the above information, value chain upgrading is a process involving: innovation, learning, and global linkages of a product / service, through which those who run enterprises acquire new knowledge and transferring it into value added product / service so as to increase total production, quality, and customer satisfaction, often through relationships with other firms in the value chain / firms in supporting markets.

2.1.5. Marketing Channel

Marketing channel is a business structure of interdependent organizations that reach from the point of product or origin to the consumer with the purpose of moving products to their final consumption or destination (Kotler and Armstong, 2003). The channel could be short or long depending on kind and quality of the product marketed, available marketing services, and prevailing social and physical environment (Islam Et al., 2014). Therefore, marketing channel is a system which ensures the distribution of goods / services from the producer to the consumers

passing through multiple levels known as middlemen. It is also known as channels of distribution. Every product is different from one another and so are their channels of distribution.

2.1.6. Marketing Segment

The term market segment refers to people who are grouped together for marketing purposes. Market segments are part of a larger market, often lumping individuals together based on one or more similar characteristics. Corporations and their marketing teams use various criteria to develop a target market for products and services. The approaches for each segment are based on fully understanding the needs, lifestyles, demographics, and personality of the target consumer (Bailey Et.al, 2010).

2.2Theoretical Literature Review

2.2.1. The Global Value Chain Theory

Theoretically, there are two unrelated theories that can be used to explain global value chain participation: the fragmentation and new trade theory.

According to Jones and Kierzkowski(1990), and Arndt and Kierzkowski (2003), the fragmentation theory which focuses on the location of the spatial production processes, become basic to examine the determinants of GVCs. According to the theory, production processes are fragmented into multiple slices and located in different countries around the world. It makes sense and assumes two arguments: the first is “there is production cost saving in fragmented production blocks, whereby the firm can benefit from differences in location (lower labor and lower production cost) between the original position and a new position”, and the second

argument is “in connecting remotely located production blocks, costs involved in incurred service link is lower, and the cost of network set-up is smaller.”

New trade theory (NTT) is a collection of economic models in the international trade since the late 1970s and early 1980s, to predict international trade patterns, proposed by Melitz (2003). The theory takes globalization and international trade as factor to explaining growth. It considers product differentiation, monopolistic competition and firm heterogeneity as the main variables. They provide a crucial way for understanding the decision of firms related to the creation of and their integration into GVCs. It suggests that a critical factor in determining international patterns of trade are economies of scale and network effect that can occur in key industries, which outweigh the more traditional theory of comparative advantage(Pettinger, 2017). Another element of new trade theory is that, firms who have the advantage of being in an early entrant stage can become a more influential in that market, because the first firm has the advantage to gain substantial economies of scale, assuming new firms can’t compete against the incumbent firms. In such a way that, global industries which are early entrants with large economies of scale are likely to face limited competition and they are leading to form monopolistic competition. According to this theory, monopolistic competition is an important because firms are often competing on branding and quality, than the simplest price. It explains why countries could be both exporter and importer of the same product. Therefore, according to the theory, being the first firm to reach industrial maturity gives a very strong competitive advantage, globally.

2.2.2. Michael’s Porter Value Chain Analysis Model

A value chain is a business model that describes the full range of activities needed to create a product or service. Michael Porter (1985) defines a value chain as the disaggregating of a

company into its strategically relevant activities in order to focus on the sources of competitive advantage. According to him, a value chain analysis involves two main activities: primary and secondary activities. Primary activities include; inbound logistics, production, outbound logistics, marketing & sales, and services. Whereas, secondary (support) activities are: firm infrastructure, human resource management, technology development, and procurement. The activities involved are not independent; rather they are dependent to each other. He identifies five forces to analyze industries and competitors: competition in the industry, potential of new entrants into the industry, power of suppliers, power of customers, and threat of substitute products. Porter identifies four basic steps that have to be followed to analyze the value chain. The steps are: first; we should identify sub activities for each primary activity, second; we should identify sub activities for each support activity, third; we should identify links between activities, and fourth; we should look for opportunities/ solutions to optimize and create a value. The following diagram shows Porter's value chain analysis framework.

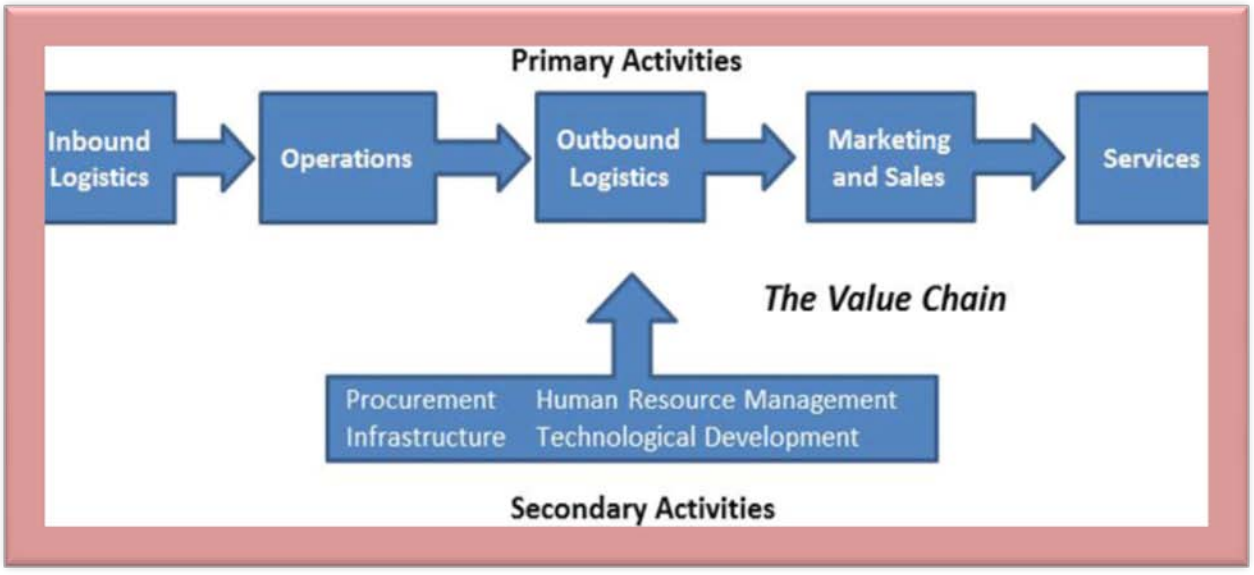

Figure 2.1: Michael's Porter Value Chain Analysis Model

(Source: Michael E. Porter "Competitive Advantage, 1985)

2.2.3. The Geographic Scope of Global Value Chains

According to Porter's 1985 best-seller, creating and sustaining superior performance are keys to firm's competitive advantage. But recent studies show, there are other variables that can affect GVCs. According to a research conducted in Argentina on automobile industry, seven broad types of determinants are identified: factor endowments, geography, domestic industrial capacity, trade policy and FDI, institutional quality, connectivity, and macroeconomic factors (Dollar Et al., 2017). Thus, the fragmentation of the global value chain has entailed a dispersion of activities around the world; some functions should locate in other countries. In such a way that firms should disperse their activities globally and choose the best locations for them to obtain a competitive advantage (Gupta and Govindarajan, 2001). However, according to Hernandez and Pedersen, limitations exist for many reasons as follows. First, some studies examining the geographical scope of firms' activities claim that, one cannot talk about global, but regional distribution, since resources are fragmented. For example, in the contemporary global political economy, production occurs in regional blocks that can be grouped into three categories called "Factories": Factory Asia (China, Japan, Republic of Korea), Factory North America (United States) and Factory Europe; especially Germany (Rugman and Verbeke 2003; Baldwin and Lopez-Gonzalez, 2015). Gereffi and Fernandez-Stark (2011) support this argument as, Multinational Enterprises are managing global networks increasingly and they inclined to work with fewer, larger and more capable suppliers, operating in a reduced number of strategic locations around the world, and favoring regionalization, than globalization. Second, though strategic management literature has explained firms disperse their activities globally to choose the best locations for competitive advantage, there should be a match between MNEs and the characteristics of the host country (Demirbag and Glaister, 2010; Hsu and Chen, 2009; Jensen

and Pedersen, 2011). Third, when activities are globally dispersed, firms may need to adapt to local market differences while at the same time they need to exploit economies of scale, scope, and maximize knowledge transfers across locations (Gupta and Govindarajan, 2001). Firms should have a global orientation, and when configuring a global strategy, they should have a global mindset, and some capabilities of cultural awareness and flexibility of location (Zou and Cavusgil, 2002; Hernández and Pedersen, 2017).

Therefore, the geographical scope of a value chain should take into account the different types of complexities of the temporal and pragmatic business environment with the broader range of firm's strategic management; mission, vision, values, and principles. Accordingly, both competitive and comparative advantages should be key firm strategies. Thus, the “degree of globalness”, to adopt the whole system of competitive and comparative advantages in the business environment should be the perspective and also should be taken in to account, strictly and precisely.

2.3. Empirical Literature Review

2.3.1 Factors Affecting Garlic Production

Global garlic production has been increasing by 1.8 % a year; expected to reach 31.1million metric tons by the year 2025. Factors behind this growth would be: world population growth; rising demand for nutritious food; policy measures by governments, increasing planted area, and the development of high yielding & disease resistance varieties (MuskaandSaksone, 2019).

Agricultural production is determined by the interaction of farmers with the biophysical environment and the cultural practices (FAO, 2018).Garlic yield and quality of productivity is

affected by various biotic and abiotic stresses, among which low/excess mineral nutrition, irrigation schedule/rainfall are among the major ones (Jaleel et al., 2007). Cropping season and soil moisture may affect the quality and yield of garlic; low moisture conditions in the soil resulted in poor yields (Shock et al., 1998), while excessive soil moisture results in nutrients leaching, and even may lead to rots and poor bulb quality. The crop yields varied considerably among sites and among production seasons at the same site probably due to soil, cropping season, amount and type of nutrients available, planting date, degree of plant population and other differences in cultural practices. Water is an important factor either it reduces or increases yield; thus, its application must be done to ensure maximizing yield, because as a natural resource it is either inadequate/irregular where production is prevalent (Muhammad et al., 2011).According to Muska (2019), there are five most significant factors that can affect garlic production: need of large financial investments to start growing, quality and availability of planting material, soil composition, weather conditions and labor intensity.

Another factor that affects the production of garlic is; its nature of environmental friendly. Because garlic has been found having too many advantages; it can be grown as a companion crop / mixed cropping so that it could influence farmers decision to grow since growing plants together might have the advantages of saving space**,** keeping the soil moist and preventing erosion**,** keeping weeds out**,** decreasing pest issues, control / reduce disease issues**,** attracts pollinators and beneficial insects **(**Walliser, 2020**).**

2.3.3 Factors Affecting Consumption

“It is unthinkable that a modern man, occupied with his creative enthusiasm, exposed to his dynamic and daily stressful activities, can allow himself not to consume five basic products:

garlic, honey, corn, apples and brandy. Each of these products possesses multiple qualities, but garlic is without any doubt dominant in this respect". Boulestin is reputed for his say "it is not really an exaggeration to say that peace and happiness begin, geographically, where garlic is used in cooking" (Totić and Čanak, 2014). Thus, the above arguments in sighted, the spicy and flavoring nature of garlic brought the demand and consumption continues to increase. The value of the global garlic market indicated an upward trend; however, the trend pattern was not consistent. For example, from 2007 to 2008 the market was growing steadily while it increases significantly from 2009 to 2011. The market again returns back until 2016, the year marked by a total recovery of the market, reaching its highest level both in value and physical terms(Boriss, 2006, Patidar and Ud Din 2016; Shafeek et al., 2015).

In addition to its nutritional importance, garlic has a variety of health and therapeutic values; the health benefits of garlic have been recognized for centuries. Ever since the ancient Greek physician Hippocrates prescribed garlic to treat all kinds of illnesses. Now modern medicine is embracing garlic's healing properties too. A recent study report that eating garlic may work to relax blood vessels, increase blood flow, and multi-spectral health benefits such as; anticancer, balancing blood sugar, boosts immunity; because garlic is rich in vitamins and minerals; manganese, selenium, vitamin C, vitamin B_6, and other antioxidants, including allicin(Beasley, 2020).

Therefore, since garlic could be available in many forms and easy to use as an input in a wide range of consumptions, the demand for it continues as far as the world population continues to increases (Boriss, 2006, Shafeek et al., 2015).

2.3.4 Global Trends of Production and Consumption

Garlic production increased from 2.85 million tons in 1970 to 30,755,884tons in 2021, cultivated under1,639,813 hectares; annually grown at the rate of 5.12%. From the total production the Asian continent accounts 28, 231,349(91.79%), followed by Europe 910,990 (2.96%), Africa 823,620 (2.67%), the America 788, 6702.56%), and Oceania 2,016 (0.006%), tons. China, India, Bangladesh, South Korea, and Egypt, are the top five producers.China and India together produces 26,215,888 (85.24%) tons of garlic under 1,192,226 (72.70%) hectares. Productivity was the highest in Kuwait, equals to 43.43 tons per hectare, and per capita consumption was the highest in China, equals to 16.72 KGs, annually (FAO, 2022).

In terms of export and sale volume, China, Spain, Argentina, Netherlands and Italy are collectively the top five exporters of garlic, together generates 90.8% of global total garlic revenues. Figuratively, China earnedUS$2.1 billion and 65.7%, Spain earned $477.9 million and 15.2, Argentina earned $174.3 million and 5.5%, the Netherlands earned $97.4 million and 3.1%, and Italy earned $39.9 million and 1.3% revenue and export share, respectively; showing there is a very concentrated cohort of garlic suppliers, globally (FAO 2021 Statistical Yearbook).

China is the largest global market. It alone consumes 75% of total production, followed by India (5%), Indonesia (2%), Bangladesh (2%), Russia (1%), the Republic of Korea (1%) and Brazil (1%). These countries together, account 87% of global consumption. With regard to per capita consumption, the top 10 consumers are: 16.72 kgs in China, 10.67 kgs in Kyrgyzstan, 7.51 kgs in the Republic of Korea, 6.62 kgs in Uzbekistan, 5.82 kgs in Spain, 5.249kgs in Algeria, 5.245 kgs in Albania, 5.09 kgs in Ukraine, 3.95 kgs in Azerbaijan, and 3.87 kgs in Myanmar(FAO 2021 Statistical Yearbook).

2.4. Garlic Production in Ethiopia

2.4.1 Patterns of Production

Garlic can be grown in a wide variety of soil and climate types. The soil should be fertile, rich in organic matter, well drained, capable of holding adequate moisture during the growing period, and having a pH value of 6.8 to 7.2. Lower values inhibit plant growth; below 5.0 values can actually lead to plant death (Janet, 2008). Garlic can also grow under a wide range of climatic conditions but prefers cool weather and grows best at higher elevation and within the geographic areas having a mean monthly growing temperature ranging from 12 to 24 degree Celsius (Libner, 1989). A relatively high temperature up to 30 degrees Celsius is required for optimum bulb development, but cooler conditions in the early stage favor vegetative growth (Tindall, 1983). In most areas, elevation from 500-2000 masl provides suitable growing conditions, particularly during dry periods (Tindall, 1983).

But in Ethiopia, garlic grows probably throughout the cooler part of the country where altitude ranges between1800-2800masl **(**Edwards et al., 1997). Garlic is cultivated in home gardens and in small irrigated fields by smallholder farmers. Because, garlic is a shallow-rooted vegetable with un-branched root system, it has low nutrient extraction capacity. Therefore, it requires a relatively high amount of nutrients for best growth and development. In the highlands of Ethiopia, garlic can be grown in diverse soil types from black heavy soils to red soils; but, ideally should be rich in organic matter, well-drained, capable of holding adequate moisture and pH value of 6.5 to 7.5 for better production (Yayeh et.al. 2021).

Garlic has been widely harvested in the western highlands which alone contribute more than 50% supply of the country, especially in the Amhara Region (Yayehetet.al. 2021). But,

Production spreads throughout the country and has been cultivated under irrigated as well as rain fed conditions, mainly in the mid and highlands of Ethiopia. It is one of the most important vegetable crops in Ethiopia and most important bulb crops produced by smallholder and commercial growers for both domestic use and export sale. The acreage land devoted for cultivation was 4,797 hectares in the year 2000 and reached to the highest figure 21,258 hectares in 2013 (Yayeh Et.al, 2019; Gebre, 2022).

2.4.2 Farming Practices

Ethiopia with diversified agro-ecological conditions is potentially endowed with favorable climatic and soil conditions to produce garlic under rain fed and irrigation (Getahun and Getaneh, 2019). Despite high potential to grow and multifaceted uses of garlic, production suffers from several problems that caused low productivity and poor quality largely attributable to the use of unimproved local cultivars having poor yield of productivity. Lack of the use of improved varieties and garlic rust are the major problems among many contributing factors for low production and productivity (Yeshiwas et.al. 2017).

According to the research conducted in Chilga, North West Ethiopia, on average 0.23 hectare of land per household is allocated for garlic production in every production season. In this study, more than 80% of the households' farmland is suitable for garlic production. But, fertility enhancement by the garlic producers is limited to frequent tilling than application of the proper fertilizer with the recommended rates. Moreover, though there is enough inorganic fertilizer supply, insignificant proportions of smallholder garlic producers have experienced its application. In the study area, farmers are preferred inorganic fertilizer to crops other than garlic. The proportions of garlic producing households who are practicing the application of

organic fertilizers (locally made compost) were less than 1% (Yehuala et al, 2018). Although some farmers are using chemical fertilizers, the rate of application is by far below the national standard, which is 105 kg N per hectare. Efforts have been made in the selection and breeding of high yielding varieties and application of organic and inorganic fertilizer (Minas, 2021), though significant changes are not still achieved.

Generally speaking, the low performance of garlic productivity can be attributed to the traditional farming practices employed by farmers such as: low use of modern farming technologies, poor application of the right type & amount of fertilizer, and application of traditional farming methods (Ethiopian Institute of Agricultural Research, 2007).

2.4.3 Garlic Value Chain in Ethiopia

The trend of garlic consumption in Ethiopia is increasing over time, most likely due to factors such as: rising popularity of cultural foods and restaurants, persistent health messages about garlic; demand from the agro processing industry, and the never ending quest by consumers for new taste experiences. These demand factors reflect a broadening view of garlic as a "functional food"; foods that offer health benefits beyond their nutritional value (Koca and Tasci, 2016).

In Ethiopia, garlic is grown for the purpose of domestic consumption and as a cash crop to generate income, (Herath and Dessalegne, 1992). Out of the total production, greater than 58% was used for household consumption, 24.5% for market and 16% for seed (ESS, 2010).The same report showed; smallholder farmers contribute 95% of the total market share.

According to Sisay (2018), there is no extension package in Ethiopia that fosters the production and marketability of garlic, however, the demand for garlic is increasing over time. Sisayadded; producers, retailers, households, restaurants, processers, cafes and snack venders are identified as

direct actors and commercially involved in the chain in different arrangements. Based on the research, the value chain of garlic appears in the following patterns:

- ☑ Producers ☞ local consumers,
- ☑ Producers ☞local collectors☞local retailers☞ local consumers,
- ☑ Producers ☞local collectors / local wholesalers ☞regional / national wholesalers☞regional / national retailers☞final consumers,

Based on the governance structure, different value adds activities are required. Activities such as: bulking, cleaning, peeling, roasting, chilling, dehydrating, drying, and other activities are required to change the garlic to a simple food item as far as to valuable products; and can bring money from consumers a double, even triple profits for farmers / traders. For example, according to Wallin (2019), in the US local market: braided garlic, garlic scapes, gourmet garlic powder, pickled garlic, garlic pesto sauce, garlic vinegars, garlic jelly, and garlic insecticide are a simple value add activities that change the garlic to a simple food item to valuable products.

But, in Ethiopia, unlike the US market, garlic market falls into three broad product segments: fresh, dehydrated, and seed stock. Sisay (2018), notify changes in relative market prices and stock levels can cause some changes, particularly between fresh and processing markets. He added, fresh garlic is carefully handled to preserve appearance (including sizing, grading, and storing) and is shipped and sold in the market. Furthermore, fresh garlic can be marketed for up to 3 months from the time of harvest with standard warehouse storage, up to 6 months if kept in cold storage, and up to a year under controlled atmosphere storage.

2.5. Research Gaps

Garlic production in Ethiopia swings up and down; due to inconsistence market demand and less government attention. Though there is horticulture development policy, garlic has been got little attention. Both methods of production and Marketing are traditional; as a result it is lagging behind the global trend. The sector lacks actors: coordination, efficient information exchange, and awareness about current global trends of production and marketing. Furthermore, garlic from Ethiopia has little international access; almost it is confined to the domestic market.

Though few in number, so far, different researchers has been undertaken their research work to find alternative solutions about garlic production and marketing. But, the researches conducted are shallow and more focused on production than marketing. For example,SissayYehualaconducted a research on a local value chain analysis of garlic in ChilgaWoreda, North West part of Ethiopia; which is to shallow and small inappropriate sample size; thus, the results gained could not be generalized to the nation. Abdisa and Negassa also reviewed the agronomic practices for improving garlic production and productivity in Ethiopia; which is one sided; thus, fails to provide alternative solutions about the marketing wing. They failed to provide full information about the trends of garlic production and marketing in the study area side by side; while they could do it.

Therefore, this research work tried to correct the methodological approach. It tried to assess what looks like the general trends of garlicproduction and marketing in the study area side by side; simultaneously. It tried to answer what are the production and marketing constraints of garlic in the study area clearly. Finally, it suggested alternative solutions including policy measures / directions; not only for the study area, but also for the nation as a whole.

2.6. Conceptual Framework

Value chain analysis provides a framework to understand better the links between chain actors and to evaluate their chain performance; distinguishing the strengths and weaknesses associated to different activities and linkages, and the barriers to chain development. Thus, whether the value chain relationship among chain actors has been benefiting them mutually or not, it should be deeply examined.

Since, in garlic value chain different actors broadly: input suppliers, producers, middle mans, traders, consumers, stakeholders are involved, and it exhibits a longest chain and largest number of operators along the marketing channel; thus it appears that the chain is comprehensive and should involve different value adding activities.

Though garlic farmers are at the bottom of the chain activity, they could not run farming without input suppliers. Thus, input suppliers should supply agricultural inputs such as: selective seed, organic & inorganic fertilizer, pesticides, and equipment in a reasonable price as the required amount. Based on such agricultural inputs, farmers operate activities such as pre-harvest, harvesting, and post-harvest activities to attain the desired productivity and the required amount of production. Brokers, also called middle mans are important market catalysts in the chain. They play a significant role to exchange market information and moderate transaction between producers and traders; as far as their intervention is formal and based on win win approach. Traders at different segment of the marketing channel are also important factors that deliver products from area of production to final markets or consumers; in such a way that costs are incurred and product is transformed through value adding activities; either in the form of product or value market chain; as a result new price margins at every point of the marketing channel are

fixed and transaction made. At the end of the marketing channel are consumers, also end users of the product are experiencing satisfaction; are sources of value chain upgrading in the form of: process, product, functional, inter-sector, or channel / geography; through their feedback. In between, every step of the marketing channels operations called logistics and sale & promotion activities played a significant role to create a smooth and efficient relationship between chain actors through customer satisfaction feedback. Above all, to bring actors mutually benefited, every actor should deliver the product / service based on value chain governance; and should act accordingly. To bring this, the government and stakeholders should provide the necessary policy framework and necessary support activities such as: credit supply, research & development, extension service, monitoring & evaluation, etc...; which brings chain actors together responsibly and accountably. The following conceptual framework shows, what ought to be the value chain relationships between garlic chain actors.

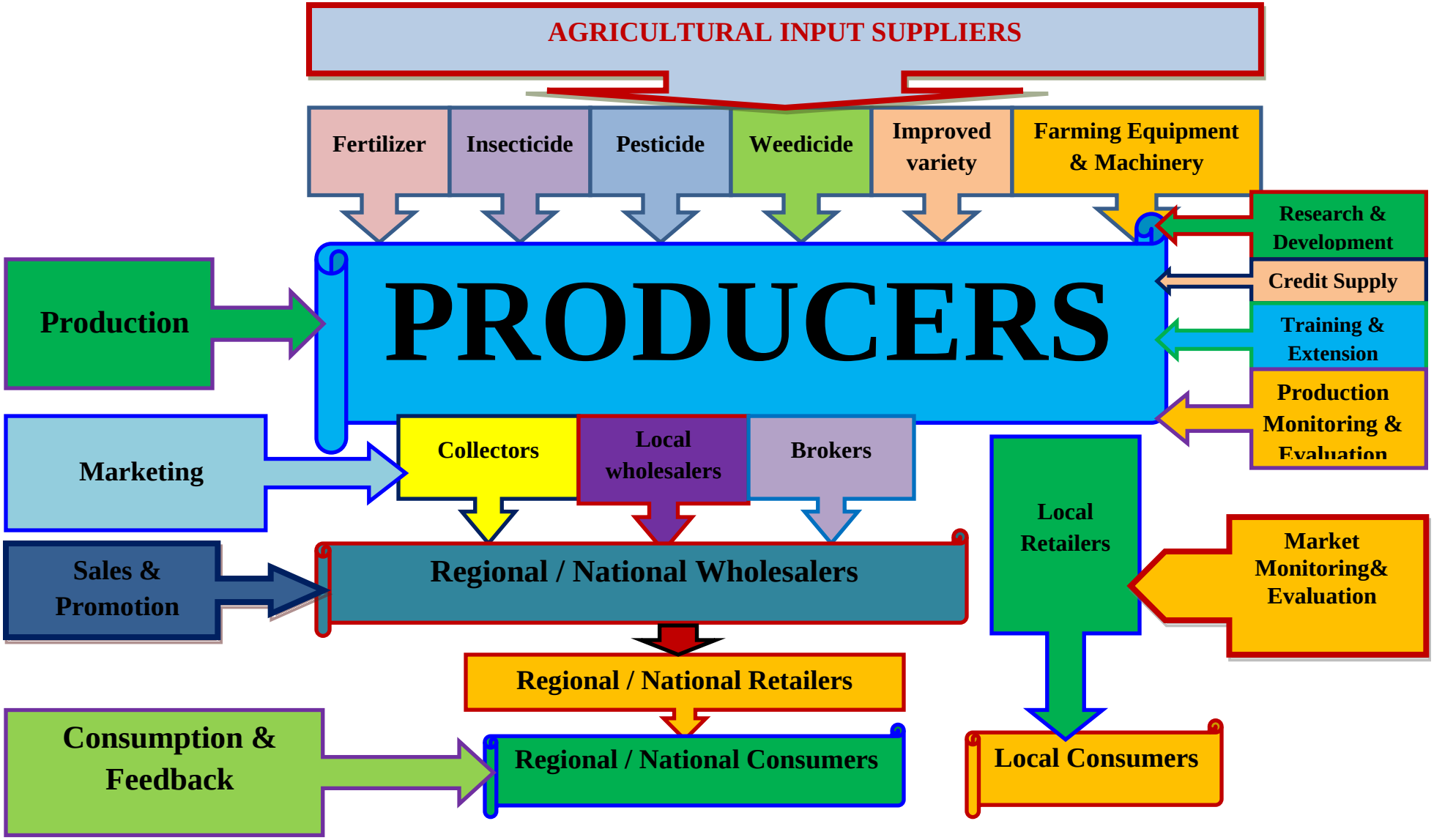

Figure 2: Conceptual Framework of Garlic Value Chain

(Source: own construct based on literature)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Description of the Study Area

3.1.1. Location and Physical Characteristics of the Study Area

Geographically, MinjarShenkoraWoredais located between 8°44’00”N to9°6’00”N latitudes and 39°14’00”E to 39°45’00”E longitudes. Politically, it is found in North ShoaAdministrative Zone of the Amhara Region, Ethiopia, where Arertiis itsAdministrative center. It is bordered by Bosset in the south, Fentale in the east, Ginbichu in the westandLumein the south east; both found in theOromia Region. It is also bordered by Hagere Mariam Kessemin the east and Berehet in the north east; both found in AmharaRegion. The study area has a total area of 2,294.63 square kilometers. Elevation ranges between 954 to 2,663 meters above sea level. Thus, the agro climatic zone of the study area lies betweenDega (cool), WoinaDega (warm cool) and Kolla (warm) type of climate; each of them accounts 4.3%, 70.90%, and 24.80% of the total area, respectively(MinjarShenkoraWoredaAdministrative Office).

According to Tindall (1983) and Libnar (1989), garlic can be grow under a wide range of climatic conditions, but prefers cool weather, and best at higher elevation; having a mean monthly growing temperature ranging between 12 to 24 degree Celsius; where altitude is between 500 to 2000 masl. But, Edwards (1997), arguing this idea as “in Ethiopia, garlic grows probably throughout the cooler part of the country where altitude ranges between 1800-2800m”. Thus, based on this argument, it is highly probable that, the study area qualifies the requirements; since, elevation ranges between 954 to 2,663 meters above sea level.

The terrain of the study area is characterized by mountains, ups & downs, and plateau; each of them accounts 2%, 24.1%, and 73.9%, respectively (MinjarShenkoraWoredaAdministrative Office). Again, since ¾ of the study area has plain topography, it has the ability to absorb water and hold soil moisture, which is also good for garlic production and mechanized farming.

The soils of MinjarShenkoraWoredaare characterized by cambisols, luvisols, leptosols, vertisols, and andosols. While Urambutialone, hascambisol (vitric cambisol) type, resulted from pedogenic processes in high mountain forest areas, strongly influenced by vegetation, and characterized by absence of a layer of accumulated clay, humus, soluble salts, or iron and aluminum oxides. They develop relatively under low mean annual temperatures, and high humidity; the second most extensive and among the most productive soils on earth *(*Jordanova, 2017; and Jain, 2011). According to Lemos et.al, 1997, the study conducted in northeastern Brazil, the soils from mid to upper landscape positions are found to be eutrophic cambisols,while those in lower positions are verticcambisols, for both soils, pH is above 7 and base saturation is higher than 90%. In order to ensure crop production, nitrogen, phosphors, and other micronutrients have to be added as fertilizers. Water runs off characterizes eutrophic cambisols; thus susceptible for drought and erosion. Water runs on characterizes verticcambisols; thus waterlogging and mechanization impediments are the critical limitations.

Since garlic needs fertile soil, rich in organic matter, well drained, capable of holding adequate moisture during the growing period, and having a pH value of 6.8 to 7.2 (Janet, 2008),inMinjarShenkoraEoreda, soils in the upper edge of the woreda; called Shenkoraregion, are characterized by verticcambisols;so that the soils in the study area qualifies the requirement for garlic production.

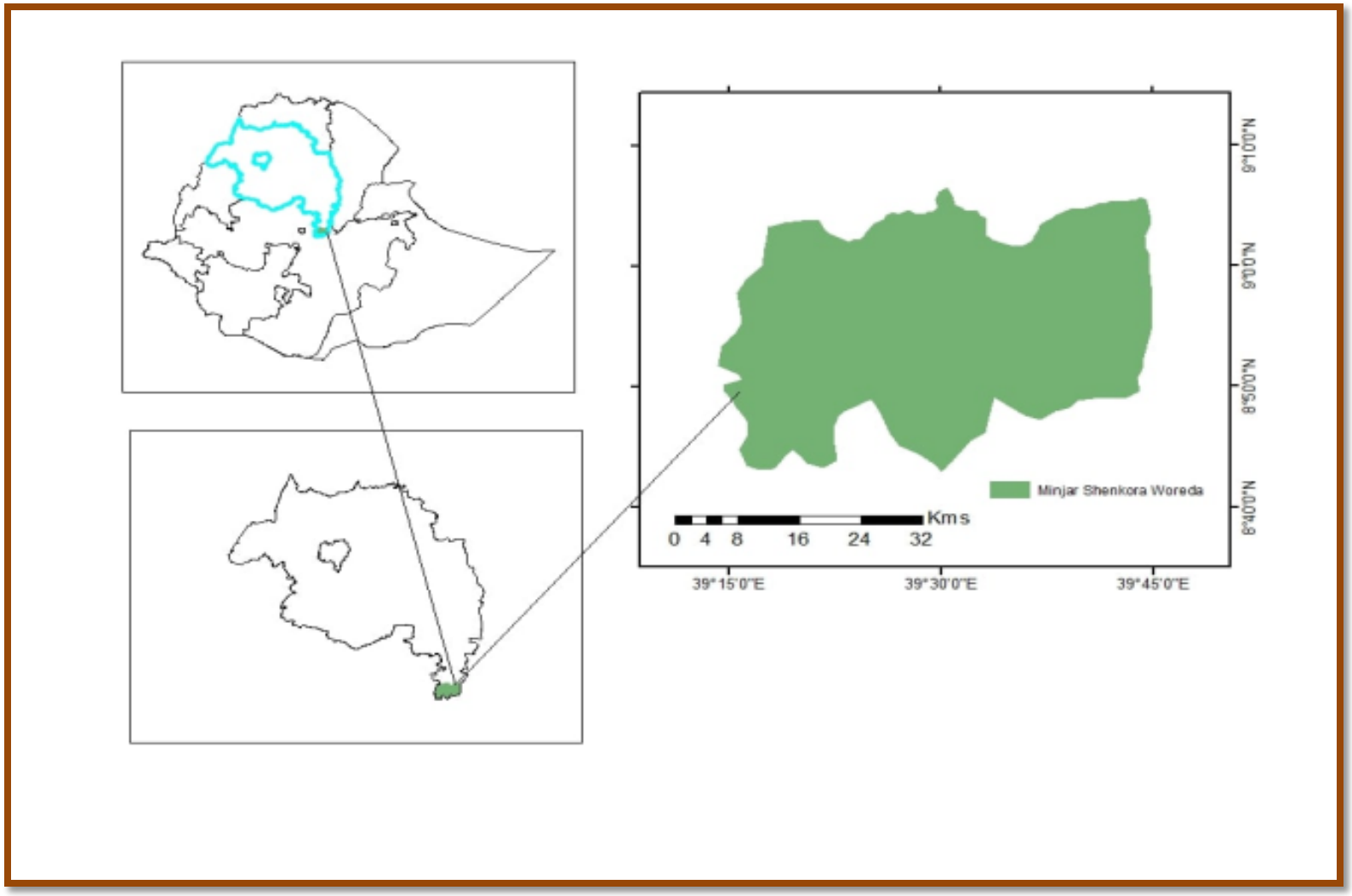

Figure 3.1: Location Map ofMinjarShenkoraWoreda

(Source: Own constructed)

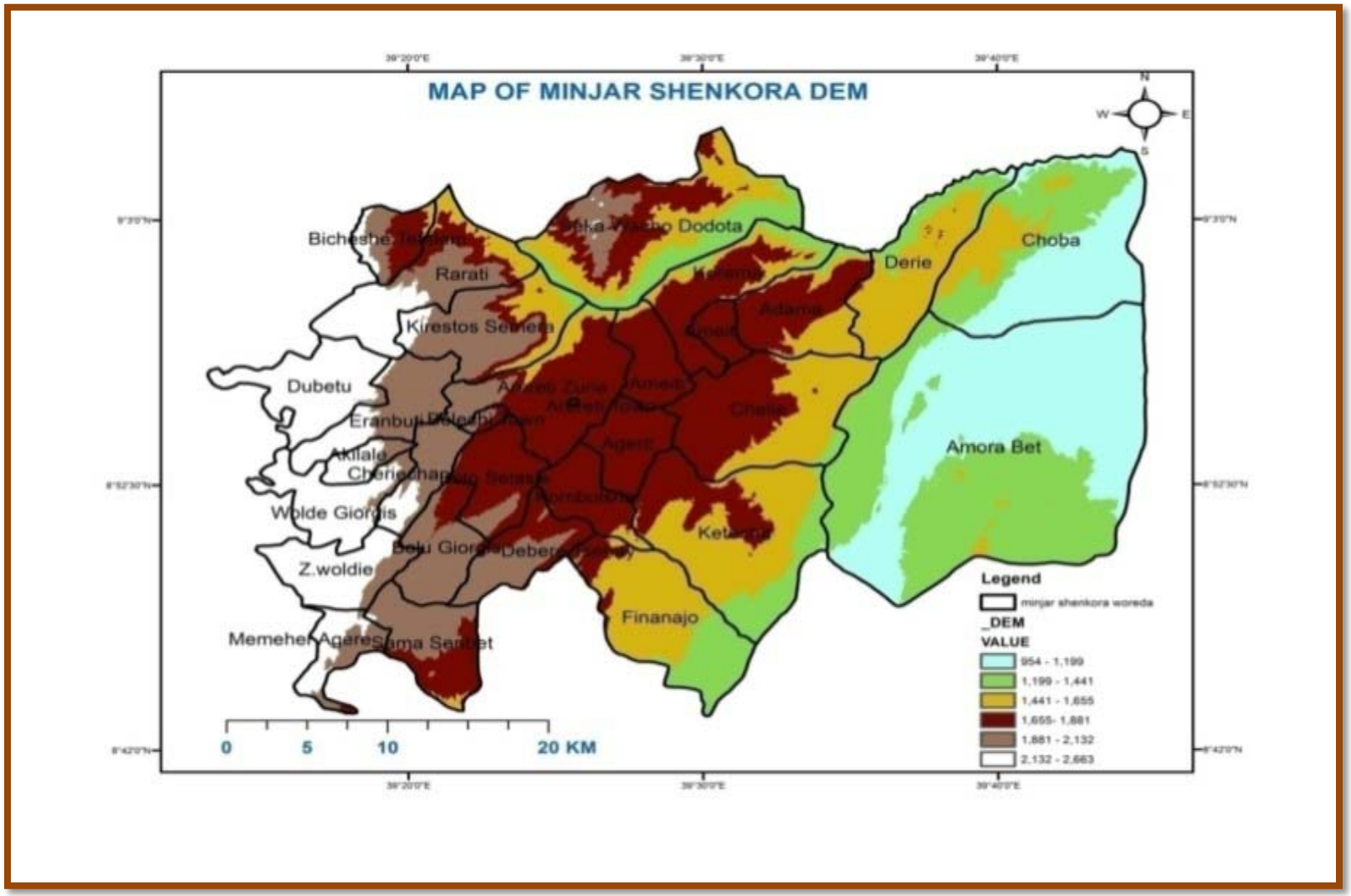

Figure3.2: PhysicalMap of MinjarShenkoraWoreda

(Source: Amahara Regional State Bureau of Planning and Development)

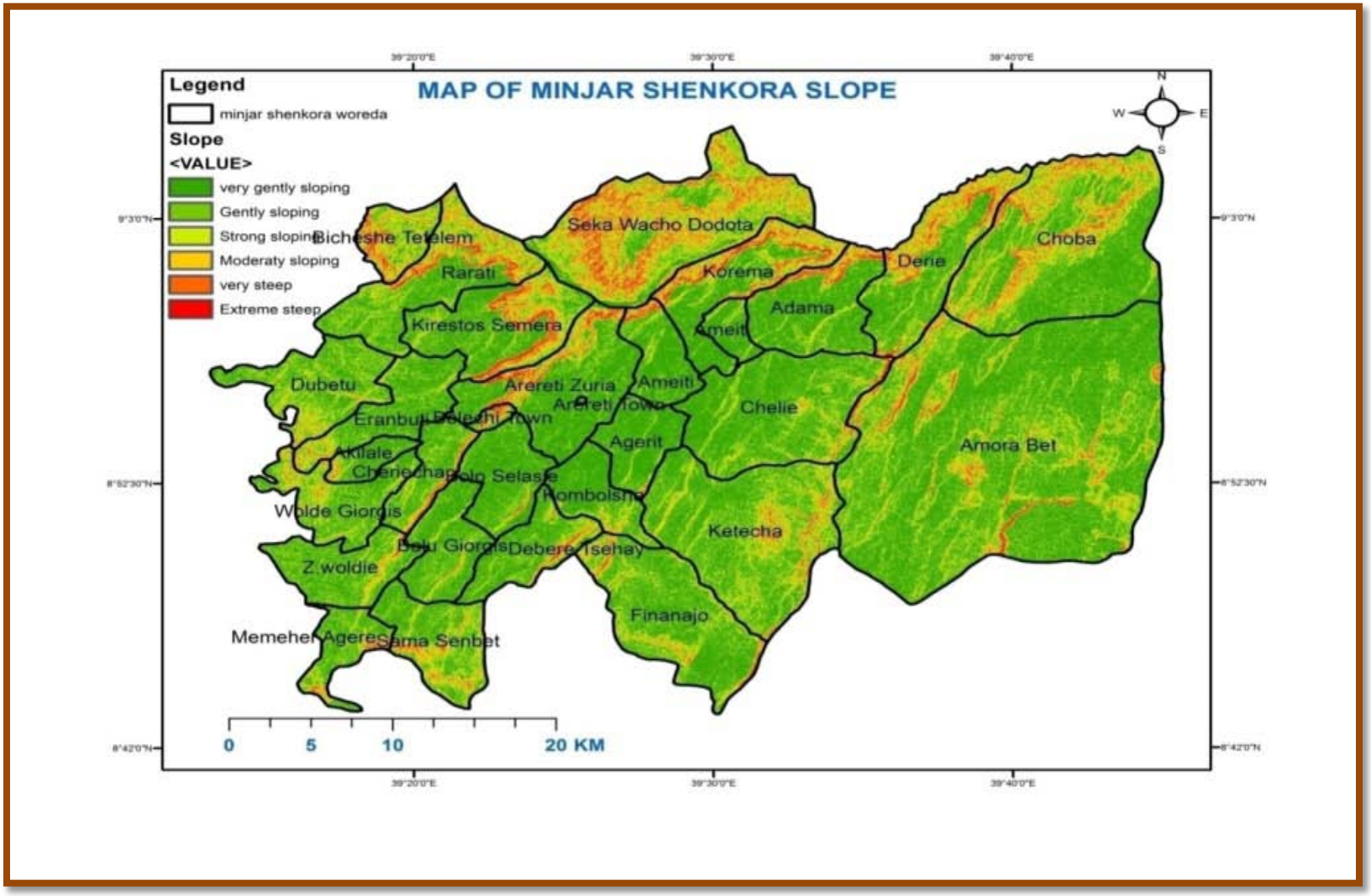

Figure3.3: Slope map of MinjarShenkoraWoreda

(Source: Amahara Regional State Bureau of Planning and Development)

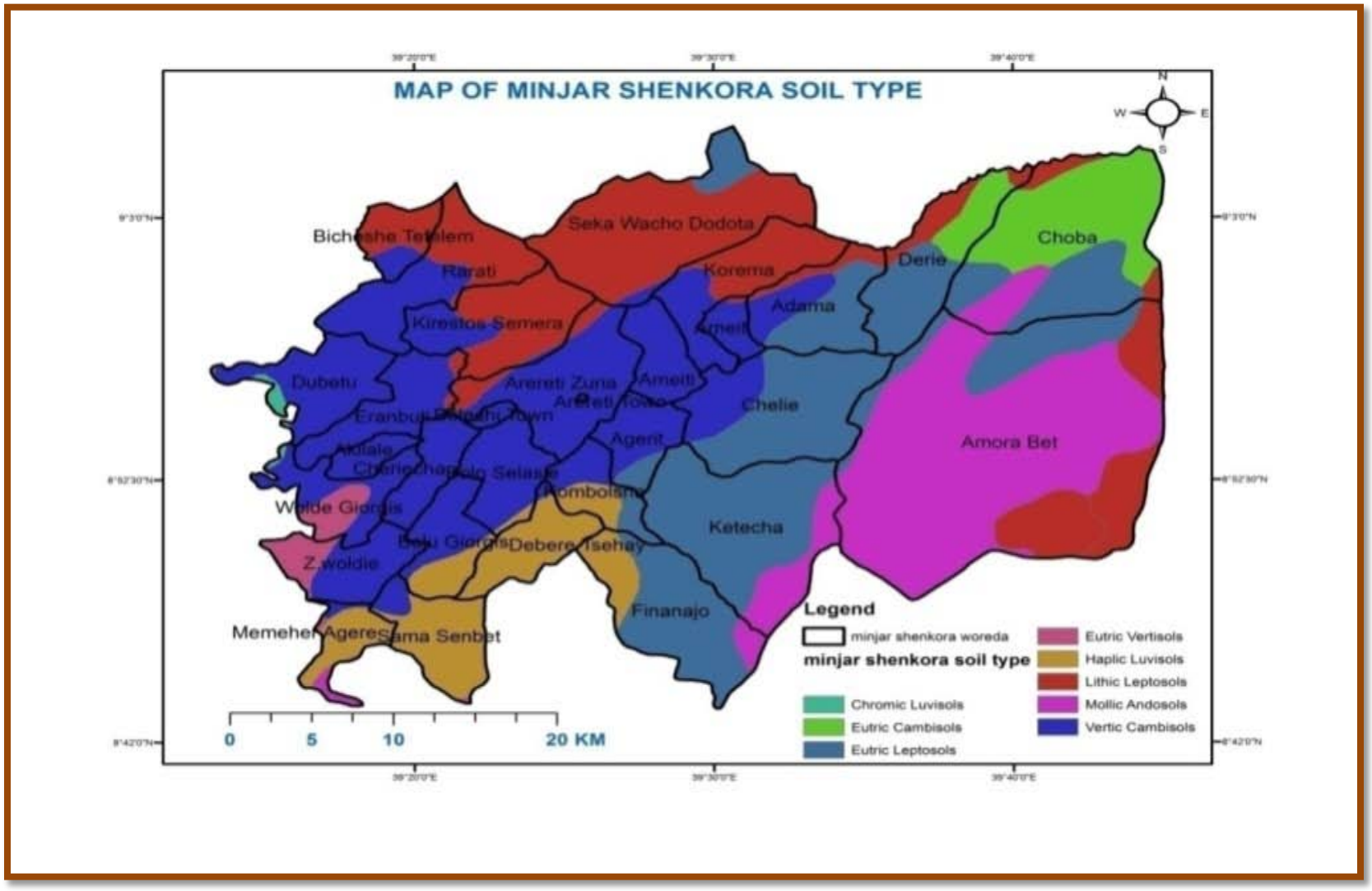

Figure 3.4: Soil Map of MinjarShenkoraWoreda

(Source:Amahara Regional State Bureau of Planning and Development)

3.1.2. Demography Characteristics of the Study Area

According to Ethiopian Statistical Authority, the censuses conducted in the year 1994 and 2007, the total population of the study area was 99,402 and 128,879, respectively, where 52% of the population was men and the rest 48% were women, and8.43% of the population was urban while the rest 91.57% were rural inhabitants.

Because census was not conducted since 2007, the researcher would like to take population projection. Thus, using the arithmetic method, the current population (2022) of the study area is computed using the formula; Pp = Pt + n (P1-P2)/N; where,

P_p = Population projection in the future;

Pt = population at time *t: i.e.* P_1*;*

P_1 = Present population as per the recent census;

P_2= Size of population in the previous census;

n = Number of years between the projection year and the previous census; and

N= Total number of years between the recent and previous census.

Thus, based on the formula, the present population of MinjarShenkoraWoredais estimated to be 162,891 considering constant rate of population growth in the study area. Given that P_1 is 128,879 and $P_2$is 99,402, the figure is calculated as:

- ☑ Pp = 128,879 + 15(128,879 – 99,402)/13

- ☑ Pp = 128,879+15(29,477)/13
- ☑ Pp = 128,879 + 34,011
- ☑ Pp = 162,891

According to the information from the Amhara Regional state bureau of Planning and Development in 2018, about 36.21% of the population was under age 15 and about 4.03% was above age 64. Based on the above information, the population of the study area is young, but the same report shows 40.24% of the entire population is independent. Though in 2007census, about91.57% of the population was living in rural area, it has been dropped to 76.66% in 2018; indicating the rate of urbanization is fast, but, agriculture as the main economic activity.

In the same year, 94%of the inhabitants were followers of the Ethiopian Orthodox Christianity, while 5.73% of the population was Muslim. Ethnically, Amhara (93.78%), Oromo (3.11%), and Argobba (2.65%), were the three largest ethnic groups while other ethnic groups constitute only0.46% of the entire population. Linguistically, Amharic was spoken by 96.93%, and Oromiffa by 2.76% of the entire population, while the remaining 0.31% spoken other languages.

3.2. Research Design

The research design refers to the overall strategy that one may choose to integrate the different components of the study in a coherent and logical way. In a research work, it is very important because it ensures that the research problem will effectively address, since it is the blueprint (roadmap) for the collection, measurement, and analysis of data (Kothari, 2004). Thus, this research is descriptive in type; qualitative and quantitative in methods; used primary and secondary data; there for, methodologically it follows a mixed approach.

The primary data were collected from 400 sample units from a population of 1,117 households using questionnaire method; and from different stakeholders based on individual and group interview. The secondary data were collected from statistical abstracts from Ethiopian Statistical Service, and annual reports from MinjarShenkoraWoreda Office of Agriculture, and MinjarShenkoraWoreda Administration Office.

Probabilistic and non-probabilistic methods of sampling techniques were applied to collect the necessary data. In the case of probabilistic sampling;Amhara region, North Shawa Administrative Zone, MinjarShenkoraworeda, and Uranbutivillage was 1stselected, using a multistage sampling technique; as they are potential garlic growing areas in Ethiopia (ESS, 2021). From 27 rural villages, Uranbuti village was selected for the reasons: its nearness to the woreda capital; Arerti town, its access to road transportation, and it has large population size to draw appropriate sample size.

Thus, under the formula: n = N/1+N (e^2) where:n is the sample size,N is the total population, and e is the error tolerance / margin of error. At 5% error,a sample size of 400wasselected from 1,117 households using a systematic random sampling; finally data was collected through questionnaire method.

Furthermore, in this study, there are also other garlic value chain actors at some point along the marketing channel which cannot be pre-defined; the target population was not known and small to draw a sample. Then, the non-probabilistic sampling technique; called snowball sampling was applied to draw sample units of garlic traders; purposely. Consequently, data was collected from 36 garlic traders along the marketing channel through questionnaire method; via face to face or telephone.

It is also true that data was collected through an interview method from: MinjarShenkoraWoreda Office of Agriculture, MinjarShenkoraWoredaOffice of Trade and Marketing Development, UranbutiVillage Development Agents, Ministry of Agriculture, and American Jewish Joint Distribution Committee (JDC).

Finally, the secondary data were obtained from:MinjarShenkoraWoredaAdministrationOffice,MinjarShenkoraWoredaOffice of Agriculture, and Ethiopian Statistical Service (ESS; formerly calledCSA); using annual reports and statistical abstracts.

3.4. Tools of Data Analysis and Interpretation

The research type in this study was already declared as descriptive and inferential, and deployed qualitative and quantitative methods of data collection and analysis. Thus, followed mixed approach of research methodology; alternatively as required. To measure the degree of centrality; mean and the degree of dispersion;thestandard deviation were used as a tool of data analysis. Chi-square test was used to infer the degree of relationships exists between the dependent and independent variables. The levels of statistical significance considered were: at alpha level: $P < 0.01$, $P < 0.05$, and $P < 0.001$. Statistical Package for Social Sciences (SPSS) was used to manage and process the data. Percentages were also used to describe frequency distributions and demographic characteristics. Furthermore, different types of maps and tables were also used to describe the study area; and to examine and describe marketing functions. In this study the researcher designs the following dependent and independent variables:

Table 3.1: variables of the study

No	Dependent variables	Independent variables
1	Productivity	Harvesting activities

No	Dependent variables	Independent variables
		Irrigation practice
		Labor
		Improved cultivar
		Fertilizerapplication
		Pesticide, insecticide & weedicide
2	Production	Easiness of garlic to grow
		Low maintenance requirement of garlic
		Garlic brings betterincome than other crops
		Garlic is productive than other crops
		Garlic reduce soil erosion& keeps the soil moist
		Garlic have low disease & weeds issues
3	Price	Nature of agricultural input price
		Nature of labor cost in the market
		Influence from value chain actors
		Nature of value chain governance
		Nature of transport cost

CHAPTER FOUR

RESULTSAND DISCUSION

4.1. Trends of Garlic Production in Ethiopia

Ethiopia produces 114,945 tons of garlic under 15,979.54 hectares, and exports 359 tons (ESS, 2021). According to the report, Djibouti, Somalia, Saudi Arabia, and United Kingdome were final market destinations; each country shares: 278.61 (77.66%), 79.95 (28.69%), 0.14 (0.18%), and0.04 (0.01%) tons; respectively.

Table 4.1: Amount of Garlic production in Ethiopia; 2008-2021

No	Year	Area in hectare	Production in tons	Yield / hectare / tons	% change
1	2008	9,316.90	103,541.68	11.11	0
2	2009	14,137.37	156,047.68	11.04	0.67
3	2010	15,361.25	179,657.80	11.70	5.96
4	2011	10,690.41	128,440.94	12.02	2.73
5	2012	13,278.55	123,961.46	9.34	-7.84
6	2013	21,258.43	222,547.93	10.47	12.15
7	2014	16,411.19	159,093.58	9.69	-7.4
8	2015	9,257.81	93,486.87	10.10	4.17
9	2016	11,845.53	107,743.46	9.10	-9.92
10	2017	15,381.01	138,664.31	9.02	-0.89
11	2018	19,412.49	178,221.89	9.18	1.84
12	2019	21,754.49	195,740.05	8.99	-2.04
13	2020	18,344.47	152,594.63	8.32	-7.510
14	2021	15,979.54	114,944.70	7.19	-13.52
Average		**15,173.53**	**146,763.35**	**9.80**	

(Source: own computation based on ESS 2008-2021 Agricultural Sample Surveys)

Total production and cultivated area were increasing over time, however, with greater degree of variability. On average terms, every year 15,173.53 hectares of land was devoted, and 146,763.36 tons of garlic was produced. Total production was the highest in 2013, equals to 222,547.93 tons, while it was the lowest in 2015, equals to 93,486.87 tons. Again, total harvested

area was the highest in 2013, equals to 21,258 hectares, while it was the lowest in 2015, equals to 9,257.8 hectares. Yield of productivity was the highest in 2011, equals to 12.02 tons, while it was the lowest in 2021, equals to 7.19 tons per hectare. The national average yield of productivity was equals to 9.80 tons per hectares. From the above information, it is clear that, though total production increases over time, productivity had been decreased; continuously. Specially, since the year 2016, yield of productivity had been decreasing; continuously for six consecutive years; from 10.10 tons to in 2015 to 7.19 tons in 2021; per hectare. There for, increase in total production is a result of increase in cropping land; not a result of increase in productivity; probably due to lack of government attention for garlic production and marketing.

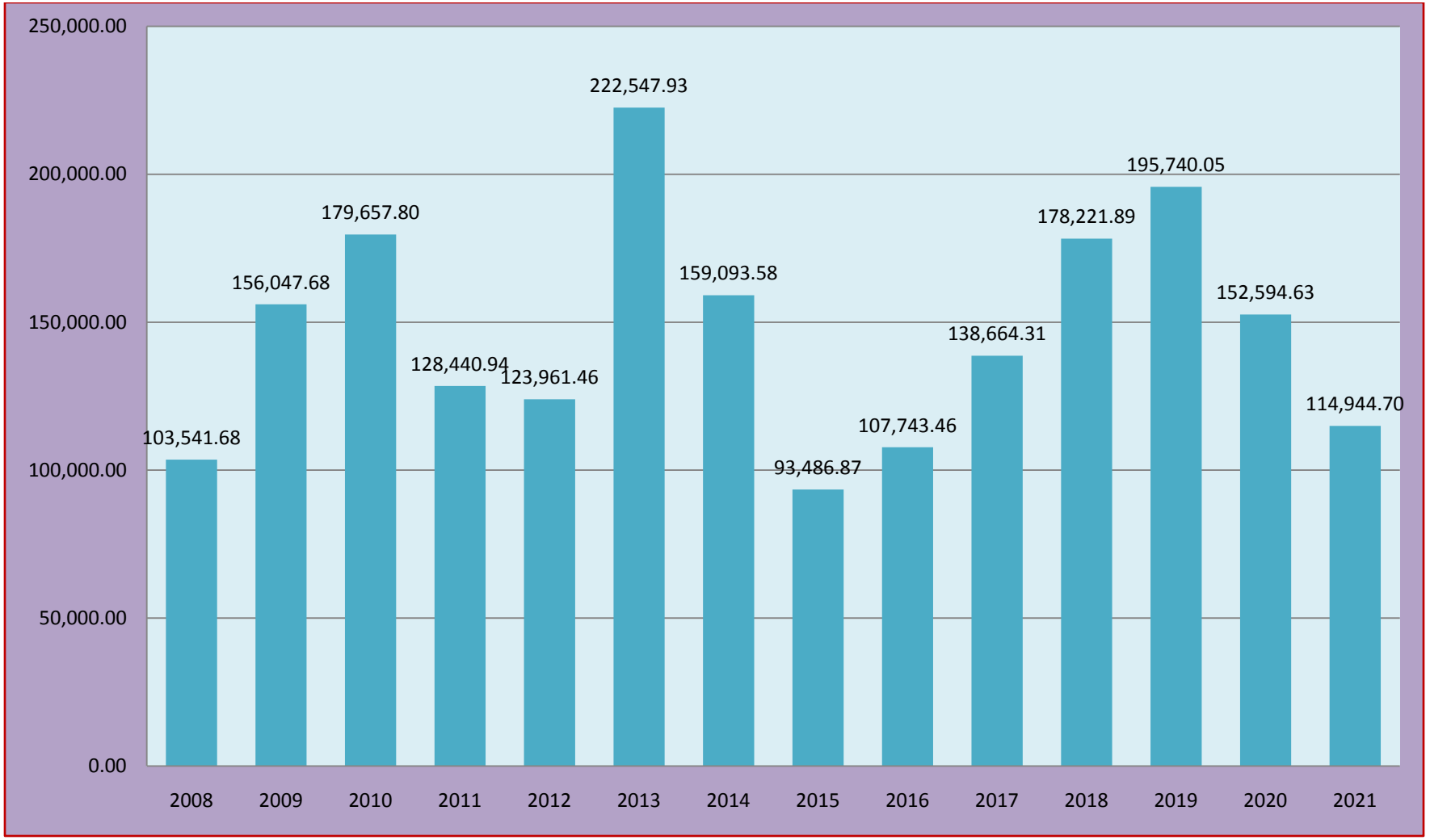

Figure 4.1: Annual Garlic Production in Ethiopia; 2008-2021

(Source: Own constructed)

4.2. Potential Garlic Production Areas in Ethiopia

In 2021, Ethiopia produced a total of 114,945 tons of garlic**.** Oromia, Amhara, Southern Nations Nationalities Regional States (SNNRS), and Tigray were the main producers. The share of production for each region was: 55,971.09 (48.69%), 53,094.00 (46.19%), 3,325. 59 (2.89 %,), and 2,049.48 (1.78%) tons, respectively. Oromia and Amhara were the main producers of garlic, 1st and 2nd producers, respectively. The two regions alone produced 94.88% of the total production. Nationally, about 1,328,146 households were participating in garlic production, and the share of each region was: 481,872,689,760, 115,432, and 34,909, respectively. Nation wise, about 15,979.54 hectares of land was devoted for garlic cultivation, annually. Regionally:Oromia, Amhara; SNNRS, and Tigray accounts 8, 037.14, 7, 167.49, 382.07, and 309.18, hectares, respectively (ESS 2021 agricultural sample survey).

Again the same data show, the national average yield of productivity was 7.19 tons per hectare, but regional difference exists considerably. Productivity was equals to: 8.70 tons in SNNRS, 7.40 tons in Amhara, 6.96 tons in Oromia, and 6.62 tons in Tigray; per hectare. The highest yield was found in the SNNRS; Gurage9.62 tons, Yem9.40 tons, and GamoGoffa8.74tons; per hectare.

Table 4.2: Regional Garlic production in Ethiopia: 2021

No	Region	Number of households	Area in hectares	Production in tons	Yield per hectares in tons
	ETHIOPIA	1,328,146	15,979.54	114,944.70	7.19
1	Tigray Region	34,909	309.18	2,049.48	6.63
2	Amhara Region	689,760	7,167.49	53,094.00	7.41
3	Oromia Region	481,872	8,037.14	55,971.09	6.96
4	SNNRS	115,432	382.07	3,325.59	8.70

(Source: Own computation based on ESS 2021agricultural sample survey)

It is probable, in SNNRS; garlic farming is more labor intensive activity than other regions, since per hectare 302 persons were engaged. In this region, land is a shortage, since a farmer runs an agricultural activity on 0.33 hectare. On the other hand, in relative terms, garlic farming in Oromia is labor extensive activity; since per hectare only 60 persons were engaged. In this region, land is not a shortage, since a farmer runs farming activity on 1.66 hectares. Thus, land value in Oromia is low in relation to labor and capital.

4.3. Demographic & Socio Economic Characteristic of the Respondents

In the study area, the total number of respondents was 400; 312 male and 88 female. The valid age of the respondents is between age 15 to 55 and the range is 40 years, while the mean value is37.39.

Table 4.3: Age and sex of the respondents

		Age of the respondents								Total
		15-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	
Sex of the respondents	male	18	12	28	54	73	91	18	18	312
	female	0	0	13	29	28	0	9	9	88
Total		**18**	**12**	**41**	**83**	**101**	**91**	**27**	**27**	**400**

(Source: Fieldsurvey, 2022)

There are three kinds of tenure systems; rental, own, and a mixture of rental & own. From the total respondents, 181(42.25%) farmershave own type, 76 (19%) rental, and 143 (35.75%) have mixed of rental & own type of tenure system. The mean annual income of the respondents is birr 499,749, and the difference between the maximum and the minimum values is 750,000 birr; the range.

Table 4.4: Sex and Annual Income of the Respondents

		Annual income						Total
		<100,000	100,001-250,000	250,001-400,000	400,001-550,000	550001-700,000	700,001-850,000	
Sexof the respondents	male	0	38	71	112	72	19	312
	female	7	15	53	6	7	0	88
Total		7	53	124	118	79	19	400

(Source: Field survey, 2022)

In the study area, all farmers have been experiencing sole cropping, and have a choice of rain fed and irrigation farming. According to the respondents, 229 (57.25%) farmers have only access to rainy season, while 171 (42.75%) have access to irrigation; also to rain fed. On average, each household own a farm size of 0.97 hectare, and productivity varies between 7.4 to >10.3, tons per hectare; while the mean value is 8.85.

Table 4.5: Productivity and Tenure System of the Respondents

Yield of productivity per hectare * Type of tenure Cross tabulation					
		Type of tenure			Total
		Rental farm	own farm	both type	
Yield of productivity per hectare	74-83	89	0	39	128
	84-93	85	19	84	188
	94-103	0	33	20	53
	>103	7	24	0	31
	Total	**181**	**76**	**143**	**400**

(Source: Field survey, 2022)

4.4. Patterns and Trends of Production in the Study Area

MinjarShenkoraWoredaproduces18, 203tons of garlic under2, 335.77hectares of land in 2022.It supplies garlic to different national and regional markets. It supplies 15.84% of the total national production in2021; and the share of cropping land was equals to 14.62% against the total national production area (source: MinjarShenkoraWoreda Office of Agriculture, 2022).

Table 4.6: Garlic Production in MinjarShenkoraWoreda; 2009-2022

Total Production in Quintal										
No	Year	Irrigation			Rain Fed			Total Production		
		Area in hectare	Total production in tons	Productivity /hectare in tons	Area in hectare	Total production in tons	Productivity /hectare in tons	Area in hectare	Total production in tons	Average productivity /hectare in tons
1	2009	-	-	-	234	2,271.85	9.71	234	2,271.85	9.71
2	2010	-	-	-	325	3,287.00	10.11	325	3,287.00	10.11
3	2011	6.55	48.24	7.364	355	4,506.94	12.70	361.55	4,555.18	12.60
4	2012	-	-	-	233	2,111.62	9.06	233	2,111.62	9.06
5	2013	1.75	11.20	6.4	280	2,388.20	8.53	281.75	2,399.40	8.52
6	2014	-	-	-	262.15	1,588.00	6.06	262.15	1,588.00	6.06
7	2015	9	27.00	3	438.90	2,747.40	6.26	447.9	2,774.40	6.19
8	2016	44.13	402.50	9.121	682.43	4,857.60	7.12	726.56	5,260.10	7.24
9	2017	-	-	-	862.5	5,392.83	6.25	862.5	5,392.83	6.25
10	2018	92	2,225.03	24.185	939.40	8,436.13	8.98	1,031.4	10,661.16	10.34
11	2019	90.22	1,353.20	14.999	371	2,620.90	7.06	461.22	3,974.10	8.62
12	2020	365.70	4,584.91	12.537	865	6,443.44	7.45	1,230.7	11,028.35	8.96
13	2021	158.26	2,463.08	15.563	1,687.8	12,752.87	7.56	1,846.06	15,215.95	8.24
14	2022	283.39	3,478.17	12.273	2,052.38	14,724.60	7.17	2,335.77	18,202.77	7.79
Average		**75.07**	**1,042.38**	**11.71**	**138.85**	**5,295**	**8.14**	**760**	**6,337.35**	**8.55**

(Source: Own computation based on MSWOoA; 2009- 2022annual reports)

Both total production and cultivated land had been increasing over time considerably. Total production was the highest in 2022, equals to 18,202tons, while it was the lowest in 2014, equals to 1,588tons. Again, total harvested area was the highest in 2022, equals to 2,335.77 hectares, while it was the lowest in 2009, equals to 234hectares. Yield of productivity was the highest in 2011, equals to 12.6tons, while it was the lowest in 2017, equals to 6.25tons per hectare.

There are two production seasons; meher called the main harvesting season, and irrigation during the dry season. More than ¾ of total production was harvested in the meher season. In this season, production is possible under rain fed; from June / July through October. The second type of cropping season is irrigation, which comes in to being since 2011, but significant since 2016. In this season, production is possible under irrigation; the dry season from late October through May / June. About ¼ of total production was harvested in this season.

On average, 83.55% of garlic was produced through rain fed farming, while the remaining 16.45% was cultivated through irrigation. With regard to productivity, average productivity was the highest through irrigation than rain fed; 13.88 vs7.73 tons per hectare; almost productivity is double through irrigation than rain fed.

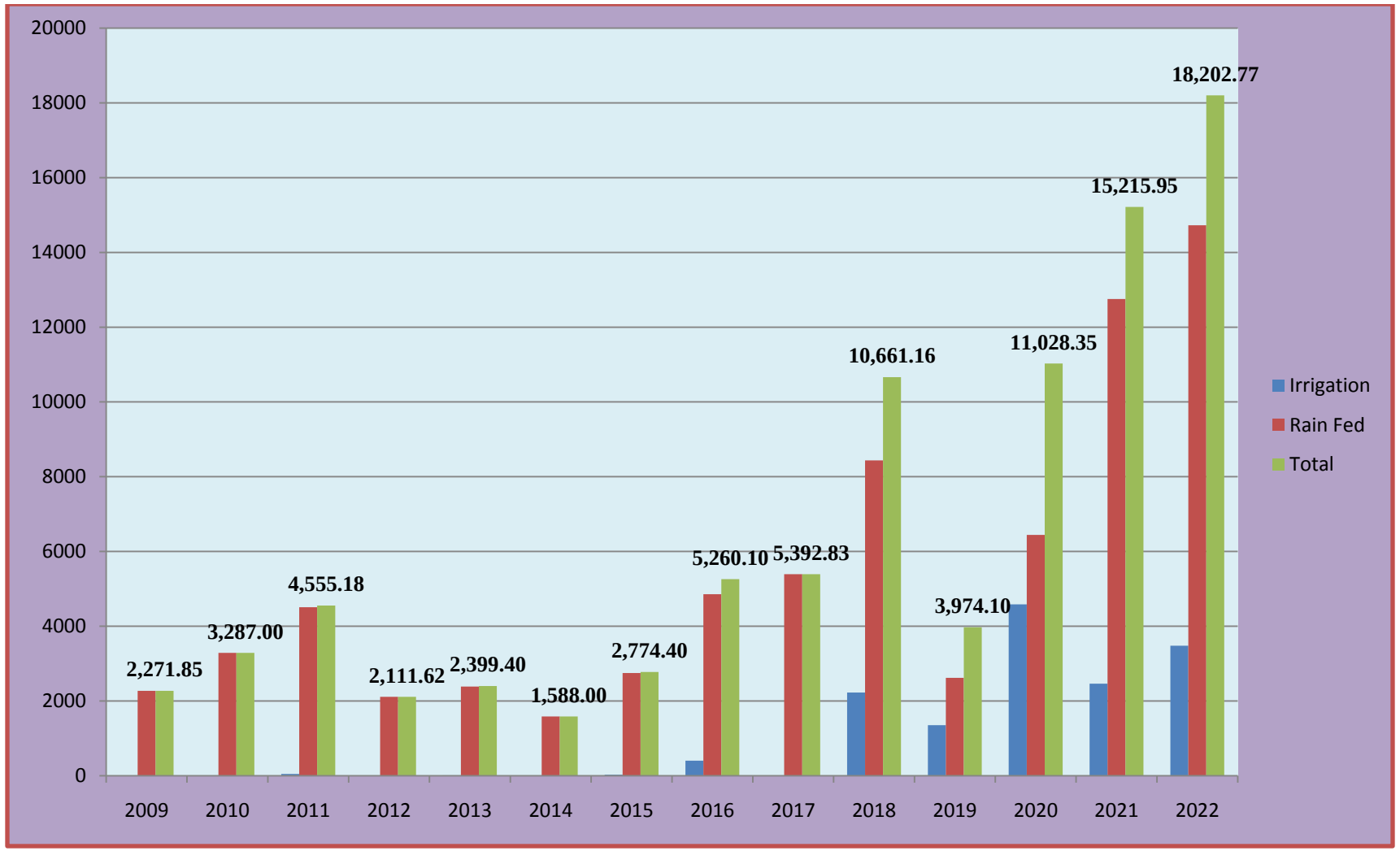

Figure 4.2: Annual Garlic Production in MinjarShenkoraWoreda; 2009-2022

(Source: Own constructed)

Annual growth of production varies considerably; but it was much higher nationally. National production has been decreasing over time, while it has been increasing in MinjarShenkoraWoreda. Results show, the highest national growth was recorded in 2013 which was equals to 80%, while in MinjarShenkoraWoredait was recorded in 2020;equals to 178%. The lowest national growth was recorded in 2015, a negative growth equals to -41%, while in MinjarShenkoraWoredait was recorded in 2019, a negative growth equals to -63%. On average, the national garlic production was growing by 6%; almost coinciding to the global figure, 5.12% annual growth, while it has been growing by32%in MinjarShenkoraWoreda, annually. Thus, in both cases trends show increasing pattern; but the national growth of production could be judged as slow, while it is the fastest in MinjarShenkoraWoreda; however, in both cases, regarded as below the production possibility; since farmers have been producing garlic under semi-traditional farming methods.

Generally speaking, in the national and study area, trends of garlic production show, production has been increasing over time not as a result of increasing productivity but due to increasing cropping land; yield of productivity has been decreasing over time.

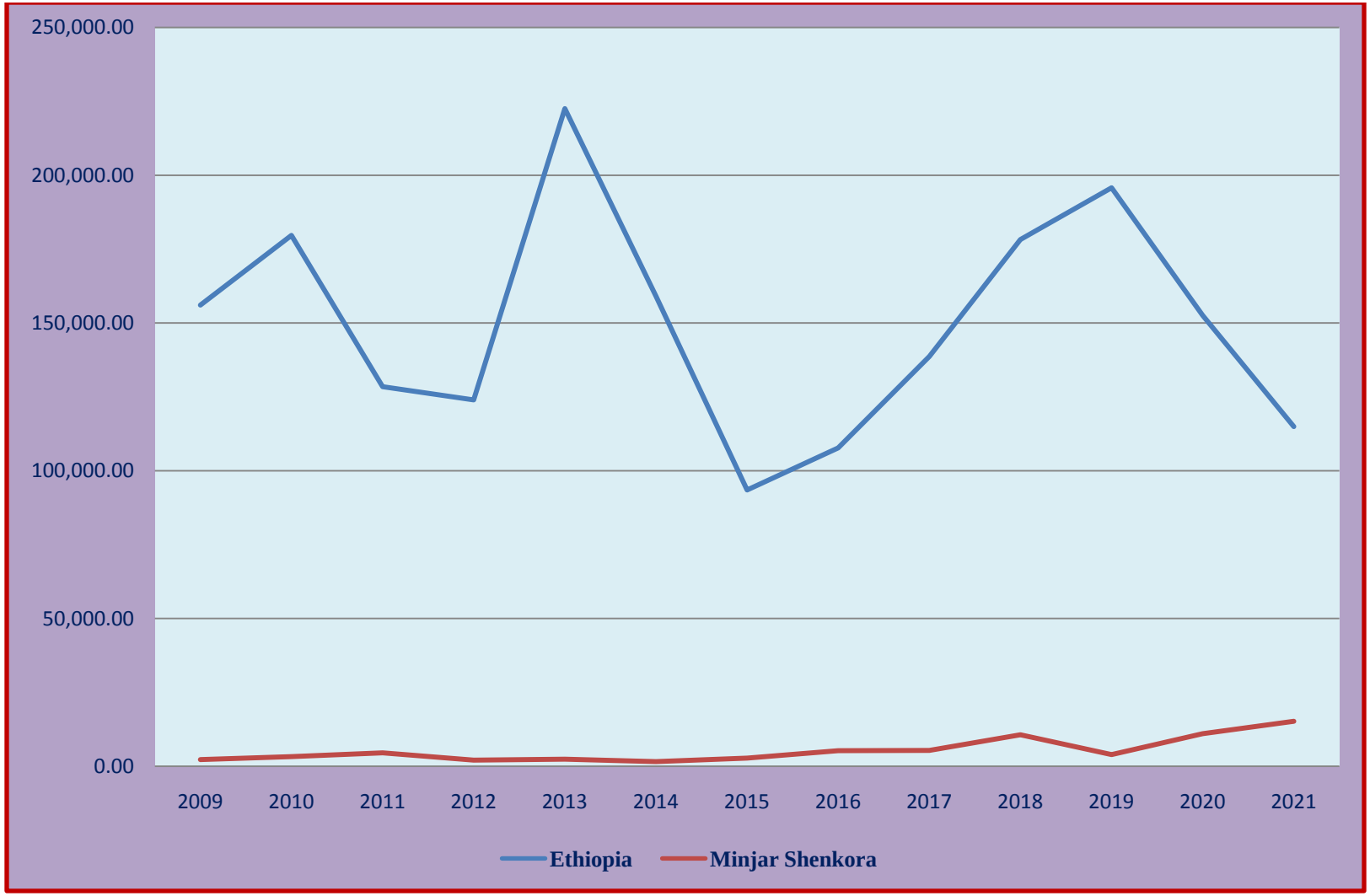

Figure4.3: Trends of garlic production in Ethiopia and MinjarShenkoraWoreda

(Source: own constructed)

4.5. Factors Affecting Yield of Garlic Productivity in the Study Area

There are several factors that could affect yield of productivity. Whether or not; harvesting activities, irrigation practiced, use of labor, use of improved variety, use of artificial fertilizer, and use of pesticide couldhave a significant relationship with garlic productivity, respondents were supposed to answers questions based on their farming experience. Their response is summarized on the following table;

Table 4.7: Factors affecting garlic productivity in the study area

No	Factor	Frequency			
		High	Medium	Low	Total
1	Harvesting activities	265	7	128	400
2	Irrigation practices	380	20	0	400
3	Labor	367	33	0	400
4	Use of improved variety	365	21	14	400
5	Use of artificial fertilizer	367	33	0	400
6	Use of pesticide	372	28	0	400
	Average	**353**	**24**	**24**	**400**

(Source: Field survey, 2022)

Based on the above table, on average,353 (88.25%) of the respondents agree harvesting activities, irrigation practiced, use of labor, use of improved cultivar, use of artificial fertilizer, and the use of pesticide highly affects yield of garlic productivity. According to Muska (2019), there are five most significant factors that can affect garlic production: need of large financial investments to start growing, quality and availability of planting material, soil composition, weather conditions and labor intensity. With regard to these assumptions, all of the respondents were found, they have been experienced using; improved cultivars, artificial fertilizer, and pesticides to boost their yield of productivity. Thus, there is similarity between respondents answer and Muska's propositions.

265 (66.25%) of the respondents agree, unless they did harvesting activities properly, productivity will not be as the required. Based on their farming experience, farmers quoted, “pre-harvesting and post harvesting activities are very determinant factors in garlic yield of productivity”. Farmers ‘experience in the study area coincides to FAO 2018 report “agricultural production is the result of the interaction between farmers ‘cultural experience and the biophysical environment”.

Out of 400 respondents in the study area, 171 (42.75%) of them have been experiencing irrigation practices, and 380 (95%) of the respondents know farming through irrigation is more productive than rain fed; because water is available continuously as required, so that they can apply agricultural inputs the right amount on the right time. Farmers’ response is similar to Muhammad Et al. (2011) argument “water as a natural resource either inadequate in amount or irregular in distribution; then it is an important factor in farming either it reduces or increases yield of productivity. Therefore, its application must be done to ensure maximizing yield of production”. There is also a match between farmers’ idea and Shock Et al. (1998) argument “productivity varied considerably among production seasons at the same site probably due to soil, cropping season, availability of water…

Labor is also a determinant factor that matters yield of garlic productivity. According to the respondents, 367 (91.75%) of them agree they have been employing different types of labor for a better yield of productivity. In the pre-harvesting season, 100% and 5% of them have been using animal labor and tractor to prepare their farm land, respectively. Further they added, during the harvesting season the most important type of labor is human labor; for the purpose of soughing, manure adding, spraying anti-disease, tillage, and harvesting activities. They rarely use labor in the post-harvesting activities, for example, they frequently use human labor for the purpose of

dehydrating and cleaning; and they use animal labor and truck to bring garlic in to the market; otherwise labor as a factor of productivity is not important in the post-harvesting season. Thus, all types of labor are among the most important factors that determines yield of productivity in the study area; which coincides to one of Muska's (2019) arguments "there are five most significant factors that can affect garlic production… and labor intensity".

Seed is a key agricultural input for improving crop production and productivity. Increasing the quality of seeds can increase the yield potential of the crop by significant folds and thus, is one of the most economical and efficient technology for agricultural development. 365 (91.25%) of the respondents agree, they have been used to improved cultivars for better yield of productivity. In the study area, there are three kinds of local cultivars called; Karakore, Bale, and Gojjam. Bale is not preferred for it has low disease resistance. Karakore and Gojjam are preferred for they have high disease resistance capacity. Above all, Gojjam type is the most preferred and widely practiced because; in addition to its high disease resistance capacity, it has also many and high bulb qualities". Thus, the findings of the study area coinciding Muska's (2019)arguments; except garlic needs large financial investments to start growing; which is probably not applicable in the study area; as far as small holder farming dominates; but, it contradicts toYeshiwas Et.al. (2017) proposition "lacks of the use of improved varieties … are the major contributing factors for low production and productivity; as far as farmers in the study area have much awareness about yield differences between improved and local cultivars.

According to Stewart (2022), fertilizer is a natural or artificial substance containing the chemical elements that improve growth and productiveness of plants either enhancing the natural fertility or replace chemical elements taken from the soil by previous crops. In the study area, 367 (91.75%) of the respondents were found, they have been using artificial fertilizer to increase

yield of productivity. They said “farming without fertilizer is almost meaningless”; but, though they reacted warmly, they have been facing two types of problems; high cost and shortage of fertilizer.

Pesticides are chemical or a biological agent such as a virus, bacterium, antimicrobial, or disinfectant that deters, incapacitates, or kills pests. In the study area, 372 (93%) of the respondents agree, they usually practiced pesticides for a better yield of productivity. According to the respondents, there are many garlic pests that causes low yield of productivity. Thus, garlic farmers in the study area are busy throughout the harvesting season to control or lower pests and weeds impacts on productivity.

Indeed, using agricultural inputs the right amount on the right time is a mandatory farming activity for every farmer in the study area in order to get the desired productivity. The village’s DAs support this idea, “unless farmers apply inputs as the required amount on the right time, productivity fails at least by 50%”. Whether or not these arguments are valid or not, a chi-square test had been conducted and the result shows, there exists a significant relationship between garlic productivity and; agricultural inputs, harvesting activities and irrigation practices. Thus, the statistical significant of the above variables is:

Table 4.8: Qui-square test for yield of productivity

No	Independent variable	Chi-square value	df	Asymptotic Significance (2-sided)	Statistical Significance
1	Harvesting activities	86.069[a]	6	.000	At alpha level 0.001
2	Irrigation practices	12.231[a]	3	.007	At alpha level 0.01
3	Labor	16.594[a]	3	.001	At alpha level 0.001
4	Use of improved variety	19.078[a]	6	.004	At alpha level 0.01
5	Use of artificial fertilizer	16.594[a]	3	.001	At alpha level 0.001
6	Use of pesticide	26.820[a]	3	.000	At alpha level 0.001

(Source: Field survey, 2022)

4.6. Factors Affecting Garlic Production in the Study Area

There are so many factors that could affect farmers' behavior of choice for garlic production. Producers are either motivated to produce or discouraged not to produce. The researcher argues; "in the study area economic and ecological benefits of the crop have greater impact on farmers' choice of behavior to produce garlic". Thus, respondents were supposed to answer questions; whether or not ecological benefits of the crop such as: easiness to grow, garlic requires low maintenance, it reduces soil erosion & it have low disease problem in one hand, and economic benefits; garlic brings better income and it is productive than other crops on the other hand; motivates farmers choice to produce garlic. Their response is summarized on the following table;

Table 4.9: Factors affecting garlic production in the study area

No	Factor	Frequency			
		High	Medium	Low	Total
1	Easiness to grow	169	132	99	400
2	Requires low maintenance	98	64	238	400
3	Brings better income than other crops	360	33	7	400
4	Productive than other crops	359	34	7	400
5	Reduce soil erosion& keeps the soil moist	11	12	377	400
6	Have low disease & weeds issues	0	4	396	400
	Average	**166**	**47**	**187**	**400**

(Source: Field survey, 2022)

On average 166 (41.25%) of the respondents agree, they grow garlic for its economic benefits because; it is easy to grow, it requires low maintenance, it brings better income, and it is productive than other crops. On the other hand; on of better income and better productivity, but not for its easiness to grow and it requires low maintenance. On average other 47 (11.75%) of the respondents have middle position; they responded not high or not low. Though respondents have different position on economic benefits of garlic, 96.62% of them highly agree they grow garlic for its economic benefits, but not for its ecological benefits such as; it reduces soil erosion /keeps

the soil moist and low disease issues. In an interview, farmers in the study area underline "growing garlic has extraordinary advantages in that; garlic is suitable for modern crop management, has high yield of productivity, and brings better income; which is impossible through other crops, for example; cereals. On the other hand, farmers in the study area argues, Charbonneau's (2017) and Walliser's (2021) ecological arguments "garlic reduces soil erosion & keeps the soil moist, it is a companion plant, and it has low disease & weed issues "as invalid. According to farmers' experiences in the study area, garlic has no such qualities. Rather, they complain the crop is highly susceptible to different types of disease problems especially; it is vulnerable to pests and insects; thus it requires high amount of pesticides; finally resulted in high production cost. Further, they explain, growing garlic as a companion plant as homegrown garden is possible, but it is impossible if it is grown for commercial purpose. As a cash crop, garlic requires sole type of cropping; so that it is suitable for modern crop management.

Thus, whether or not these arguments are valid or not, a chi-square test had been conducted and the result shows;

- ☑ There exists a significant relationship between yield of productivity and economic benefits of the crop: Easiness to grow, Requires low maintenance, Brings better income than other crops, and Productive than other crops,
- ☑ There is no significant relationship between yield of productivity and ecological benefits of the crop: garlic reduces soil erosion and garlic have low disease problem, as far as the result falls outside the degree of freedom.

Table 4.10: Qui-square test for garlic production

No	Independent variable	Chi-square value	df	Asymptotic Significance (2-sided)	Statistical Significance
1	Easiness to grow	108.410[a]	10	.000	At alpha level 0.001
2	Requires low maintenance	125.341[a]	10	.000	At alpha level 0.001
3	Brings better income than other crops	34.701[a]	10	.000	At alpha level 0.001
4	Productive than other crops	36.116[a]	10	.000	At alpha level 0.001
5	Reduce soil erosion	10.144[a]	10	.428	Not significant
6	Have low disease problem	1.473[a]	5	.916	Not significant

(Source: Field survey, 2022)

4.7. Factors Affecting Price of Garlic in the Study Area

There are different factors that could affect price of the commodity. It is not the willingness of suppliers to sell or consumers to buy that only determines price. Rather, there are other multiple factors behind. With regard to this, the researcher designed and supposed respondents to answer questions that lead, whether or not; price of agricultural inputs, labor cost, influence from value chain actors, value chain governance, and transportation cost have an impact on price of garlic. Based on these questions, respondents were reacted. Their response is summarized on the following table;

Table 4.11: Factors affecting price of garlic in the study area

No	Factor	Frequency			
		High	Medium	Low	Total
1	Input price	365	21	14	400
2	Labor cost	359	34	7	400
3	Influence from value chain actors	153	221	26	400
4	Value chain governance	0	0	400	400
5	Transport cost	293	107	0	400
	Average	234	77	89	400

(Source: Field survey, 2022)

Based on the above table, on average 234 (58.50%) of the respondents agree; price of agricultural inputs, labor cost, influence from value chain actors, and transport cost have greater impact to cut price margins. On the other hand, 89 (22.55%) of them agree, the above factors have little impact on price issues; especially 400 (100%) of them agree, value chain governance totally have little impact on market price; while 77 (19.25) of the respondents agree as middle position on price matters.

In a group discussion, all farmers agree, they have been charged high cost of agricultural inputs; especially high cost of artificial fertilizer and labor cost; which are mandatory to their farming activity. Thus, they critically consider it in pricing. According to farmers, they hired daily laborer as far as 240 to 800 birr during the harvesting season, and some of them reported, they have experiencing using tractor especially in the pre-harvesting farming activities to prepare their farm land. Further, respondents capitalize; there is high brokers' intervention in the market. Thus, brokers, have the upper hand to fix price margins. According to farmers', collectors and local wholesalers have also the greater power of influence; next to brokers, however, other traders (wholesalers & retailers) little accept farmers' argument "high brokers intervention"; because traders have at least a middle position in price matter; thus, they are least affected by price issues; hence they can cut their own new price margin as garlic passes through different marketing channel. On the other hand, from value chain actors, farmers have little bargaining power, while they are important actors. Based on the findings, exporters and consumers have no power to influence market price at all; however, they are primary actors. Indeed, exporters and consumers are price takers, than price makers. In the study area, transportation service is also an important matter in agricultural value chain. All farmers and traders agree, like agricultural inputs and labor cost, transportation cost highly affects their price margin.

Finally, though the researcher didn't consider, security issues were found extraneous variables that have significant relationship to market price. According to most of farmers and traders opinion, during peace time demand expands, then price is getting up. But, at crisis time, demand shrinks for security reasons; then, traders are confined in their locality; they cannot mediate producers and consumers; then price falls, sometimes drastically; that might disappoint farmers to grow garlic. As a result, shortage would probably prevail the market; especially next production season.

To justify, whether or not price of agricultural inputs, labor cost, influence from value chain actors, value chain governance, transportation cost, and security issues have a significant impact on price of garlic, a chi-square test had been undertaken and the result shows:

- ☑ There exists a significant relationship between price of garlic and factors such as; input price, labor cost, influence from value chain actors, transport cost, and security issues,
- ☑ There is no significant relationship between price of garlic and value chain governance, as the value falls outside the degree of freedom.

Table 4.12: Qui-square test for price of garlic

No	Independent variable	Chi-square value	df	Asymptotic Significance (2-sided)	Significance
1	Input price	38.927[a]	10	.000	At alpha level 0.001
2	Labor cost	34.137[a]	10	.000	At alpha level 0.001
3	Influence from value chain actors	103.177[a]	10	.000	At alpha level 0.001
4	Value chain governance	55.010[a]	40	.057	Not significant
5	Transport cost	197.497[a]	20	.000	At alpha level 0.001
6	Security issues	73.840[a]	20	.000	At alpha level 0.001

(Source: Field survey, 2022)

Based on the above table, both dependent variables are significant at alpha level 0.001; except value chain governance. The reason behind why value chain governance is not statistically significant might be related to weak governance structure between value chain actors.

4.8. Garlic Value Chain Actors in the Study Area

Actors are all the individuals or organizations, enterprises and public agencies related to a value chain. In the study area, there are about 15garlic value chain actors. From these numbers, 10 of them are direct actors while the remaining 5 are indirect actors. The following table shows garlic value chain actors; name, type, and their respective role along the marketing channel; in the study area.

Table 4.13: Value chain actors and their respective role in the study area

No	Actor's Name	Actor Type	Actor's Respective Role
1	Agricultural Input suppliers (local private suppliers and the government)	Direct actor	Supply of fertilizer, insecticide, pesticide, weedicide, agriculture equipment, and tractor.
2	Garlic farmers	Direct actor	By default they produce garlic based on the market standard, and they supply local cultivars for other farmers as a source of seed.
3	Collectors	Direct actor	Collection of garlic from garlic farmers, and distribution to local retailers, local wholesalers retailers.
4	Local wholesalers	Direct actor	Collection of garlic from garlic farmers and collectors, and then distribute garlic to another wholesalers and retailers.
5	Regional / national wholesalers	Direct actor	Collection of garlic from garlic farmers, collectors, and local wholesalers, and then redistribution of garlic to another wholesalers and retailers.
6	Brokers	Direct actor	They are middle man between garlic farmers and garlic traders.
7	Retailers	Direct actor	They made transaction with consumers at central market place and other mediums.
8	Consumers	Direct actor	They are either end users of garlic for home consumption or use garlic as an input for further processing to add value along

No	Actor's Name	Actor Type	Actor's Respective Role
			the marketing channel,, They are also sources of feedback about the product for upgrading or to bring a new product type targeting either to expand the marketing area or incorporating new marketing segment.
9	Inland transporters (truckers)	Direct actor	Distribution and redistribution of garlic and agricultural inputs to different actors along the marketing channels.
10	Warehouse owners	Direct actor	Provide storage facility to input suppliers and garlic wholesalers; however it is most common along traders' side.
11	Policy makers (government)	Indirect actors	Setting regulation, policy framework, fix tax & tariffs if necessary; Provide the necessary infrastructure developments to facilitate the value chain relationship among actors along the marketing channels.
12	NGOs (techno service Ethiopia and JDC)	Indirect actors	An international NGOs, provide credit supply, drip irrigation technical support, and production & value chain trainings for garlic farmers
13	R&D Institutions (Amhara Agriculture Research Institute &DebreBirhan University)	Indirect actors	Provide on spot (field) research and technical support for garlic farmers how to increase productivity.
14	MinjarShenkoraWoreda Office of Agriculture	Indirect actors	Provide training & extension service, and accessed farmers to credit facility (fertilizer).
15	MinjarShenkoraWoreda Office of Trade and Market Development	Indirect actors	Facilitates market opportunities for garlic farmers, Provide continuous monitoring so as to regulate the marketing situation; in the study area.

(Source: Field survey, 2022)

4.9. Marketing Channels of the Study Area

A marketing channel is described as the set of people, organizations, and activities that work together to transfer goods from the point of origin to the point of consumption. The primary purpose of a marketing channel is to create a connection between the organization that creates a product / service and prospective customers who may want to purchase it. In this case, a

marketing channel could be: social media, digital advertising, email marketing, offline promotion, and a market center.

On the other hand, market segmentation is a term that refers to aggregating prospective buyers into groups or segments with common needs; who respond similarly to a marketing action. It enables companies to target different categories of consumers who perceive the full value of certain products and services differently from one another.

In the study area, there are four possible marketing channels; with different arrangements. Actors create their own value chain relationships at different points; via the marketing channels. Their relationships type is based on: 1sttype is face to face contact with farmer, collector or local wholesaler in the nearby marketing center. The 2nd type is face to face contact with farmer in the farm gate. The 3rd one is contact with local wholesaler through mobile order. Farmers in the study area have access to the market either in the farm gate or in the nearby market calledBalchi; while traders have additional option; telephone order. But, except these marketing channels, neither of farmers nor traders has been experiencing other types of marketing platforms; for example internet options. For every marketing channel, there should be menses of transportation. In fact, the study area has access to all weather roads. Thus, farmers should have either to use animal (camel) or truck to ship their product to the market center, while traders have only one option; truck. In both cases, neither farmers nor traders report transportation problem. According to the results of this study, the marketing channels of the study area fall under the following patterns:

- ☑ Input suppliers ☞garlic farmer ☞ collector / local wholesaler ☞ local retailer ☞ consumer,

- ☑ Input suppliers ☞garlic farmer ☞ broker ☞ collector / local wholesaler ☞ broker ☞ regional / national wholesaler ☞ regional / national retailer ☞ consumer,
- ☑ Input suppliers ☞garlic farmer ☞ broker ☞ regional / national wholesaler ☞ regional / national retailer ☞ consumer,
- ☑ Input suppliers ☞garlic farmer ☞ broker ☞ regional / national wholesaler ☞another regional / national wholesaler ☞ regional / national retailer ☞ consumer.

4.10.Market Destinations of the Study Area

Garlic farming in the study area is an extraordinary economic activity for farmers. It is the main cash crop; produced in huge amount. For example, MinjarShenkoraWoredaalone generates 15.84% of the national production; in 2022. For garlic farmers in Uranbuti village, the main market destination areas are Uranbutilocal village market in the farm gate, and the nearby town called Balchi; a garlic cluster market center for garlic farmers and traders from all over the country. After transaction takes place, traders shipped and transport garlic to different parts of the country either for whole selling or retailing; via truck.

According to the study, all of garlic traders have been made transaction from Balchi market center; while12 of them did have transaction fromUranbuti; where they could find garlic farmers in the farm gate. In addition to these places, there have been a witness that traders did also have transaction with other places; for example, 3 of them did have transaction from Adet; AmharaRegion, and 12 of them have transaction from Arsi; Oromia Region. Based on the findings, all except one of the traders, theyare not engaging in retailing activity; they sold their product either to another regional wholesaler or retailer either in the local market or nearby place; but madetransactiondirectly from the local garlic market; Uranbuti. After transaction had been made; garlic is transported, distributed, and redistributed to several places across Ethiopia.

Addis Ababa, Adama, Sheshemene, Wolaita, Arba Minch, Jinka, Saula, Hawassa, Bale, Jima, Nekemet, DombiDollo, DebreBirhan, ShewaRobit, Bati, Kombolcha, Dessie, Woldia, Gondar, Bahir Dar, DebreMarkos, and Gish Abbay are the main final market destinations according to traders. Almost garlic from the study area has been accessed throughout the country. But, despiteESS2021 report show, there were international destinations for Ethiopian garlic, in this study, none of the traders respond garlic from the study area has access to international market.

4.11.Value Additions in the Study Area

Value added is the extra value created over and above the original value of something; downstream and upstream**.** According to Anandajayasekeram and Berhanu (2009), in a value chain, product changes hands through chain actors. Then, transaction costs are incurred, and some form of value is added. In the study area, there are value addition activities, but they are regarded as simple value adds activities. Farmers only perform dehydrating and cleaning while traders do have activities: dehydrating, cleaning, and grading. According to farmers and traders, if they do fail dehydrating, the garlic is spoiled and damp away; thus, above all, dehydrating is a prerequisite and a mandatory value adds activity. As the garlic passes through dehydrating process, especially traders have been faced weight losing problem; thus they compensate weight losing problem through fixing new price margins.

Generally speaking, in the study area, and along the marketing channel, there is no a significant garlic value adding activity after harvesting. Everything 1st moves to the local market with little value adds activities, and then to other regional markets almost involving similar value adds activities by the trader. The main value adds activity involving in the garlic market along the marketing channel, is setting new price margins. Thus, the type of value adds activity in the study area along the marketing channel is a production market chain, strategically focused on

basic product or commodity whose principal focus is cost / price; than a value market chain, strategically focused on differentiated product whose principal focus is value / quality. Thus, price matter is the main issue of every actor along the marketing channel than the creation of new real value addition product; finally resulted in high price charge as the garlic reaches to final consumers.

4.12.Pricing and Power Relationship of the Study Area

In determining the price margin, garlic farmers have little power, since 95% of farmers have moderate position while 88% of brokers, collectors, and local wholesalers have the upper hand. According to farmers, even regional wholesalers have no significant power to influence market price; they have a middle position in pricing; they accept the price offered: brokers, collectors, and local wholesalers than the market center. Price margins are significantly cut by the collective power of these three actors. Based on farmers' response from an interview, in the study area, a significant number of traders have a triple role to control the market price: 1^{st,} they are garlic farmers, second, they are brokers and third, they are traders; almost they controlled the local market.

Farmers in the study area complaining, there is high broker intervention; 93.5% of farmers agree brokers have high power of influence. On the other hand, traders argue that, it is not true; only they have been paid commission for brokers reasonably for their contribution. Traders agreed, 86.7% of brokers have a middle position in determining market price, which is regarded as healthy. On the other hand, other value chain actors; consumers and government have little or no power to influence market price at all.

In addition to this, garlic farmers have also reported, they are facing price fluctuation. According to farmers, most of them have been sold garlic immediately the harvesting season. They also added they have little experience of warehousing; forced them to sell garlic immediately harvesting. But, despite this constraint, the main issue that farmers sell garlic early in the harvesting season is to cover production costs such as: agricultural inputs, labor, and house hold expenditure; even they have also the fear of price fall. The following table shows seasonal variation of price based on farmers and traders information in the study area, and along the marketing channel.

Table4.14: Average estimated price of garlic farmers and traders across months in Birr

No	Actor name	Average Price			
		September	December	March	June
1	Farmers	0	27.52	43.73	58.42
2	Traders	175	61.93	71.33	96.60

(Source: Field survey, 2022)

From the above table, we can understand, in the study area, and along the marketing channel, garlic farmers sold their product cheaply before price gets high. They have no chance to sell their garlic at higher price. For example, all farmers have no transaction in September; when price was regarded as high. It is also true that, the rate of change in price between consecutive months is very high; thus, it left farmers in a disadvantageous position. On the other hand, traders have transactions across all months, and they have got better price than farmers, as far as they are price makers at every point along the marketing channel. They cut their price margin based on costs incurred. In the study area, December is the beginning of fresh garlic market; regarded as the month experiencing the lowest price not because of surplus production, but due to lack of warehousing; they cannot stored it for long period so that they brought much of garlic to the market; as far as garlic is perishable. On the other hand, September is characterized by shortage of production since farmers brought their garlic earlier. Thus, September is the month characterized by shortage and high market price.

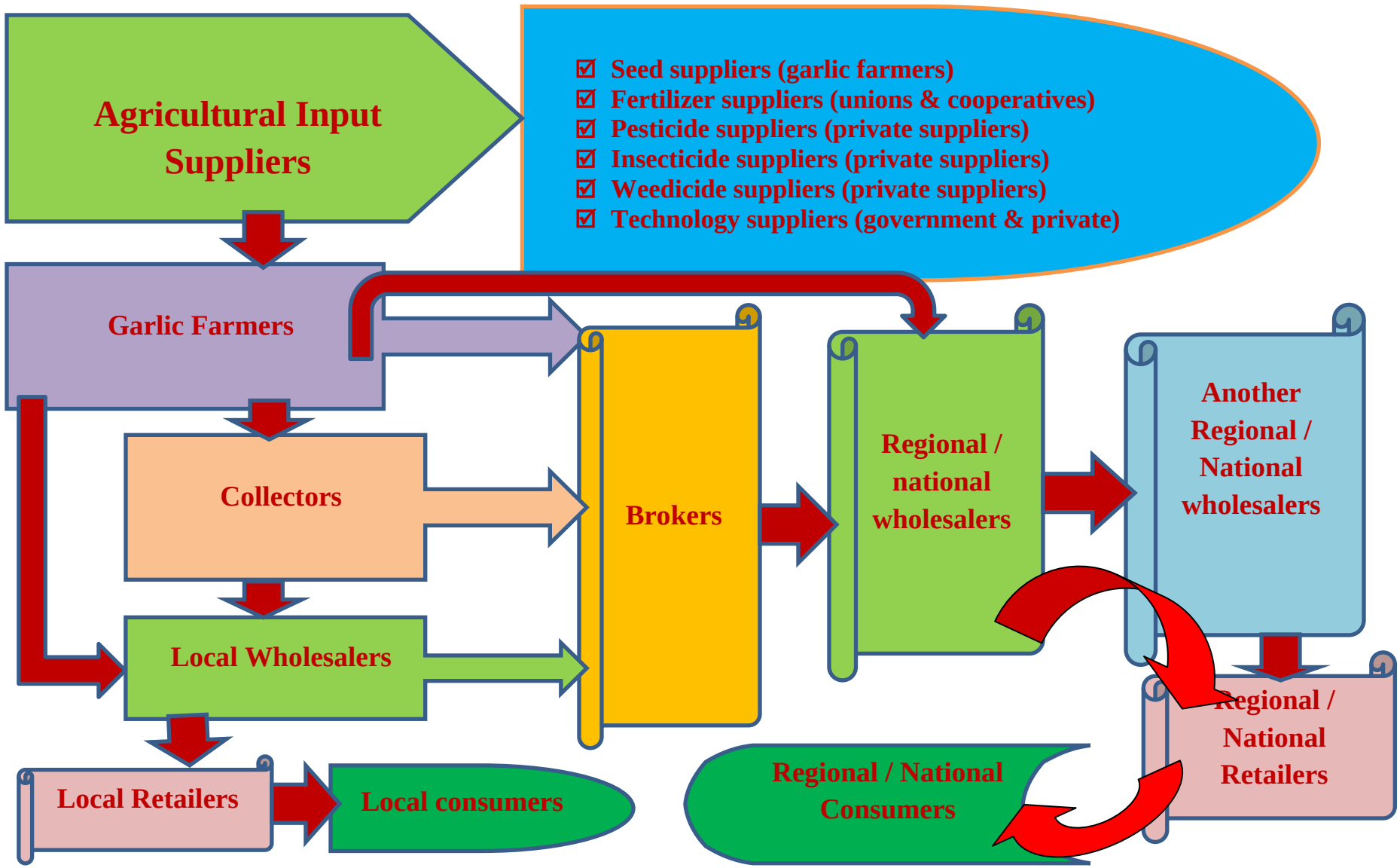

Figure 4.2: Garlic Value Chain of the Study Area

(Source: Field survey, 2022)

4.13.Information Exchange & Transaction in the Study Area

According to farmers in the study area, all of them agree, they access market information from the nearest market. Occasionally, they used to get information from brokers via mobile or face to face, but they consider the information from brokers as unreliable; because, brokers are middle men's' who have the power of influencing the local market; thus farmers fear cheating & sabotage.

According to the wholesalers, like garlic farmers, they access information from the nearby market and brokers. But, traders have also another option to get market information; from other garlic traders along the value chain. Unlike farmers, they don't bother about brokers' intervention, but they donot completely denyingbrokers'intervention in the local market. According to traders, they have to pay commission for brokers either in the market or in the farm gate as a reward for their contribution; but they made compensation, through cutting new price margin; otherwise things would be difficult and complex for their work.

Therefore, for all actors along the chain, the main means of communication is mobile telephone, and the means of marketing channel is either in the farm gate, the nearby market center or telephone order. All farmers in the study area sold their garlic either for: brokers, collector, local wholesaler or regional wholesaler; for farmers, brokers are cheaters even looters. Based on the study, almost all farmers and wholesaler along the marketing channel responded, they have no direct contact to consumers.

4.14.Opportunities and Constraints of Garlic Production in the Study Area

Opportunities are those factors that provide possibilities for garlic farmers and traders to expand their production and sales so as to make more transactions; then profits. Constraints on the other

hand, are those factors that limit the ability to grow production and sale; thus reducing amount production and total sale; thus constraints are threatening factors that hinder profit maximization and business sustainability**.**

4.11.1 Opportunities

Garlic is an important cash crop grown in MinjarShenkoraWoreda, which plays a significant role in the livelihood of every small-holder farmer. Garlic farmers in the study area are experiencing different opportunities. According to farmers in the study area, it is obvious that farmers grow garlic to take different types of advantages such as: better price, improved living standards, better yield of productivity, and relatively have long shelf period. Though lower price and many other factors threatening garlic farmers in the study area, all farmers respond they will have continuing to grow garlic; coping up the challenges. In the same manner, traders also agree, though different constraints and challenges are in garlic trading, they will have continuing their work for the benefit of better income and improved living standards. In addition, some of the traders also added, they prefer garlic trading as far as it is a seasonal work; it allows them to enjoy other economic activities too.

4.11.2 Constraints

Though garlic is a cash crop and has many opportunities, it does not mean that production takes place without threats. Rather, in the study area, garlic farmers and traders have been confronting many difficulties, called constraints; from the point of production to marketing. For garlic farmers in the study area, prevalence of disease, price fluctuation, high labor cost, shortage of fertilizer, high cost of inputs, brokers intervention, lack of improved variety, high land rental

cost, water shortage during the dry season, lack of regular monitoring, lack of market regulations, and lack of research & development are the main threats, according to their order of importance. Similarly, for garlic traders'; price fluctuation, weight loss, perish ability, security issues, transport cost, lack of market regulations and brokers' intervention are the main threats, according to their order of importance. Thus, there should be mitigation strategy to resolve such production and marketing constraints. The following table summarizes opportunities, constraints, and alternative remedies of garlic production and marketing; independently.

Table 4.15: Opportunities and constraints of garlic farming

Opportunity	Constraint	Remedies
Better income	Price fluctuation	Improve the peace situation all across the country, Increase garlic farmers awareness about the advantage of the use of warehousing so that farmers could bring their product step by step,,
Better productivity	prevalence of disease	Access to research and development, Increase farmers awareness about different types of garlic diseases and how to prevent & treat,
Improved livelihood	High labor cost	Expansion & access of modern farming machinery,
Long shelf period	Shortage and High cost of fertilizer	The government and other stakeholders should subsidize fertilizer, Increase the use of alternative fertilizers; organic manure, Establish home fertilizer manufacturing plants,
	High cost of inputs	Subsidy from the government & other value chain actors, Expanding home chemical and machinery manufacturing plants,
	Brokers intervention	Bringing the marketing environment under formal standards; for example, brokers should be under license, Increase awareness of value chain actors about the importance of value chain relationship that could benefit mutually.
	Lack of improve	There should be Research and Development

Opportunity	Constraint	Remedies
	variety	on garlic to increase production and solve disease issues,
	High rental cost	Improve the tenure system,
	Water shortage	Expanding modern irrigation & water harvesting technologies, Increase farmers' awareness about the benefits of the use of irrigation and water harvesting technologies.
	Lack of regular monitoring	Insuring farmers' access to regular monitoring & evaluation, Increase farmers' awareness about the importance of monitoring and evaluation.
	Lack of market regulations	Create a legal environment that could bring contract farming among value chain actors,
	lack of research & development	Insure farmers access to research & development via research institutions and universities

(Source: Field survey, 2022)

Table4.16: Opportunities and constraints of garlic trading

Opportunity	Constraint	Remedies
Greater demand	Price fluctuation	Expanding new marketing segments; domestic and international market destinations, Expanding food and chemical agro-processing manufacturing plants, Increasing farmers' awareness about the use of information technologies in farming and marketing.
Better income	Weight loss and Perish ability	Expanding infrastructures such as modern warehousing and transportation facility.
Means of livelihood	Security issues	Guaranteeing the peace situation
Seasonal work	Transport cost	Access to other types of alternative menses of transportation.
	Lack of market regulation	Setting market regulation mechanisms that could bring every actor in the chain together.
	Lack of credit supply	Provide appropriate amount of credit supply via credit institutions and other financial organizations.

(Source: Field survey, 2022)

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

The global production and consumption of garlic has been continuing to increase. Both methods of production and the marketing environment have been changed and improved. China alone dominates the global market in terms of production, volume of export, and gross per capita consumption. Indeed, in the global garlic market, few countries are significant producers, while all nations are significant consumers.

The soil, climate, water, and population resources of Ethiopia are conducive for garlic production; but, the methods of production are lagging behind the current global technological advancement. Production and consumption trends have been increased and improved over time;with greater degree of variability. The highest productivity was recorded in 2011 equals to 12.02 tons, while it was the lowest in 2021 equals to 7.19 tons in 2021; and the average yield of productivity is 9.80 tons; per hectares. There for, increase in total production is a result of increase in cropping land; not a result of increase in yield of productivity. Probably declining in productivity is the result of lack of government intervention to increase production and improve the marketing environment.

Oromia, Amhara, SNNRS, and Tigray regions are major production areas, however, Oromia and Amhara regions produce the bulk. Arsi and West Wollega in Oromia Region and North Shoa and Central Gondar in Amhara Region are major production areas. Despite this fact, insignificant portion of garlic has international outlet. Thus, garlic value chain in Ethiopia regrets from the

fragmentation and new trade theories of international trade; confined only to the domestic market.

The climate, soil, demographic characteristics, and water resources of the study area are by far suitable for garlic production. 71% of the study area is lying between 1500-2500 masl; regarded as a cool sub-tropical type of climate with alternative dry and wet season. Physically, 73.9% of the study area has plateau land, suitable for mechanized farming. A significant part of the study area is characterized by verticcambisol soil types, soils which are productive for agricultural activities. Population is young and productive which is required by labor intensive farming. Both surface and underground water; irrigation and summer rain are available to nourish garlic continuously throughout the growing season. Almost, 1/6 of total garlic was produced in this area; nationally; but, productivity is much lower as compared to other global producers. Garlic production in the study area is a fashion and a game booster for every farmer. Every farmer has a garlic farm; on average equals to 0.97 hectare; for a commercial purpose.

There are many garlic value chain actors in the study area; input suppliers, producers, collectors, brokers, wholesalers, retailers, consumers, and stakeholders; each of them have their own respective role. But, trends of the marketing environment shows, not all of them, but few of the actors are dominant and benefited. Producers have little power, and consumers have no power at all; only few traders at different point in the marketing channel have the upper hand either in price setting or influencing the entire marketing environment. The type of value chain relationship exists between value chain actors is market type; a weak type of relationship, in which buyers and sellers with little information, knowledge, and product specification left everything to the market; dominated by brokers and other illegal traders interest; and the type of

value add is product market chain, not value market chain. Indeed there a weak value chain relationship exists.

In the study area, though farmers and traders have been experienced value additions, value addition is more expressed in the form of cutting new price margins at different points along the marketing channel than transforming garlic as a value added product. Only simple value adds activities: dehydrating, cleaning, and grading are common value adding activities by farmers and traders so that they have relatively long shelf period. Indeed, along the marketing channel, there is no significant value adds transformation; rather, fresh garlic is almost and everywhere the common product type in the market.

There are four marketing channels; in which actors create their own value chain patterns. Actors' relationship is based on: face to face contact in the nearby market center, face to face contact in the farm gate, and through mobile order. There for, garlic farmers have access to the market either in the farm gate or in the nearby market called Balchi town; while traders have additional option; telephone order. The main means of communication is mobile phone; neither of farmers nor traders has been experiencing other types of IT platforms; for example internet options. Farmers in the study area have uses either animal (camel) or truck as the main menses of transportation to ship their product to the market center, while traders have only one option; truck. In both cases, there is no transportation problem in the study area. Garlic from the study area reaches to all parts of the Ethiopia; via traders called wholesalers; but, there is no international market destination.

Farmers prefer growing garlic to wheat or other cereals; as far as they can earn more income in a single production season. But, it does not mean that farming is a simple economic activity. To get such a reward, farmers should pay costs such as; high input cost, shortage of fertilizer, and

high labor cost to increase productivity. They are also confronting challenges such as: pests & weeds; water shortage & bad weather; pricefluctuation&high rental cost; market irregularities &brokers' intervention; perishability & weight loss; and lack of improved cultivars& access to agricultural services. Traders have also been challenged by problems such as; perishability, weight loss, transport cost, security issues, market irregularities and lack of access to credit. Therefore, growing garlic is a tedious and challenging economic activity for farmers and traders in the study area. Indeed, value chain actors in the study area, especially farmers are enjoying the benefits of garlic, but they should have to pay many costs before getting the rewards,

Generally speaking about garlic production and marketing of the study area, though biotic and abiotic factors are extraordinary good, productivity is low and total production is little. Again, though the global demand for fresh or dehydrated garlic is very high, garlic from the study area is confined to the domestic market. The trade relationship and patterns of garlic production and marketing of the study area, is far from the models: fragmentation theory, Michael Porters' model of value chain analysis, and the patterns of Global Value Chains. Indeed, the value chain relationship exists between chain actors is poor & weak; due to lack of government intervention; inefficient policy frameworks.

5.2. Recommendations

Garlic farming is an international business activity benefiting producers, traders, consumers, and in general nations' economy. Many countries around the world produced garlic, but few countries have been benefited. Those, who are benefiting from the sector have been made different efforts to transform the agricultural sector through; improving methods of production, improving the marketing environment, and designing& use the sector as a poverty mitigation

strategy under different platforms. Thus, based on the literature reviews and findings of this study, the researcher has the following recommendations:

Though garlic farming has been becoming international business, the methods of production in the study area is not based on modern farming methods &technologies. Farmers are not getting agricultural inputs on the right amount the right time at a reasonable price; especially they are challenged by shortage of fertilizer. Further, they have no enough access to improved seed verity. Though the study area is suitable for mechanized farming, still farming is based on animal and human labor; it is traditional. Further, garlic farmers have little awareness and access to agricultural services such as; contract farming, credit supply, and research & development. As a result, productivity is much below the global standards. Therefore, to divert the situation and modernize the farming sector there should be agricultural transformation. Government strategies should focus on ***National Garlic production Initiative Program*** containing projects: cluster farming, expansions of home industries focus on production of fertilizer and pesticides, proper supply of modern& appropriate type agricultural technologies, farmers' experience sharing, establishing national garlic center of excellence, farmers' access to credit supply, expanding garlic research & development centers, provision of proper agricultural extension services, and designing &implementing appropriate monitoring and evaluation system.

In the study area, the marketing experience of actors is characterized by absence of value chain governance, and less government intervention. Due to these facts,inthe value chain, some actors; brokers and wholesalers have almost a monopolistic power; while producers have little bargaining power, and consumers totally denying at least having some power; they have only an option either to accept or regret the price. There is no clear market regulation mechanism sated either by the value chain actors or the government. It is also true that, garlic from the study area

has no access to international market; indicating less government involvement in the garlic market. Therefore, to bring efficient and smooth marketing environment, there should be a need of more collaborative action to establish a garlic stakeholders' dialogue platform, so that responsive and accountable system of operation could become in to being. Thus, strategies should focus on***National Garlic Marketing Initiative Programs***; the***ValueChain Governance***: to bring this, the government should focus to accomplish projects; proper supply of agricultural inputs, production based contract farming, manufacturing based export oriented production &product upgrading,branding& promotion, and awareness creation &training; so that actors in the chain could mutually benefited, and the nation could have a reasonable share of international market.

There is little understanding of global garlic market among actors; especially the government. Off course, according to the Ministry of Agriculture, much attention has been given to the horticulture industry; specifically to onion and tomato as they are domestically becoming common in every household dish; and avocado and mango for export purpose, to generate foreign currency. But, while garlic is becoming an important item in the domestic market as a food flavoring ingredient in every household's daily meal, and in many countries as an export commodity for example coffee and sesameto generate foreign currency, the Ethiopian government doesn't consider garlic as important as onion and tomato for the domestic market, and avocado and mango for the international market. As a result, in the study area, garlic farming is undertaking under private smallholders' initiative; thus, productivity and quality of garlic is poor. Therefore, to benefit & improve living standards of garlic actors significantly in particular, and to bring garlic as an alternative cash crop to generate foreign currency and to use as a menses of national poverty mitigation strategy as other experiencing countries in general, there should be

a need to a more collaborative action between value chain actors and stakeholders. Thus strategies should focus on the ***reconsideration of thehorticulture policy framework***, and ***awareness creation***; by the Ethiopian government / MoA.

There are countries which can be mentioned credential to modernize the garlic sector. They are credential for their significant contribution to;improve productivity, increase total production, and value chain system of marketing operation; On the opposite side, though huge potential resources to produce, the garlic sector in Ethiopia is traditional; it lacks productivity and efficient value chain system of operation. Therefore, to resolve the issue, the government of Ethiopia should focus to modernize the garlic sector through ***experience sharing****;* from abroad especially, China;

In the study area, garlic production is an extraordinary economic activity for every farmer and every household for many years. Amount of production has been increasing from time to time; farmers in the study area by far experiencing an extended skill in garlic production, and the marketing area has been expanding almost it covers the whole part of the country. Thus, farmers could share their experience to others across the country; so that farmers across the nation could produce garlic so that total production increases. In doing so, farmers' way of living and living standard could become improved, and the nations revenue from the sector; domestically and internationally could significantly increase. Thus, there should be a more collaborative action between the Ministry of Agriculture and stakeholders, to bring ***garlic center of excellence***; in MinjarShenkoraWoreda.

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Appendixes

Appendix I: Regional and Zonal Distribution of Garlic Production in Ethiopia; ESS 2021

No	Region	Number of households	Area in hectares	Production in tons	Yield per hectares in tons
	ETHIOPIA	**1,328,146**	**15,979.54**	**114,944.70**	**7.19**
1	**Tigray Region**	**34,909**	**309.18**	**2,049.48**	**6.63**
	S/Tigray	8,233	-	-	0.00
	SE Tigray	4,896	24.62	157.78	6.41
2	**Amhara Region**	**689,760**	**7,167.49**	**53,094.00**	**7.41**
	N/Gondar	46,964	-	-	0
	S/Gondar	64,410	208.6	1,671.10	8.01
	N/Wollo	74,738	458.33	3,210.78	7.01
	S/Wollo	123,416	635.5	4,245.14	6.68
	N/Shawa	129,197	1,627.67	13,249.93	8.14
	E/Gojam	91,587	-	-	0
	W/Gojam	76,151	-	-	0
	WagHimra	19,026	64.2	310.08	4.83
	Awi	30,914	211.22	1,482.81	7.02
	Oromo	3,311	-	-	0
	C/Gondar	29,923	808.85	6,519.13	8.06
3	**Oromia Region**	**481,872**	**8,037.14**	**55,971.09**	**6.96**
	Illuababora	8,030	10.13	51.03	5.04
	Jimma	33,429	86.89	557.84	6.42
	W/Wollega	144,019	1,421.89	10,786.76	7.59
	N/Shawa	61,631	248.17	1,209.24	4.87
	E/Shawa	4,750	-	-	0
	Arsi	31,876	1,206.28	9,814.13	8.14
	W/Arsi	12,390	753.42	5,388.76	7.15
	W/Hararge	3,728	-	-	0
	SW Shawa	34,311	81.46	534.21	6.56
	HoroGuduru	34,428	76.72	510.28	6.65
	BunoBedele	13,620	17.53	98.19	5.60
	FinfeneZurea	29,037	274.81	1,794.59	6.53
4	**SNNRS**	**115,432**	**382.07**	**3,325.59**	**8.70**
	Gurage	27,173	220.63	2,124.22	9.63
	Hadya	6,962	-	-	0
	Kambata	4,956	-	-	0
	Shaka	18,462	-	-	0

No	Region	Number of households	Area in hectares	Production in tons	Yield per hectares in tons
	Kaffa	37,970	57.97	449.24	7.75
	GamoGoffa	11,043	25.02	218.90	8.75
	Yem Special	2,564	3.34	31.42	9.41
	Segen	1,124	-	-	0

Appendix II: Global Garlic Producing Countries According to FAO; 2022

No	Country	Total production in tons	Per capita consumption	Acreage of land in hectare	Productivity in kgsper hectare
1	China	23,305,888	16.72	834,226	27,937.1
2	India	2,910,000	2.177	358,000	8,128.5
3	Bangladesh	466,389	2.824	71,734	6,501.6
4	South Korea	387,671	7.508	27,689	14,000.9
5	Egypt	318,800	3.27	15,503	20,563.8
6	Spain	271,350	5.816	27,350	9,921.4
7	United States of America	237,340	0.724	10,930	21,714.5
8	Algeria	223,311	5.249	13,408	16,655.1
9	Uzbekistan	216,272	6.623	7,089	30,508.1
10	Ukraine	215,070	5.089	23,600	9,113.1
11	Myanmar	208,908	3.879	28,280	7,387.1
12	Russian Federation	202,120	1.376	21,008	9,621.1
13	Ethiopia	152,595	1.419	18,344	8,318.5
14	Argentina	147,649	3.318	15,787	9,352.6
15	Brazil	131,523	0.628	11,209	11,733.7
16	Indonesia	88,817	0.335	12,280	7,232.7
17	Thailand	84,039	1.215	13,092	6,419.1
18	Peru	83,297	2.667	7,924	10,512
19	Mexico	82,910	0.665	6,807	12,180.1
20	Pakistan	75,342	0.373	8,109	9,291.2
21	Nepal	71,902	2.461	10,107	7,114.1
22	Kyrgyzstan	69,201	10.968	4,342	15,937.6
23	North Korea	64,379	2.514	5,988	10,751.3
24	Iran	58,582	0.717	4,701	12,461.6
25	Kazakhstan	49,125	2.688	2,311	21,257
26	Taiwan	47,464	2.013	5,115	9,279.4
27	Sudan	45,339	1.111	3,708	12,227.3
28	Azerbaijan	39,118	3.952	3,862	10,128.9
29	Guatemala	34,867	2.015	3,721	9,370.3
30	Tunisia	32,464	2.836	2,726	11,909
31	Italy	29,270	0.484	3,410	8,583.6
32	France	28,140	0.418	3,740	7,524.1
33	Romania	27,700	1.419	5,760	4,809

No	Country	Total production in tons	Per capita consumption	Acreage of land in hectare	Productivity in kgsper hectare
34	Turkey	23,351	0.289	2,557	9,132.2
35	Syria	21,988	1.203	1,121	19,614.6
36	Chile	21,097	1.2	1,556	13,558.5
37	Japan	20,690	0.164	2,514	8,229.9
38	Belarus	19,530	2.061	1,808	10,802
39	Tajikistan	16,459	1.843	959	17,162.7
40	Cuba	16,383	1.46	2,169	7,553.3
41	Poland	15,100	0.393	1,400	10,785.7
42	Venezuela	15,069	0.473	1,673	9,007.2
43	Albania	15,056	5.245	989	15,223.5
44	Mali	14,956	0.783	1,025	14,591.2
45	Morocco	10,319	0.297	1,375	7,504.7
46	Armenia	10,081	3.395	1,066	9,456.8
47	Colombia	9,272	0.186	695	13,341
48	Niger	7,449	0.347	490	15,202
49	Hungary	7,370	0.754	1,170	6,299.1
50	Philippines	7,256	0.068	2,612	2,777.9
51	Moldova	7,124	2.006	3,683	1,934.3
52	Tanzania	6,392	0.118	2,234	2,861.2
53	Bosnia and Herzegovina	5,641	1.491	1,687	3,343.8
54	Libya	4,703	0.727	819	5,742.4
55	Macedonia	4,515	2.176	904	4,994.5
56	Greece	4,390	0.408	580	7,569
57	Iraq	3,986	0.101	594	6,710.4
58	Turkmenistan	3,483	0.595	309	11,271.8
59	Yemen	3,334	0.115	480	6,945.8
60	Serbia	3,092	0.442	1,145	2,700.4
61	Madagascar	2,972	0.113	436	6,816.5
62	Croatia	2,880	0.687	410	7,024.4
63	Lebanon	2,858	0.469	285	10,028.1
64	Jordan	2,506	0.245	120	20,883.3
65	Oman	2,501	0.499	185	13,518.9
66	The Netherlands	2,470	0.143	180	13,722.2
67	Bolivia	2,230	0.197	515	4,330.1
68	Bulgaria	2,220	0.315	510	4,352.9
69	Georgia	2,100	0.563	700	3,000
70	Kenya	2,067	0.041	114	18,131.6
71	Portugal	2,040	0.198	170	12,000
72	New Zealand	2,016	0.411	334	6,035.9
73	Dominican Republic	1,951	0.190	338	5,772.2
74	Czech Republic	1,640	0.155	360	4,555.6
75	Israel	1,449	0.163	1,176	1,232.1

No	Country	Total production in tons	Per capita consumption	Acreage of land in hectare	Productivity in kgsper hectare
76	Latvia	1,380	0.717	430	3,209.3
77	Ecuador	1,349	0.079	846	1,594.6
78	Nigeria	1,283	0.006	98	13,091.8
79	Canada	1,248	0.034	537	2,324
80	Austria	1,210	0.137	210	5,761.9
81	Haiti	1,116	0.100	42	26,571.4
82	Slovenia	1,060	0.513	180	5,888.9
83	Palestinian Territories	1,058	0.233	103	10,271.8
84	Montenegro	1,056	1.697	250	4,224
85	Lithuania	970	0.346	430	2,255.8
86	Uruguay	893	0.255	162	5,512.3
87	Bhutan	761	1.047	312	2,439.1
88	Malawi	645	0.036	115	5,608.7
89	Slovakia	590	0.108	100	5,900
90	Cyprus	359	0.420	21	17,095.2
91	Malta	358	0.753	43	8,325.6
92	East Timor	307	0.243	132	2,325.8
93	Kuwait	304	0.072	7	43,428.6
94	Honduras	242	0.027	62	3,903.2
95	Paraguay	234	0.033	168	1,392.9
96	Zimbabwe	218	0.015	48	4,541.7
97	Estonia	130	0.099	70	1,857.1
98	Finland	70	0.013	40	1,750
99	Cape Verde	59	0.108	12	4,916.7
100	Switzerland	58	0.007	60	966.7
101	Sweden	50	0.005	20	2,500
102	Mauritius	48	0.038	8	6,000
	Total / Average	**30,755,884**	**1.42 kgs**	**1,639,813**	**9,488.45**

Appendix III: Garlic Farmers Questioners

1. Socio-economic data of the respondents

No	Category	Sex	
		Male	Female
1	Age		
2	Marital status		
3	Family size		
4	Academic status		
5	Income		
6	Farm size		
7	Amount of total production		
8	Yield of Productivity		

9	Type of tenure		

2. Factors Affecting Yield of Productivity

2.1. What type of farming you are experiencing in garlic production?

a) Sole cropping
b) Mixed farming

2.2. What types of cropping seasons are there in your locality?

a) Rain fed
b) Irrigation
c) Both

2.3.What types of climate are best fit to the production of garlic in your locality?

a) Cool & dry
b) Cool & wet
c) Warm & dry
d) Hot & dry
e) Hot & wet

2.4. Based on your experience, what type of precipitation is conducive for garlic farming?

a) Light & continuous
b) Moderate & continuous
c) Heavy & continuous

2.5. Have you ever made an effort to increase yield of productivity?

2.6. If your answer is yes, which of the following factors significantlyaffects yield of productivity?

No	Factors	Scale		
		High	Middle	Low
1	Harvesting activities			
2	Irrigation practice			
3	Labor			
4	Use of improved variety			
5	Use of artificial fertilizer			
6	Use of pesticide, insecticide & weedicide			

3. Factors Affecting Total Production of Garlic

3.1. Are there factors that motivate you to produce garlic?

3.2. If your answer is yes, which of the following factors significantly motivate garlic production?

No	Factors	Scale		
		High	Middle	Low
1	Easiness to grow			
2	Requires low maintenance			
3	Brings better income than other crops			
4	Productive than other crops			
5	Reduce soil erosion& keeps the soil moist			
6	Have low disease & weeds issues			

4. Factors Affecting Price of Garlic

4.1. Have you been experienced garlic price fluctuation?

4.2.If your answer is yes, which of the following factors significantly affects the price of garlic?

No	Factors	Scale		
		High	Middle	Low
1	Agricultural input price			
2	Labor cost			
3	Influence from value chain actors			
4	Value chain governance			
5	Transport cost			

4.3.Do you think that the price for garlic grow over time?

a) Yes
b) No

4.4.Had you experienced a seasonal difference in price for garlic?

a) Yes
b) No

4.5.What looks like the trend of garlic price across months?

No	Month	Price
1	December	
2	March	
3	June	
4	August	

5. Value Chain Actors and Their Respective Role

5.1. Who are the garlic value chain actors along the marketing channel?

No	Actor's Name	Actor Type	Actor's Respective Role
1			
2			
3			

6. Value Additions and marketing Situation

6.1.Have you ever had value adding experience?

6.2.If your answer is yes, what were the types of value adding activity you prefer?

No	Type of value added activity	Why you prefer?
1		
2		
3		

6.3.Where do you sell your garlic**?**

No	Buyers	Marketing channel			
		Farm gate	Market center	Cooperatives	Government
1					
2					
3					

6.4.What were the final markets to your garlic?

No	Destination

	Domestic destination	International destination
1		
2		
3		

7. Opportunities and constraints of garlic production and marketing

7.1.Are there opportunities and constraints of garlic production and marketing?

7.2.If your answer is yes, what are the opportunities and constraints, and their remedies?

	Opportunity	Constraint	Remedies
1			
2			
3			

Appendix IV: Focused Group Discussion Questions for Policy Makers

1.1 Do you know much about horticulture industry?

1.2 If your answer is yes, do you recommend the sector as a remedy for Ethiopian economic development?

1.3 How much you know about the economic and health importance of garlic?

1.4 Is there a policy framework that designed to motivate garlic production specifically?

- 1.4.1 If the answer is yes, how well it address the phenomenon?
- 1.4.2 If your answer is no, how you motivate farmers to increase production & productivity?

1.5 Is there an institution that supports the horticulture industry?

1.6 If yes, what type of support it provides to garlic farmers?

- 1.6.1 Supply of farm inputs
- 1.6.2 Extension service
- 1.6.3 technical support
- 1.6.4 financial / credit support
- 1.6.5 Training support
- 1.6.6 Value chain support
- 1.6.7 Other (specify)

1.7 Are there a local / an international non-governmental organization that provides assistance?If your answer is yes, what kind of assistance they provide?

- 1.7.1 Supply of farm inputs
- 1.7.2 Extension service
- 1.7.3 technical support
- 1.7.4 financial / credit support
- 1.7.5 Training support
- 1.7.6 Value chain support
- 1.7.7 Other (specify)

1.8 Do you think farmers in Ethiopia are motivated to grow garlic? If your answer is yes, how they are motivated? Please explain

1.9 Is there garlic value chain relationship in Ethiopia? If your answer is yes,

- 1.9.1 Who are the main garlic value chain actors?
- 1.9.2 How much actors are mutually benefited from the chain?

1.10 Do you think that garlic has been got the right attention from the government?

1.11 What do you think the overall importance of garlic to the Ethiopian Economy?

1.11.1 Poverty alleviation strategy
1.11.2 Alternative agricultural commodity in the international trade
1.11.3 Food security
1.11.4 Environmental sustainability
1.11.5 Other (specify)

1.12 What are the opportunities & constraints of garlic farming currently?

1.12.1 Opportunities
1.12.2 Constraints