

**VALUE CHAIN ANALYSIS OF TOMATO IN KERSA
DISTRICT OF OROMIA, SOUTH WESTERN ETHIOPIA.**

MSC THESIS

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DEDICATION

This thesis is dedicated to my wife Meseret Dechasa for her strong commitment for my success and Abebe Emana for his individual consult. At the end, all my friends for their personal consultation.

BIOGRAPHICAL SKETCH

The author was born at Jarte district in Horro Guduru Wellega, Ethiopia to his father, Mr. Deressa Eticha, and to his mother, Mrs. Jebene Wakjira on February 1, 1987.

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STATEMENT OF THE AUTHOR

This thesis has been submitted in partial fulfilment of the requirements for M. Sc. degree at the Jimma University and when it's recognised, I was deposited at the University Library to be made available to borrowers under rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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ABBREVIATIONS AND ACRONYMS

AAFC	Agriculture and Agri-Food Canada
AVRDC	Asian Vegetable Research and Development Centre
CSA	Central Statistics Agency
EIAR	Ethiopia Institute of Agricultural Research
EHDA	Ethiopian Horticultural Development Agency
FAO	Food and Agriculture Organization
GVC	Global Value Chain
GTZ	German Agency for Technical Cooperation
ILO	International Labour Organization
GMM	Gross Marketing Margin
GPM	Gross Profit Margin
MVP	Multivariate probit Model
MOA	Ministry of Agriculture
NARS	Ethiopian National Agricultural Research System
NMM	Net of Marketing Margin
OLS	Ordinary Least Square
UNIDO	United Nations Industrial Development Organization
USOD	United state of Development
UNDP	United Nation Development Program
RATES	Agricultural Trade Expansion Support Program
WOIDA	Woreda of Irrigation Development Authority
TGMM	Total Gross Marketing Margin
TGPM	Total Gross Profit Margin
VIF	Variance Inflation Factor

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VALUE CHAIN ANALYSIS OF TOMATO IN THE KERSA DISTRICT, SOUTHWEST, ETHIOPIA.

ABSTRACT.

In Jimma zone of Oromia National Regional state, Tomato is a most important edible and nutritional vegetable crop, which is mainly produced by smallholder farmers. The study was to under taken with the specific objectives of identifying actors in tomato the value chain, analysing marketing margins; analysing factors affecting tomato supply and examining market outlet choice for selling tomato. The data were collected from both primary and secondary sources. The primary data for this study were collected from 129 farmers from four kebeles and 45traders through application of appropriate statistical procedures. Descriptive and econometric methods of data analyses were used. The study result showed that tomato producers are faced with lack of proper coordination among the value chain actors, shortage of education, farmers coordination, low price of product, limited access to extension contact, low bargaining power of producers, limited access credit, transport, market information, quality and post-harvest losses, lack of policy framework are the major problems. The value chain analysis revealed that the major actors in the Woreda are input suppliers, producers, brokers, collectors, wholesalers, retailers, consumers and supportive services. Tomato passes through several intermediaries with little value being added before reaching the end users. The chain is governed by wholesalers who have capital advantage over the other chain actors. Out Of total tomato producing households, 21.05% sold their tomato to collectors 25.3%, to retailers, 52.7% whole sellers and respectively. The net market margins in that participant are found out 605,175, 548, and 80. Finally trader on average took 61.04% of total profit margin. While farmers doing all the work of producing tomato and bearing the associated risk took only 38.96% of the profit margin. Therefore, farmers are forced to capture a lower share of profit margin. This unequal share of benefit is the reflection of power relationship among the actors. The ordinary least square regressions (OLS) model result shows that tomato commercial was significantly affected by five variables such as education level, current price, farm size, access to market information, and distance to market. Multivariate probit model result also indicate the probability to choose the wholesaler and collector outlet was significantly affected by household education, land size, distance to market, access to credit, access to extension, farmers cooperative membership and distance to the market. Therefore the strategy aim to, facilitating education level, enabling experience sharing habit of tomato farming (preparing conferences at least by selecting demonstration site), adequate market information by establishing technical committee among the sectors , fixing market place for producer with technical committees for establishing reasonable prices, land extension, developing access to credit, improving access extension and establishing capable farmer cooperative are a recommended issues.

Key word: Ethiopia, supply, Tomato, Value Chain.

1. INTRODUCTION

1.1. Background of the study

Agriculture is the main stay of Ethiopian economy contributing about 43% of the GDP, 80% of employment and 90% of the export (MoFED, 2011). Since 1994/95, the Ethiopian government adopted Agricultural Development Led Industrialization (ADLI) development strategy. The strategy argues that growth starts from agriculture and initiates the growth of other sectors especially the industry sector through backward and forward linkages (MoFED, 2006). Furthermore, Ethiopia launched and commenced implementing its Growth and Transformation Plan (GTP) in 2009/10. GTP envisages the ADLI strategy to continue with the bid to transform Ethiopian economy from agriculture domination and using agriculture itself as a stepping board (MoFED, 2010). Therefore, it is becoming increasingly crucial for policy makers to focus immediate attention on agro-industries. Such industries, established along efficient value chains, can increase significantly the rate and scope of industrial growth (UNIDO, 2009).

According to MoFED, the Ethiopian government has prioritized commercialization of farming as a policy agenda since 2005 and this priority is demonstrated by the central place this issue has gained in the second Poverty Reduction Strategy Paper (PRSP) (Sharp *et al.*, 2007:44). The second Poverty Reduction Strategy Paper for Ethiopia (PRSP), known as the Plan for Accelerated and Sustainable Development to End Poverty (PASDEP), is established up on eight pillars; the second pillar intends to achieve growth and thereby improve people's livelihoods and reduce poverty (MoFED, 2006 cited in Samuel and Sharp, 2007).

Vegetables are primarily produced by horticulture and only for human nutrition. A group of crops known as "vegetables" consists of more than 200 plant species all over the world by (Sacks and Silk, 1987as cited by Haile *et al.*,2014).A serious challenge to human survival, particularly in the developing world, is the ever growing gap between human population and food supply. Growing and using wild vegetables is an opportunity that has never been adequately prospected to alleviate malnutrition and ameliorate food insecurity. Hundreds of edibles including many vegetables of wild/semi-wild origin are known to be sporadically consumed by rural communities in Ethiopia (Getachew, *et al.*, 2013).

Tomato is one of most important edible and nutritional vegetable crops in the world. It ranks next to potato and sweet potato with respect to world vegetable production. It is widely cultivated in tropical, sub-tropical and temperate climates. According to FAO (2009) 126 Million tons of tomatoes were produced in the world. China, the largest producer accounted for about one fourth of the global output, followed by United State, Turkey, Iran, Mexico, Brazil, and Indonesia. It is one of the most economically important vegetable crops and is widely cultivated in the world with the total tones in area and production of 5,227,883 ha and 129,649,883 in 2008. It is the most frequently consumed vegetable in many countries, becoming the main supplier of several plant nutrients and providing an important nutritional value to the human diet (Wilcox *et al.*, 2003).

There are about 7500 tomato varieties worldwide. One of the types known as Heirloom tomatoes is becoming increasingly popular, particularly among home gardeners and organic producers, because they produce more interesting flavourful crops and are disease resistant. The introduction of cultivated tomato into Ethiopian agriculture dates back to the period between 1935 and 1940 (Samuel *et al.*, 2009). The Ethiopian Institute of Agricultural Research (EIAR) was established in 1966 (Setotaw, 2006; cf. Roseboom *et al.*, 1994:2) during which tomato was recognized as a commodity crop. Since 1969, 300 varieties were tested (Shushay, 2011). However, among varieties tested most showed susceptibility to late blight, powdery mildew and mosaic virus (Tindall, 1970).

According to (MoA, 2013) Ethiopian National Agricultural Research System (NARS) has released about 25 tomato varieties till 2013. From these varieties 11 were released by Ethiopian Institute of Agricultural research (10 of them are under production and 1 is released in 2013/14 which is expected to be multiplied and scaled up during the next Ethiopian fiscal year), by Regional Agricultural Research institutes (4 of them are under production) and 10 by private companies (10 of them are under production). But, Melka salsa (Serio) and Melka Shola (Red Pear) which were released by Ethiopian Institute of Agricultural research (Melkasa Agricultural research center) in 1997/98 are the oldest varieties which are on production still now. They are disease tolerant tomato varieties.

Tomato is a seasonal climbing plant of the family solanaceae which is one of economically important and widely grown vegetable crop as annual both in the rainy and dry seasons for

their fruits by smallholder farmers and commercial state and private farms in Ethiopia (MoA, 2013; AVRDC, 2014; Ambecha O. Gemechis *et al.*, 2012).

According to (CSA, 2013/14), Ethiopia devoted 7,257.45 ha to produce 393,730.22 tons of tomatoes. In 2012 Ethiopia was rated as the 84th producer of tomato in the world and ranked 58th in area coverage (Fact fish, 2013). Recently due to expansion of state farms and private investment which are basically concentrated in the rift valley areas of Ethiopia, commercial production of vegetables like tomato has been increasing. However still it is the smallholder farmers that contribute most of the tomato production produced in the country. The smallholder farmers are interested in tomato production more than any other vegetables for its multiple harvests potential and for its high profit per unit area (AVRDC, 2014).

The value chain concept entails the addition of value as the product progresses from input suppliers to producers and consumers. A value chain, therefore, incorporates productive transformation and value addition at each stage of the value chain. At each stage in the value chain, the product changes hands through chain actors, transaction costs are incurred, and generally, some form of value is added. Value addition results from diverse activities including: cleaning, grading, and packaging, transporting, storing and processing (Anandajayasekaram and Berhanu, 2009).

Tomato production is a widely practiced activity in Kersa *woreda* and other surrounding *woredas* of Tiro Afata and Gommaa Woreda of Jimma Zones. In this area tomato production is undertaken by smallholders. The area has a plain topography, with favourable weather conditions (moderately hot temperature), better availability of water (underground and river sources), and an advantageous location (with better infrastructure and high market potential) for tomato production. As a result, a large amount of tomato products are supplied to different markets in the area and to different parts of the country as a whole.

In Ethiopia, tomato is produced in the state and private horticultural enterprises, commercial farms and small farmers scattered in different parts of Ethiopia. It is produced mainly as a source of food and income both under rain-fed as well as irrigated conditions. Tomato is among the most important vegetable crops in Ethiopia (Jiregna *et al.*, 2012).

However, in Ethiopia more efforts are necessary to widen the horizon of success by linking tomato research, extension activities and multiplication of tomato seed provided by research centres. The result has been a significant increase in quality of tomato production and supply to the market. So as to exploit the opportunity of the current growing demand for tomato development programs and approaches which bring actors to ultimate user of tomato is fundamental to improve quality and strengthen linkages. Therefore, this study was initiated to fill information gap on tomato value chain analysis in kersa Woreda.

1.2. Statement of the problem.

Agricultural development can be constrained by many factors. Key constraints include high transaction costs, market imperfection, lack of technology, lack of access to credit, perishability of the products and the prevalence of staple foods that are only slightly traded (World Bank, 2008). These constraints may result in either exclusion of smallholders from market or unequal distribution of benefits. There is a need to manage effective participation of stakeholders in national and international economy to ensure that incomes are not reduced or further polarized (Kaplinsky and Morris, 2000).

Growing and marketing of tomato production in Ethiopia is complicated by high postharvest losses, which are about 30% (EIAR, 2000; Workneh *et al.*, 2011). This high loss is due to packaging, storage facilities and poor means of transportation such as human labor, donkeys and mules, public transport and rented trucks (Kebede, 1991; Samira *et al.*, 2011). The selection and careful handling of perishable products determine the quality of the production. Harvesting products at optimum maturity, maintaining higher sanitation standards, decreasing injury, incidence and maintaining environmental conditions guarantee excellent postharvest quality (Zagory and Kader, 1988; Workneh *et al.*, 2011).

Several studies *et al.*, Dereje, (2007), Kaleb, (2008); Dendena *et al.*, (2009). A review of literature on value chain indicates that the agricultural sector facing many challenges due to limited seed supply, market outlets, limited efforts in market linkage activities (institutionalization) and poor market information among actors. Abebe *et al.*, (2005) tomato production was broad and covered all horticultural crops. Such surveys were crude and did not identify production status and constraints at the level of the individual crop. Moreover, the limited information available at the crop level is site-specific and no attempts have been

made to assess for each tomato growing eco-region and this conditions limit or reduce yield. Correspondingly, Mamo (2009) argued that small scale, dispersed and unorganized producers being unlikely to exploit market opportunities as they cannot attain the necessary economies of scale and lack bargaining power in negotiating prices.

According to the diagnostic study conducted for this research, there are different factors that could affect the volume of tomato supply to the market in Ethiopia in general and in kersa districts of Jimma zone in particular. Some of those factors affect the production and the amount supplied of Tomato are: lack of proper coordinate on among the value chain actors, low price of tomato, low bargaining power of producers, limited access availability, low strength of cooperatives, quality and post-harvest losses, *'' resulted in diminish producers' price''*. There is no value adding activities to the product by the trader at all, and unbalanced share of actors are the major gaps for the production and supply of tomato in the study area. The extent to which these variables affect the tomato supply and farmer channel choice outlet is not studied in the area.

In this regard, tomato value chain analysis is motivating route that has not been investigated much in the study areas. Both buyers and sellers in the study areas usually do not play proper joint towards one another and there are limitations on tomato supplying and processing activities in the study area. However, the farmers and traders do not use much service that have to be served by the support services. All the above mentioned production, and marketing situations are the highlights of tomato producers' need the specific focus of researchers to conduct tomato value chain analysis in these specific areas as it incorporates factors influencing production, volume of tomato production supplied to the market and producers margins of end consumers' prices in it.

Furthermore, the study was focus on the major factors affecting tomato supply and the channel choice outlet of tomato supply actors in the value chain as far as to knowledge is concerned. There is little study in the study areas on the selected commodity. So, this study was investigating the value chain analysis of tomato produced in Jimma Zones. Therefore, this study was help to find the weak link of chain actors, factor influence tomato supply return and channel choice outlet are narrow the research gap that has been observed currently on tomato value chain analysis in the study area.

1.3. Research Questions

The study attempted to answer the following questions:

1. Who are the main actors and lines of movement's tomato products?
2. What are the tomato marketing margins among the value chain actors?
3. What are the major factors affecting tomato supply in the study area?
4. What are the key factors affecting farmers' channel choices of tomato supply?

1.4. Objectives of the study

The general objective of the study was to analysis the tomato value chain in Kersa District.

1.4.1. The specific objectives

1. To Identify major actors and lines of tomato products movements
2. To analyze profit margins share among the value chain actors.
3. To analyzes factors affecting tomato supply in the study area.
4. To examine factors affecting channel outlet choice of farmers in tomato supply.

1.5. Significance of the study

The study analyzed the complete tomato value chain from input supplier to the consumer of the study area. It also provides a holistic picture of existing challenges and opportunities in the tomato value chain. Moreover, this study provides information on the determinants of tomato supply to the market, actors 'and channel choice outlet and identifies opportunities and constraints of tomato value chain in the study areas. Therefore, it could light on required efforts to enhance utilization of tomato at larger scale to bring about economic development in the area. The information generated could also help a number of stakeholders including: research and development organizations, traders, producers, policy makers, extension service providers, government and non-governmental organizations to assess their activities and redesign their mode of operations and ultimately influence the design and implementation of policies and strategies. It could also help different actors to identify and analyze new ways of interesting innovation.

1.6. Scope and limitations of the study

This study was conducted in kersa *woreda*, important information was collected from sampled households and marketing actors in the study area. Hence, the study was limited by fluctuation price of products, difficulty of getting the randomly selected households on schedule in the course of collecting primary data from farm households, the secondary data collected at different levels sometimes show inconsistent. Latest literature review was the biggest challenge faced the researcher.

1.7. Organization of the thesis

The study is divided into five main sections. Following the introduction, chapter two presents review of literature. In chapter three, the research methodology is presented. In chapter 4, result discussion and analysis of empirical findings is presented. In the last section, conclusions and recommendations are specified.

2. LITERATURE REVIEW

In this part of the thesis, theoretical reviews like the basic concepts of value chain, concepts guiding agricultural value chain, benefit of value chain in agricultural sector, markets and marketing, market channel, supply, marketing performance, developing value chain towards the benefit of producers, status of tomato production in Ethiopia and relative empirical reviews would be discussed below.

2.4. Definitions and basic concepts

2.4.1. concepts of value chain

A value chain encompasses the full range of activities and services required to bring a producer or service from its production to its end use (Kaplinsky, 2000). Value chain includes process actors like input suppliers, producers, processors, traders and consumers. At one end are the producers – the farmer who grow the crop and raise the animal. At the other end are consumers, who eat, drink and wear the final products. In the middle are hundreds and thousands of individuals and firms, each performing one small step in the chain: transporting, processing, storing, selling, buying, packaging, checking, monitoring, making decision, etc.

It also includes a range of services needed in the value chain including technical support (extension), business enabling and financial services, innovation and communication, information brokering, etc. the value chain actors and service providers interact in different ways starting from local to national and international levels (Bezabih, 2011). The multitude of functions that are performed to produce goods and make them available for the consumer is also expressed in the concept of market chain. The market chain refers to the system that consists of actors and organizations, relations, functions, and products, cash and value flows that make possible the transfer of goods or services from the producer to the final consumer (Bezabih and Mengistu, 2011).

A value chain consists of all value-generating activities, sequential or otherwise, required to produce, deliver and dispose of a commodity (Schmitz, 2005). More specifically, it describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical

transformations and the input of various producer services), to delivery to the final consumer and final disposal after use (Kaplinsky and Morris, 2000). A typical chain includes all of a product's stages of development, from its design to its sourced raw materials and intermediate inputs, its distribution, and its support to the final consumer (McCormick and Schmitz, 2002).

Supply chain is the physical flow of goods that are required for raw materials to be transformed into finished products. Supply chain management is about making the chain as efficient as possible through better flow scheduling and resource use, improving quality control throughout the chain, reducing the risk associated with food safety and contamination, and decreasing the agricultural industry's response to changes in consumer demand for food attributes (Dunne, 2001).

A value chain is the full range of activities required to bring a product from conception, through the different phases of production and transformation. A value chain is made up of a series of actors (or stakeholders) from input suppliers, producers and processors, to exporters and buyers engaged in the activities required to bring agricultural product from its conception to its end use (Kaplinsky and Morris, 2001). Bammann (2007), identified three important levels of value chain. Value chains encompass a set of interdependent organizations, and associated institutions, resources, actors and activities involved in input supply, production, processing, and distribution of a commodity. In other words, a value chain can be viewed as a set of actors and activities, and organizations and the rules governing those activities.

Value chain management is about creating the added value at each link in the chain and a sustainable competitive advantage for the businesses in the chain. How value is actually created is a major concern for most businesses. Porter (1985), indicates that value can be created by differentiation along every step of the value chain, through activities resulting in products and services that lower buyers' costs or increase buyers' performance. In much of the food production and distribution value chain, the value creation process has focused on commodities with relatively generic characteristics; creating relatively small profit margins. Value chains provide the framework for designing and implementing many developments programs and projects. Given a multitude of different areas of application, geographical locations, commodity types, and desired outcomes, a variety of closely related conceptualizations of value chains has emerged (Stamm and von Drachenfels, 2011). It is a

group of companies working together to satisfy market demands. It involves a chain of activities that are associated with adding value to a product through the production and distribution processes of each activity (Schmitz, 2005). An organization's competitive advantage is based on their product's value chain. The goal of the company is to deliver maximum value to the end user for the least possible total cost to the company, thereby maximizing profit (Porter, 1985).

Value chain actors: -The chains of actors, who directly deal with the products, i.e. produce, process, trade and own them. These value chain actors operate within an institutional environment, which can either facilitate or hinder its performance (Gereffi, 1995). Value chain supporters: - The services provided by various actors who never directly deal with the product, but whose services add value to the product. Value chain influencers: - The regulatory framework, policies, infrastructures, etc. The value chain concept entails the addition of value as the product progresses from input suppliers to producers and consumers. A value chain, therefore, incorporates productive transformation and value addition at each stage of the value chain. At each stage in the value chain, the product changes hands through chain actors, transaction costs are incurred, and generally, some form of value is added.

Vertical coordination:-describes how different types of enterprises interact with their input suppliers (one or more functional level below them in the value chain map) and with the firms that purchase their output (one or more functional levels above them in the value chain map). The nature of these interactions defines the governance structure, which influences the distribution of benefits and, in turn, reflects the distribution of power and control within the value chain (Steven *et al.*, 2012).

Horizontal coordination: - among like firms can often confer competitive advantages as well. Farmer associations and marketing cooperatives emerge for correctly this reason, in order to help large numbers of small value chain actors increase their bargaining power, reduce their transaction costs, attain the scale necessary to attract high prices and assemble the minimum lot sizes necessary to meet the requirements of large-scale intermediaries from whom they purchase or to whom they sell (Steven *et al.*, 2012).

Competitiveness:-Value-chain analysis originally emerged as a tool for increasing competitiveness by pinpointing where and how participants could introduce efficiencies,

reduce costs and maximize value. The implementation of competitive strategies, initially popularized by (Porter, 1985), aimed to promote behaviours that make value chains more competitive. Indeed, value-chain analysis provides useful information on structure linkages, actors, and dynamics. It helps to identify where, how, why, and by whom value is added and created along the chain, as well as how changes could result in improved performance (Hawkes and Ruel, 2011). These improvements or “upgrades” in the competitiveness of value chains can occur in different ways, through process upgrading, product upgrading or functional upgrading (Kaplinsky and Morris, 2000; Knorrington and Pegler, 2006). Process upgrading involves improving the efficiency of internal processes.

Concepts and analytical tools for analyzing the functioning of agricultural value chains are, therefore, important to understand the impact of chain development interventions on smallholders and the rural poor. Similar to the agricultural innovation systems perspective, value chain approaches help orient agricultural development thinking more towards a systems perspective (Rich *et al.*, 2008). Value chain has been used to analyze the dynamics of markets and to investigate the interactions and relationships between the chain actors. The agricultural value chain approach is utilized by many development interventions that intend to engage smallholders either individually or collectively into the production of market oriented high value crops (Anandajayasekeram and Berhanu, 2009).

There are four major key concepts guiding agricultural value chain analysis (Ananda jayasekeram and Berhanu, 2009; Kaplinsky and Morris, 2000). These are effective demand, production, value chain governance, and upgrading. Production:- In agricultural value chain analysis, a stage of production can be referred to as any operating stage capable of producing a saleable product serving as an input to the next stage in the chain or for final consumption or use. Typical value chain linkages include input supply, production, assembly, transport, storage, processing, wholesaling, retailing, and utilization, with exportation included as a major stage for products destined for international markets. A stage of production in a value chain performs a function that makes significant contribution to the effective operation of the value chain and in the process adds value (Anandajayasekeram and Berhanu, 2009).

Producing the required amount effectively is a necessary condition for responsible and sustainable relationships among chain actors. Thus, one of the aims of agricultural value chain analysis is to increase the quantity of agricultural production. Understanding the

mechanisms of the agricultural production greatly help to design appropriate policy that bring more gain to farmers and the whole society at large. For a long time, sector analyses have been used to measure the different economic aspects of production. However, sector analyses have not been without weaknesses. In particular, sector analysis tends to be static and suffers from the weakness of its own bounded parameters. Such analysis struggles to deal with dynamic linkages between productive activities that go beyond that particular sector (Kaplinsky and Morris, 2000).

Value chain governance: - Governance refers to the role of coordination and associated roles of identifying dynamic profitable opportunities and apportioning roles to key players (Kaplinsky and Morris, 2000). Value chains imply repetitiveness of linkage interactions. Governance ensures that interactions between actors along a value chain reflect organization, rather than randomness. The governance of value chains emanate from the requirement to set product, process, and logistic standards, which then influence upstream or downstream chain actors and results in activities, roles and functions. According to Raikes *et al.* (2000), trust-based coordination is central for goods and services, whose characteristics change frequently, making a standardized quality determination for the purposes of industrial coordination difficult. This applies to the manufacturing industry as well as agri-food chains. It is possible to identify in one industry several coordination forms used by different firms where the choices rely on the trust existent between the firms.

Gereffi *et al.*, (2005). Governance within value chains reflects the distribution of power and information among various actors. Alternative types of vertical coordination emerge depending on the distribution of market power (the ability to set prices, quality standards and minimum delivery quantities), political power and information (on standards and alternate market prices). As a result, adjustments in vertical coordination mechanisms generally require investments in literacy, information and organization that modify the underlying power structure within the value chain. At the same time, these public investments increase prospects for successful horizontal coordination among value chain members, for example, in farmer organizations. Value chain upgrading:-Product upgrading involves the introduction of new, improved or more profitable goods and services. Functional upgrading involves increasing profitability by changing the mix of activities undertaken. In many instances, these forms of upgrading require investment in equipment, know-how or human capacity, potential barriers that risk excluding the poor. Upgrading refers to the acquisition of technological

capabilities and market linkages that enable firms to improve their competitiveness and move into higher-value activities (Kaplinsky and Morris, 2000).

Benefit of value chain in the agricultural sector: - It is an innovation that enhances or improves (in the opinion of the consumer) an existing product, or introduces new products or new product uses. This allows the farmer to create new markets, or differentiate a product from others and thus gain an advantage over competitors. In so doing, the farmer can ask a higher premium (price) or gain increased market share or access. Adding value does not necessarily involve altering a product; it can be the adoption of new production or handling methods that increase a farmer's capacity and reliability in meeting market demand. Value added can be almost anything that enhances the dimensions of a business. The key is that the value adding activity must increase or stabilize profit margins, and the output must appeal to the consumer (AAFC, 2004). Value chain is useful as a poverty-reduction tool if it leads to increase on and off farm rural employment and income. Increased agricultural productivity alone is not a sufficient route out of poverty within a context of globalization and increasing natural resource degradation. A focus on post-harvest activities, differentiated value added products and increasing links with access to markets for goods produced by low-income producers would appear to be the strategy open to smallholders (Lundy *et al.*, 2002).

In spite of the fact that markets are crucial in the process of agricultural commercial, transaction costs and other causes of market imperfections could limit the participation of farm households in different markets (Sadoulet and de Janvry, 1995 as cited in (Moti, 2007). This implies that markets could be physically available but not accessible to some of the farm households. Value chain analysis is essential to explain the connection between all the actors in a particular chain of production and distribution and it shows who adds value and where, along the chain. It helps to identify pressure points and make improvements in weaker links where returns are low (Schmitz, 2005).

Developing value chain systems towards the benefits:-In recent years, the pro-poor growth approach has become one of the key concerns of developmental organizations. The focus of the approach lies in the promotion of economic potentials of the poor and disadvantaged groups of people (OECD, 2006). The main aim is to enable them to react and take advantage of new opportunities arising as a result of economic growth, and thereby overcome poverty (Berg *et al.*, 2006). The promotion of value chains in agribusiness aims to improve the

competitiveness of agriculture in national and international markets and to generate greater value added within the country or region. The key criterion in this context is broad impact, i.e. growth that benefits the rural poor to the greatest possible extent or, at least, does not worsen their position relative to other demographic groups. Pro-poor growth is one of the most commonly quoted objectives of value chain promotion. In recent years, the need to connect producers to markets has led to an understanding that it is necessary to verify and analyze markets before engaging in upgrading activities with value chain operators. Thus, the value chain approach starts from an understanding of the consumer demand and works its way back through distribution channels to the different stages of production, processing and marketing (GTZ, 2006)

2.4.2. Concepts of marketing

Market can be defined as an area in which one or more sellers of given products/services and their close substitutes exchange with and compete for the patronage of a group of buyers. Originally, the term market stood for the place where buyers and sellers are gathered to exchange their goods, such as village square. A market is a point, or a place or sphere within which price making force operates and in which exchanges of title tend to be accompanied by the actual movement of the goods affected (Backman and Davidson, 1962). The concept of exchange and relationships lead to the concept of market. It is the set of the actual and potential buyers of a product (Kotler and Armstong, 2003).

Formally, a 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). This channel may 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.*, 2001). Marketing costs refers to those costs, which are incurred to perform various marketing activities in the shipment of goods from producers to consumers. Marketing costs include: handling cost (packing and unpacking, loading and unloading putting inshore and taken out again), transport cost, product loss, storage costs, processing cost, capital cost (interest on loan), market fees, commission and unofficial payments (Heltberg *et al.*, 2001)

A marketing margin is the percentage of the final weighted averages selling price taken by each stage of the marketing chain. The total marketing margin is the difference between what the consumer pays and what the farmer receives for his product. In other words, it is the difference between retail price and farm price (Cramers and Jensen, 1982). Agricultural products differ from manufactured goods in terms of supply and demand. Agricultural products supply is irregular because of the very seasonal biological nature while their demand is relatively stable throughout the year.

Market supply; - Supply is boldly underlined in economic theory that human being is always under process of choice from a number of alternatives. The basis for the decisions could be issues ranging from in house to the exogenous uncontrollable factors. A case in point here is market supply where scholars put each owns point of determining variables.

The study of market supply helps filling the gap for success of commercialization. The analysis can identify factors that determine market supply. Knowing the determinants mean knowing where to focus to boost production. The point is to improve supply based on the capacity of potential market. However, how much can be increased is a question of supply determinants and demand. A vivid review of the basic principles and applications, therefore, help reveal all these. Market supply refers to the amount actually taken to the markets irrespective of the need for home consumption and other requirements where as the marketed surplus is the residual with the producer after meeting the requirement of seed, payment in kind and consumption by peasant at source (Wolday, 1994).

Marketable_surplus is the quantity of produce left out after meeting the farmer's consumption and utilization requirements for kind payments and other obligations such as gifts, donation, charity, etc. This marketable surplus shows the quantity available for sale in the market. The marketed_surplus shows the quantity actually sold after accounting for losses and retention by the farmers, if any and adding the previous stock left out for sale (Thakur et al., 1997). Taking the specific conditions of India Harris (1982), defined market supply (volume sold) in agrarian economy to constitute the basic wage good for those in the economy not controlling grain (even if they were used for its production). In the process of commercialization marketed surplus is an indicator, not only sets up physical flows of commodities; it is instrumental in monetizing the economy added.

The surplus product supply stands for what the household brings to the market, but this does not necessarily imply an excess over his "subsistence requirement". It includes parts of the

product needed for consumption by the farm household when the farmer is forced to sell to pay rents, buy inputs, cancel debts, buy non-farm staples, to meet socio-cultural obligations, and to cover other immediate expenses. As a result, marketed surplus represents actual surplus and the quantity sold in the form of forced selling (ANRS-BOARD, 2003).“Commercialisation is ‘the process of transforming ideas, knowledge and inventions into greater wealth for individuals, businesses and/or society at large’. Commercialisation is a subset of the broader process of innovation. It is driven by market and profit motives, with firms and others seeking to gain a positive return on investment in research, licensing, product development, and marketing, including through the creation of competitive niche markets.

Neway (2006) cited two options for commercialization. The most common form in which commercialization could occur in peasant agriculture is through production of marketable surplus of staple food more than what is needed for own consumption. Another form of commercialization involves production of cash crops in addition to staples or even exclusively. At the farm household level, commercialization is measured simply by the value of sales as proportion of the total value of agricultural output. At the lower end, there would always be some amount of output that even a subsistence farmer would sell in the market to buy basic essential goods and services. For this reason, the ratio of marketed output up to a certain minimum level cannot be taken as a measure of commercialization. Neway (2006), proposed the proportion to be 20 percent of marketable surplus in the Ethiopia as a cut of rate for commercialization. According to Von Braun et al. (1994:11), commercialization of subsistence agriculture takes many forms. They state that: “Commercialization can occur on the output side of production with increased marketed surplus, but it can also occur on the input side with increased use of purchased inputs. Commercialization is not restricted to just cash crops: The so called traditional food crops are frequently marketed to a considerable extent, and the so called cash crops are retained, to a substantial extent, on the farm for home consumption, as, for instance, groundnuts in West Africa. Also, increased commercialization is not necessarily identical with expansion of the cash economy when there exist considerable inland transactions and payments with food commodities for land use or labourers. Finally, commercialization of agriculture is not identical with commercialization of the rural economy.”

Development of market-driven tomato value chain: - The value chain approach considers both the added value of a product and an insight into the actors' roles and relations. The value chain approach analyses a product's development process from input supply through production and processing level, transport, trade and marketing, to consumption. Despite the fact that, earlier work on agriculture concentrated mainly on improving the supply side of the respective value chains e.g. production conditions and output, recent studies have also paid attention to the demand side (Diao, 2007). Here the value chain analysis concentrates on both ends of the chain corresponding with the two sides of a market. The development of the domestic markets of a commodity is strongly determined by factors on the supply side; example soils, aridity, agricultural knowledge, competition, weather, and market infrastructure as well as on the demand side example increase in population, urbanization, and income-elasticity. Natural occurrences such as aridity, the composition of soils, and the weather are mainly responsible for creating opportunities and constraints on the supply side of the market. Production of tomato in rain fed is highly affected by seasonality (high and low supply on the markets), which is mainly influenced by the climate and weather conditions. Those farmers who have access to irrigation can operate more independently of the seasons (Koenig *et al.*, 2008).

Furthermore, the importance of market co-ordination and market participation have been highlighted and described as one of the most important constraints responsible for the poor performance of commodity (Dorward *et al.*, 2005). According to estimations by Kelley and Byerlee (2004), some 60% of the African rural population lives in areas of good agricultural potential, but with poor market access. Only 22% live in areas of good agricultural potential and good market access and 18% suffer from poor market access and poor agricultural potential.

Agricultural potential and market access alone cannot make farmers profitable. Availability of market infrastructure (storage, transport, etc) is important for farmers to avoid flooding of markets and enables them to increase their profit by selling in times of low supply. Due to seasonality, market prices fluctuate depending on the quantity and the quality of the products on the markets. Especially on the wholesale and retail markets prices also fluctuate even during one day. Often the limited availability of storage is the reason that traders and retailers try to sell all their produce by the end of one day, even if they achieve only a low price. In

times of high supply, traders benefit more; in times of low supply farmers can sell everything they harvest for good prices (Koenig *et al.*, 2008).

Overview of Ethiopia's vegetable production: - A vegetable is not a new sector in Ethiopia as the production of these crops has been undertaken for decades. The sector comprises large state farms supplying fruits and vegetables to the local market and for exports. There are few private companies involved in the production of vegetables mainly for the European market. In addition, there are numerous small producers growing a small range of vegetables for the local and regional export market. Apart from tropical fruits and few selected vegetables like onions, cabbage and tomatoes, local demand for horticultural produce is minimal (Ethiopian-Netherlands Horticulture Partnership, 2007).

The World Health Organization Estimate that low fruit and Vegetable intake contributes to approximately 2.7 million deaths a year from chronic disease and causes about 31% of ischaemic heart diseases and 11% of strokes worldwide. It ranks low fruit and vegetable intake as the sixth main risk factor for mortality in the world (Marie, 2005). The currently population of 70 million people in Ethiopia is expected to double within the next 30 years.

2.5. Tomato Production and marketing in Ethiopia

Among the major vegetable, tomato is the most important edible and nutritional vegetables in the world, The fruit and vegetables sector is particularly well developed in the Mediterranean Member States (current and Accession States). Fruit and vegetables account for around one quarter of total agricultural output in Spain, Italy, Greece, Portugal, Malta and Cyprus. But it is also important in Belgium and the Netherlands, where it is the primary non-livestock production sector, and in the United Kingdom. Beside the Production of 15 million tonnes makes tomatoes the most produced vegetable. of this volume, 7 million tonnes are produced in Italy, almost 4 million tonnes in Spain, 2 million tonnes in Greece and over 1 million tonnes in Portugal. Contributions of tomato to smallholders' livelihood: - Tomato contributes to smallholder livelihoods in many ways. Firstly, it can play a significant role in improving smallholders' food security, as an affordable source of vitamin. Secondly, it also can have an income benefit for smallholders, both in terms of diversification and because they yield a higher gross margin than cereals.

Mapping the value chain: - First step of a value chain analysis is the so-called mapping. In order to do so, the boundaries to other chains need to be defined. The main idea is initially to identify the actors and then to 'map' the suggested product flows within the chain including input supply, production, and marketing activities. The objective is to give an illustrative representation of the identified chain actors and the related product flows. A mapped value chain includes the actors, their relationships, and economic activities at each stage with the related physical and monetary flows (Anja *et al.*, 2009). Mapping means giving visual representation of business actors along the value chain and the connection between them, illustrating the entire production (service-delivery) process from the beginning (raw materials, conception, design, input supply etc.) to the final consumer. According to McCormick and Schmitz (2001), value chain mapping enables to visualize the flow of the product from conception to end consumer through various actors. It also helps to identify the different actors involved in the tomato value chain, and understand their roles.

According to UNIDO (2009), mapping value chains to obtain a clear understanding of the sequence of activities and the key actors in the value chain. This exercise is carried out in qualitative and quantitative terms through graphics presenting the various actors of the chain, their roles and all operations of the chain from pre-production (supply of inputs) to industrial processing and marketing. Depending on the level of detail needed, this exercise may focus also on factors such as the size and scale of main actors; production volume; number of jobs; sales and concentration.

2.6. Review of Empirical Literatures on value chain

In this section empirical review of documents and studies relevant for this study is made. A number of empirical studies have been conducted by different people and institutions on the supply of agricultural products both outside and inside Ethiopia. But the studies are mainly conducted around major vegetables, fruit, cereals, and coffee crops and However studies conducted in the area, particularly on tomato are very limited. As a result of this, the review mainly included the studies conducted on cereals, coffee, vegetables and fruit with much related vegetable crops.

2.6.1. Value chain Analysis

There are a number of studies that have employed on the value chain approach to agricultural commodities. But as mentioned above, the studies are mainly conducted on cereals, vegetables, fruit and coffee crops. However studies conducted in the area of tomato is very limited. A study on green beans by Lusby (2007) has revealed that lack of crop husbandry skills and limited extension services has constrained the productivity of the sector. Simultaneously, Cormick and Schmitz (2001) have indicated that even though firms in a system are formally independent of one another, an increasing network through personal relations and repeated transactions has assisted to inspect and alleviate the chain's core problems by developing their capacity and reducing the cost of the actors. Dereje (2007) used value chain approach to study the competitiveness of Ethiopian coffee in the international market. The study indicates that Ethiopian farmers have low level of education, large family size with small farmland and get only 3% of the retail price in the German market. Thus, policy intervention was suggested to improve farmers' performance.

Further, a value chain study conducted on mango by Dendena *et al.*, (2009) indicated that the subsector facing some challenges. Among others: highly disorganized and fragmented industry with weak value chain linkages, long and inefficient supply chains, inadequate information flows and lack of appropriate production are explained as the major problems.

Furthermore, a study conducted by Biruhalem (2010) on rice value chain in Metema district using value chain approach revealed that there were multiple public and non-public actors involved along the rice value chain, upstream from input supply to downstream consumers, playing different role. However, there is no mechanism to coordinate multiple actors together for effective and efficient functioning of the value chain. There is public sector actors' domination with limited private sector involvement// in the value chain. A long tradition of limited responsiveness, top-down, hierarchical, non participatory exclusiveness and less risk taking type of organizational culture, habits and practices lead to have weak interaction, knowledge and information sharing with the various actors along the value chain. As to the linkage, weak and informal linkage between chain actors characterizes the rice value chain. Lack of post harvest processing technology, limited access to supply of inputs, severe termite attack, non availability of well developed rice market, high labour demand for crop management, absence of responsible body who works on actors interaction were some of the challenges identified for innovation at various stages of rice value chain. The study recommended partnership to be created among value chain actors to create an enabling environment for sharing information, knowledge and solve existing problems and as

extension service should be strengthened to solve the existing problems and to increase competitive advantage of the rice production.

Generally, a value chain approach is particularly effective at diagnosing challenges and indicating solutions. However, value chain analysis on some important crops, in Ethiopia, is not adequate (Kaleb, 2008).

2.3.2.Determinants Market supply

There are a number of empirical studies on factors affecting the market supply of agricultural commodities. For example, Bosen (2008) identified the major factors that affect the marketable supply of cotton of farm households at Metema district. She examined the relationship of marketable supply and the determinant factors using Ordinary Least Squares (OLS). Factors identified to affect the household level of sesame marketable supply include yield of sesame, number of oxen, number of foreign languages spoken by the head of the household, modern inputs used, sesame area and time of selling influenced positively the marketable supply as expected. Wolday (1994) identified major factors that affect teff, maize and wheat at Alaba Siraro District. He studied the relationship of farm level marketable supply of the cereals using cross-sectional data. To capture the influence of the independent variables on the marketable supply of food grain, he adopted multiple regression analysis with both dummy and continuous variables as independent variables. He found out that the size of output, access to market and family size had affected marketable supply of food grain.

Geremew (2012), examined factors affecting sesame market supply in Diga district based on the Hausman test and the post estimation tests of Durbin Hausman endogeneity test. According to his study, the quantity of sesame marketed is likely endogenous variable to the model, which may result in inefficient estimation result. Basically such problems arise if some factors explaining the variation in the dependent variable (in this case, total income generated from sesame sale) could also affect of the potential repressors (e.g. quantity of sesame marketed).

Ayelech (2011), identified factors affecting the marketable surplus of fruits by using OLS regressions. She found that fruit marketable supply was affected by education level of household head, quantity of fruit produced, fruit production experience, extension contact, lagged price and distance to market. Another study by Wolelaw (2005), find out the major

factors that affect the marketable supply of rice at Fogera district using multiple linear regression models. And it is investigated the relationship between the determinant factors of supply and the marketable supply of rice and her study revealed that the current price, lagged price, amount of rice production at farm level and consumption at household level had influenced marketable supply of rice at the district.

Wolelaw (2005), and Kinde (2007), indicated that the major factors that affect marketable supply of sesame in Metema district by using cross-sectional data with dummy and continuous explanatory variables. In his study he implemented multiple linear regression model to identify the relationship between the marketable supply of sesame and the hypothesized explanatory variables, hence his study acknowledged that amount of sesame productivity, use of modern inputs, number of language spoken by the household head, number of oxen owned, sesame area and time of selling of sesame influenced marketable supply of sesame positively.

Abay (2007), applied Heckman two-stage model to analyze the determinants of vegetable market supply. According to Wolday (1994), marketable supply of agricultural product could be affected by different factors including the size of land holding, the output level, family size, market access, price, inputs, formal education, oxen number, accesses to extension and credit services, distance to market, time of selling, access to labor and age. In sum, empirical evidences indicate that marketable supply approach has become an important framework to analyze economic agents in agricultural sector. In this study an attempt will be made to identify factors affecting the marketable supply of tomato.

Abraham (2013), applied multiple regression model to indicate that marketable supply of tomato was significantly affected by access to market information and quantity of tomato produced; marketable supply of potato was significantly affected by access to extension service, access to market information, vegetable farming experience and quantity of potato produced; and marketable supply of cabbage was significantly affected by non/off farm income, Woreda dummy, distance to the nearest market and quantity of cabbage produced. The result of endogenous regression result shows that quantity of potato production significantly affected by access to extension service, access to market information, vegetable farming experience, sex of the household head, age of the household head and quantity of

fertilizer application. Therefore, according to the author, these variables require special attention if marketable supply is to be increased.

From these studies, the researcher can conclude that most of the factors that affect the supply of each commodity differ from other commodities. Hence, difference in the marketing system of these commodities, type of commodities (food or industrial commodity), and location of the study area can result in differences in factors affecting commercial supply of the commodities. Hence, it is important to analyze factors affecting supply of Tomato. Recent studies are commonly using regression models to estimate the supply function as we have seen in above reviews. *Likewise* for this particular study, Multiple Linear Regression model has been projected to analyze and estimate supply of tomato in the study area.

2.7. 3. Channel outlet choice decision

The study conducted by Jari (2009) on institutional and technical factors influencing agricultural marketing channel choices amongst smallholder and emerging farmers in the Kat river valley in South Africa showed that access to market information, availability of contractual agreements, availability of good market infrastructure and participation in producers group were important factors affecting channel choice. The finding suggested as an adjustment in each one of the significant variables may significantly influence the probability of channel choice in either formal or informal marketing channels.

Misginaw (2010), in his study of constraints and opportunities of pastoralists' commercial off take used multinomial logit model to identify factors that determined the pastoralists' decision to take on commercial off-take regimes or positions. Masuku *et al.*, (2012) identified that age of the farmer, quantity of baby corn produced and level of education as significant predictors of the choice to sell vegetables to using different market channel instead of selling to other-wholesale market channel. The age of the farmer, distance from production area to market, membership in farmer organization and marketing agreement were significant determinants of the choice to use non-wholesale market channel over other-wholesale market channel. The study uses descriptive and multivariate probit regression analyses to investigate factors that influence market channel choices. Taking lessons from the various studies

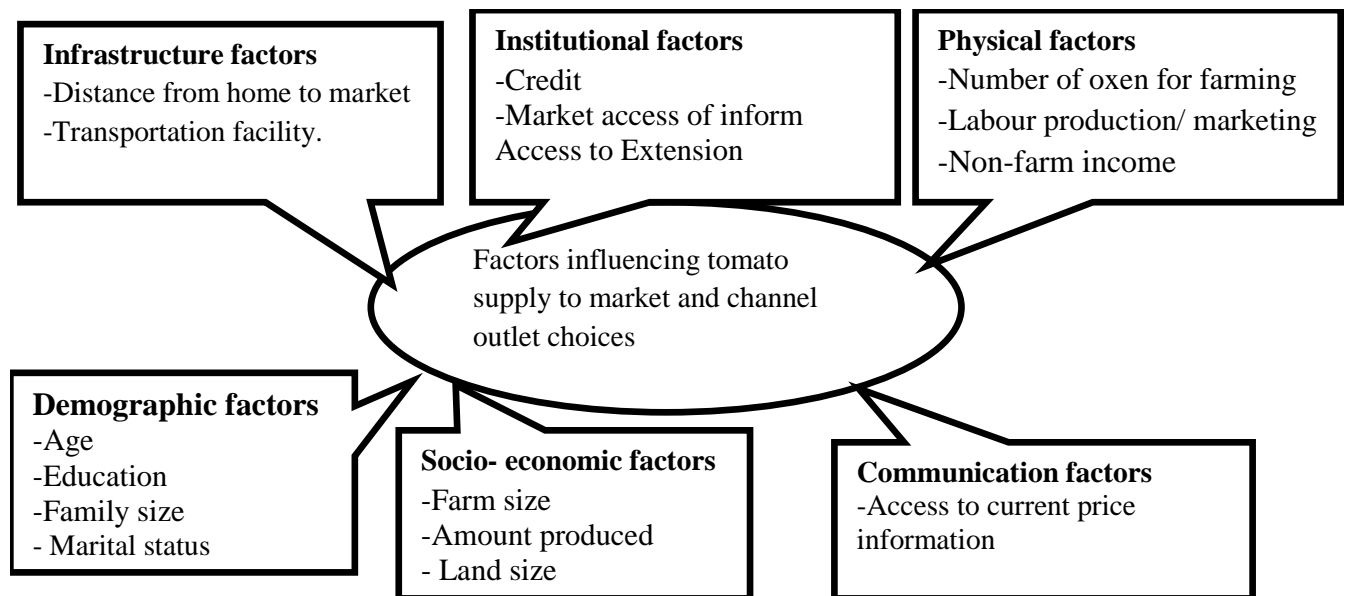
mentioned above, in this study was give to identify determinants of producers' choice of market.

Besides of the above studies, researcher concludes that most of the factors that affect the farmer channel outlet choice of each commodity differ from other commodities. Hence, difference in the marketing system of these commodities, type of commodities, and location of the study area can result in differences in factors affecting farmer channel outlet choice of the commodities. Hence, it is important to analyze factors affecting channel choice outlet of tomato. Recent studies are commonly using multinomial logit models to estimate the channel outlet function as we have seen in above reviews. *Likewise* for this particular study, multivariate probit model has been projected to analyze farmer channel outlet choice of tomato in the study area.

2.4. Conceptual framework

The review of related literature presented above clearly indicated that agricultural productivity improvement at farm household level and market supply are influenced by diverse and complex factors. The conceptual framework that is used in conducting the study entails Tomato output & related input, farm household characteristics, socio-economic factors, etc. The conceptual framework in Figure 1 show that how these factors are interrelated and influence tomato producers' decisions to employee optimum input thereby produce efficiently so as to supply more. Hence with very few exceptions of the details, the conceptual frame work below was used to analyze the data with regard to assessing the supply determinants of Tomato farm households in Jimma zone. Based on the theoretical and empirical review, observations of tomato supply factors of the study area, the following conceptual framework depicts the most important variables expected to influence producers to supply tomato to market in the study area which is Jimma zone.

1. Conceptual frame work of the study



Source own sketch (2016)

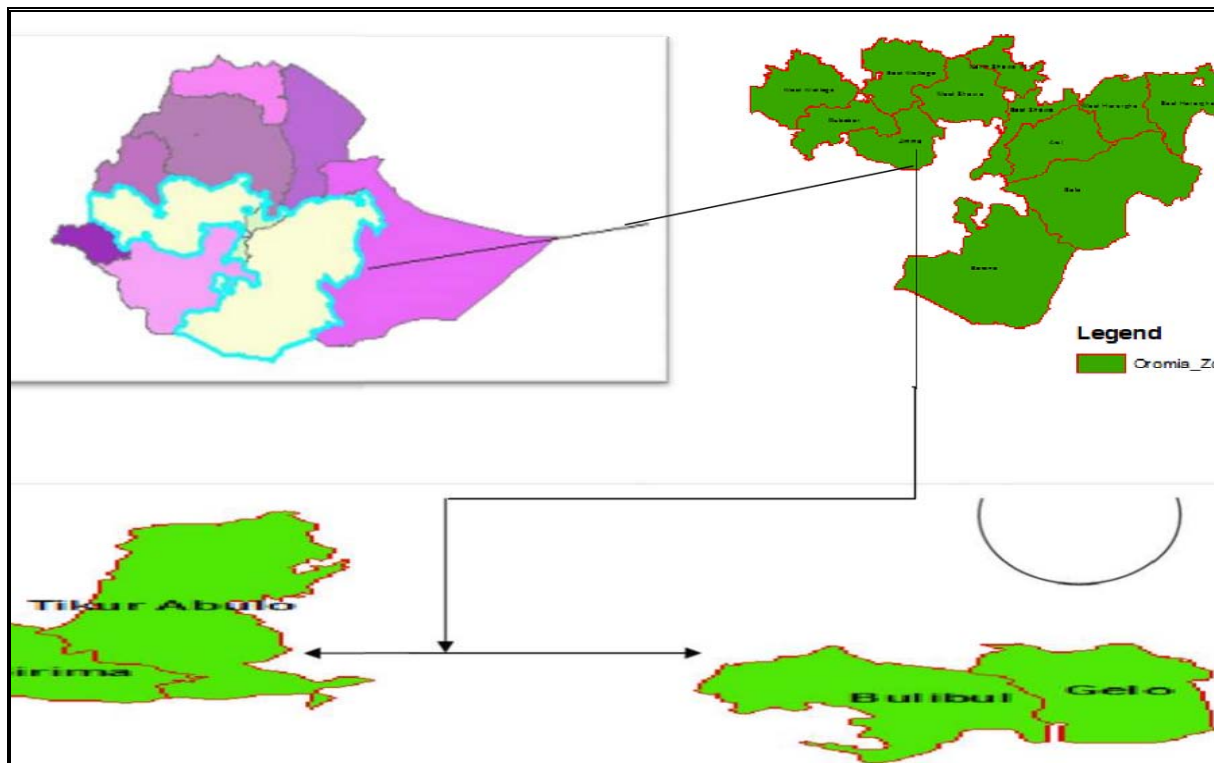
3. RESEARCH METHODOLOGY

3.4. Description of the study area

Kersa woreda is located at Jimma zone of western Oromia region. The capital city of this woreda is Sarbo town, which is located at 20, km from Jimma town and 344 km from Addis Ababa along the main asphalt road that leads through Addis Ababa. The woreda is bordered with Jimma city to the west, Sokoru Woreda to the East, Tiro Afata woreda to the North and Omo Nadda woreda to the south. The Kersa woreda has a total of 30 rural and 2 urban kebeles. Its total population and households were estimated at 193,165 and 16,323, respectively. The total woreda population of 193,165, about 106582.5 were males and 86582.5 were females. Amongst the total 16,356 rural agricultural households, 14,121 and 2,235 were male and female headed households (CSA, 2014). The woreda has a total area of 978.6 km² and is situated between 7⁰5-8⁰00 north latitudes and 36⁰46-37⁰14, East longitudes. Almost district altitude range from 1500 to 2500 m. a. s. l, the area covered by 65.1 %, 30.5%, 2% and 24% respectively consists cultivation, forest, wood land and grass land. The major soils categories of kersa district are reached by Orphic Nit sols, Aerosols and pelvic vertical Orphic Aerosols 45%, 10%, and 45%. All the soils types have good agricultural potentialities; annual rain fall varies between 1300mm and 1700mm respectively (CSA, 2013).

The major water resources in these woreda is in the Didessa river, basin Gibe (Gilgel Gibe) kersa kellecha, Bulbula, Melka katta ,Bibirsa and Awetu are the major perennial rivers that drain to Gibe river . The district does not have lakes. These rivers and ground water play quite a vital role in operation of agricultural practices. Mixed farming system characterizes agriculture in the woreda. The diversified agro-ecology of the area creates an opportunity for the production of different crops such as cereals, pulses, oil crops, vegetables, onion, tomato, papaya and cabbage (sarbo irrigation and Agricultural office.

Figure 2. Map of kersa Districts of Jimma zone.



Source: - own sketch (2016)

Data types, sources, and methods of data collection: - For this, study both primary and secondary data was used. Consecutively qualitative and quantitative data were applied. The qualitative data include socio demographic information like farmers' sex, livelihood, Access to service, educational status of the household head etc. The quantitative data include, age of the household head, market prices of tomato, distance to district market, family size, land size, farmers experiences and so on. The study used these and other data to estimate the determinants of tomato supply to the market. According to Creswell (2012), both quantitative and qualitative data together provides a better understanding of a research problem.

In this study, the researcher was used both primary and secondary data sources. Primary data was collected through questionnaire; check lists, direct observation, from producer farmers, cooperatives, traders, and consumers of the study area. The secondary data was collected through thorough review of both published and unpublished records/documents from aforementioned sources. The Questionnaire was prepared in English, translated to Afaan Oromo, pre-tested and modified before the execution of the survey. Enumerators, who are familiar with the study area, was recruited and trained about the objectives of the study, methods of data collection, and interviewing techniques. Then collected data from the sample households was supervised by the researcher daily. The data collected was included

production, exchange arrangements (buying and selling), information system, pricing, input, and output delivery and distribution, credit system, problems and opportunities, and characteristics of the market. A source of primary data was producer farmers, cooperatives, traders, and consumers

Sampling procedure and sample size: - For this study, tomato producers, traders (wholesalers, Collectors and retailers), and consumers was sampled for data gathering. Kersa woreda is selected purposively as it is well known for tomato production in Jimma zone. This woreda is covered by 30 rural administrative and 2 urban kebeles. Tomato is produced in 30 rural kebeles. In the *first stage*, with the consultation of woreda Irrigation experts and development agents, out of 30 kebeles of kersa woreda 9 Tomato producer’s kebeles was purposively selected based on the potential of production. In the *second stage*, from 9 selected rural kebeles, 4 kebeles namely xuqur Abulloo, Girmaa Bulbul, and Gelloo was selected purposively according to their level of tomato production. In the *third stage*, using the household list of the sampled kebeles 129 respondent farmers and 40 traders was selected randomly based on proportional to the population size of the selected kebeles.

Table 1. Sample size distribution of Household

Kebeles	Total population	Proportion size	Household sampled
Bulbul	419	0.2	27
Girma	615	0.3	39
Xuqur Abullo	676	0.35	45
Gelloo	293	0.15	19
Total	2003	1	129

According to Cochran formula we determines the sample size

$$n = \frac{no}{1+(no-1)/N}$$

$$no = z^{2pq}/e^2 = (1.96)^2(0.1)(0.9)/(0.05)^2 = 138 \text{ in constant formulae.}$$

$$= n = \frac{138}{1+(138-1)/2003} = \frac{138}{1.0685} = 129$$

Sample size of traders was also taking according to the above formula. The total population of traders are 64 from this 45, are selected. It was determined based on information obtained from kersa woreda Trade and Industry office. A different type of traders was taken randomly based on their size. (Woreda market and Trade, Transportation Authority office and Kebele administrations)

Consumers' survey:-Consumers were also interviewed in kebeles along the tomato marketing channel,namely X/Abullo Gello, Girma, and Bulbul. The consumers were selected based on random selecting technique. Firstly, the *kebeles* in the town were purposively selected and then respondents were no-ruling sapling randomized. The researchers take a sample without any rule, being the sample representative if the population is homogeneous and we have no selection bias. The major purpose of the consumers' survey was to get feeling of local consumption of tomato products and assess constraints associated with consumption so that possible interventions for improvement of tomato production and marketing can be identified. In total 40 consumers were interviewed using a structured questionnaire 58 % of them are female.

Table 2. Number of consumer included in study

Kebeles	Sex of respondents		Total
	Male	Female	
Bulbul	7	6	13
Gello	3	5	8
Girma	5	6	11
Bulbul	2	4	6
Total	17	23	40

Source: - Own survey (2016)

Method of data analysis and presentation:-Data is a raw fact. According to Creswell (2012), both quantitative and qualitative data together provides a better understanding of a research problem. Regarding to this the researcher used both mixed methods approach for this study. The data collected from primary sources were coded and entered into STATA computer software. The data were checked for consistence and completeness and analyzed. In this study, a both descriptive and econometric method of data analysis was in used.

Descriptive statistics:-To analyze different characteristics of the sample households' descriptive statistics was used. Hence, descriptive statistics such as frequency, range, mean, percentages and standard deviations was computed. For this study, value chain analysis and performance of actors' along the tomato value chain was by using descriptive statistics analysis.

The following three steps of value chain analysis was apply to this study:- Mapping the value chain to understand the characteristics of the chain actors and the relationships among them, including the study of all actors in the chain, of the flow of Tomato through the chain, of employment features. This information can be obtained by conducting surveys and interviews as well as by collecting secondary data from various sources. Identifying the distribution of actors' profit in the chain. This involves analyzing the margins and profits within the chain and therefore determined who benefits from participating in the chain and who need support to improve performance and gains. This step is particularly important, since the poor and small holder farmers involved in value chain promotion were the most vulnerable.

Emphasizing the governance role, within the concept of value chain, governance defines the structure of relationships and coordination mechanisms that exist among chain actors. By focusing on governance, the analysis identified actors that may require support to improve capabilities in the value chain, increase value added in the sector and correct distributional distortions. Thus, governance constituted a key factor in defining how the upgrading objectives can be achieved. The following the above procedure, the main aspects of Tomato value chain analysis was done by applying some quantitative and qualitative analysis. First, an initial map was draw which depicts the structure and flow of the chain in logical clusters. This exercise was carried out in qualitative and quantitative terms through graphs presenting the various actors of the chain, their linkages and all operations of the chain from pre-production (supply of inputs) to consumption.

Mapping a value chain gives a clear understanding of the sequence of activities and the key actors and relationships involved in the value chain. This exercise was carried out in qualitative terms using graphs presenting the various actors of the chain, their linkages and all operations of the chain from pre-production (supply of inputs) to consumption. In order to map a diagram that clearly depicts the structure and flow of the value chain the following questions were raised:

- What are the main activities carried out in the value chain to obtain the final product?
- Who are the operators involved in these activities and what are their roles?
- What are the flow of products, information and knowledge in the value chain?
- What are the production volumes and the number of actors?
- Where does the product (or service) originate from and where does it go?
- What types of roles exist among the various chain actors?

- What types of business services are feeding into the chain, including the regulatory and policy framework in which the sector is operating? (Marshall, 2010).

After having developed the general conceptual map of the value chain, the next step was analyzing the chain's economic performance and benefit share of actors

Analysis performances of actors along the tomato value chain:-To find out the benefit share of each actor the following concept was applied. In analyzing margins, first the Total Gross Marketing Margin (TGMM) was calculated. This is the difference between producer's (farmer's) price and consumer's price (price paid by final consumer) i.e.

$$TGMM = \frac{\text{endbuyerprices} - \text{firstsellerprices}}{\text{endbuyerprices}} \times 100 \dots\dots\dots \text{Equation (1)}$$

The gross margin is the difference between sales revenue and cost price, expressed as percentage of the cost price or as discounted percentage of the sales price. The producer's margin or share in the consumer price

GMMp is calculated as:

$$GMMp = \frac{\text{endbuyerprices} - \text{Grossmarketmargin}}{\text{endbuyerprices}} \times 100 \quad (2)$$

The consumer price share of market intermediaries is calculated as:

$$MM = \frac{\text{sellingprices} - \text{buyingprices}}{\text{endbuyerprices}} \times 100 \quad (3)$$

In marketing chain with only one trader between producer and consumer, the net marketing margin (NMM) is the percentage over the final price earned by intermediary as his net income once his marketing costs are deducted. The percentage of net income that can be classified as pure profit (i.e., return on capital) depends on the extent to which factors such as the middleman's own, often imputed, salary are included in the calculation of marketing costs.

$$NMM = \frac{\text{Grossmargin} - \text{marketingcost}}{\text{pricespaidbyendbuyers}} \times 100 \quad (4)$$

Similar concept of profit margin that deducts operating expense from marketing margin was done by (Dawit, 2010) and (Marshall, 2011).

Where

- GPM =Gross profit margin at ith link GMMp=Gross marketing margin at ith link
- MM =Marketing Margin TGPM=Total gross profit margin
- NMM=Net Market Margin

3.5. Econometric analysis

Econometric analysis was used to estimate the causal relationship between the dependent variable and the explanatory variables. It was crucial to understand the effects of different factors on tomato supply and channel outlet choice decision. Hence, model specifications for both tomato supply and channel choice decision are presented as follows.

Multiple linear regression models:-To identify the determinants of tomato supply, a linear regression model was used in the study. This model was selected for its simplicity and practical applicability (Greene, 2000). Accordingly, the model was specified as in the following form.

$$Y_i = \beta_0 + \beta_i x_i + u \quad (5)$$

Where Y_i = is Quantity of tomato supply to the market

β_0 = intercept.

β_i = Coefficient of explanatory variable

x_i = A vector of explanatory variables such as: age, education, family size, improved seed, experience, current price, extension, distance to market, access to credit, livestock ownership, farm size, and market information

u_i = Disturbance terms

Modelling channel choice decision of the producers: - The primary goal of modelling channel choice decision is to explain the effects of the independent variables on the probability of choosing between different channel choice outlets in the tomato value chain.

According to Gujarati (2003), to estimate the effect of explanatory variables on dependent variable involving multiple choices with unordered response categories, multivariate probit model is required as a function of the explanatory variables. Channel choice selection is multivariate in nature. It will either involve producers in selling to Collectors engaged in tomato marketing, to wholesalers, retailers, and consumers or in other marketing system. The dependent variable (choice of market channel in the value chain) is thus discrete variable with J+1 alternative (j=0, 1, 2,.....J).

This study has investigated the channel choice decision making between multiple channel options and different factors. Therefore, multivariate probit was applied to analyze channel

choice behaviour of actors in the value chain. The decision whether to choose or not to choose market channel could be considered under general framework of utility and profit maximization (Norris and Batie, 1987). The multivariate probit model refers to the choice process of a sample of individuals taking a particular action or not. The action (or response) then is related to a number of characteristics of the individuals. The ensuing discussion of this model is suitably adapted to the situation of product concept evaluation. Model let X_1, X_2, \dots, X_n denote product attributes used in the design of m product concepts. Let x_{ij} denote the value of the j^{th} attribute for the i^{th} concept, $j = 1, 2, \dots, n$; $i = 1, 2, \dots, m$. Let y_i denote the behavioural intention responses (yes = 1, no = 0) toward the i^{th} concept from one respondent. The multivariate probit model postulates that the probability of responding "yes" to the i^{th} stimulus (or $y_i = 1$) is described by a cumulative normal density function. The psychological underpinnings of this postulate are similar to Thurstone's judgment scaling model; for a complete discussion. This model assumes that the X variables are summarized into an index, I_i , which is distributed as a standard normal variable. The particular relationship between the index, y_i , and the X variables is assumed to be linear.

$$y_i = \beta_0 + \beta_1 x_{i1} + \dots + \beta_n x_{in} \quad (6)$$

Further, for each concept, the respondent is assumed to have an entrance value of the index, y_i , obtained by substituting x_{i0} for X_i in equation. Then the probability, P_i , of obtaining a positive response (yes) to the i^{th} stimulus is given

$$P_i = \text{prob}(y_i = 1) = \text{prob}(I_i < 1) = \int^1 \phi(\varepsilon) \quad 7$$

Where $\phi(u)$ is the probability density function of a unit normal variate. If one assumes that the respondent gave statistically independent responses to the m concepts, the likelihood of getting a configuration of (y_1, y_2, \dots, y_m) from the respondent is

$$L = \prod_{i=1}^m [P_i^{y_i} (1 - P_i)^{1 - y_i}] \quad 8$$

Because each P_i is a function of β s, the likelihood, L , is also a function of β s. The β parameters are estimated by maximizing the likelihood function. The resulting equations to be solved for maximizing L are:

$$\begin{aligned} &= \sum_{i=1}^m \left[\frac{y_i}{P_i} - \frac{1 - y_i}{1 - P_i} \right] \phi(\mathbf{i}_j) = 0 \\ &= \sum_{i=1}^m \left[\frac{y_i}{P_i} - \frac{1 - y_i}{1 - P_i} \right] \phi(\mathbf{i}_j) x_{ij} = 0, \quad j=1, 2, \dots, n \end{aligned} \quad 9$$

The multivariate probit is the models which can be used to describe the underlying choice process leading to (0, 1) data.

Variable specification and hypotheses:- In the way of identifying factors influencing tomato supply to the market and market channel choice outlet decisions, the main task is exploring which factors potentially influence and how these factors are related with the dependent variables. Tomato supply to the market:-The supply of tomato denoted as Y is the dependent variable measured in terms of quintals. In the study area the household uses two wooden box made of timber for measuring one quintal or 100kg. A number of factors can influence the supply of a tomato. However, the importance of these variables in explaining the produced amount was different depending on the crop type, area of production and degree of supply.

Independent variables expect to influence the dependent variables of tomato supply are the following:-

Age of the household head (AGHH):-This is a continuous variable measured in years. The expect sign was positive. As an individual stays long, he/she have better knowledge and decide to allocate more size of land, produce more and supply more. Hence, direct relation was assumed between age and amount supplied. Wubshet (2010) found age of household head having positive effect on coffee supply through cooperatives. This implies that aged farmers supply more tomato than younger one.

Education (EDUCAT): It is a continuous variable and refers to schooling year for formal education of household heads. Education enhances information acquisition and adjustment abilities of the farmer, thereby improving the quality of decision-making (Fakoya *et al.*, 2007). Thus, education is hypothesized to have positive effect on supply.

Family size (FAMSZ): It is a continuous variable, measured in adult equivalent (AE). Production is a function of labour, and availability of labour is assumed to have positive relation with quantity of supply. Therefore, family size is expected to have positive impact on supply. A study conducted by Wolday (1994) showed that household size had significant positive effect on quantity of *teff* marketed. In this context, family size was hypothesized to have a positive impact on supply of tomato.

Improved seed (IMPSEED): This is a dummy variable and takes a value of 1 if a farmer uses improved seed and 0 otherwise. Improved seeds are associated with high productivity level and better capacity to resist diseases (Abay, 2007). Therefore, use of improved seed was expected to have positive effect on tomato supply.

Experience of the household head (EXPHHH):- This is a continuous variable measured in number of years. A household with better experience in tomato farming is expect to produce more amount of tomato than the one with less experience and, as a result, he/she is expect to supply more amount of tomato to market. Therefore, experience in tomato production was expected to have a positive relation with supply of tomato. As farmers experience increases, increasing tomato supply to market in kersa, Jimma Zone.

Current price: This is the price offer a farmer got from selling his produce. It is a continuous variable measured in Birr per quintal and expect to influence supply decisions positively. The study of Wolelaw (2005), on determinants marketed supply of rice found a significant positive relationship between rice sold and current price.

Extension contact (EXTENS): This is a continuous variable, which is measured in terms of number of visit extension agent to the farmer within a year. Extension agents assist farmers in dissemination of new technologies, these speeding up the adoption or use of new technologies and practices (O'Neill *et al.*, 2001). Farmers who have frequent extension contact assumed more production and as a result valuable supply.

Distance to market (DSTMKT): It is a continuous variable measured in kilometres. The closer market the lesser the transportation charges, reduced transaction costs, and reduce other marketing cost. The study conducted by Berhanu and Hoekstra (2008) on enhancing market orientation of smallholders on grain marketed surplus in Ethiopia revealed negative relationship between grain marketed surplus and distance to market. Therefore, as the market becomes far from the farm the marketed supply was low. Thus, distance to the nearest market is hypothesized to have negative relationship with supply of tomato.

Access to credit (ACCR): This is a dummy variable that represents access to both formal and informal credit for farm related purposes. It was measured as 1 if a farmer has access to credit and 0 otherwise. Access to credit is an important source of financing the agricultural

activities of smallholder farmers (Kinde, 2005). Hence, access to credit is predicted to have a direct relationship with the supply.

Livestock ownership (LIVEST): This reflects the total livestock a farmer owns expressed in Tropical Livestock Unit (TLU). The farmer who possesses more number of livestock is expected to have more money for the purchase of agricultural inputs, and again has the chance to get oxen for draught power. It also serves as an alternative means to obtain benefit in times of crop failure (Desta, 2004). Therefore, livestock ownership is hypothesized to have positive relationship with supply of tomato

Farm size (FARMS): This is a continuous variable expressed in hectare indicating the total land owned by a farmer. It is expected to take positive sign implying that the larger land size a farmer owns the more land size was allocated for the crop of interest. Increase in size of land is assumed to directly influence supply. Branson and Norvell (1983) and DNIVA (2005) found expanding the area under crop increasing the marketed supply of the crop.

Access to market information (ACMIF): This is a dummy variable and takes a value of 1 if a farmer has market information and 0 otherwise. Farmers marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movement. Therefore, it is hypothesized that market information is positively related to supply.

Channel choice decision:-In the analysis, it is measured by the probability of selling tomato to either of the markets. With the consideration of the objective of the study and ease representation of the dependent variable as discrete choice in the Multivariate probit model, farmers are grouped into four categories based on their pattern choice of market for their product. The dependent variable for the model is categorical variables taking discrete values of 0 to 3, reflecting choices available to farmers. It is represented in the model as $y_1=1$ if choice wholesalers 0, otherwise $y_2=1$ if choice collectors 0, otherwise and $y_3=1$ if choice sell to retailers 0, otherwise.

Independent variables: Independent variable hypothesized to affect farmers' channel outlet choice for their produce is:-

Education (EDUCAT): It is a continuous variable and refers to schooling year for formal education of household head. Educations make wider farmers' intelligence and enable them to perform the farming activities intelligently, accurately and efficiently. Moreover, better educated farmers tend to be more innovative and the probability to adopt retailers market is more. A study conducted by Ferto and Szabo (2002) on supply channel choice of Hungarian vegetable revealed relationship between channel choice decision and education level of household. Hence, education was hypothesized to influence collectors and retailers' market channel outlet choice directly.

Extension contact (EXTENS): This is measured in terms of number visit the extension agent to the farmer within a year. Extension variables include having access to information through farmer training and visiting. Agricultural extension service provided by development workers was used as a proxy for farmers' access to information on profitable market. Several studies show that farmers contact with extension workers increasing the probability of adopting better market (Techane *et al.*, 2000; Abdissa *et al.*, 2001). Based on these grounds, it is assumes to have direct relation with retailers' market channel choice.

Distance to the market (DSTMKT): It is a continuous variable measured in kilometre. The closer the market the lesser the transportation charges, reduced transaction costs, and reduce other market cost. According to (Moti, 2007) market choices are perfectly related to the distance of market. Therefore, the probability that farmers prefer the nearest market may be high.

Off farming income activities (INCOM): It is a continuous variable and referred to income obtained from off farming activities by tomato producer households. Since both tomato production and non-farm activities is conduct mainly for household cash requirement, security of non-farm income.

Access to credit (ACCR): This is a dummy variable that represents access to both formal and informal credit for farm related purposes. It is measured as 1 if a farmer has access to credit 0 otherwise. Credit was enhanced the financial capacity of farmers. According to Jeffrey *et al.* (2009) study conducted on market channel choice decision for potato, access to loan has a significant effect on the decision of producers.

Membership in cooperative (MCOOP): It is binary variable and takes the value of 1 if the household is member of cooperatives engages in tomato business, otherwise 0. Furthermore, cooperatives involves in tomato business may have backward and forward linkage with producers in the study area. A study conducted by Mamo and Degnet (2012) revealed that membership to cooperative reduce probability of choosing traders as livestock marketing channel. Therefore it is expects to have indirect effect on decision of tomato producing households.

Farm size for tomato (FARMSZ): It refers to size of land allocated for tomato production by producer. It is continuous variable and measured in hectare. If the producer allocates more land to tomato production, he/she was benefit from scale of production. Furthermore, those producers who allocate large farm size for tomato are likely to prefer wholesalers market because they purchase their product at large amount.

Bargaining power of supplier/farmer (BPSU): This is a dummy variable that refers to the power of farmer or suppliers to influence the setting prices of tomato whether they have or not when the market is imperfect. The bargaining power was expected to increases the probability of selling to collector market, Therefore it was expected to influence household decision in favour of collectors directly. Furthermore, those producers who allocate large farm size for tomato is likely to accept wholesalers' market channel.

Farming experience of the household heads (EXPHHH): It stands for duration of channel choice in farm activities by household head and measured in years. Farmers with longer farming experience is suppose to have better competence in assessing the characteristics and potential benefits of new marketing opportunity than farmers with shorter farming experience. Accordingly, it is hypothesized that this variable is indirectly related to value chain marketing channel choices and gross income of tomato farm households.

Access to market information (ACMIF): It is a dummy variable. Market information is the information on price, demand, quality, buyers and other relevant information that was contributed for a good decision making for sellers. A study conducted by Jeffery *et al.*, (2009) revealed access to market information having positive effect for potato market channel choice in Bolivia. Therefore, it market information was hypothesized to have relation with probability of market channel choice.

Table 3 Description of dependent and independent variables used in the MLRM.

No	Description	Types	Parameters.	Effect on	
				supply	Ch/outle choice
1	Age of the respondent	Cont.	In, yrs, As individual stays long, have better knowledge and decide to allocate more size of land, produce more and supply more.	+ve	----
2	Educational level ‘’	Cont.	Formal schooling. Make wider farmers’ enable perform the farming activities intelligently, accurately and efficiently.	+ve	+ve
3	Active family size ‘	Cont.	Measured (AE) production is a function of labour.	+ve	-----
4	Improved seed	Dumm	<i>1 if. 0 otherwise.</i> Better capacity to resist diseases.	+ve	----
5	Farming experience ‘	Cont.	<i>In, yrs.</i> better competence in assessing the characteristics and potential benefits.	+ve	+ve
6	Current price tomato	Cont.	<i>In birr.</i> Prices of farmer got from selling produces.	+ve	-----
7	Extension access.	Cont.	Number of visit extension agents within a year	+ve	+ve
8	Distance to market.	Cont.	<i>In km,</i> the closer market, lesser transportation charge.	-ve	-ve
9	Access to credit	Dumm	<i>1 if. 0 otherwise.</i> enhanced the financial capacity of farmers	+ve	+ve
10	Source of livestock	Dumm	<i>In TLU,</i> number of livestock are probability to have more money	+ve	-----
11	Total land allocated.	Cont.	<i>In hectares,</i> who allocate large farm size prefer wholesalers market b/c they	+ve	+ve
12	Coops membership	Dumm	<i>1 if. 0 otherwise.</i> Binary, tomato business may have backward and forward linkage with producers in the study area.	_____	+ve
13	Access market info	Dumm	<i>1 if. 0 otherwise.</i> Farmers marketing decisions are based on market information,	+ve	+ve
14	Bargaining power of supplier/farmer	Dumm	Power suppliers to influence the setting prices of tomato whether they have or not when the market is imperfect.	_____	+ve
15	Income from non farming activities	Cont.	Conduct mainly for household cash requirement, security of non-farm income.	_____	+ve

Source: - own design (2016)

4. RESULTS AND DISCUSSION

This chapter of thesis deals with results and discussion of the findings from descriptive and econometric analyses. Descriptive result deal about socio demographic formation like farmers' sex, marital status, religion, and livelihood, access to service, tomato value chain actors are discussed in detail. The chapter also deals with the analysis of quantifying the general characteristics of sampled farm households and traders, and marketing margin of tomato value chain actors. Moreover, the results of econometric analysis on factors that affect tomato supply and channel choice of farmer for tomato production is sample households in the study area are presented.

Table 4.Characteristics of sampled households.

Variables		Number	%
Gender	Female	23	17.83
	Male	106	82.17
Marital status	Single	10	7.75
	Married	101	78.29
	Divorce	12	9.30
	Widowed	6	4.65
Religion	Muslim	89	68.99
	Christian	32	24.81
	Wakefata	8	6.20
Ethnicity.	Oromo	90	69.77
	Amara	21	16.28
	SNNP	18	13.95

Source: Own survey (2016).

As above table results have shown that both male and female headed household's engagement in production and marketing of tomato. Total tomato producers 82.2% were male headed and the remaining 17.8% were female headed. Similarly (UNDP, 1996). Gender involvement ratio on vegetable production activities varies greatly from country to country, depending on cultural/religious context, the economic conjuncture, the economic activity, the production system, scale and areas involved. In the study area, male farmers are dominant and 78.29 were married 7.75 single and the left one was divorce and widow About 89% of the sampled respondents were Muslim, while the remaining 32% and 8% were protestant christen and Wakefata, respectively .The dominant ethnic group in

the study area is Oromo which constitute 90%, while the remaining respondents were Amhara and SNNP.

Table 5. Level of education of the household heads by kebeles.

Education level	Kebeles				Total
	X/Abullo	Girma	Bulbul	Gelloo	
No formal educati	37	33	35	38	35.75
Adult Education	31	29	30	26	29
Prima, education	26	34	22	24	26.5
Secon,education	6	4	13	12	8.75
Total	100	100	100	100	100
N ^o respondents	45	39	27	19	129

Source: Own survey (2016)

Education is a critical factor for skill development and enhancing effective production and marketing decisions. The survey shows that 35.75 % of the producers do not have formal education while about 8.75% attended high school level education. The smallest proportion of those who attended high school level education is found in Girma kebeles.

Table.6 Household and farm characteristics.

Variables	Mean	Std. Deviation
Age of respondents(years)	37.14	14.5
Total family size(AE)	6.10	2.4
Family Experiences (years)	23.1	8.3
Total farm size(ha)	2.95	1.01

Source: Own computation based on survey data (2016)

The average age of the respondents was 37.14 years with standard deviation of 14.52. (Table 6). The result further indicated 58.8 percent of the producers were within the age range of 18 and 30 years .whereas 41.2 percent of them were between 30 and 50 years.

The households had the average family size is found to be 6.10 persons. The respondents had an average of 23.1 years of experience in tomato production, ranging from 2 to 40 years. The result also indicated that 83 percent of the respondents in the study area had

farming experience of more than 15 years. The local unit of measurement for land size in the study area is “*Facasa*” which is equal to 0.125(0.125*4) hectare. Sample farm households owned an average of 1.75 ha of farm land. The average tomato production area was 2.9 facasa.

Table 7. Major means of income generation of the producers.

Income source	Numbers	Percent	R/importance
Tomato production	114	88.4	1
Khat and coffee production	84	65.1	2
Khat trading	69	53.5	3
Grain and pulse production	57	44.2	4
Livestock production	48	37.2	5
Horticulture trading	44	34.1	6
Total	129	100	

Source: Own computation based on survey data (2016).

The respondents depend on different means of income generation activities. Tomato production is a major source of income for the majority of the producers. About 88.4% of the respondents earn their living from tomato production as a primary source. Khat and coffee production is considered as the second major means of livelihood of the producers. Khat trading takes the 3rd means of livelihood of producers and similarly the 4th, 5th and, 6th are grain and pulse, livestock production is the major livelihood of producers respectively.

Access to services: - Access to timely and accurate market information is the basic element not only in tomato market supply but also in other commodity marketing. For farmers, knowing where and when to sell their output is one of the most difficult challenges. If they have no knowledge of current market prices, they can easily be exploited. But gathering current information about markets may not be easy, especially for people living in very remote areas. The study results discovered that 70.1% of the sample households had access to market information and the remaining 29.9% did not have (Table 8).

Table 8. Sample households’ market information, credit, and member to cooperatives

Access to service	Yes	No
Access to Market information	70.01	29.9
Access to extension contact	70.7	29.3
Access to credit	68.2	31.70
Membership of cooperatives	21.70	78.29

Own computation based on survey data (2016).

About 70.7% of the sample households had access to extension service. On average 19.5 times within a year by different agents, The extension advice they have been receiving focuses on technical aspects of improving tomato production and productivity, post harvest management, market orientation and etc. It helps farmers in selecting high yielding varieties, prevention of tomato diseases and gaining high profit from their productions (Table 8). About 68.3% household had access to credit. Credit is one way of improving smallholder farmers' production and productivity. Farmers' ability to purchase inputs such as improved seed and fertilizer is tied with access to credit. Farmers having better access to credit can minimize their financial constraints and buy inputs more readily than those with no access to credit (Table 8). About 21.7% of the sample households were members of cooperatives, and the remaining was non-members.

Market channel outlet choice of tomato; - In the study area producers supplied their tomato to different markets within the same production year. There were farmers who sell their produce through more than one channel but their number was negligible. Consequently they were merged to their respective channel to which large proportion of their produce was supply. Among available alternative channels for tomato, selling to wholesalers took the largest proportion of the product. From tomato producing households, 10%, sold to consumer, 19.3% to collectors, to 17.05% retailers, to wholesalers was 52.7% during 2016 production year. (Table.9)

Table. 9. Channel outlet choice of tomato producers.

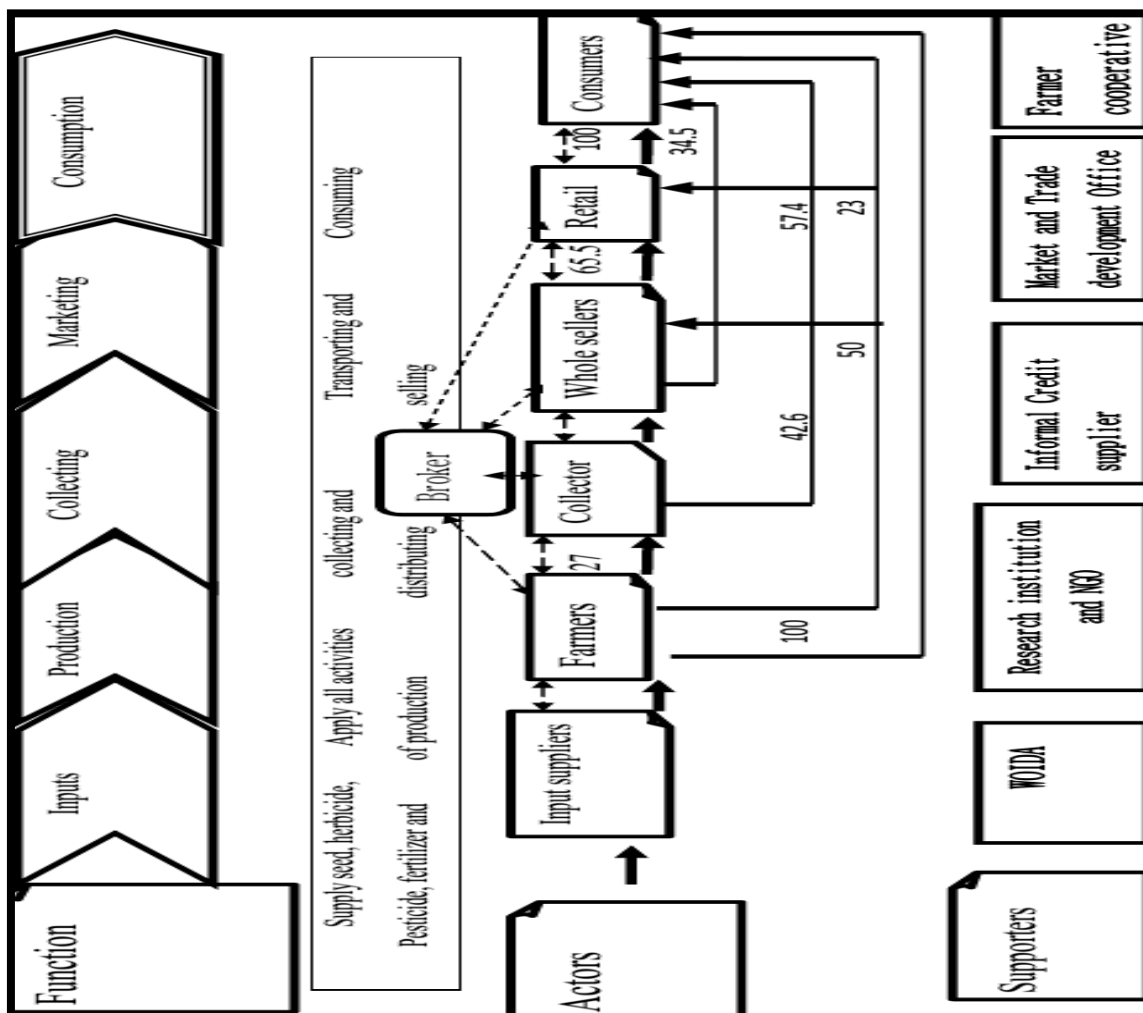
P. choice outlet	Frequency	Percent
Whole seller	68	53
Collectors and other	31	26
Retailer and other	28	21.0
Total	129	100.0

Own survey (2016)

4.1. Value chain analysis

The study uses value chain analysis which is very effective in outlining product flows, showing the value adding stages, identifying key actors in the chain. Tomato value chain map involves different actors in tomato value chain and activities performed by different value chain actors. It also shows that flow of tomato production inputs from input suppliers to producers as well as flow of the product from farmers through different value chain actors to the consumers. Figure shows different levels of tomato value chain in the study areas. This include different levels, actors and it involved in the flow of the product, quantity of product flow through different levels and information flow from consumers to the producers regarding the quality of products they prefer to buy through different actors that help to improve performance of the chain

Figure 3. Map of Tomato value chain



Source: - own design (2016)

Tomato market outlet choice:-three major channels were identified for tomato marketing. When the producers sell their product at farm gate especially for the wholesalers purchase the whole product but select the good quality product and transport to resell to other traders. The

left out low quality collected by producer especially women backload and sell to near market to consumers by low price. The main channels outlet identified from the point of production until the product reaches the final consumer through different intermediaries were:

Channel IV: Producers → Collectors → wholesaler's → retailer → consumers

Channel III: Producers → Collectors → retailer → consumers

Channel II: Producers → retailers' → consumers.

Channel I: Producers → consumers

Market channel I where producers who sell their tomato to consumers; consumer uses for consumption. Channel II:-producers sell their tomato directly to retailers and retailers sell their purchase to consumers. *In channel III*: - producers sell their product to collectors and collectors sell directly to retailer resell to consumers. *In channel IV* is the outlet through which producers sell their tomato to collectors sell to wholesalers at District level, it sell to retailer at local level retailer sell to consumer like, small restaurants, consumption etc. Marketing costs and margins:-The important points to be considered in value chain analysis are marketing costs margin of producers as well as intermediaries from consumers' price or end buyers for products. Accordingly, a main channel was followed beginning from farm gates of tomato producer households up to the end users. In this study, the major channels are Whole sellers, collectors and retailer respectively. Margins were calculated for the main actors in these four major channels: producers, collectors, wholesalers and retailers engaged in tomato supply. Production Costs of tomato:-Tomato producing farmers of the study area incur costs mostly during the production phase rather than during marketing their produce.

Table 10. Costs of production of tomato.

Production cost of items.	Costs per quintals
Land value	35
Costs of fertilizer	45
Chemical cost	13.14
Labour cost	15.25
Seed cost	31.
Weeding cost.	8
Harvesting cost	14
Separation cost	8.
Cleaning cost	8.25
Total costs of production	174.9

Source:- own design (2016)

They incur production cost of 175 birr per quintal. The estimated land value and labour cost is opportunity cost of land which is rental value of land and labour value is hiring value of labour in the study area.

Table 11. Estimated marketing margin of tomato value chain participants

Item (birr/qt)	Producer	Collector	Wholesaler	Retailers	Sum
Purchase cost	-	800	1000	1600	4150
Prod ⁿ cost	175	-	-	-	175
Material cost	10	10	10	10	50
Transport cost	10	5	25	5	65
Tele. Cost	-	5	5	-	15
Load/unload	-	5	5	3	18
Tax		2	2	2	8
T.Marketing cost.	20	27	52	20	170
Total cost	195	827	1053	1620	4434
Average waited sales pri	800	1000	1600	1700	5800
Gross margin (v. added)	625	200	600	100	1525
market Share margin %	34.4	13.11	39.34	6.55	100
Profit margin (NM)	605	173	548	80	1311
profit share %	38.52	13.19	41.7	6.15	100
RANK	2nd	3rd	1st	4th	

Own sketch (2016).

Marketing margins of tomato in different channel outlet choice;-Marketing margins of tomato in the four channels for each group of market participant are shown above Table 10. GMMp, GMMc, GMMr and GMMw are gross marketing margins of producers, collectors, retailers and wholesalers, respectively. NMMc, NMMr and NMMw are net marketing margins of collectors, retailers and wholesalers, respectively.

Value allocation among tomato value chain actor:-Tomato value chain actor adds value to the product as the product passes from one actor to another. In a way, the actors change the form of the product through improving the grade by sorting, cleaning or create space and time utility. Traders' operating expense is much less but their profit margin is more than that of farmers. That means by simply buying from the farmers and selling to consumers, traders on average took above 61.04% of the total profit margin. While farmers, doing all the work 'of producing tomato and bearing the associated risks, took only 38.96% of the profit margin. 'This unequal share of benefits is the reflection of power relationship'' among actors. Tomato

producers are responsible for risks and other situations, the risks which include unexpected seasonal factors, rodents and the most serious risk are pests. So by this kind of situations the loss is accounted on producers. They are risk takers. During marketing stage the price makers are the traders who has not clue about the production cost of the product. But the producers who produce the product and has every specific cost incurred for the process of that product are price taker. This is due to the absence of excessive interference of intermediaries who could have increased marketing cost that in turn reduces the share of producers. Furthermore, farmers can have bargaining power to get reasonable prices for their produce. The gross marketing margin (GMM) is the highest in channel III, I, II, and IV.

Opportunities and Constraints of tomato value chain in the study area:-The result indicated that tomato producers facing major constraints of the tomato production and marketing. Some of the principal constraints and problems are discussed below. There are factors that hinder the production of tomato products in the study area. The majority of the sample producers indicate farmer related factor, natural factors, and infrastructures and institutional factors as major constraints of tomato production. Table 12 shows the proportion of sample producers ranking the constraints of tomato production as the top problems of the specified vegetables. On the other pests, diseases, and higher fertiliser prices, lack of market facilities are the most important problems for tomato production, which is also location and season specific

Table 12. Major constraint's tomato vegetable production in the study area.

Constraints	Number	%	Constraint
Natural factors,(Seasonal factors)	112	86.8	1
Institutional factors,	76	59	4
Farmer related factor(traditional activity	88	68.2	3
Infrastructure.	109	84.49	2
low price of the product	56	43.41	5
higher fertilizer price	41	31.78	6
N^o of respondent	129	100	

Own survey (2016)

Natural factors such as rainfall, pests, rodent, and flood are often beyond the control of farmers and institutions. Moreover, an appropriate management system including variety selection and diversification would reduce the effect of natural factors. Improving the

institutional constraints discussed above was instrumental for improving the management system.

Institutional factors are related to the provision of improved horticultural production technologies including supply of relevant varieties, agronomic practices and improved product management techniques. The study reveals that the farmers are not receiving the varieties they wish to cultivate. The capacity to distinguish between varieties is also low in the area. Research based practical recommendations on agronomic practices and pre- and post harvest management are lacking at farmers level. Moreover, inputs such as fertilizer, seed and pesticides should be available through known and accountable sources. Conducive policies and enforcement mechanisms should be put them in place.

Farmer related factors are: tomato production in the western part of the country is based on tradition, which is poorly supported by scientific recommendations. Although one can associate this constraint to institutional factors, it is apparent that inadequate farmer skills and knowledge of production and product management affects the supply. Farmers attempt to select varieties and practice traditional crop management practices. Farmers' know-how of product sorting, grading, packing and transporting is traditional, which severely affects the quality of horticultural products supplied to the market. This skill gap should be addressed to improve the quality of marketable horticultural products.

Infrastructure such as rural roads and means of communication for efficient flow of goods and market information is a limiting factor. Most of the rural area is not accessible by vehicle. The products are transported to the road side by donkeys or by people. This requires longer time to reach the market and affects the quality of the products. Moreover, there is no telephone or other fast communication systems to access market information that would assist decision making. But specifically seasonality, Occurrence of tomato diseases and pest, Lack of finance, Poor transportation infrastructures are well known problems.

Marketing problems of tomato traders:-High perishability, In Ethiopia considerable quantity of tomato is wasted before it reaches the target markets due to limited shelf life of the fruit and poor postharvest handling (Bezabih and Hadera, 2007). The perishable nature of tomato made the transportation of the product very risky to the wholesalers and all traders in general in the study area. All respondents show that from the total purchased product 10% was

damaged. As it is known, tomato has high percentages of postharvest losses with a range of defects. It is very susceptible to mechanical damage.

Information gap and dissemination: - Some tomato traders get market information through personal communication and phone call with other traders and brokers and to some extent from the *woreda* input/output case team. However, the knowledge about tomato supply and demand situation is not properly known by the traders before they get into the tomato business. Generally, the study reveals that there is no reliable and trustful market information source and dissemination system in district.

Poor marketing skill: To increase their bargaining power in the exchange process, traders must require marketing skill. The traders and producers lack experience or marketing skills, to use the opportunities in different market alternatives. Because of these training proposed for primary cooperative management committee and employees on business plan development, and on keeping quality and standardization by the zone Irrigation, Agricultural and rural development expert. Hence, this needs to be further strengthened in a continuous and coordinated way.

Opportunities in tomato value chain:-The study area does not only have constraints associated with production and marketing of tomato, but there are also diversified opportunities that need to be exploited. The opportunities they foresee to realize the intended plan are given in Table 13. The most commonly mentioned opportunities are related to the use of improved production technologies including land availability, government support, free from water shortage, availability irrigation machines, increase production skills and existence of high demand for products in the market. The government encourages private sector development which is instrumental for the commercial activities.

The current government Plan for Accelerated and Sustainable Development to End Poverty (PASDEP) sets intensification and commercialization of agriculture as a development path during the next five years. Provision of improved agricultural technologies, provision of extension packages and farmers' capacity building, etc. are major areas of support the government has planned to provide farmer.

Table 13 . Opportunities of tomato vegetable production.

Opportunities	Number	%	Opportunity
Land suitability	104	80.6	2
Government support	93	72.09	3
Possibility of using improved inputs	72	55.8	5
Labour availability	58	44.9	7
Availability of water	109	84.4	1
Having Motor and tridle pumping	92	71.3	4
Relatively high demand in the market	64	49.6	6
Increased production skills	45	34.8	8
N^o of respondents	129	100	

Own survey (2016)

Tomato production provides good opportunity for farmers in the study area to generate income and nutritional value. Despite the constraints identified above, there are opportunities for increasing tomato vegetable production in the area. Some of them are: -

Increasing marketing skills:-tomato vegetable production enables livelihood diversification of the population, and since farmers' awareness of the marketability of tomato production is increasing, the prospect to expand tomato production is becoming high and creativity. Farmers are increasingly becoming aware of production technologies and improved inputs. If the supply of these inputs is facilitated at reasonable prices, and farmer' knowledge on sustainable use of the technologies is improved, there is a potential to increase yield. In this regards, farmers training and adequate extension system play crucial role.

The government policy and development strategy (EFDR, 2005) identified intensive production and commercialization of agriculture as its development path. Attempts to implement this plan provide opportunities for increased horticulture production in the area. In the long run, investment in the country opens up the possibility of investment venture in vegetable and fruit processing. The below mentioned processing is a main potential opportunity of tomato production and marketing. This will create a reasonable market price for the producers, stabilize the price and motivate the producers to expand tomato production.

Figure 4: Opportunities in tomato production.



Source:- own design (2016)

4.5. Econometric model outputs

Determinant of tomato supply:-There are various variables to ensure this objectives, those are:- age of the household heads, education level of the household head, family size, and access to market information, access to credit, distance to market, current price, and experience in tomato production, land size, livestock ownership, improved seed, and extension contact was hypothesized to affect supply. Based on the OLS estimation result five variables influence supply positively significant. Linear regression models were employed to identify the factors, the parameter estimates to be efficient, unbiased and consistent.

Assumptions of Linear Regression model should hold true. Hence, multicollinearity, and heteroscedasticity detection tests were performed using appropriate test statistics. The results for mean of VIF were 1.06. Therefore, Since VIF is less than 10 and serious multicollinearity problems would not be suspected. In this study, (Breusch-pagan) test was used to check for hetroscedasticity and the result showed that p-value of 0.08. Ho: Constant variance. The

heteroscedasticity problem is not found. The problem of heteroscedasticity is always common and expected when analyzing cross-sectional data (Gujarati, 2003). After the appropriate tests, the OLS regressions was run and analyzed various explanatory variables the result showed that five explanatory variables (education level, current price, farm size, access to market information ,distance to the market,) are found to significantly determine the variability in the households tomato supply (Table 14).

Table. 14. Determinants producer supply to the market.

Variables	Coefficient.	Std.Error.	T	P>t
Age of house hold	0116127	.0261611	0.44	0.658
Family size	5.535	3.0856	1.79	0.276
Education level	2.435***	1.4347	1.70	0.092
Farm experiences	24.211	68.985	0.35	0.725
Farm size	0.1503*	.00546	27548	0.000
Improved seed	395.161	1223.29	0.32	0.747
Livestock	-41.599	243.904	-0.17	0.867
Accesses to Market info	8.090**	4.0229	2.01	0.047
Current prices	0.7489 *	.000198	378	0.000
Extension Contact.	21.658*	.997332	2.17	0.132
Access to credit	24.782	138.995	0.18	0.858
Distance to market	-14.869**	0.7250	-2.05	0.043
_cons	311.64	66.415	0.469	0.000
Pro>F	0.71			
R squared	0.5803			
Adj R squared =	0.5447			

***, ** and * represents significance at 10%, 5% and 1% probability levels, respectively.

Source: Own computation based on survey data (2016)

Educational level of the household:-As expected education level of farmer's make wider performances of farming activities intelligently, accurately and efficiently. Moreover, better educated farmers tend to be more innovative and are therefore more likely to adopt the marketing systems. But According to Astewel (2010) found that if paddy producer gets educated, the amount of paddy supplied to the market increases, which suggests that education improves level of sales that affects the tomato supply. Therefore, this variable is hypothesized to influence volume of tomato sales positively. Is continuous variables measured in formal schooling. The variables are positive significant at 10% significance level, the model output predicted that as the household education level for tomato production

increases by one formal school, supply would increase by 2.43 quintal, than non-formal schooling producers(farmers).

Size of land allocated for tomato production: - As expected, total land a respondent owned for tomato production, is a continuous variable measured in hectare influence choice outlet decision. The variable was significant at 1% significance level. The model output predicted that as the household allocation of land for tomato production increases by one hectare, supply would increase by 0.15 quintal. As the more land is allocated for tomato production; more tomato supply to the market. Similarly Alemnew (2010) found out that total land owned has a significant effect to the amount supplied. DNIVA (2005) found expanding the area under crop increased the marketed surplus of the crop.

Current price: - Price was expected to affect the supply of tomato positively. The variable was measured in birr per quintal. As the current selling price of tomato increases by one birr the amount of tomato supply to the market was increase by 0.74 quintals. The variable was significant at less than 1% significance level. The positive and significant relationship between the variables indicates that as the current price of tomato rises, the quantity supply of tomato also increased. According Wolelaw (2005) identified the major factors that affect the supply of rice at Fogera *Woreda*. His study revealed that the current price had affected marketable supply of rice positively.

Access to market information (ACMIF):- This is a factor, which positively affected supply of tomato at 5% significance level. In this case, supply of tomato producers who had access to market information was greater than those who did not have by 8.09 quintal, keeping other variables which affect supply constant. Current market information accessed through different sources like radio programs, telephone services, personal observations, from other traders or from extension agents encourages farmers to produce more. This leads to an increase in supply of tomato. This is agree with Muhammad (2011) who illustrated access to market information by farming households increase marketed supply of *teff* significantly in Halaba especial *woreda*. Also Adugna (2009), who illustrate if papaya and tomato producer gets information, the amount of papaya and tomato supplied to the market increases.

Distance to market: - Distance to market has also a significant negative effect (at 5% significant level) on supply of tomato. If the nearness from the farm to market increases by

one kilometre, the quantity of tomato supply to the market decreases by 14.8 quintal. The closer to the market the lesser would be the transportation cost and time spent so that it makes supply of tomato to be more. This is in line with Ayelech (2011) who found that distance to market caused marketed surplus of avocado to decline in Gomma woreda.

4.5.2. Determinants of farmer’s channel outlet choice tomato

The Multivariate probit model specified for this study, the application of the Multivariate probit specification to the data set was justified. The estimation from Multivariate probit model is statistically significant in explaining farmers ‘channel choice outlet of different tomato marketing channels. Table.15. Presents the coefficients from multivariate probit regression on the alternative marketing channels in the study area. The independent variable affected the selling to the Wholesaler, Collectors and retailers market

Table. 15. Result of multivariate probit model for channel outlet choice.

	Coef.	Std. Err.	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
	whole seller		Collectors			Retailer		
educat	.2958261	.2712892	.0702241	.2770184	0.080	-.461243	.3407131	0.176
farmsz	.577084	.2965462	-.134434	.3139273	0.668	-.369094	.3480441	0.0389
non_incom	-.079225	.2472325	.1127353	.2682401	0.674	.1505503	.2563925	0.557
extension	-.28304	.1242607	.26304	.1247866	0.035	-.058437	.135663	0.667
farmexp	-.04018	.1075656	-.191395	.1091117	0.079	.035257	.132365	0.790
acccredit	.3097143	.2570613	.193189	.27923	0.0489	-.569428	.2752778	0.039
accmif	-.04811	.3740653	.2847856	.3648543	0.435	-.040245	.429799	0.925
barganing	.05408	.2392426	-.289458	.2533984	0.253	.1325222	.270941	0.625
mcoops	.4898198	.2931827	.2827222	.3326086	0.0395	-.884052	.3089949	0.004
dstmrkt	-.095899	.1217933	.0129671	.1146261	0.0910	.008180	.1425377	0.0954
_cons	-1.26022	1.193635	-1.65054	1.130902	0.144	2.258257	1.443203	0.118
Waldchi2(30)	=61.04		Log likelihood =			59.035916		
Prob > chi2	0.073							

***, ** and * indicates level of significance at 10%, 5% and 1% respectively.

It is representing in the model as $y_1=1$ if choice wholesalers 0, otherwise $y_2=1$ if choice collectors 0, otherwise and $y_3=1$ if choice sell to retailers 0, otherwise.

The average marginal effect estimates are probability of selling to wholesalers, collector's retailer over each others. This indicates that the discussion of the results focuses on the impact of the explanatory variables on selling tomato to wholesaler market or selling to collectors or retailers relative to each channel. Thus in all cases, the estimated marginal effects are compared with main channels (Table 16).

Table 16 marginal effects of multivariate probit model for market channel outlet choice

Delta method	wholesaler			Collector			Retailer		
	dy/dx	Std. Err.	P>z	dy/dx	Std. Err.	P>z	dy/dx	Std. Err.	P>z
educat	.10633**	.0967143	0.027	.0210***	.082974	0.080	-.118257	.0847105	0.163
farmsz	.20743**	.1027155	0.043	-.0402	.0937013	0.667	-.0946**	.0890682	0.028
non_incom	-.02847	.0887841	0.748	.0337	.0801695	0.674	.03859	.0657341	0.557
extension	-.10174*	.0420078	0.015	.0787*	.0360518	0.029	-.0149	.0347254	0.666
farmexp	-.01444	.0385986	0.708	-.0573**	.0325168	0.078	.00903	.0338143	0.789
acccredit	.11132**	.0912171	0.022	.0578**	.0831529	0.0486	-.1459**	.0684111	0.033
accmif	-.01729	.1344566	0.898	.0853	.108557	0.432	-.0103	.1102006	0.925
barganing	.01944	.0859673	0.821	-.0867	.0749081	0.247	.03397	.0691144	0.623
mcoops	.17606***	.1025425	0.086	.0846*	.0981625	0.038	-.226*	.0719932	0.002
dstmrkt	-.03447**	.0434977	0.042	.0038***	.0343398	0.0910	.002***	.036502	0.0954

NOTES: dy/dx is marginal effect, *, ** and *** indicates level of significance at 1%, 5% and 10% probability levels, respectively. The dependent variable is choice marketing channel, i.e. Y^1 = wholesalers channel, Y^2 = collector channel and Y^3 = retailers channel

Educational level of household Head (EDUCAT.): - the result revealed that education of household affect positively and significant with wholesaler outlet choice at 1% significance level and collector, at 10%, significance level. The result also confirmed that, if the household head is educated the probability of choice of wholesaler and collectors outlet increased by 10, 02 times. This is agree with Ferto and Szabo (2002) on supply channel choice of Hungarian vegetable revealed relationship between channel choice decision and education level of household. Education is believed to give individuals with the necessary knowledge that can be used to collect information, interpret the information received, and make productive and marketing decision. Education is related with the wholesale market and collector outlet because as the education level increases farmers' ability to post harvests handling activities increases and strengthen the linkage with wholesalers.

Land allocation of farmers for tomato production (FARMSZ):- Producers who have allocated more land for tomato production would obtain larger amount of tomato. Farm size was found affecting households' decision to sell to whole seller positively and retailer negatively at 5%, 1% significance level relative to other outlet. A one hectare increase in farmers' farm size has increased the probability of farmers' choice selling position to wholesalers market by 20 times and decreased the probability of farmer's choice selling to retailer by 09 times . In most cases volume of production is directly related to farm size, as a result there is high possibility to have market channel choice. In other words, farmers with larger total land holding produce large amount and they prefer to sell this large amount to wholesaler and other channels. This could be explained by the fact that tomato producers choose the nearest marketing channel and it indicates that producers tend to shift their produce to wholesaler marketing channel relative to other channels. Branson and Norvell (1983) and DNIVA (2005) found expanding the area under crop increasing the market supply of the crop.

Access to Extension Service (EXT):- The result revealed extension was negatively and significantly associated with the wholesaler channel choice outlet and collectors at 5% significance level. The probability selling to wholesaler and collectors of household who have access to extension tend to decrease by 10, 07 times respectively as compared to household who do not have extension access relative to using other outlet. But Farmer's access to extension service increased the ability of farmers to acquire important market information as well as other related agricultural information which in turn increases farmer's ability to choose the appropriate market outlets for its product. This result is agree with Mamo and Degnet (2012) who found agricultural extension services in the form of visit of farmers by extension officers tended to increase the probability of selling directly to consumers in livestock market channel choice of farmers in Ethiopia.

Access to credit (ACREDIT): - The model result reveals probability of selling to the retailer negatively significant at 5%, level, and positively significant to whole seller and collectors at 1%, level. The implication is that households' prefer selling to wholesalers by 11 and collectors 05 times as they start accessing to credit on tomato. Probability of households who have access to credit selling to retailer tends to decrease by 06, times as compared to households who do not have access to credit. This result may be due to the fact that access to credit eases the financial constrains of the households and motivates the household to purchase inputs and produce at large amount. In the study area credit from the formal sector

and cooperative is predominantly in terms of agricultural inputs, which also promotes use of quality/improved seeds and increase the quantity of the product to be supplied to wholesalers. This study is agree with Jeffrey *et al.* (2009) study conducted on market channel choice decision for potato, access to loan has a significant effect on the decision of producers.

Membership of Cooperatives (MCoops): The result shows that, cooperative determines farm household's channel outlet choice decision. These variable where positively significant influenced wholesalers and collector but negatively retailer's choice outlets at 5% significance level. This result indicated that those households who were members of cooperatives the probability of choosing wholesalers, and collector outlet increased by 17 08%, and retailers' decreased by 22 times compared to other outlet choice. This is agree with the study conducted by Mamo and Degnet (2012) revealed that membership to cooperative reduce probability of choosing traders as livestock marketing channel. Therefore it is expects to have indirect effect on decision of tomato producing households.

Distance to the market place (DSTMRKT), In fact that tomato producers choose the nearest marketing channel choice outlet and it indicates that when the nearness of district market increases producers tend to shift their produce to wholesalers marketing channels, the result found that the probability of choosing wholesalers, are negatively influenced but positively collectors, and retailer market channel choice. The negative relationship indicates that the farther a household is located far from the market, the more difficult and costly. The result confirms that a one-kilometre increase in the distance of market from the production area farmer or producer reduces the probability of selling to wholesaler market by 0.9% but increase the probability of selling to collectors and retailer by 0.03%,0.02% relative to other channel choice outlet. In other words, as the distance of nearest market increase by one-kilometre the probability to sell their tomato to collectors and retailer channel increase. According to (Moti, 2007) market choices are perfectly related to the distance of market. Therefore, the probability that farmers prefer the nearest market may be high.

5. SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1. Summary and Conclusions.

This study was analyzing tomato value chain in of Kersa District in Jimma Zone of Oromia, Southwest Ethiopia. The specific objectives of the study was to identify actors and, Analysing market margin, to identify factors of affect tomato supply and channel choice of farmers for selling tomato. The data was collected from both primary and secondary sources. The primary data was collected from 129 producers and 45 traders from Kersa district. The raw data collected from four potential tomato producing *kebeles* namely Xuqur Abolloo, Girma, Bulbul Gelloo, Total household heads, 82.1% were male headed and the remaining 17.8% were female headed.

The average age of the sample respondents was 37 years, 63% adult education level and family size was 6.10. About 70.7 % of sampled households had access to extension service on tomato production. Regarding market information, about 70.01% of them have access to market information and majority of them got from brokers and surrounding farmers. The analysis was using descriptive statistics and econometric models. The sampled household was tomato producers, traders, and consumers. Channel choice decision and supply of tomato are found to be important elements in the study of tomato value chain. Therefore, in identifying factors affecting supply of tomato, researcher use multiple linear regressions and a multivariate probit model was applied to analyze factors affecting channel choices outlet of farmers for selling tomato in the study areas.

Tomato value chain analysis of the study area revealed that, the main actors in the chain being tomato producers, Collectors, wholesalers, retailers and consumer. Collectors are engaged in purchasing of tomato from each Keble's producers (local market) and sell either to the wholesalers, retailers. Wholesalers buy from both producers, collectors and to some extent sort, assemble and transport it to central market, Jimma/Waliso/Addis Ababa. By doing so, they add value to the tomato. Consumers obtain tomato from retailers. The choice channels of tomato in the study areas shows four major channels choice outlet and major share of producers goes to channel whole sellers. This may be due to the absence of excessive

interference of intermediaries who could have increased marketing cost that in turn reduces the share of producers.

Though tomato value chain actors adds value to the product as the product passes from one actor to another. In a way, the actors change the form of the product through improving the grade by sorting, cleaning or create space and time utility. Frankly when compared to farmers, traders' operating expense is much less but their profit margin is more than that of farmers. Finally trader on average took 61.04% of total profit margin. While farmers doing all the work of producing tomato and bearing the associated risk took only 38.96% of the profit margin. This unequal share of benefits is the reflection of power relationship among actors. Furthermore, farmers can have bargaining power to get better reasonable prices for their products. The gross marketing margin (GMM) is the highest in channel IV, III, and II and also enables farmers to minimize transaction costs. Regarding the cost of the chain actors, producers of tomato in the study areas incur more cost during production rather than marketing their produce. Producers incur more costs compared to other tomato value chain actors of the study areas; Birr 175 per quintal as average production cost. However, the net market margins in those participants are found out 605,175, 548, and 80.

Multiple Linear regression models were used to analyze factors affecting supply of tomato and five variables were found to affect tomato supply significantly. Those are, education level, Current price, farm size, access to market information, and distance to market affected supply. The multivariate probit model was run to identify factors determining farmers' market outlet choice decision.

Multivariate probit model result also indicate the probability to choose the wholesaler and collector outlet was significantly affected by household education, land size, distance to market, access to credit, access to extension, farmers cooperative outlet. Because, these variables require special attention for farmer's margin from tomato production is to be increased.

5.2. Conclusion

Generally processing tomato into nutritional consumption is a way of adding value. There is need to develop a sustainable strategy involving the government, NGOs and farmers in order to increase the production base. GOs and NGOs can capacitate the farmer by training them on various value additions. The financial sector can fund the production of tomato products whilst the government can provide subsidized inputs to the small holder farmer. This multi sectoral approach will definitely yield the required result of increasing income for the smallholder farmer. The government can also incorporate technology in the curriculum of institutions of higher education.

The private sector can also contract the smallholder farmer by equipping them with the inputs and machines. There is need to reduce over reliance in the importation of key production inputs such as seed and fertilizer. Imported inputs have meant that the domestic farmer inputs costs has risen and remained higher. There is need to reduce the cost of inputs in tomato production and boost local production and encourage more smallholder farmers. The question that now arises and needs to be addressed in order for the productive farmers to become profitable is do they have the a business mindset, access to finance, infrastructural support and access to transport and market? One of the most practical solutions to this dilemma is the division of responsibilities between the private sector and NGOs. NGOs can add value through capacity building activities such as farmer group strengthening and business training activities. One aspect of value chain implementation might be enhancing access to mechanization or other means of enhancing the resources smallholders have to manage their land. All these efforts however need to be gender sensitive women also need to be fully involved at all levels. The farmer needs adequate financing on the farm and processing operations. The farmer needs a special bank to address their particular needs of through specialized interest rates to promote the expansion of production. In addition they are needed to upgrade irrigation schemes and consistent input supply to improve tomato production.

5.2. Recommendations

The major problems identified in tomato value chain analysis were related to both tomato production and marketing. Thus, appropriate interventions are required to alleviate these problems. To solve the production, marketing problems and increase production, market supply of tomato the following recommendations are forwarded: The results indicated that output level is important determinant of commercialization. So, to increase the output level and improving infrastructures are important factors.

Improving farmers education level; - Study revealed that education level of a household head positively and significantly influenced farmer's tomato production and marketing. This clearly indicates that for effective utilization of improved technologies, enhancing the educational status of the farmers through adult education, training and the expansion of primary education should be given due attention.

Land extension for tomato production: - As expected, total land a respondent owned for tomato production, influence choice decision. The model output predicted that as the household allocation of land for tomato production increases the amount of tomato commercial. As the more land is allocated for tomato production; more tomato supply to the market. Positively land extension or technically supported land uses of tomato vegetable production were appropriate forwarded recommendation.

Adequate market information: The model result revealed that the farmers being sensitive to access market information. Market information can help them make choices, from the very first steps of the production planning until the moment when the product is actually sold. Market information services have to be established or strengthened to provide farmers and traders consistently and timely. Market information services must be widens and broadens in order to rich producers all over the country and '*establishing technical committees*' among the governmental sectors. Such as Irrigation Development Authority, Land management offices, Trade and Market Development office, saving and credit organization, cooperative offices

Assessments of current market information: - the result of model indicates that Current market information is positively significant to supply of tomato. This implies that

'information accessment is a power of reduce risk perceptions and encourages supply of the product. Strengthening the existing market information system may helped to alleviate this problem. Likewise, "Market linkages should be given top priority". Without strong market linkages, the production cannot succeed and livelihood earnings of the smallholding farmers, particularly the poor farmers' was not benefit Concerned organizations and stakeholder have to work hard to strengthen markets for tomato by creating adequate market linkages for products promoted by government.

Facilitating infrastructures to alleviate post harvest loss: - The model results reveal that Distance to market has also a significant negative effect to supply of tomato. The closer to the market the lesser would be the transportation cost and time spent so that it makes surplus of tomato to be more. To minimize the post harvesting loss of tomato supply to the market, must be promoted farmers' awareness about marketing and post harvest handling, developing storage infrastructure and coordinating fragmented producers.

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7. APPENDICES.

Appendix Table 17 Conversion Factor used to look Adult Equivalent (AE)

Age Category(Years)	Male	Female
< 10 Years.	0.60	0.60
10 – 13	0.90	0.80
14 – 16	1.00	0.75
17 – 50	1.00	0.75
> 50	1.00	0.75

Source: Storck, et al. (1991)

Appendix Table 18 Conversion Factor for Tropical Livestock Unit (TLU)

Animal Category	Tropical Livestock unit(TLU)
Ox	1.1
Cow	1
Heifer	0.5
Bull	0.6
Calves	0.2
Sheep	0.01
Goat	0.09
Donkey	0.5
Horse	0.8
Mule	0.7
Poultry	0.01

Appendix Table 19 Result of VIF for continuous explanatory variables in Model

Variable.	VIF	1/VIF
FAMSZ	1.13	0.886383
EXTENS	1.09	0.920362
FARMSZ	1.09	0.920390
DSTMRT	1.06	0.945012
FARMEXP	1.05	0.954974
AGEHH	1.05	0.956046
LEVEL_EDUC	1.04	0.965142
CUURRENT_PRICES	1.02	0.978628
Mean VIF	1.06	

Table 20 Result Contingency coefficients for the discrete variables in MLR model

Variable	VIF	1/VIF
IMROVSEED	1.02	0.975730
LIVEST	1.02	0.980362
ACCR	1.01	0.993388
ACCMIF	1.01	0.994866
Mean VIF	1.01	

Table 21 result in dummy variable of multicollinearity

e(V)	IMROVS~D	LIVEST	ACCR	ACCMIF	_cons
IMROVSEED	1.0000				
LIVEST	0.1354	1.0000			
ACCR	0.0653	0.0365	1.0000		
ACCMIF	0.0545	0.0314	0.0438	1.0000	
_cons	-0.5040	-0.7183	-0.4434	-0.4383	1.0000

Table 22 Result of multicollinearity test for all variables.

e(V)	AGEHH	FAMSZ	EDULEV	FARMEXP	FARMS	IMROVS	LIVEST	ACMIF	MRKTP	EXTEN	ACCR	DSTM	_cons
AGEHH	1.0000												
FAMSZ	0.0046	1.0000											
LEVEL_ED	-0.1496	-0.0488	1.0000										
FARMEXP	0.0526	-0.0166	0.0239	1.0000									
FARMSZ	-0.0101	-0.1904	-0.0396	0.2031	1.0000								
IMROVSE	0.0833	-0.0968	-0.0684	0.0857	0.0864	1.0000							
LIVEST	0.0611	0.0170	-0.1625	0.0396	0.1018	0.1356	1.0000						
ACCMIF	0.1248	-0.1637	-0.1538	0.0712	0.0992	0.0987	0.0330	1.0000					
MRKT_PR	-0.1157	0.0881	-0.0479	-0.0477	-0.0487	-0.0419	0.1983	-0.1666	1.0000				
EXTENS	0.1743	-0.2097	-0.1378	0.0663	0.1397	0.2253	0.0060	0.1223	-0.0492	1.0000			
ACCR	0.1655	0.0911	-0.3647	0.0450	0.0048	0.0800	0.0957	0.0991	-0.0049	0.0422	1.0000		
DSTM	0.0038	0.2308	0.0439	-0.0077	-0.0123	-0.1590	-0.0041	-0.0082	0.0044	-0.0549	0.0378	1.0000	
_cons	-0.4785	-0.1200	0.1108	-0.2096	-0.2668	-0.3438	-0.5305	-0.2290	-0.4650	-0.3658	0.3166	-0.1064	1.0000

Appendix table 18: Heteroscedasticity test

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Ho: Constant variance

Variables: fitted values of SUPPLY_AMOUNT

chi2(1) = 2.91

Prob > chi2 = 0.0880

APPENDIX B. CONSULTATION SCHEDULES

JIMMA UNIVERSITY

College of Agriculture and Veterinary Medicine

Department Agricultural Economics and Extension

Agribusiness and Value Chain Management (ABVM) Master's Program

Research work (2016)

Value Chain Analysis of tomato in kersa District of Jimma zone Southwest, Ethiopia.

Household Survey Questionnaires

Introductory Statement: As per the requirement of the research project I prepared this questionnaire to undertake study entitled **Value Chain Analysis of Tomato in Kersa district of Jimma zone south west, Ethiopia.** Thus, for the objective of this research your choice is expected and kindly invited for giving information. I expect maximum effort from the local respondents with sincerity.

BY: - MOTI DERESSA ETICHA.

1. GENERAL INFORMATION.

1. Interviewer name (enumerator): _____ signature: _____

2. Interview Number _____ 3. Date / /

2. Household heads Characteristics.

4. Name of the household head _____

5. Age of the household head _____ years _____

6. Sex of household head _____ 1. Male. 2. Female

7. Keble _____

8. Ethnicity _____

9. Marital status 1.Single 2.Married 3.Divorced 4.Widowed

10. Religion of the household head: A. Muslim B. Christian c. Other (Specify) _____

11. Total family size _____

12. Have you attended any formal education? Yes _____ No _____

If yes, what level (Education level of the household head? _____

13. Farming experience of household head: _____ years

14. Age, sex and level of education for family

15. How long have you been in tomato production? _____ Years.

16. Are you a member of any cooperative? Yes _____ No _____

If yes, what is the name of the cooperative _____?

3. Farm characteristics and production Aspect:

17. Total farm size: ___ /hectares/ 1. Rented out. 2. Rented in_ 3. Own__ 4 = other_

18. Area cultivated for tomato _____ hectares

19. Production of vegetable, grain and other cash crops in 2016

20. Why do you engage in tomato production (multiple answer is possible)?

a. High demand b. Low cost of production c. Resource suitability d. for immediate cash requirement e. Availability of nearby water. f. Having pumping machine g. Other reasons,

21. Allocation to different activities and costs/benefits (last production year):

22. Tomato production.

23. Did you use improved tomato seed variety? Yes, _____ No, _____

24. If yes, what type of tomato seed variety did you use? 1. Local 2. Improved 3. Both

25. What are your sources of tomato seed? 1. Agricultural office 2. Traders 3. Seed producer cooperatives 4. Local seed business project. 5, Others -

26. How did you get the seed? 1. Cash 2. Credit 3. Others specify _____

27. What is the price of this seed? _____ birr/kg

28. Type of crop (especially tomato) diseases in the area _____

29. Did you use any chemical fertilizers? _____ 1 = yes 2 = no

30. Did you use organic fertilizers (compost)? _____ 1 = yes 2 = no

31. Did you use irrigation? Yes _____ No _____

If yes, Type ___ Irrigation frequency_____, and Priority _____ If not, why? ___

32. What are the major constraints of production in this area? (Multiple answers)

A. lack of market b. low price c. prevalence of disease d, Farmer related factors, e, Institutional factors, f, Natural factors, g, Infrastructure. H, higher fertilizer price j, low road facilities i. others specify _____

33. What are the opportunities in the area? (Multiple answers)

A. land suitability b. having pumping c. government support d. Possibility of using improved inputs and rent land E, Availability of water f. Labour availability. Others specify__

34. What are the major constraints of marketing? a. perishability of the product b. poor market information and skills c. interferences of brokers d. others specify_____

35. Working hours in a day (Only for tomato) __, Working days/ week _No. of holydays/ year

36. Livestock production

Livestock type		number	Purpose of keeping	Animal Products or renting during last year (Birr)
Oxen/bull				
Milking cows				
Heifers				
Young bulls				
Calves				
Horses				
Mule				
Donkey	mature			
	kid			
Sheep	Mature			
Goat	Lamb			
	Mature			
	Kid			
Poultry				

37. Own farm tools: Total no. _____

Name	Quantity	Purpose	Value (Birr)

38. Labor for farming activities:

Enterprises	Activities	Sources of labor and quantity required in a year (days)				
		Family			Hiring	Cooperation
		Men	women	Child		
Tomato product	Plowing					
	Sawing					
	Weeding					
	Harvesting					
	Transporting					

39. Oxen power requirement?

Source: a, Own___b, Rent___c, other (specify) __Rate of payment (if rented) ____ birr

40. Is it easy to hire labor? a. Yes b. No

41. What are the major sources of family income?

a. Crop produce sell b. Animal sells Own c. Animal products d. Others (specify

42. Of this income, how much you get in 2016 production season? _____

43. Did you perform other income generating activities? 1 = Yes, 2. = No

44. If your answer for Q.43 is Yes, what are these sources of income?_____

45. How much do you earn from such activities per year? _____ birr

4. Information access.

46. Did you have a chance to set price of tomato? 1 = yes; 2 = no

47. Did you have market information before you sold your tomato? 1 = yes; 2 = no

48. What was/were as source of market information?

1. Tomato traders 2. Radio 3. Telephone 4. Coops

5. Personal observation. 6. Broker 7. News paper 8. TV 9. Other farmers

49. Do you know market price before you sold your tomato? 1= yes; 2 = no

50. If yes from where? _____

5. Extension service

51. Have you ever been visited by one or more of the following bodies in the last production period?

	No. of visit per year	Purpose of visit
Oromia Agricultural & Irrigation Development Bureau		
Zone Agricultural & Irrigation Development Office		
Woreda Agricultural & Irrigation Development office		
Development Agent (DA)		
Non-government organization		
Others (specify)		

52. Have you visited one or more of the following bodies in the last production year?

	No. of visit per year	Purpose of	Types of
--	-----------------------	------------	----------

		visit	extension services
Oromia Agricultural & Irrigation Development Bureau			
Zone Agricultural & Irrigation Development Office			
Woreda Agricultural & Irrigation Development office			
Development Agent (DA)			
Non-government organization			
Others (specify)			

53. Have you ever attended any demonstration field days arranged by development agents regarding tomato production? 1. Yes 2.No

54. If yes how pick did you get it? _____

55. What are the constraints of tomato production and marketing in the area? _____

6. Credit

56. Have you received credit in year (2016)? _____ Yes = 1 No=2

57. If yes, what are the sources? a. Government banks b. Private Banks's c. Credit Institutions

d. Cooperatives e. Ministry of Agriculture f. Others (specify), _____

58. How much did you borrow? _____ Birr.

59. How much was the interest rate? _____ Birr.

60. If Question No. 53 is No why? 1. Not available 2. Restricted criteria 3. High interests

4. No need 5. Others (specify)

61. What problem do you perceive in formal credit? 1. Inadequacy of supply 2.High interest rates

3. Restrictive procedures 4. Others (specify) _____

7. Cooperatives and their members (only for members)

62. Are you a member of fruit and vegetable marketing cooperative? 1= yes; 2 = no

63. What service did you get from the cooperative?

1. You got credit in birr or kind 2. You got financial support when you incur a loss

3. Encourage to save 4. Facilitate joint marketing

5. No benefit
6. Got market information
7. Coordinate purchase and sale
8. Protection against unfair competition

64. How long have you been the member of this cooperative? (Years)_____

65. What was your position in the cooperative in the last two years?

1. Chairman 2. Ordinary member 3. Member of director 4. Others/ specific

66. Do you see any difference in price between cooperative and traders__ 1, Yes 2, No?

67. What is the difference in price between cooperative and trader_____birr/Cent

68. What is your suggestion on the benefit and service of your cooperatives?

69. Why did you sold to traders? _____

70. Value addition works for tomato before you sell and associated costs

Activities	Estimated cost for each Activity	Remark
separation		
cleaning		
Other (specify)		

71. What are marketing costs you incur when you take your produce to the market?

Items	Cost (birr)	Remark
Sales tax		
Transport cost		
Others		

8. Distances of the respective marketing agents to which the farmer sold tomato

72. To whom you sold your product (tomato)?

1. Wholesalers 2. Main collectors 3. Retailers 4. Consumers

73. Where could (did) you get them?

1. at the farm level 4. At the local market
2. at the woreda market 3. On the main Collectors 5. Others/ specify_____

74. How much you sold for

1. Whole sellers _____ quintals 2. Local market (if there is) _____quintals
3. Collectors market (if there is) _____quintals 4. The district market _____ quintals

1. Better quality 2. High supply
3. Shortest distance 4. Others (specify)

4. Are all your purchasing centres accessible to vehicles? 1. Yes 2. No.

5. To which market and to whom did you sell tomato. (*Multiple market area is possible, ** and multiple answers are possible)

Market location (name)	Actors	Quantity it purchased/quintal	Average price/quintal	Payment ** 1. cash 2. credit 3. advance payment
	Producers			
	Whole sellers			
	Collectors			
	Retailers			
	Brokers			
	Consumers			
	Unknowns			
	Others			

6. How did you sale your produce? 1. Direct to the purchaser 2. Through broker
3. Other (specify) _____

7. When did you get the money after sale?
1. as soon as you sold 2. After some hours
3. On the other day after sale 4. Other _____

8. What do you do, if the product is not sold on time?
1. Took back home. 2. Took to another market 3. Sold it at lower price 4. Sold on

9. How did you attract your supplier?
1 = by giving better price related to others 2 = by fair scaling (weighing)
3 = by visiting them 4 = other (specify) _____

10. How did you attract your buyers _____?
1 = by giving better price relate to others 2 = quality of your product
3 = by fair scaling (weighting) 4 = by visiting them
5 = by giving credit 6 = other specify _____

11. How many regular buyers did you have in 2016?
1 = wholesalers (urban) _ 2 = wholesalers (rural) ___ 3 = retailers (urban) _ 4 = retailers _

5 = urban assembler ____ 6 = consumers (urban) ____ 7 = consumer (rural) _ 8 = other government organization _____ 9 = other (specify) _____

12. How many regular suppliers did you have in 2015/16 _____?

1 = wholesalers (urban) __? 2 = wholesalers (rural)____ 5 = urban assembler ____? 3 = retailers (urban)_?

6 = farmer /producer __, 7 = retailer (rural)____? 4 = collectors __ 8 = other (specify)

13. Purchase of Tomato in season _____

Product	Tomato
Source	
Nature of contract if any	
Reason for choice of source	
Qty /wk	
Av. price /unit	
Mode of payment	
Distance traveled	
Time spent/wk	
Transport cost/wk	
How is product differentiated	
How is price determined	

CODES:

Source: 1 = farm gate 2 = whole seller 3 = cooperatives/group 4 = others specify_____

Reason for choices of source: 1 = good price 2 = short distance 3 = product quality 4 = reliable means of transport 8 = others (specify) _____

Mode of payment: 1 = cash 2 = cash in advance 3= credit 4 = others (specify)_____

Nature of contract 1 = future market 2 = spot market 3 = others (specify) _____

14. How did you set the purchasing price of tomato in year 2016_____?

1 = set at the time the advance is given 2 = negotiated at delivery

3 = it's the market price at the time of delivery 4 = others (specify)_____

15. If purchasing price was set at the time of the advance is given, how did you agree ___?

1 = Orally 2 = Written agreement 3 = (specify) _____

16. Who did purchase tomato for you in year 2016_____?

1 = myself 2 = through broker 3 = family members.4 = commission agent 17. If others purchased for you, how did you pay them?

1 = _____ Birr/volume. 2 = above the price you decide

3 = percent on purchase 4 = other (specify) _____

18. Is your usual purchasing price higher than your competitors_____? 1 = yes 0 = no

- 6 = good quality of the grain 7 = others (specify) _____
2. Who decided on your selling price last time _____?
- 1 = myself 3 = purchaser 5 = negotiations between me and the purchaser
- 2 = by the market 4 = other traders
- 6 = others (specify) _____
3. If you decide on the selling price, how did you set the price _____?
- 1 = individually 2 = consult with other traders 3 = others (specify) _____
4. Who sold the tomato (your sales) in year 2015/16 _____?
- 1 = myself 2 = through broker 3 = family
- 4 = commission men 5 = others (specify) _____
5. If others sold for you, how did you pay them? 1 = birr/quintal 2 = above the price you decide 3 = percent per sales price 4 = others (specify) _____
6. What did you do if you cannot sell the tomato you offered to the market _____?
- 1 = took it back to home 2 = took it to other market 3 = sold at a lower price
- 4 = waited for other market day(s) 5 = others (specify) _____
7. How many sellers were there in this market in year 2016 _____?
8. How many buyers were for you in this market in year 2016 _____?
9. What was the major problem to enter to tomato market _____?
- 1 = license 2 = lack of capital. 3 = government policy
- 4 = interest 5 = others (specify) _____
10. Is there restrictions imposed on unlicensed tomato trader's _____? 1 = yes 0 = no

VI. Marketing service

1. Did you pay tax for the tomato you purchase in year 2015/16 _____? 1 = yes 0 = no
2. Did you pay tax for the tomato you sell in year 2015/16 ___? 1 = yes 0 = no
3. If you pay tax, where _____?
- 1 = at purchase place _____ birr 2 = on the way of destination _____ birr
- 3 = at selling place _____ in all places total _____ birr
4. What is your opinion regarding the marketing fee paid in this market as compared to your transactions? 1 = low 2 = high 3 = average 4 = I don't know
5. Is tomato trading in your locality needs a trading license ___? 1 = yes 0 = no 2 = not mand
6. Did you have tomato trade license _____? 1 = yes 0 = no

VII Marketing and transactions cost last month;

Quantity and cost items	Product: Tomato
Quantity purchased(kg)	

Cost of buying	
Sources	
Prices/unit by sources	
Mode of payment	
Transportation Labor hour(hr)	
Self	
Hired labor	
Hired labor cost(birr)	
Cost of donkey or equivalent(birr)	
Cost of vehicles(birr))	
Search	
Search labor(hr)	
Total capital tied during search(birr)	
Opportunity cost of capital tied during search(birr)	
Loss due to quality deterioration qty or birr	
Selling /negotiating	
Labour hour	
Buyer type	
Sales outlets	

Source: 1 = farm gate 2 = whole seller 3 = cooperatives/group 4 = others specify_____

Mode of payment:- 1 = cash 2 = cash in advance 3 = credit 4 = others (specify) _____

Sales outlets: 1 = own storage 2 = delivery to market place/spot market 3 = collection cent
4 = delivery to buyer 5 = other (specify) _____

Buyer type 1= consumer 2 = retailer 3 = whole seller
4 = cooperatives/group 5 = research centers 6 = other (specify)

VIII. Main problems with sale and purchase of tomato (prioritize);

Product	Problem related to purchase	Problems related to sale
Tomato	1	1
	2	2

Problem related to purchase:-

1 = Non reliable supply of tomato 2 = seasonal supply of tomato
3 = high purchasing price per unit of tomato 4 = poor quality of tomato due to handling
5 = perishability of the product 6 = interferences of brokers 7=others (specify) _____

Problem related to sale:-

1 = non reliable demand for tomato. 2 = high loss due to quality deterioration during transaction 3 = low selling price of tomato 4 = others (specify) _

Thank you!