ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

INSTITUTE OF REGIONAL AND LOCAL DEVELOPMENT STUDIES

(IRLDS)

VEGETABLE VALUE CHAIN ANALYSIS: THE CASE OF *GOLINA MODERN IRRIGATION SCHEME* IN NORTH EAST ETHIOPIA: *KOBO DISTRICT* (NORTH *WOLLO*)

A Thesis Submitted to the School of Graduates Studies of Addis Ababa University in Partial Fulfillment of the Requirement for the Degree of Master of Arts in Institute of Regional and Local Development Studies

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ACKNOWLEDGMENT

A number of individuals and organizations have contributed to this work. I thank all of them, to mention some of the organizations, Addis Ababa University and College of Development Studies in general and Institute of Regional Local Development Studies in particular, Amhara Regional Agricultural Research Institute(ARARI), Sirinka Agricultural Research Center(SARC), SHWISHA (Soil and Water Harvesting and Institutional Strengthening) and North Welo zone and Kobo Wereda Agriculture offices. I thank all of them.

I am indebted to and gratefully acknowledge Dr. Isaac Paul, who was my advisor. He put me in the right track of the research. Successful and timely accomplishment of this study would have been very difficult without his generous time devotion from the early questionnaire design until the final write up of the thesis through adding his constructive and extremely useful comments.

I wish to extend my gratitude to collaborative enumerators, encouraging friends, the members of the sample farm households and all respondents, and key-informants for their valuable cooperation during data collection. I thank also my friends and stuff members of SARC, who directly support me in various dimensions , to list their names, Tewodros H/mariam, Jemal Hassen, Kasaw, Mesfin Lakew, Mesfin Bahita, Alemash Haile, Minyahil and Asresie and others not mentioned.

Finally, I would like to acknowledge all individuals that assisted me in the course of my study. I would like to especially recognize Minyahel Fekadu, Anteneh Girma, Daniel Tilahun, Aderajew Molla , Minilik Hailu who were sharing my pain up to the end of the work.

Last but not least, I want to express my everlasting gratitude to my family members especially my mother Aregash Yimer, my father Lemlem Gebru , my brother Girma and my fiancée Tigist, without your support it was impossible for me to be successful. You are all the source of my strength.

Declaration

I, the undersigned, declare that this thesis is my original work and that all sources of the material used for the thesis have been duly acknowledged.

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BIOGRAPHICAL SKETCH

The author was born on December 17, 1981 in North East Amhara Regional Administrative State, Ambassel town. He attended his elementary and junior secondary education at Ambassel Elementary and Junior Secondary School, and his secondary school education at Tana Haik Comprehensive Secondary School in Bahir Dar Town. He joined Alemaya University with B.Sc. degree in Agricultural Extension in 2001 and graduate in 2005.

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Abstract

A survey was conducted in April 2010 with emphasis to vegetable value chain in Golina Modern irrigation scheme. The study attempted to assess the nature of both forward and backward linkages and interactions among vegetable producers, traders and consumers, input suppliers and service providers in vegetable value chain and to identify the major constraints, challenges, and opportunities embodied within the chains. Data were collected by using household survey and mixed methodologies were used including key informant interviews, focus group discussions and observation. The data were analyzed by descriptive statistics, content analysis and interpretative. The guiding line of analytical frame work was Michel Porter Qualitative value chain model. Farmers in Golina modern irrigation scheme produced three times in a year. Cereal production is the leading sector across all production seasons followed by vegetables. Onion and tomato are the major vegetable produced in the study area. Market insecurity, drought, pest incidence, lack of input and lack of effective service provisions are the major constraints of vegetable sub sector. Whereas, lack of collaborative chain actors in tomato value chain, lack of transportation facility, absence of standardize measurement, undeveloped processing technology, lack of knowledge in market information managements are reported to be the major marketing challenges in the study area. Tomato subsector faces complex marketing problem, hence, dumping tomato in markets and feeding cattle with it is common in surplus production periods. The opportunities that need to be further exploited are better access to irrigation, main road access, market potentials, experience of farmers, and existence of community-based organizations (traditions). Producers incurred 0.67 birr to produce & sell a single kilogram of marketable fresh tomatoes to Mekele whole sellers. This production cost covered 17.40% of the total costs required to produce and distribute one kg of tomatoes to Mekele consumers. The remaining 83.60 %(3.18 birr) of the total cost was costs of distribution, covered by Mekele traders constituting 58.96% (2.27 birr) by whole sellers and retailers covered the remaining 23.64 % (0.91 birr) of the total cost. Producers obtained a net of 0.21 birr out of a single kilogram of marketed fresh tomatoes to Mekele whole sellers, this benefit covered 13.29 % of the total net benefits of a kilogram of tomatoes obtained after sold to Mekele consumers. Mekele traders shared the remaining 86.71% (1.37 birr) of the total net benefit constituting 70.87 %(1.12 birr) by whole sellers and retailers enjoyed the remaining 15.82 %(0.25 birr) of the total net benefits. Finally, a single kilogram of tomatoes gave a net benefit of 1.58 birr, in its path from farmers to consumers. Promotion of vegetable production should be attached with market strength. Solving such constraints may help poor producers to increase their income and improve their efficiency.

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Acronyms

ADLI	Agricultural Development Led Industry
ANRS	Amhara National Regional State
AU	African Union
CSA	Central Statistic Agency
ECA	Economic Commission for Africa
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GOs	Government Organization
HHs	House Holds
MDGs	Millennium Development Goals
MFIs	Micro Finance Institutions
MoA	Ministry of Agriculture
MSMEs	Medium and Small Micro Enterprise
MoFED	Ministry of Finance and Economic Development
NGOs	Non-Governmental Organizations
PASDEP	Plan for Accelerated and Sustained Development to end Poverty
PRA	Participatory Rural Analysis
PVCA	Participatory Value chain Analysis
SARC	Sirinka Agricultural Institute
SDPRP	Sustainable Development and Poverty Reduction Program
SMSEs	Small and Medium Scale Enterprise
SNV	Netherlands Development organization
SPSS	Social Package Statistical Software
SSC	Super Market Supply chain
SWISHA	Soil and Water Harvesting and Institutional Strengthening in Amhara
VC	Value Chain
VCA	Value chain Analysis
WB	World Bank
WHO	World Health Organization
WoARD	Woreda of Agricultural and rural Development

Chapter I: Introduction

1.1. Background of the study

Value chain 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 transformation and the input of various producer services), delivery to final consumers (Porter, 1985 cited in Altenburg, 2007). The value chain concept has proven particularly useful for the identification and formulation of projects as well as in the development of strategies for improved agricultural and rural development (ECA, 2009).

More than 85% of the Ethiopian population, residing in the rural area, is engaged in agricultural production as a major means of livelihood. The Ethiopia government strategy of Agriculture Development Led Industrialization (ADLI), as formulated in 1994, views agriculture as the driving force of the economy, and encourages for investment in agriculture as both a motor for economic growth and a means of ensuring household and national food security (PASDEP, 2005/06). The overall performance of Ethiopia's economy is highly influenced by the performance of the agricultural sector which itself is subjected to vagaries of weather and related natural and synthetic factors. Ever-increasing population pressure coupled with declining land holding sizes and natural resource degradations is leading to low level of production to meet the consumption requirement of the households in rain dependent agricultural subsystem. Northeast part of Ethiopia is one of the most degraded land, drought, and famine prone areas having high population density. In such areas, the Ethiopian government encourages promotion of effective irrigation based agriculture in the national Plan of Great Transformation Period (MoFED, 2010). Vegetable production is one of the most potential sub sector that provide multiple advantages in improving farmers' income benefits and supporting local economies and national economies.

Vegetable sector presents growth opportunities for Ethiopia in terms of both the expanding domestic market and the regional and even European market, which is yet largely untapped. The sector provides business opportunities for all actors in the value chains and it improves livelihood with potential of backward and forward businesses development. It allows intensive production and increases smallholder participation. The poor farmers who produce vegetables

can benefit a lot and their livelihoods can be enhanced through the provision of continuous innovation processes of integrated vegetable value chains (ECA, 2009).

Vegetable production in Ethiopia has shown faster growth rate than the rest of crops categories, however its contribution is still insignificant (MOA, 2006, 2007). Ethiopia had only 1.4 % of benefit out of the overall agricultural export value in the year 2006 and 2007 (ibid). Likewise, WB (2004) showed that, Ethiopia's total horticultural export income in 2000 was about 2.8 million USDs, which was only 2.2 percent of Kenya's export income from the same sub-sector in the same year.

The domestic demand of vegetable production is very high, but the average consumption of vegetable in Ethiopia is around 26.7kg/person/year (WHO, 2005), which is well far below the WHO-recommendations vegetable intakes, 146 Kg/person/year. This implied that both the domestic and export horticulture market of Ethiopia tends to be very weak. Small-scale farmers produce the larger share of vegetable production for domestic consumption and most vegetables are cultivated as an annual crop in most of the low land regions of the country (MOA, 2009).

Amhara National Regional State is one of the regions of Ethiopia having good potentials of irrigation for vegetable production (CSA, 1994). Even though the region has an ample production potential and market access to the nearby regions, it had never reaped the opportunities of vegetable production, as it would suppose to be. Vegetable production is constrained by drought and market challenges that reduced efficiencies of the subsector and farmers' income.

Generally, to increasing competitive participations of smallholder producers in small- and medium-size irrigation schemes, value chain upgrading is the key element in creating effective forward and back ward integrations with local, national, regional and international markets. Therefore, vegetable value chain analysis is a critical intervention point to readjust both value adding and value reducing activities of the subsector accordingly.

1.2. Statement of the Problem

Availability of irrigation water, quality seeds and seedlings, pests and disease, and the perishable nature of the product all limit the marketability of the products and constrain expansion of horticultural crops in the area. Horticulture marketing is a means of livelihood providing business opportunities for all actors in the market chain including the producers, brokers/commission agents, transporters, traders, processors, and consumers.

Unlike grain markets, vegetables are more sensitive to the immediate lose unless they tend to be timely marketed. Vegetables are highly perishables and susceptible to further loses. This implied that vegetable production alone is not sufficient unless it is attached to the string of functional market. In the absence of good market, farmers may sell their vegetables at any bedrock prices that in turn open huge holes on their income and investment. This condition may work a 'down spiral effect' and discourage the subsector growth potential.

According to Demelash Seifu (2003), majorities of the Ethiopian vegetable producer farmers in particular and other market actors in general are said to be low benefit earners due to several and networked constraints of production and marketing. Lack of organized input delivery system, traditional tools and practice, absence of responsive technologies and risk of drought coupled with poor risk minimization strategies. These production constraints and marketing challenges reduce the performance of the sector significantly. Similarly, Bezabih Emana and Hadera Gebremedhin, (2007) indicated that, though, horticulture production provides an opportunity for market integration for smallholder farmers in eastern Ethiopia, farmers faced challenges of low output prices.

The study area was not special for constraints of vegetable production and marketing. The Wereda was selected purposively for its high potentials of vegetables production constrained with marketing challenges. The official annual report of Kobo Woreda Agricultural and Rural Development office in 2008/09 and the diagnosis report of (SWHISA, 2007) indicated that, modern irrigation based vegetable production of the Wereda faces problems of market for produced vegetables. To the contrary, the Wereda has better location and infrastructural advantages than other Weredas.

Generally, Bezabih Emana and Hadera Gebremedhin, (2007) and demelash Seifu, (2003) concluded that producers are in a disadvantageous position in terms of vegetable marketing margin. However, the depths of farmers' disadvantageous position in vegetable marketing chains were not clearly investigated thoroughly. Both of the studies did not examine cost and benefit distributions in any of the marketing chains, therefore, it might be difficult to identify clear intervention points without indentifying the degree of benefits accrued between chain actors. Moreover, Demelash seifu (2003) focused on the general characteristics of vegetables production and marketing issues without disaggregating by crops and production seasons; hence, it lacked to address critical production and market constraints of specific crops over various production periods over a year. The nature and context of actors' relationships may vary on; types of vegetable, production seasons, demand tests, market structures and degree of participations, socioeconomic and biophysical environments. Such gaps were more seriously reflected in the study of Bezabih Emana and Hadera Gebremedhin (2007), in which the study was too aggregated under horticulture sub sector.

The above discussions provide us with basic and important issues on the general level of agricultural production and marketing challenges. However, it has little or no efforts made so far to disaggregate constraints and detailed study of the forward and back ward interactions of value chain actors on a certain product cases. Moreover, different products may have different marketing conditions in different localities and periods. There was a significant and clear methodological and scope differences between this study and the past studies (Demelash Seifu, 2003; Bezabih Emana and Hadera Gebremedhin 2007). The studies used a one-way market chain/ supply chain approach to study marketing and production challenges. Besides, there was no any study conducted in vegetable (tomato) value chain showing cost benefit distribution among major actors and its implications.

Therefore, this study attempted to fill the gaps by using descriptive and survey research design with the support of Michel porter qualitative model of value chain analysis. The study tried to answer the nature of forward and backward linkages and interactions among vegetable producers, traders, consumers, input suppliers and service providers in vegetable value chain and identify the major constraints, challenges and opportunities embodied within the chains.

1.3. Objectives of the study

1.3.1. General Objective

The general objective of the study was to assess the nature of both forward and backward linkages and interactions among vegetable producers, traders and consumers, input suppliers and service providers in vegetable value chain and to identify the major constraints, challenges, and opportunities embodied within the chains.

1.3.2. Specific Objectives

There were four specific objectives in the study:

- To identify major actors, their roles and relationships in the tomato value chain.
- To assess the flow of input and output in the value chain of tomato both in backward and forward linkages of the chains.
- To assess income and cost distributions among market actors in the tomato value chain.
- To assess constrains and opportunities faced by the tomato value chain members.

1.4. Significance of the Study

The primary significance of the study is to actors who participate in the vegetable value chain system. By revealing strengths and weaknesses, findings will help chain stakeholders and policy-makers to delineate corrective measures. Moreover, it can also help to create a shared vision among chain participants through maintaining or establishing common goals and minimizing barriers of chains. Hence, actors may create harmonious and synergic relationships both between and among the vegetable value chain actors in forward and backward linkages. Particularly, it will contribute a lot for the poor farmers in designing and responding of potential challenges and barriers of production and marketing.

Though vegetable value chain analysis is a newly introduced approach for Ethiopia, the output of this study may serve as a supportive resource for further studies of the academician world. Moreover, it will trigger policy makers, service suppliers and development agents to review, plan and execute effective development activities in addressing vegetable value reducing and maximizing value-adding interventions under their local contexts.

1.5. Research Questions

The study attempted to address the following research questions.

- Whom are the stakeholders participating in the value chain and what are their roles?
- What is the nature of institutional mode of operation in the value chain?
- What is the nature of stakeholder relationships in the value chain?
- What is the level and nature of income and cost distribution among chain actors?
- What are the challenges and opportunities that exist in the value chain?
- What are the potential solutions and strategies for the value chain development?

1.6. Methods of Data Collection and Analysis

This section discusses methods of research design, sampling techniques, data collection tools and analysis.

1.6.1. Research design

For the study, survey research design was employed to collect data from vegetable producers, wholesalers, retailers, rural dealers & service providers, hence, household survey and market visits were conducted to collect data using structured, semi structured and open ended questionnaires. Besides, due to the complex nature of the value chain analysis, and to avoid biases, mixed methods such as, focus group discussions, observations, key informant interviews, and informal discussions were employed to collect sufficient data. To collect the data, cross sectional data collection approach was employed and finally the collected data were analyzed in descriptive statistical tools, content analysis and interpretation methods, under the guide line of Michel Porter's qualitative value chain model.

1.6.2. Sampling procedures and techniques

1. Population of the study

Vegetable producer farmers in modern irrigation schemes (medium scale), and major actors involved in vegetable value chain were the major focus of the study. Therefore, participant actors like, producers, input suppliers, service providers, rural assemblers, whole sellers and retailers were included in the study as source of information and information triangulation purposes.

2. Selection of irrigation scheme

The study area was selected purposefully for two major reasons. Size & type of the scheme and the degree of vegetable production were considered. Hence, Golina modern irrigation scheme was both the largest both in size of scheme and vegetable production in general and tomato in particular. The scheme is 400 ha in size serving 1375 HHs and found to be the only major tomato supply sources of the Wereda in particular and the region in general (WoARD, 2010). Moreover, Golina medium scale modern irrigation scheme was proposed by the local community representatives and officers WoARD of Kobo based on the level of tomato production and market constraints. Tomato production & marketing is the most challenging business than the rest of vegetable types, the scheme has high tomato and onion production potential coupled with marketing challenges (SWHISA, 2007; WoARD, 2009).

3. Selection of respondent farmers

Following to scheme selection, the document of water unit association was used to select vegetable producers from the total lists of 1375 HHs who have registered as beneficiaries of the scheme. Accordingly, 60 HHs were selected through simple random sampling technique.

4. Selection of respondents from Rural assemblers, wholesalers and retailers

Since the universe is unknown, the samples were selected by using a non-random sampling technique. Moreover, it was impractical to access all chains actors and traders easily in cross sectional due to the nature of business that traveler traders are engaged in. Hence, snow ball sampling technique was employed to select 18 vegetable wholesalers based on degree of participation, distance factors and accessibility/availability. Likewise, 28 retailers were selected purposively from weekly local market centers. To add accuracy, various actors like local dealers, key informants, official experts and concerned bodies provided relevant information.

Generally, the total respondent sample size was taken as 106 constituting; 60 vegetable producer households selected by simple random sampling, 18 wholesalers and 28 retailers selected by purposive sampling techniques. Principally, the sample size required depends on the required precision, the variance of variables among the total population, and the sampling technique.

However, in practical terms, apart from the nature of the value chain study, the sample size is often restricted by the amount of available fund and time.

1.6.3. Data collection, tools, and techniques

Different mixes of tools and techniques were used to collect data and triangulate information. Data collection tools include; both structured and semi-structured, matrix & rating types, ranked/ ordinal open-ended sets of questions in questionnaire forms, and observations, key informant interviews and focus group discussion were used to collect data on input system, production system, marketing system, services system , actors relations in the value chains and cost-benefit distributions.

1.4.3.1. Primary Data Collection

A. Quantitative data collection using survey questionnaire

1. Translation, pretest and enumerator training

The data collection tools were translated in to Amharic language version. The translated version of questionnaires were pretested on the ground and modified accordingly. **Then, t**en enumerators were selected from the target localities based on their educational background and interest. The selected enumerators were trained for two days. On the first day of the training, theoretical concepts were discussed on areas of how to collect data, how to approach respondents and how to manage data. On the second day, enumerators were given practical skills on ground. Moreover, three local DAs and four researchers were included to facilitate the data collection processes smoothly and to capture their technical knowledge on various disciplines.

2. Data collection, Supervision and Monitoring

The data were collected through continuous follow up to correct unexpected challenges/problems /gaps during the data collection time. This enabled the researcher to make proactive and corrective measures. Through self-administrations, marketing data were collected side by side from traders in weekly local market centers & farm gate market. Coding of data was done both on the designing stage of the questionnaire, and after data collection. Coded data were screened and transferred into SPSS 17 software package and excel sheet.

B. Qualitative data collection

1. Interview with Key informants

To gather information, checklists, semi structured and unstructured questionnaires were employed. Key informants were selected based on the requirements of relevant issues, their experiences, responsibilities, and positions on some specific issues. Likewise, WUA leaders, input suppliers, Zonal and WoARD level concerned bodies and experts of different divisions, KGVDP manager and technical experts, cooperative members, traders of Mekele and Kobo were interviewed accordingly.

2. Observations

Observations were employed to gather more information that might not be accessed through interpersonal communication. Observable facts were gathered and recorded both by using digital and by taking note on a notebook. Field observations were made on; farmers plot, irrigation canals, road networks, farm gate markets, weekly local markets and Vegetable markets of Mekele were included. Hence, farm managements, harvesting & transportation techniques, post harvest techniques, farm gate marketing activities like sorting, grading & packaging were observed. Weekly visits were made to observe the conditions of tomato marketing, the volume of supply and qualities, and marketing performances in weekly local market centers of Kobo, Alemata & around kobo.

Focus group discussions

Focus group discussions were employed with five groups constituting participants of 10 tomato producers, eight local dealers, five Mekele traders, five Woreda of agricultural office experts and eight committee of WUA members. Accordingly, issues that had not been obtained through individual approach were triangulated. It helped the researcher to; get disclosed ideas/issues which were vague or/and closed realities. The first focus group discussion was made with tomato producers on areas of both potential challenges encountered and solutions taken on production, pre harvesting, post harvesting and marketing stages. The second focus group discussion was conducted with local dealers on the issues; their working norms and roles, challenges they encountered and solutions taken, desired and actual product quality, their relations with sellers and buyers, identification of large buyers and their roles in the market.

The third discussion was made with Mekele traders on areas of mode of trading operation, challenges and opportunities, relations and they have with producers, local dealers and distributors, between producers and related other issues. The remaining two discussions were made official experts and WUA focusing on areas of challenges and constraints encountered in various stages of value chains, like in service provision in input supply, in technical support, in training arrangements in linking producers with markets etc.

1.4.3.2. Secondary data collection

Both relevant quantitative and qualitative secondary data were collected and reviewed for the development of further analytical framework. Official reports, published and unpublished materials, proceedings, manuals, internet sources and others were used as major sources of secondary data. Data were gathered through the support of official letters to make smooth interactions with data providers.

1.6.4. Data analysis

The underlying methodology to analyze vegetable value chains was the Diagnosis Qualitative Model of Michael Porter's value chain model. The model is a simple Cause and Effect relationship. Hence, the nature of backward and forward relationships of participant actors, the physical flow of input and output along the value chain, the flow of services and skills along the chain, destination of sales, cost benefit distributions were analyzed through descriptive, content analyses and interpretative methods. SPSS 17 software and excel sheet were used to analyze the data. Besides, simple cost benefit analysis of economics methods were employed to determine; costs of production and marketing, gross output values, net output values (gross output, minus input costs).

1. Qualitative data analysis

Qualitative data were analyzed by using content, interpretative, cause and effect diagnosis methods. Content analysis was used as a major tool to avoid errors of misinterpretation and description of data. Unlike interpretative approach, through systematic procedure, qualitative individual responses were grouped & categorized into quantitative forms based on common theme patterns and analyzed quantitatively in content analysis.

2. Quantitative data analysis

The collected quantitative data were analyzed by using statistical tools like; simple statistical descriptive methods including; mean, median, mode and standard deviations. SPSS Version-17 was used to analyze data. Cost and benefit analysis was analyzed by a simple economics approach of simple cost benefit analysis methods. The analyzed data are presented and summarized by using tables, percentages and graphs and frequency distributions.

1.7. Scope of the study

The geographical scope of the study was limited to a single Woreda (Kobo), on one medium sized modern irrigation scheme (400 ha) called Golina. However, maximum efforts were made to collect data on the general vegetable value chain system by incorporating major actors participating in the value chain. Hence, vegetable traders of Kobo and its surroundings , and major buyers of Mekele vegetable traders were included.

The content scope of the study covered; production coverage, pattern, potential and constraints of major crops were considered. However, due to the complex nature of value chain research, due emphasis was given to tomato subsector to make detail investigations on production, input and out flows, cost and benefit distributions , service provisions, actors relations and constraints and opportunities of the sub sector value chain. The type of crop was limited to tomato, because, it is the major perishable crop that has high potential constraints throughout the chains. Hence, it seeks in depth and focused attention than other crops do.

Attempting to analyze the entire value of the commodity is an impossible action given the limited resources and human skill. Thus, the study focused on detail analysis of tomato value chins with due emphasis on major channels.

1.8. Limitations of the Study

Value chain approach is a newly introduced approach, it was introduced in 1987 to the world by Michel Porter, and in 2007 by Netherlands Development organization (SNV) to Ethiopia (Wilhelm Elfring, Yohannes Agonafir, (2005). In Ethiopian context, the approach is still very young; as a result, there are not sufficient and relevant supportive references so far.

Methodologically, the approach is limited to qualitative model until now. In real life, it is impossible to isolate some causal mechanisms and factors. It is also difficult to avoid unwanted

interferences or circumstances that are likely to affect the nature of your observations and measurements. Data on cost of production and other transaction costs were insufficient, however, systematically, efforts were made to collect and triangulate such data and map cost-benefit distributions descriptively.

The time and financial limit as factors squeezed the chance to include other areas of vegetable production, marketing and its implication to the case of the study area. Despite such limitations, maximum efforts were made to fill such gaps and to search advantage points of intervention.

1.9. Organization of the Report

The report is organized into three chapters. Chapter II describes literature parts focusing on operational definitions, value chain concepts & conceptual framework, overview of Ethiopian Vegetable sub sector and ends with empirical evidences of the value chain concept. Chapter III provides certain highlights of demographic, agro climatic and irrigation potential and status of the background of the study area including the target scheme. Finally, Chapter IV shows the result and discussion parts on vegetable value chain, which describes; socioeconomic and demographic characteristics of producers, vegetable production and marketing, input and service provisions, roles and relationships of major value chain actors. Vegetables production covering farming systems, type of vegetable crops produced, and inputs used, production level, pre and post harvest techniques. Vegetable marketing functions covering market centers, market structures, marketing channel, facilities/infrastructure, constraints and opportunities for vegetable marketing including the prices of vegetables are discussed. Finally its shows the cost and benefit distributions across chains and ends with final conclusion and recommendations.

Chapter II: Vegetable Value chain Analysis: Reviewing the Literature

This chapter begins with definitions and operational terms that can be applied in the rest of literature bodies and in the final discussions of the report. Following to this the theoretical body of knowledge on value chain is discussed thoroughly. The conceptual framework, importance, analytical tools, approaches and other related components of the value chain system is presented. Following to this, the context of Ethiopian vegetable sub sector and value chain status are highlighted. Finally, different empirical evidences are presented to show the relevance of the value chain approach.

2.1. Operational definitions in vegetable value chain analysis

2.1.1. Definitions of value chain and Value chain analysis

Value chain: defined as a set of value adding activities through which a product passes from the design to the consumption stages. The approach presented in this paper is attempt to combine the strengths of value chain analysis with the promotion of sustainable, market-based solutions that respond to the recurrent needs of micro, small, and medium scale enterprise (MSME).

The primary focus in value chains is on the benefits that accrue to customers, the interdependent processes that generate value and the resulting demand and funds flows that are created.

Value chain analysis: has a diversified type of importance. It is useful to understand problems of production, market access, challenges and opportunities of markets, distribution of gains along the chain, to find "Leverage" points for policy and organizing initiatives, to identify funnels for technical assistance (Porter, 1987).

2.1.2. Types of Actors involved in a vegetable value chain

Input Traders: Large traders, generally wholesales, of inputs.

Input Retailers: Generally the small traders particularly in the district towns or remote areas retailing inputs of the producers. They generally buy their inputs from the wholesalers

Vegetable Producers: Farmers engaged in production of vegetable, in this case it refers those small-scale farmers in modern irrigation schemes. They are important participants in the value chain since they ensure the commonly is available for the initial transaction to take place. The

smallholder producers do not have good marketing strategies for their produce as they wait for traders to go and buy the commodity at farm gate.

Agents/brokers-Intermediaries: The intermediaries or rural traders are involved in rural purchases and transportation arrangements and sales at the terminal markets or distribution points.

Local Trader: Local traders are directly involved in buying and selling tomatoes from different remote district towns or markets and sells to the wholesalers at a profit. They often work as a commissioning agent of the large wholesaler or exporters.

Transporters: They facilitate the movement of the commodity from the production point to the consumption end. Transporters play a key role in moving the produce from rural to urban markets due to the wide variation in agro-ecological zones and geographical distribution of horticultural produce.

Wholesalers: These are the individuals found at the market place dealing with bulk quantities of produce. Wholesalers deal with large volume of products through either local traders or farmers. They invest and transact large amount of money in their business and often control the market price. The wholesalers sell the produce to the retailers who then sell to consumers. Their main buyers are retailers, institutions and processors:

Retailers: Comparatively, small business traders buy and sale tomatoes in relatively smaller quantity and sells directly to the end user. The retailer's stock very small quantities of the commodity, mainly due to high cost and limited demand among the users. The units of measure at the retail point vary depending on the clients and the quantities the retailers are able to afford. The main buyers from retailers include individual households, hoteliers and institutions dealing in relatively small quantities.

Trader/Exporter: These are large traders mostly working for large forward markets. They may obtain their products from the wholesalers, farmers or local traders and even through their Owen commissioning agents to collect desired quantities of products. These traders often work as exporters, sell directly to foreign market traders, and play the role as commission agent for other forward markets

Consumers: Different types of consumers are served through different market channels. The consumers in the domestic market and regional market are served by various channels depending on the type of commodity, the location (urban verses rural) and wealth status (from slum resident to up-class hotel guests) of the consumer.

2.1.3. Vegetable Product Characteristics

Product: the core output (either a service or a manufactured good) produced by a firm. Da Siliva (2005) emphasized the importance of product traits in his review of the growing role of contracting in agro-food systems. As noted by Da Siliva, perishable products require careful handling and synchronization of production, transportation and processing.

Perish ability: Vegetables are highly perishable, as the result, they must be sold right after harvest, and continued throughout the process until they are consumed. For this purpose elaborated and extensive marketing channels, facilities and equipments are vital. Sellers might have little market power in determining a price. The urgent, informal marketing processes often leads to disputes between buyers and sellers of fresh fruits and vegetables.

Seasonality: vegetables have seasonal production directly influencing their marketing. Normally they have limited period of harvest and more or less a year round demand. In fact, in some cases the cultural and religious set up of the society also matter demand to be seasonal. This seasonality also worsened by lack of facilities to store.

Product Quality: quality of fresh-cut vegetable products is a combination of attributes, properties, or characteristics that determine their value to the consumer. Quality parameters include appearance, texture, flavor, and nutritive value. Consumers judge quality of fresh vegetables based on; appearance and freshness ("best if used by date") at the time of purchase. However, subsequent purchases depend upon the consumer's satisfaction in terms of textural and flavor (eating) quality of the product. Consumers are also interested in the nutritional quality and safety of fresh-cut products. Quality of the intact vegetable depends upon the cultivar, pre harvest cultural practices and climatic conditions, and time between harvest and harvesting method. Handling procedures, conditions, and time between harvest and preparation as a fresh-cut fruits and subsequent handling conditions (packaging, speed of cooling, maintaining

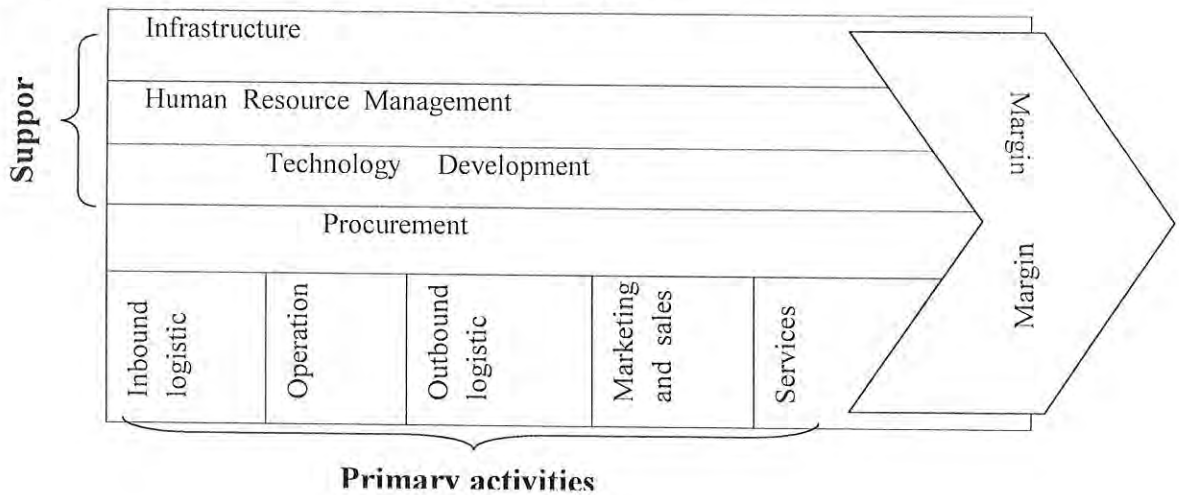
optimum ranges of temperature and relevant humidity, expected marketing, and proper sanitation procedures).

2.2. Theoretical literature: Value chain Analysis

The underlying methodology to analyze vegetable value chains was the Diagnosis Qualitative Model of Michael Porter's value chain model. The model is a simple Cause and Effect relationship. 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 raise 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 thin profit margins. Porter distinguishes between primary activities and support activities. Primary activities are directly concerned with the creation or delivery of a product or service.

They can be grouped into five main areas: inbound logistics, operations, outbound logistics, marketing and sales, and service. Each of these primary activities is linked to support activities, which help to improve their effectiveness or efficiency. Secondary activities are supportive service provisions that facilitate the efficiencies of primary activities. Profit margin implies that the chain actors realize a profit margin that depends on their ability to manage the linkages between all activities in the value chain. The model enable us to go beyond mere finger pointing and understanding of core transactions within the chain: it needs to identify the underlying systemic causes of bottlenecks in the chain.

Figure 2.1: the basic model of Porter's Value Chain



2.2.2 Types of Value Chain

According to Kaplinsky, (2000), the type of value chains can be categorized in to three, namely; Simple value chain, extended value chain and one or many value chain types.

1. The simple value chain

The value chain 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 transformation and the input of various producer services), delivery to final consumers, and final disposal after use. From this, production per se is only one of a number of value added links.

2. The extend value chain

In the real world, of course, value chains are much more complex than this. For one thing, there tend to be many more links in the chain. In addition to the manifold links in a value chain, typically intermediary producers in a particular value chain many feed into a number of different value chains. In some cases, these alternative value chains may absorb only a small share of their output; in other cases, there may be an equal spread of customers.

2.2.3. Strategic Approaches to national value chain development

There are three possible strategic approaches for promoting value chains: (a) comprehensive planning approach; (b) participatory workshop- centered- tools approach; and (c) incentives for private -sector-driven projects approach (Altenburg, 2007). According to Altenburg (2007), there are five major drivers in value chain development, namely, system efficiency, product quality, product differentiation, social environmental standards and enabling business environment.

2.2.4. Innovations and upgrading of Value chains

Innovation in itself may not be adequate. If the rate of innovation is lower than that of competitors, this may result in declining value added and market shares. Thus innovation has to be placed in a relative context- how fast compared to competitors-and this is a process, which

can be referred to as one of upgrading (as distinct from innovation) explicitly recognizes relative endowments, and hence the existence of rent (Dolan etal, 200).

Process upgrading: increasingly the efficiency of internal processes such that these are significantly better than those of rivals, both within individual links in the chain(for example, increased inventory turns, lower scarp), and between the chain (for example, more frequent , smaller and on-timer deliveries)

Product upgrading: introducing new products or improving old products faster than rivals. This involves changing new product development processes both within individual links in the value chain and in the relationship between different chain links.

Functional upgrading : increasing value added by changing the mix of activities conducting within the firm(for example, taking responsible for , or outsourcing accounting, logistics and quality functions or moving the locus of activities to different links in the value chain(for example from manufacturing to design)

Chain upgrading is the moving to a new value chain (for example, moving from exporting fresh tomato to exporting processed tomato products).

2.2.5. Barriers to entry and governance of value chain

2.2. 5.1. Barriers to entry, Rent and Governance of value chain:

Barriers to entry and rent: Essentially, the primary returns accrue to those parties who are able to protect themselves from competition. This ability to insulate activities can be encapsulated by the concept of rent, which arises from the possession of scarce attributes and involves barriers to entry. There is a variety of forms of rent. The focus of much of the literature, entrepreneurial energies and government policies is on what is called economic rents. Consequently, it is sometimes argued that the primary economic rents in the chain of production are increasingly to be found in areas outside of production, such as design, branding and marketing. Yet, this is too simple a conclusion, since even within production some activities involve greater barriers to entry. The pervasive trend is towards control over disembodied activities in the value chain.

Governance: A second consideration which helps to transform the value chain an heuristic to an analytical concepts is that the various activities it the chain- within firms and in the division of

labor between firms- are subject to what Gereffi has termed 'governance' explained by Kaplinisky ,(2000). Value chains are governed when parameters requiring product, process, and logistic qualification are set which have consequences up or down the value chain encompassing bundles of activities, actors, roles, and functions.

2.2. 5.2. Equity issues and cost benefit distributions in value chains

According to Donal and etal (2000), Value chain analysis can help to explain this growing disjuncture between the spread of activities and incomes, particularly in a dynamic perspective. The key to understanding distributional outcomes is to be found in a focus on the incomes, which are sustained in different parts of the chain, rather than on profits. We need to focus on the value added (that is output value minus input costs) rather than the gross value of sales/exports in each link of the value chain. Value chain analysis provides a direct line of entry into identifying the nature and extent of this barrier to entry along the chain. However, the distinction between determinants to barriers to entry, which are endogenous and exogenous to the chain, is not as clear as it might seem.

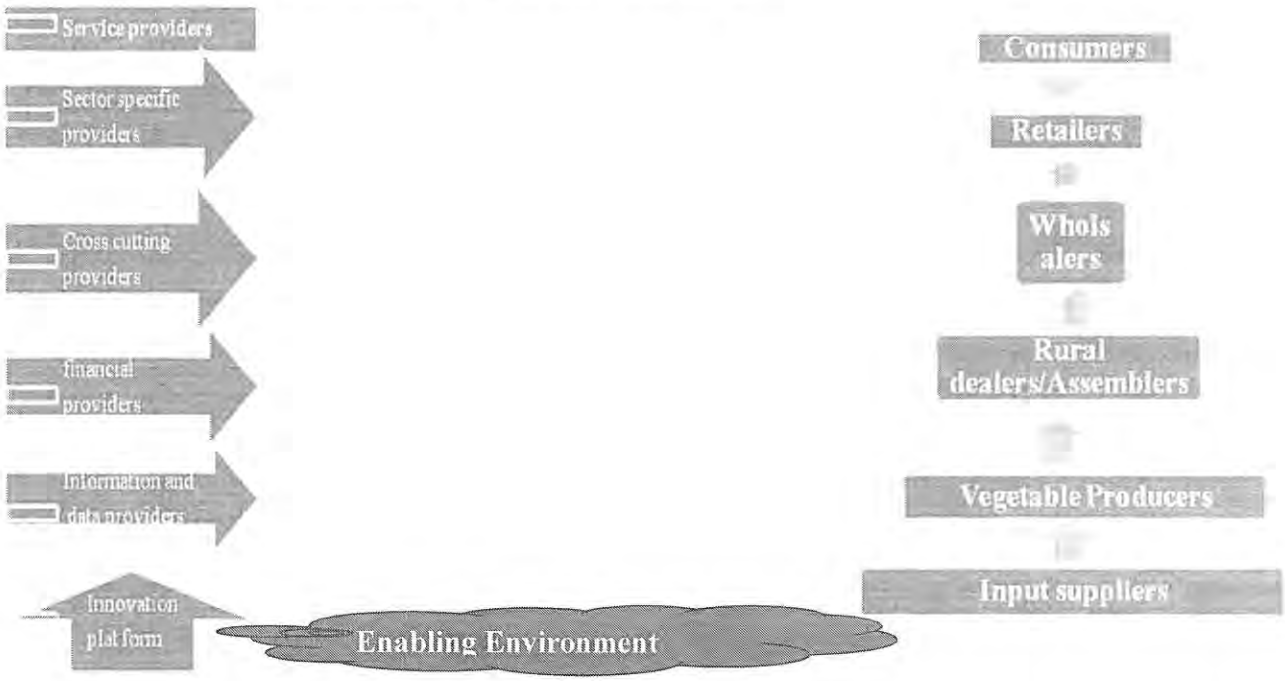
There are two potential equity issues with value chain processes. The first concerns the distribution of rents in vertically coordinated food supply chains. The second concerns the participation and exclusion of smallholders and poorer farmers in contract farming. Value chain has the potential to affect the way of income distribution with in rural economy and can exacerbate to existing patterns of economic stratification (Da silva, 2005).

Simple economic cost benefit distribution: A Simple economic cost benefit distribution between chain helps to identify the nature of benefit & cost asymmetry in the value chain. Cost calculation is the way to calculate the total costs of making and selling a product or providing a service. Costing helps to; set prices control and reduce costs, plan & make better decisions. Steps to calculate costs include; Identify cost components, systematize costs, Calculate variable costs, Calculate fixed costs, and finally Calculate total costs per unit. Production cost includes; manpower, raw materials, transport, rent, et, equipment and tools, and others ; Marketing costs; production loses, cost of promotion, commissions, Costs of packaging, transport and marketing arrangements etc and Finance costs; interest, taxes, fees. Finally profit is calculated by a simple economics model, Profit = revenue – cost. Estimation of typical volumes and values of product

sold; quality preference in terms of variety, appearance, size, taste, packing, grading; post-harvest practices, shelf life, storage opportunities; differences in demand according to time of year, day of the week and whether. Identification of different marketing channels for major products and their relative importance; who the important businesses involved in agricultural marketing are and how/where they can be make transactions, how they like to do business with farmers and their trading and business interests. Such important information needed to build up knowledge about the crops and other agricultural products and to be able to calculate the costs and possible returns across major channels.

In a Value Chain marketing system, farmers are linked to the needs of consumers, working closely with suppliers and processors to produce the specific goods required by consumers. Using this approach, and through continuous innovation and feedback between different stages along the value chain, the farmer's market power and profitability can be enhanced. Rather than focusing profits on one or two links, players at all levels of the value chain can benefit.

Figure 2.2: Conceptual framework of vegetable value chain



(Source: adapted from world report fall (2006), 2010)

Agricultural transformation should be broad based, starting from productivity improvements and encompassing the upgrading of infrastructure and auxiliary services and industries throughout the value chain of strategic commodities. Macroeconomic conditions, policies, laws, standards,

regulations and institutional support services (communications, research, innovation, finance, etc.) which form the chain environment – are also important elements affecting the performance of value chains. As pointed out earlier, value chains are entrenched in broader production system contexts and are affected by a wide range of policies.

Vegetable value chain encompass activities that take place at the farm or rural level, including input supply, vegetable production, and continue through post harvest handling, Sorting , grading, packaging, transporting, storage & distribution. As products move successively through the various stages, transactions take place between multiple chain stakeholders, money changes hands, information is exchanged and value is progressively added and distributed across chains.

The nature of horizontal & vertical coordination, between & within chains is the determinant factor that determines the performances of the value chain system. Hence, assessing the nature of chains, their roles & responsibilities could be one of the critical areas of investigations.

The nature of services provisions on improved production process like; improved farming techniques; use of appropriate doses of fertilizer and pesticide; soil, fertilizer and pest management; quality seed production, preservation and use; improved harvesting and post harvesting techniques (including sorting, grading, packing and arrangement for safe transportation), determines the performance of production. Likewise, the level of service provision for market development including marketing information, financing, infrastructures, market regulation & subsidized trade promotion influences the nature of market performance, hence the assessment of cost of production, marketing & distributions is found to be critical intervention to improve vegetable value chain.

2.3. Overview of the Ethiopian vegetable sub sector

Vegetable cultivation is certainly not a new activity in Ethiopia as the production of horticultural crops has been undertaken for decades. There are numerous small producers growing a small range of vegetables for the local and regional export market. The sector comprises large state farms supplying fruits and vegetables to the local market and for exports. However, a few private companies involved in the commercial production of vegetables and vegetables for export trade (tomatoes, strawberries, fresh herbs). The total area under fruit and vegetable cultivation

(including potatoes and other roots and tuber crops) in Ethiopia amounts to around 800 thousand ha which accounts for around 5% of the total land under cultivation (MoA, 2007).

Small-scale farmers mainly produce the fresh onions, tomatoes, cabbage and potatoes for exports to Djibouti and from there to Saudi Arabia, Yemen and other Middle East destinations. Due to a general lack of care and proper facilitates during transport however, produce often arrives in poor condition. Over the last two decades, the volume of export has not shown a clearly discernible and sustainable positive trend, except for a sharp rise in the second half of the 1990s (Tesfaye Zegaye, 2003). Also some of the large state farms, i.e. Upper Awash Agro-Industry Enterprise near Wonji and the Horticulture Development Enterprise near Ziway, sometimes produce and transport the produce directly by state owned trucks and trains to the international harbor in neighboring Djibouti (Frank .J,2007).

2.3.2. Tomato production in Ethiopia

Tomato is one of the most widely world crops in the cultivated crops in the world. It is an important source of vitamins and an important cash crop for smallholders and medium- scale commercial farmers. The bulk of tomato production is concentrated in the Central Rift Valleys however; there are favorable growing pockets in different parts of the country. Farmers are interested in tomato production more than any other vegetables for its multiple harvests potential of year round production, which result in high profit per unit area (Lemma Desalegn, 2002).

Table 2.1: Characteristics of the released tomato cultivars

Cultivars	Growth habit	Fruit shape	Fruit size (g)	Maturity (days)	Research yield q/ha
Chali	Short	Square	80-85	80-90	431
Cochoro	Short	Oblong	70-76	80-90	463
Miya	Tall	Plum	90-97	82-90	471
Fetane	Short	Cylindrical	110-120	75-80	454
Bishola	Short	Slightly cylindrical	140-150	85-90	340
Eshete	Tall	Slightly flatten	130-140	75-80	394
Metade	Semi-tall	Slightly flatten	190-100	75-80	345
MelkaShola	Short.	Cylindrical	60-70	100-120	430
MelkaSalsa	Short set	Pear	40-50	100-110	450
Sirinka	Tall set	Round	160-65	95-100	382
Woyno	Short set	Oval	40-50	85-90	249

(Source: MoA, 2009)

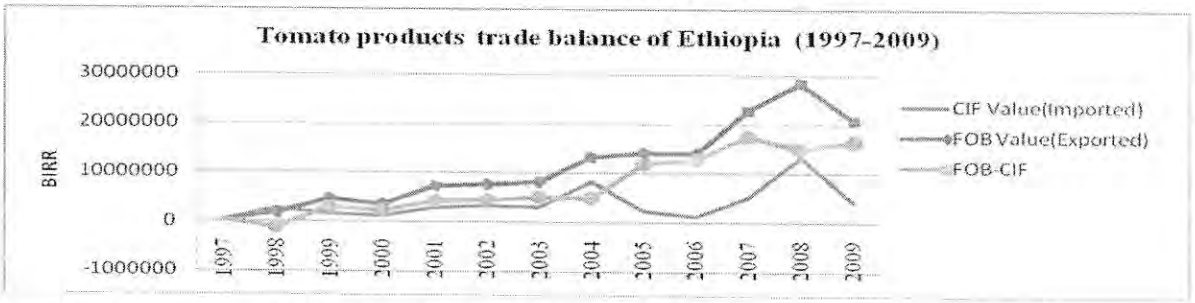
According to MoA, (2009), tomato (*Lycopersicon esculuntum* Mill) is one of the most important and widely grown vegetable in Ethiopia. It is produced in altitudes between 700 and 2000, which is characterized as warm and dry day and cooler night, are favorable for optimum growth and

development of tomatoes. Tomato is widely produced under irrigation. Production in the rainy season is also possible, but need intensive pest management. The bulk of tomato production is concentrated in the Central Rift Valleys however; there are favorable growing pockets different parts of the country (MoA, 2009). Tomato research in Ethiopia was started in mid 1960s to address various production constraints (Lemma Desalegn, 2002).

2.3.3. Trade balances of tomato and tomato processed products

The following figure indicated that Ethiopia is both exported and importer of tomato processed products. However, the export trend shows an increasing trend, hence expansion of agro-processing industry can play vital role for both domestic and export markets.

Figure 2.3: Tomato products trade balance of Ethiopia (1997-2009)



(**Source:** Raw data of Ethiopian Custom Authority, 2010)

Fresh, processing and cherry types are produced in the country. Small-scale farmer produces the bulk of fresh market tomatoes. Processing types are mainly produced in large-scale horticultural farms. It is an important cash-generating crop to small-scale farmers and provides employment in the production and processing industries. It is also important source of vitamin A and C as well as minerals. Farmers are interested in tomato production more than any other vegetables for its multiple harvests potential of year round production, which results in high profit per unit area. The fresh produces is sliced and used as salad. It is also cooked for making local sauce. The processed products such as tomato paste, tomato juice, tomato ketchup and whole peel-tomato are produced for local market and export. Recently tomato is recognized for treating various human diseases.

2.3.3 Status of Value chain Approach in Ethiopia

SNV Ethiopia is using value chain analysis to understand how farmers are interlinked with other actors, and to identify capacities of key actors that require strengthening, Netherlands Development organization (SNV) Ethiopia has adopted value chain as a framework for its work

in various production chains, including those for honey, milk, oilseed and fruit. For each chain, SNV brings together key actors to create a multi- stakeholder platform. The members may include representatives of the private sector (input suppliers and processors), producer associations, government programs, as well as potential investors (www.snvworld.org/en/countries/ethiopia). The value chain approach involves a combination of desk research, market analysis and field studies in which all actors in the chain, both direct and indirect, are interviewed, so that they are all able to contribute to the larger picture.

2.4 Empirical Literature Review

2.4.1. Small scale farmer participation in agro-food value chain: Honduras

To analyze the role of transaction costs and collective in the decision of Honduran small-scale farmers whether to supply the FFV, a survey of participant and non-participant farmers was carried out over the period April to June 2005(Syde etal, 2009). This was informed by a qualitative research phase during the period September 2004 to December 2004, which included in-depth interviews with small-scale producers, supermarkets, market intermediaries and so forth. The study explored the role of transaction costs and collective action in shaping small-scale farmer participation in the fresh fruits and vegetable (FFV) supply chain to supermarkets (SSC) in Honduras. Transaction costs and collective action are found to be significant in determining farmer participation in the SSC. Contrary to the findings of other studies, human capital and farm characteristic variables are not significant, suggesting that small-scale farmers can be included in new supply chains under certain conditions, especially if incentives to farmers, trust-based relationships between buyers and sellers, risk reduction practices and new forms of collective action are put in place.

2.4.2 Coordination and Distribution along commodity Value Chain: FAO case studies

Between 2000 and 2005, FAO conducted a series of case studies and regional workshops on agribusiness development and farm-agribusiness linkages. While these cases mainly focused on farm agribusiness development and business linkages were covered in the case studies and regional workshops. The Work in Africa began in 2002 with preparation of five case studies covering three or four agribusiness models in each of Kenya, South Africa, Uganda, Ghana and Nigeria. The purpose of the consultation was to identify opportunities for strengthening farm-

agribusiness linkages, and identify possible actions to be implemented by government institutions, private sector organizational and NGOs. Generally, the FAO case studies and consultations on farm- agribusiness linkages point to a number of issues that are likely to affect contracting all levels of value chains. One of the most important issues is to clarify stakeholder perceived advantages of linkages and contracts. Case studies and consultations indicate that attention is required to create enabling environments these are; facilitation and linkage programs, strengthening of farmer and professional organizations, and building technical and management skills can all play important roles in reinforcing business linkages.

2.4.3. Workshop on Value Chain Development: Egypt

Project name is 'Ethiopia Four Thousand Tons per Day: A Global Development Alliance with the Heinz Group' represented in Egypt.

The Four Thousand Tons per Day program is a market-driven horticultural value-chain program, anchored by Heinz and its intent to enhance its current tomato processing capacity in Egypt from 750 MT per day to 4,000 MT in five years. The program is strengthening horizontal and vertical linkages to achieve higher levels of productivity and quality in the horticultural chain by 1) transferring appropriate technologies and best practices to smallholders, 2) encouraging information flows and partnerships to increase coordination along the horticulture value chain, and 3) facilitating development of commercial business service providers in production, post-harvest and marketing.

During the five-year timeframe, the program will build the capacity of 8,000 smallholder farmers to profitably serve as reliable suppliers by increasing farmer organization, improving product quality and quantity through extensive training in good agricultural practices and targeted on-farm support, and developing sustainable linkages to the market and support services. Increases in production will trigger a series of investments by Heinz in processing facilities and facility upgrades in Egypt. Production planning, post harvest, and marketing services will be transferred to smallholders producing high value horticulture crops for export, grown in rotation with tomatoes. Key challenges include mobilizing and training 8,000 farmers in GAP certification and crop-specific production practices; facilitating a successful and long-term relationship between the farmers and Heinz processors through contract sales of process tomatoes; and integrating

production planning and market intelligence into farmer decisions in growing and marketing high value horticulture for export.

2.4.4. Changes in response to integrated interventions in the value chain of vegetables: The case of Atsbi-womberta district of Tigray Region, northern Ethiopia

With irrigated vegetables development, interventions on the uses of improved inputs such as water lifting devices; varieties; on-farm water, nutrient and pest management, and access to credit and market information were introduced in Atsbi-Womberta district, Ethiopia. Besides, skill and uptake capacity of vegetable growers, extension service providers and vegetable traders were improved accordingly. The response to the integrated interventions in the value chain of vegetables indicated that the total annual income increased from less than 16,733 in 2000 to more than 3.0 million USD in 2008. Simultaneously, beneficiaries increased by 82% while irrigated vegetable coverage by 87%. These successful changes in income attributed to improved capacity of actors to manage irrigated vegetables effectively in response to emerging opportunities and challenges including shifts in irrigated crop choices in reply to nutrient mining, pest load and market demand. Hence, the introduction of highland pulses in rotation with vegetable successfully breaks the pest load and increase soil fertility while simultaneously generating high income. Moreover, the presence of attractive market for vegetables and alternative crops triggers the expansion of water harvesting and utilization, increased crop diversification and sharpened the choice of marketable crops to optimize income.

2.4.5. Value chain management and poverty Alleviation in rural areas: Project Experience of Kyrgyzstan, 2005

This report reviews the status of value chain management in the Kyrgyz agriculture sector and works out recommendations for how to proceed in the development of agricultural value chains in Kyrgyzstan so that the poorest farmers are not excluded. With 53% of the employed Kyrgyz population involved in farming, and a large proportion of those engaged in subsistence farming, investigating methods for linking small farmers to markets and ensuring sustainable business development for processors and traders addresses rural poverty. A rationale for value chain development is based on the authors' experience in local market development in Kyrgyzstan. The authors have observed that local producers face a lack of access to potential markets for

several reasons: 1) lack of trust and unstable relationships between producers and potential buyers, 2) lack of reliable information about markets and financial resources, 3) small production volume, especially in the south where land is scarce, 4) lack of quality seeds and fertilizers, and 5) lack of mechanization. The report builds on project experience to offer several recommendations to other practitioners who are interested in pursuing local market development using the value chain approach.

Chapter III: Back ground of the study area

3.1. Demographic Characteristics

CSA, (2007), indicated that, Kobo Wereda has an estimated total population of 247, 672 constituting 123, 595 and 124,077 were male and female respectively. Out of the total population, 20.15% live in urban, which is by far greater than the Zonal average of 8.9%. Kobo has a population density of 127.6 people per square kilometer, which is greater than the zonal average of 105.59 (CSA, 2007).

3.2. Geographical location

Kobo is one of the 114 Wereda of Amhara regional states of Ethiopia, located in northeast corner of north Wollo zone. Kobo Wereda boarded; on the south by Logya River which separates the Wereda from Habru and Gubalafto, on the west by Gidan Wereda and on the north and east by the Afar regional state. Kobo Wereda is divided in to 32 peasant associations and 4 towns including the town of the Wereda administrative center (WoARD, 2009).

3.3. Agro climatic condition

According to WoARD report, (2009), the agro climatic feature of the Wereda is inclined to be tropical as 7.9, 37.2 and 54.9% are Dega, Woinadega and Kola respectively. As described by the report of WoARD, 65% is plain while the rest 20, 6, 5 and 4% are mountainous, rugged, gorges and swampy.

Kobo is characterized by low and erratic rainfall with mean annual rainfall of 577.33mm. Compared to other Wereda of the zone, Kobo Wereda has relatively hot climate, it has mean annual temperature of 23.1c.The land escape of the Wereda is characterized by a broad fertile plain which is separated from low lands of the Afar region by the Noble mountains, which are over 2000m high. In general, the altitude of Kobo ranges from 1100 meters on the plains to slightly more than 3000 meters above sea level, along the border with Gidan.

The rainfall is erratic, unreliable and low. However, its distribution is bimodal. The first and short rains or 'Belg' season rains fall from March to May and the second major rains or 'Meher' season rains fall from July to September. The whole rain however, is highly variable from year to year and less adequate in amount to support the growing period.

Frequent dry spells and droughts exacerbate the incidence of crop failure and hence food insecurity and poverty. Kobo wereda of North Wollo administrative zone is among parts of the Amhara National Regional State (ANRS) with food insecurity and vulnerable society for famine. Given the amount of water available, even while passing through the semi-arid, arid, and desert areas, it is evident that the promotion of water development technologies, especially irrigation, at both small and large-scales, can provide an opportunity to improve the productivity of land and labor and increase production volumes. As Kobo is found in dry agro ecology, water is a very important and crucial resource.

3.4. Irrigation Development in Kobo

According to North Wollo Zonal Agricultural office (2010), Kobo Woreda shares 43.74 % of the total 472927ha of irrigable land of North Wollo, which is equivalent to 5.5% of the total irrigable land of the region. There are around 17, 000 ongoing pressurized irrigation projects run by KGVDP in this Woreda and valley. However, the document indicated that discussion with the regional government has been started to decide upon the continuation of the project.

Among the major water sources of Kobo, Golina River is one of the largest rivers that have a potential to irrigate 10345.6, 6724.65 and 5172.8 ha of land in supplementary, primary and secondary irrigation periods respectively. The river covers 10.75% of the total irrigable land of the Woreda. According to Amhara water resource Bureau (2009), Golina River has 11 diversions and two pumps irrigation structures having water sources of 12 rivers and 1 ground water.

3.4.1. Golina irrigation scheme

Golina irrigation scheme is a medium scale river diversion irrigation scheme studied and designed by Kobo Alamata Agricultural Development Project in 1985 funded by (Ethio-Italy government and UNDP). The head work (weir and delivery canal) construction started in 1986 by Ethiopian Water Works Construction Enterprise, suspended for some years due to security problems and completed in 1998. The Ministry of Water Resource Development carried out design of the infrastructure and construction started in 1998 by a Chinese Construction Private Limited Company completed in 2000. Development was commenced in 2001, dry season. It serves for 1,334 users with about 0.30 ha average irrigable land holding per farm household (Co-SAERAR and CECE P.L.C., 1999).

The project was planned to irrigate 400 ha. The diversion weir is located upstream of Golina bridge (bridge constructed on Addis Ababa to Mekelle road). The irrigable land is located immediately at the downstream of Aradom village on the left side of Golina River (Co-SAERAR and CECE P.L.C., 1999). The Golina irrigation scheme in Kobo sub basin receives annual average rainfall of 610 mm. The mean annual maximum and minimum temperature are 26.2 and 14.8 0C, respectively. Topographically, the command area is flat plain. The command area has good slope for surface irrigation. Vertisol (heavy black light black) is the dominant soil in the command area. In general, soils of the scheme area are considered productive with medium to very deep depth (Co-SAERAR and CECE P.L.C., 1999).

Figure 3.1: Map of the study area

Source: Adapted (Co-SAERAR, 1999)

Chapter IV: Result and Discussion

This chapter presents the analytical part of the study. There are four main sections to meet the objectives of the study. The first section presents a summary of demographic and socioeconomic characteristics. The second section present and discusses analysis of production overages, patterns, mode of vegetable productions and constraints, the nature of service provisions, the role of vegetable value chain actors in backward and forward interactions , the third section discuss and analyzes the nature of value chain cannons including the cost and benefit distribution map. Finally, it ends up with conclusion and recommendation.

4.1 Demographic and socioeconomic characteristics

This section presents the demographic and socioeconomic compositions of the study population including sex, age, marital status, religion, ethnic composition, education level, wealth status and social participation, family sizes, and labor profiles.

4.1.1. Demographic characteristics

Sex composition:

According to Aradom (Kebele 06) official report of 2010, the kebele has 6141 peoples constituting 32148 males and 2893 females. Out of the total population of the kebele, 1375 households benefit from Golina modern irrigation scheme, out of them, 1200 are males while the rest 175 are female.

From the total 60 sample respondents, 85 % of the total sample respondent farmers were male while the rest 15 % were female. Out of the total respondents, 50% produced tomato in different seasons of 2009/10, predictably, 83.33% were male and 17.67 % were female. Similarly, 70 % of the total respondents produced onion, more seriously, 90.48% were male and 9.52% were female (see Table 4.1.1 below). Comparatively, in the landscape of vegetable production, women participation seems to be very low in onion production than tomato. Involvement of women is so poor; the problem deep rooted in the heart of socioeconomic characteristics of a given society. Undeniably, irrespective of gender biases, the participation of all farmers in vegetable production is a fundamental element of development drive. Without

active participation of women, it is unattainable to fuel and accelerate the success of the desired change of rural poverty.

Table 4.1.1: Demographic, socioeconomic characteristics of respondents

Major categories	Cases	Total Respondents		Tomato Producers		Onion producers	
		N	%	N	%	N	%
HH sex	Male	51	85.0	25	83.33	38	90.48
	Female	9	15.0	5	16.67	4	9.52
	Total	60	100.0	30	50	42	70
Religion	Orthodox	56	93.3	27	90.0	42	100.0
	Muslim	4	6.7	3	10.0	0	0
	Total	60	100	30	50	42	100.0
Marital status	Married	47	78.3	24	80.0	34	81.0
	Un Married	6	10.0	3	10.0	5	11.9
	Divorced	6	10.0	3	10.0	2	4.8
	Widowed	1	1.7	0	0	1	2.4
	Total	60	100.0	30	100	42	100.0
Ethnicity	Amhara	57	95.0	28	93.3	42	100.0
	TiGrie	2	3.3	1	3..3	0	0
	Oromo	1	1.7	1	3..3	0	0
	Total	60	100.0	30	100	0	0
Education	Unable to Read and Write	25	41.7	10	33.3	17	40.5
	Literacy grade level Completed	14	23.3	7	23.3	9	21.4
	First cycle completed	10	16.7	6	20.0	7	16.7
	High school (9-10)	10	16.7	7	23.3	8	19.0
	Others	1	1.7	30	100.0	1	2.4
	Total	60	100.0			42	100.0
Wealth status	The poorest of the poor	2	3.3	0	0	2	4.8
	Poor	7	11.7	3	10.0	5	11.9
	medium	46	76.7	24	80.0	31	73.8
	Rich	5	8.3	3	10.0	4	9.5
	Total	60	100.0	30	100.0	42	100.0
Social organization	Edir (Yes)	54	90.0	27	90.0	37	88.1
	Edir (No)	6	10.0	3	10.0	5	11.9
	Total	60	100.0	30	100.0	42	100.0
	Equib (Yes)	5	8.3	5	16.7	3	7.1
	Equib(No)	55	91.7	25	83.3	39	92.9
	Total	60	100.0	30	100	42	100.0
	Jigie (Yes)	17	28.3		33.3	14	33.3

Source: Own Field survey, 2010

Age composition:

In the rural economy, members of a house hold, who are in the domain of 'working ages', are active participants throughout the day to day activities of agricultural sub systems. It is sensible

that the average age of the total sampled household heads was 42.27 years, ranged between 21 to 68 years (Table 4.1.2). The average ages of tomato producers and onion producers were 42.60 and 40.05 respectively with similar age range of the total sampled population. Noticeably, majority of farmers are adult ages. The average age of tomato producers was higher than that the onion producers.

Marital status:

Boldly, marriage holds family members tied together in one umbrella; it enables a family to support itself along the roadmap of rural life. Predictably, marital status of the total respondents constituted married, unmarried, divorced and widowed with 78.3%, 10%, 10%, and 1.7% respectively. Interestingly enough, 80%, 10%, and 10% of tomato producers were married, unmarried and divorced respectively. Likewise, from the total onion producers, 81.0%, 11.9%, 4.8% married, unmarried, and divorced respectively while the rest 2.4% were widowed (Table 4.1.1).

4.1.2. Socioeconomic characteristics

As the table above indicated that, majority of the total respondents, (93.3%) were Orthodox religion followers whereas the rest 6.7% were Muslims. Out of the total tomato producers, orthodox and Muslim followers were 90% and 10 % respectively while 100% of onion producers were orthodox. Like the religion composition, the ethnic composition of respondents was found to be so homogenous, 95% of respondents were Amhara while the rest 3.3% and 1.7% were Tigrie and Oromo correspondingly. From the total tomato producers, 93.3%, 3.3%, 3.3% were in the orders of the above-mentioned ethnic groups, while 100% of onion producers were Amhara (Table 4.1.1).

Education status:

Education is the building block of life that enables peoples to be responsive for various social, political, economical, and environmental phenomena of life they tend to face.

Out of the total respondents, 41.7%, 23.3%, 16.7%, 16.67%, and 1.7% were unable to read and write, literacy grade completed, first cycle grade completed, high school grade level completed and preparatory grade completed respectively (Table 4.1.1). From the total tomato producers, 33.3%, 23.3%, 20%, 23.3%, were unable to read and write, literacy grade completed, first

cycle grade and high school completed in that order, while 40.5%, 21.4%, 16.7%, 19.0%, and 2.4% of onion producers unable to read and write, literacy grade completed, first cycle grade completed, high school grade level completed and preparatory grade completed respectively. Illiteracy was relatively high to total respondents than vegetable producers.

Wealth status:

After identifying and determining the indicators of wealth position of the community with local elders, ownership of cattle, shelter (iron-roofed house), food security status, and bank deposits were assumed to be major wealth indicators of the community. Consequently, respondents were asked to position themselves in four types of wealth status categories in their community, accordingly, 3.3%, 15%, 76.7% and 8.3 % of the total respondents claimed that they were the poorest of the poor, poor, medium, and rich respectively. As well, , 0%, 3%, 80% and 10% of tomato producers categorized themselves as, the poorest of the poor, poor, medium, and rich respectively while 4.8%, 11.9%, 73.8%, and 9.5% were for onion producers in the above ordered wealth categories (Table 4.1.1). Relatively, majority of the respondents categorized themselves as medium income groups, in fact, irrigation based production practices might have higher role to improve their livelihood than rain fed agrarians of the locality. Tomato producers might be good indicators, as there was only 3% poor and none of the poorest of the poor categories.

Informal institutional participation

Rural communities have various informal institutions that tie them together in their social, economical, and religious dimensions of life. Such social institutions can improve group spirits and sustain privileges through synergic cooperation and coordination. Majority of the respondents (90%) participated in Edir, while, 8.3% and 28.3% participated in Equib and Jigie social organization respectively. Out of the total tomato producers, 90% participated in Edir, and 16.7 % participated in Equib, and 33.3 % in Jigie (Table 4.1.1). Generally, such institutions run by pulling resources jointly and supporting each others in; the time of sorrows and happiness, the faces of ups and downs of life, labor shortages in peak periods, the time of drought and etc...

Among all informal institutions, Edir is the major and fundamental institutions for the rural people. Edir is the most popular institutions of farmers that accommodate majority of the community members with irrespective of political, religious, ethnic, and economical dimensions. Usually, when a member of a household depart from this world, members of the community support the household; in running the funeral ceremonies smoothly, pooled resources like money and grains. This institutions also present sense of belongingness to the family who loss its members through coordinating neighbors and villagers in treating broken hearts of the family member. This local institution facilitates self-supportive mechanisms and create strong social bond.

Equib is one of the major informal institutions that can support farmers to save money collectively and solve parts of their financial needs to cover; schooling expenses of children, food deficits of bad days, farm input expenses, clothing expenses etc. Apart to its economical benefits, Equib can build social cohesions and group sprits. However, this important informal institution seemed to be weakened and ignored by service supporters.

Jigie is one of the major institutions that coordinate labors to support one by others during labor deficit periods. Such labor sharing culture can play vital role for farmers having constrained labor inputs, women farmers, poor farmers and elders may use shared labor sources to, timely manage major agricultural practices in growing vegetables. However, this social institution is less practiced. Hence, it seeks due attention to strengthen such and other social institutions as they can play vital role in supporting directly or indirectly the social & economical spheres.

Family sizes and labor profile of house hold members

The average family size was estimated to be 6.03 with a range of 2-10.The average family size of tomato and onion producers indicated that, 5.87% and 6.1% respectively (Table4.1. 2). Based on the 2007 Census result of the CSA, the average family size of rural parts of Ethiopia and Amhara region indicates that 4.7% and 4.5% respectively. This shows that the study area has larger family size than both the national does and the regional average family size.

Children below 10 and elders above 64 were assumed dependent/inactive labors while individuals found in age range of 10-64 were independent family members/active labors. The

average active labor for all respondents, tomato producers, and onion producers showed that, 4.08, 2.08, and 2.02 respectively. The average inactive labor for total respondents, tomato producers, and onion producers were, 1.95, 1.97, and 2.02 respectively. The average of inactive to active labor ratio for total respondents, tomato producers and onion producers indicated that, 0.52, 0.49, and 0.49 respectively (Table 4.1.2). The labor scarceness in the lowlands is very significant during weeding, harvesting, and threshing in the rain fed farming areas and, additionally, during cultivation in irrigated farms (SARC, 2000).

Table4.1. 2: Family size, age of household head, and labor profiles

Category	Descriptions	Minimum	Maximum	Sum	Mean	Std. Deviation
Total	Age of HHH	21	68	-	42.27	10.62
	Family size	2	10	362	6.03	1.59
	Inactive labor	0	4	117	1.95	1.21
	Active labor	1	8	245	4.08	1.75
	Inactive: Active labor ratio	0	2	-	0.52	0.45
Tomato producers	Age of HHH	21	68	-	42.60	11.28
	Family size	3.00	9.00	176.00	5.87	1.43
	Inactive labor	.00	4.00	59.00	1.97	1.066
	Active labor	2.00	3.00	71.00	2.37	.49
	Inactive: Active labor ratio	.00	1.50	-	.83	.42
	Active labor	2.00	3.00	71.00	2.37	.49
	Inactive: Active labor ratio	.00	2.00	-	.84	.63
Onion producers	Age of HHH	21	68	-	40.05	10.86
	Family size	3.00	10.00	256.00	6.1	1.60
	Inactive labor	.00	4.00	85.00	2.02	1.20
	Active labor	2.00	3.00	100.00	2.38	.49
	Inactive: Active labor ratio	.00	2.00	-	.85	.519

Source: Own Field survey, 2010

Livelihood and food security

The farming community of Kobo lives in very diverse, risk prone and complex circumstances. A number of factors that are dynamic and changing any moment, their changes significantly affecting the efficiency of agriculture, influence their foundation of life – agriculture –. This implied that both on farm and off farm income generating activities play vital role in ensuring rural livelihoods.

According to respondent interviews, 25% of the total respondents had additional income sources while the rest 75% relied on a single agricultural income sources (Table 4.1.3). The

additional income sources include pity trades; forage trade, urban commodities like salt, sugar, cotton fiber making, local drinks, seedling business; daily labors in different land preparation, watering, weeding and harvesting , urban construction; and others like cart rent, oxen rent, etc. which accounts 15%, 50%, and 15% of income earners respectively (Table 4.1.3).

Farmers might be able of feeding themselves for some months and fail to do so in some others. Respondents were asked that they had reserve grains and money since a year before, hence, 33.3 % of the respondents had crops deposits while the rest 66.7 % did not have. Only 23.3% had saved money while the rest 76.3% had not any in the same year. Among the total respondents, 20% faced food shortages during the last five years period (Table 4.1.3). Out of them, 41.7% used a strategy of selling cattle, while the rest 25%, 16.7%, 16.6 % used food for work, trading, and others respectively to solve food shortage (Table 4.1.3).

Therefore, due attention is required to expand and diversify the bases of non-farm income generating activities. Trainings, credits and relevant sets of technical supports can contribute to fill the gaps of links between rural and urban economies.

Table 4.1. 3: Food insecurity and additional income sources

Category	Cases	Frequency	Percent
Reserve crops	I do have	20	33.3
	I do have not	40	66.7
Saving practice	I do have	14	23.3
	I do have not	46	76.7
Additional income sources	I do have	15	25
	I do have not	45	75
Types of income source (N=15)	Pity trades like	3	20
	Laborers	5	33.3
	others	7	46.6
Incidence of food shortage	Yes	12	20.0
	No	48	80.0
Strategies used to solve food insecurity (N=12)	Selling cattle	3	9.1(14.3)
	Food for work	3	9.1 (14.3)
	Borrowing money	2	6.1 (9.5)
	Off/non farm income	5	15.2 (23.8)
	Food aid	1	3.0 (4.8)
	Responses of laborers	17	51.5 (81.0)
	Responses of Remittances	2	6.1 (9.5)
	Total responses		(157.1)

Source: Own survey, 2010 Key: ( ) refer multiple cases

4.1.2.1. Land Holdings

The study indicated that the average total land holding size was 0.872 ha ranged between 0.12-2.12 ha with a standard deviation of 0.46 (Table 4.1.2.1). The total average land holding sizes for women and men were 0.746 and 0.894 ha respectively. The average land holding of respondents in Golina modern irrigation schemes was 0.342 ha with a range of 0.07-1 ha. In Golina, the average land holdings for females and males indicated that, 0.289 and 0.352 ha respectively with ranges 0.12-0.37 and 0.07-1 ha in the same order as above (Table 4.1.2.1). The average total land holding size of modern irrigation, rain fed land and traditional irrigation were 0.342ha, 0.443 ha and 0.25 ha respectively with standard deviation of 0.208, 0.262 and 0.045 respectively (Table 4.1.2.1).Gender disaggregated data showed that men have an average of 0.352 ha land size while women have 0.289ha land in Golina modern irrigation scheme. Tomato producers and onion producers have average land holding of 0.32 3and0.365 ha respectively in Golina modern irrigation scheme while non-tomato and onion producers have 0.3617 and 0.289 ha respectively (Table 4.1.2.1).

Table 4.1.2.1: Access to land and land holding size in ha

Land categories	Cases	Descriptions	N	%	Mini	Maxim	Total	Mean land	Stan. Deviation
Golina modern irrigation	Total respondents	Male	51	85	.07	1.00	17.94	.35	.22
		Female	9	15	.12	.37	2.60	.29	.09
		Total	60	100	.07	1.00	20.54	.34	.210
	Tomato	Producers	30	100	.12	.87	9.69	.32	.19
	Onion	Producers	42	100	.07	1.00	15.33	.37	.23
Other modern scheme	Total	Male	10	19.6	0.01	1	0.42	0.31	0.31
		Female	0	0	0	0	0	0	0
		Total	10	16.7	0.01	1	0.42	0.31	0.31
All Modern irrigation	Total respondents	Male	51	85	.07	1.62	22.19	.44	.35
		Female	9	15	.12	.37	2.60	.29	.09
		Total	60	100	.07	1.62	24.78	.41	.33
Traditional	Total respondents	Male	2	3.9	0.25	0.25	0.5	0.25	0
		Female	0	0	0	0	0	0	0
		Total	2	3.33	0.25	0.25	0.5	0.25	0
Rain fed	Total respondents	Male	48	94.1	0.04	1.25	22.47	.47	.26
		Female	9	100	.25	.62	4.11	.46	.14
		Total	57	95	0.04	1.25	26.56	0.47	0.25
Total land holding	Total respondents	Male	51	85	.12	2.12	45.60	.89	.49
		Female	9	15	.37	.99	6.71	.75	.19
		Total	60	100	.12	2.12	52.31	.87	.46
	Tomato	Producers	30	100	.12	2.12	24.46	.82	.51
	Onion	Producers	42	100	.12	2.12	37.24	.89	.49

Source: Own field survey, 2010

The study indicated that respondents has mixed sources of land access either in one or more land types from land sets of modern irrigation schemes (in Golina or/and in other modern irrigation schemes), in traditional irrigation scheme, and in rain fed lands. Hence, 16.6 % of the total respondents have access over other modern irrigation schemes, in which all of them were male. While, 3.33% of the sample has access over traditional irrigation scheme, likewise women have no access. Except 5%, 95 % of the total respondents have access to rain fed lands. Unlike the access of both traditional and other modern irrigable lands in which women had denied accesses, 100 % of women had access in rain fed lands while 94.1% of the sample males had access over rain fed lands (Table 4.1.2.1).

Share cropping and lease practices in 2009/10

Table 4.1.2.2: Share cropping practices for the last two years

Respondent categories	Land holding types	Descriptions	Sharecropping in		Share cropping out	
			N	%	N	%
Total respondents	Modern irrigation	Male	15	29.4	2	3.9
		Female	1	11.1	1	11.1
		Total	16	26.7	3	5
	Traditional irrigation	Male	4	7.8	1	2.0
		Female	0	0	0	0
		Total	4	6.7	1	1.7
	Rain fed	Male	11	21.6	1	2.0
		Female	1	11.1	0	0
		Total	12	20	1	1.7

Source: Own field survey, 2010

Sharecropping is more popular for modern irrigation followed by rain fed. In table 5, the study implied that 26.7 %, 20% and 6.7% of the land holdings in modern irrigation, rain fed and traditional irrigation were under 'sharecropping in' agreement respectively (Table 4.1.2.2). Besides, 5%, 1.7% and 1.7% of respondents were under 'in share cropping out' agreement respectively.

In the study area, sharecropping in and out is commonly practiced between farmers with a share of half dividends of the grain yield between landowner and farmers that contract the land. The contractor farmer is allowed to use the crop residual yield alone. In share cropping system, landowner only provide his land to the one who can accommodates all the necessary inputs like labor, seed, fertilizer, and chemical. Term of agreement is usually unknown initially; the

landowners along the track can decide it in the future. Most of the cases, kinships, friendships, and proximity are prime factors to get in crop sharing agreements

4.1.2.2. Livestock ownerships

The livestock production system is an important means of security during crop failure at Kobo. It plays a vital role in the livelihood of the wereda's population. The livestock subsystem is highly interrelated with the crop production subsystem. That is, the sub system provides draught power and means of transportation for the crop farming. The total average TLU was estimated to be 3.53 with a range of 0-11.13 at a standard deviation of 1.88 (Table 4.1.2.2b.).

Table 4.1.2.3 : Livestock holding

	Category	Cases	Minimum	Maximum	Sum	Mean	Std. Deviation
TLU Ownership	Total respondents	Male	0	11.13	184.72	3.62	1.98
		Female	1.66	4.34	26.9	2.99	1.05
		Total	0	11.13	211.62	3.53	1.88
	Tomato	producers	1.00	8.70	99.14	3.30	1.67
		Non producers	.00	11.13	112.48	3.73	2.07
	Onion	Producers	1.00	8.70	99.14	3.30	1.67
		Non producers	.00	11.13	112.48	3.75	2.07
Oxen in numbers	Total respondents	Male	.00	4.00	85.00	1.67	.84
		Female	.00	2.00	11.00	1.22	.83
		Total	.00	4.00	96.00	1.60	.85
	Tomato	producers	.00	4.00	46.00	1.53	.78
		Non producers	.00	4.00	50.00	1.67	.92
	Onion	Producers	.00	4.00	67.00	1.60	.91
		Non producers	.00	3.00	29.00	1.61	.70
Donkey	Total respondents	Male	.00	1.00	26.00	.51	.50
		Female	.00	1.00	2.00	.22	.44
		Total	.00	1.00	28.00	.47	.50
	Tomato	producers	.00	1.00	19.00	.63	.49
		Non producers	.00	1.00	9.00	.30	.47
	Onion	Producers	.00	1.00	19.00	.45	.50
		Non producers	.00	1.00	9.00	.50	.51

Source: Own field survey, 2010

As we can see from the Table 4.1.2.2b, TLUs of oxen, cows, bulls, calf, camel, donkey, sheep, and goat were 1.6, 0.77, 0.24, 0.13, 0.25, 0.35, 0.03, and 0.16 respectively. The total average TLU for women was 2.99 with a range of 1.66-4.34, while men have an average TLU of 3.63

with a range of 0-11.13. Averages of TLU ownership for tomato producers and onion producers were equal, 3.3, while non-producers of tomato and onion were 3.7 each. Oxen is found to be the major power source to plough and cultivate land, however , 8.3%, 43.3%, of respondents had no oxen and had only a single ox out of the total oxen ownerships. Similarly, pack animals like donkey and camel are the major transportation means in the study area, but 53.3% of the respondents have no donkey while the rest had one donkey each. Similarly, 81.7 % of respondents had no any camel while only the rest had camels ranging 1-4 (Table 4.1.2.2b). According to farmers view, the trend shows that livestock population both in number and species composition declines from time to time due to the recurrent drought and shortage of land caused by increasing human population.

4.2. Vegetable production and cropping pattern

Farmers in the risky venture of agriculture, particularly when it is in Wollo, have two main objectives to achieve. The first and more important one is producing sufficient food for the family (Girma et al 1999).The second objective of the farming community is securing some cash. The major vegetable crops grown includes onion, tomato and pepper while teff, maize, sorghum are from cereals. Besides, crops like sesame and chickpeas are produced. Teff and maize are grown as rain fed and irrigated crops while sorghum particularly those long maturing types are exclusively grown under rain fed condition. Crop production objectives vary considerably with crop commodities. Vegetables such as tomato, onion and pepper are produced mainly for cash income. Maize production largely targeted to satisfy household food and feed requirement. On the other hand, teff is such a versatile crop and meets food, cash income and feed production objectives of the households that indicate its importance in this particular production system.

Table4.2: Producers by cropping season

Producers /season	Primary			Secondary			Supplementary			Annual		
	N	% Column	% Raw	N	% Column	% Raw	N	% Column	% Raw	N	% Column	% Raw
Yes	39	65	27.46	48	80	33.8	55	91.67	38.73	142	78.89	100
No	21	35	35	12	20	20	5	8.33	8.3	38	21.11	100

Source: Own field survey, 2010

In Golina modern irrigation scheme, farmers produce in three production seasons, namely, primary, secondary and supplementary from November-Feb, March-June and July-October respectively. Generally, 88.33 %, 70%, 50% and 21.67% respondents each of the total respondents produced cereals, onion, tomato, and hot pepper respectively in 2009/10 production seasons respectively. Out of the total respondents, 65%, 80%, and 92.7% produced in primary, secondary and supplementary production seasons respectively (Table 4.2). Generally, an estimated number of 78.89% of the total respondents irrigated 67.38% of the total irrigable land in 2009/10. This indicates that number of farmers whom produce crops is high in supplementary followed by secondary irrigation periods, hence majority of the land can be covered during wet periods of supplementary irrigation.

4.2.1. Land allocation and coverage

Table4.2.1: Land allocation and coverage in Golina modern scheme.

Production Season	Crop	No. plots	Land allocation					
			Min.	Max.	Total	mean	Std. Devationn.	% cultivated in a season
Supplementary Producers	Tomato	11	0.03	0.25	1.28	0.12	0.056	7.77
	Onion	24	0.07	0.62	4.71	0.2	0.12	28.6
	Pepper	1	0.37	0.37	0.37	0.37	-	2.25
	Cereals	33	0.07	0.87	10.1	0.31	0.19	61.38
	Total	55	0.03	0.87	16.5	0.24		100
Primary Producers	Tomato	6	0.07	0.37	1.06	0.18	0.11	9.8
	Onion	6	0.06	0.62	1.8	0.3	0.2	16.63
	pepper	6	0.12	0.25	1.14	0.19	0.07	10.53
	cereal	25	0.12	0.75	6.82	0.27	0.19	63.04
	Total	43	0.06	0.75	10.8	0.25		100
Secondary	Tomato	13	0.06	0.25	2.5	0.19	0.07	17.57
	Onion	12	0.06	0.62	2.27	0.19	0.2	15.95
	pepper	8	0.07	0.25	1.21	0.15	0.08	8.5
	cereals	30	0.06	0.62	8.25	0.27	0.16	57.98
	Total	63	0.06	0.62	14.2	0.22		100
Total	Tomato	30	0.03	0.37	4.84	0.16	0.81	11.66
	Onion	42	0.06	0.62	8.78	0.21		21.15
	Pepper	15	0.07	0.37	2.72	0.18		6.55
	Cereals	88	0.06	0.87	25.2	0.29		60.64
	Total	175	0.03	0.87	41.5	0.24		100

Source: Own field survey, 2010

From the total land owned in Golina modern irrigation scheme, 10.82ha (52.68%), 14.23ha (69.28%), and 16.47(80.19%) ha of land were covered in primary, secondary, and supplementary production periods respectively (Table 4.2.1). From the total annual cultivated land, 4.84 ha (11.66%), 8.78 ha (21.15%), 2.72 ha (6.55%), and 25.18 ha (60.64%) were covered by tomato, onion, pepper, and cereals respectively (Table 4.2.1). Out of all the three seasons, the maximum average land allocated for cereals and tomato was recorded in supplementary while primary was for onion. The study showed that more land was allocated to cereals than vegetable crops across all the three production seasons. Onion was the first leading vegetable crops followed by tomato.

4.2.1.1. Primary production system

Out of the total 10.82 ha land covered in primary irrigation, 6.82ha (63%) was covered by cereals and 1.8ha (16.63%) was by onion while the remaining 1.14 (10.53%) and 1.06(9.8%) ha were covered by pepper and tomato respectively (Table 4.2.1). Cereal production is found to be the first leading crops category followed by onion, pepper, and tomato respectively under primary irrigation period. As indicated in Table 4.2.1, the average land allocated in Primary production period for cereals, onion, tomato, and hot pepper were 0.27, 0.3, 0.11, and 0.19 ha respectively. Unlike the other two production seasons, the larger average land was allocated for onion followed by cereal.

4.2.1.2. Secondary production system

Out of the total land 14.23ha covered in secondary production period, 2.5ha (17.57%), 2.27 ha (15.95) percentage, 1.21ha (8.5%), and 8.25ha (57.98%) were covered by tomato, onion, pepper, and cereals respectively (Table 4.2.1). Likewise, the average land allocated in secondary production period for cereals, onion, and tomato vegetables were 0.27, 0.19, 0.19, and 0.15 ha respectively. In secondary production period, the maximum average land was allocated for cereals followed by tomato and onion with similar average land. Larger portion of land was allocated to cereals than the rest crops followed by tomato under secondary irrigation period.

4.2.1.3. Supplementary production system

Similarly, from the total land covered (16.47 ha) in supplementary production periods, 1.28 ha (7.77%), 4.71 ha (28.6%), 0.37ha (2.25%), and 10.11ha (61.38%) were covered by tomato, onion, pepper, and cereals respectively. The average land allocated in supplementary production period for cereals, onion, and tomato vegetables were 0.31, 0.2, and 0.12 ha respectively (Table 4.2.1). Hot pepper production is not common in this season.

4.2.2. Vegetable production and Technology

Table4.2.2: Technology utilization

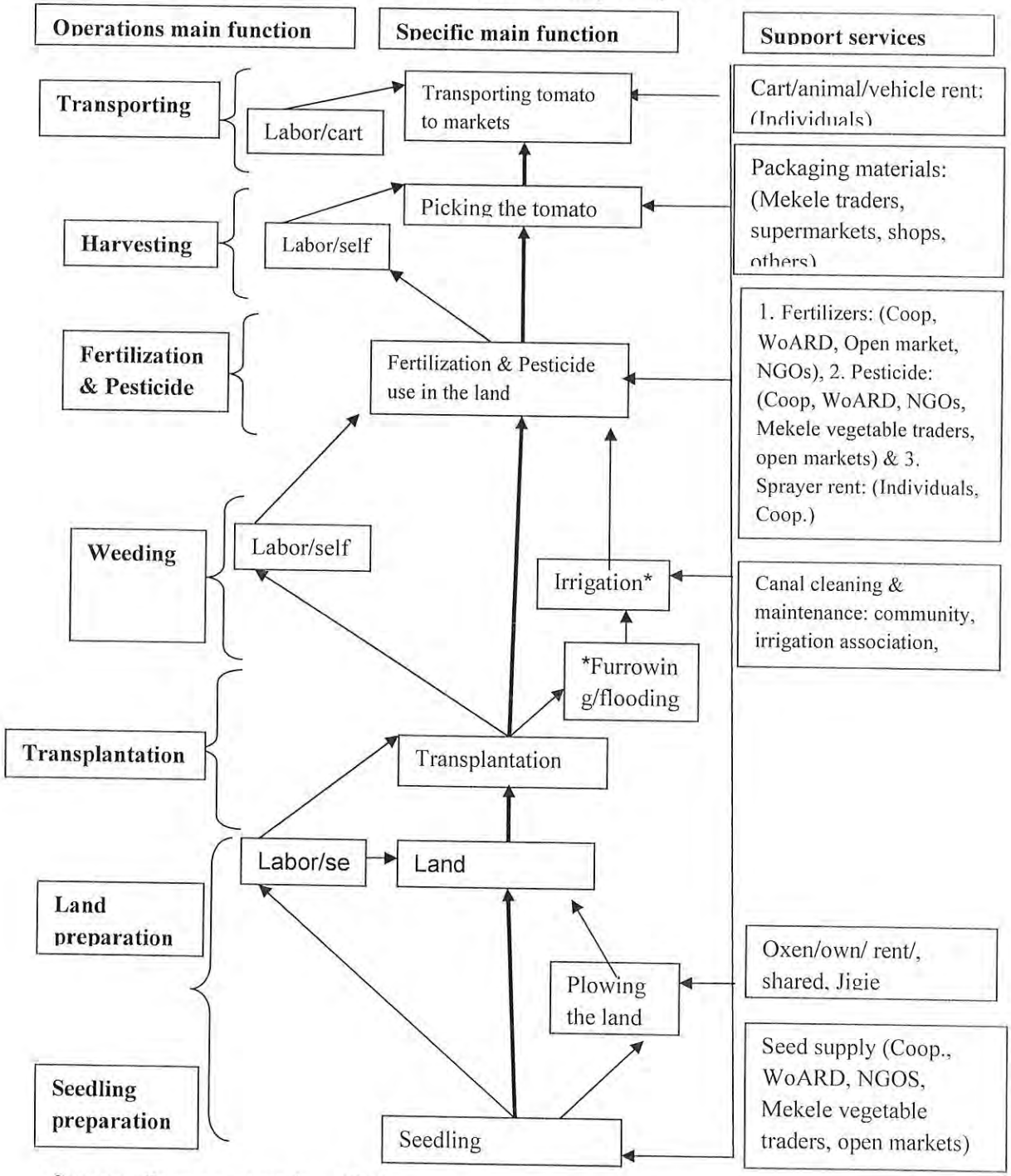
Producers	Inputs	Users		Non-users	
		N	%	N	%
Total (60)	Fertilizers	20	33.3	40	66.7
	Manures	27	45	33	55
	Compost	7	11.7	53	88.3
	Chemical	47	78.3	13	21.7
	Improved seed	49	81.7	11	18.3
	Furrowing	45	75	15	25
	Plowing with own oxen	38	63.3	22	36.7
Tomato (30)	Fertilizers	8	26.7	22	73.3
	Manures	15	50	15	50
	Compost	3	10	27	90
	Chemical	22	73.3	8	26.7
	Improved seed	25	75	5	25
Onion (42)	Fertilizers	12	28.6	30	71.4
	Manures	18	42.9	24	57.1
	Compost	7	16.7	35	83.3
	Chemical	35	83.3	7	16.7
	Improved seed	33	78.6	9	21.4
Pepper (13)	Fertilizers	5	38.5	8	61.5
	Manures	6	46.2	7	53.8
	Compost	1	7.7	12	92.3
	Chemical	11	84.6	2	15.4
	Improved seed	0	0	9	100

Source: **Own field survey, 2010**

From the total respondents, it is witnessed that the general level of technology adoption of improved seed, fertilizer, manure, compost, pesticide, and in the study area were 81.7, 33.3, 45, 11.7, and 78.3%, respectively (Table 4.2.2). From the total respondents, 75% used furrowing methods of watering techniques while the rest 25% used simple flooding techniques. Out of the total respondents, 36.7% did not have their own oxen to plow their land. From the total onion producers, improved seed, fertilizer, manure, 78.6, 28.6, 42.9, 16.7, and 83.3 % respectively adopted compost, and pesticide. While pepper producer adopted, improved seed, fertilizer,

manure, 84.6, 38.5, 46.2, 7.7, and 0 % respectively adopted compost, and pesticide. From the total tomato producers, 75, 26.7, 50, 10, and 73.3 % respectively adopted improved seed, fertilizer, manure, compost, pesticide (Table 4.2.2).

Figure 4.2.2: Tomato production steps and sources of major inputs



Source: Own construction, 2010

4.2.3. Onion Production

Currently, Kobo Woreda has become known for its high onion production. According to FGD made with producers, the discussion made with experts of WoARD and views of key committee of cooperatives, and manager of KGVDP, the share of onion coverage has increased from time to time in modern irrigation schemes. Hence, Bombie Red and Adama Red varieties of onion are adopted widely. These varieties have been introduced since 1998.The area overage and production are increased from time to time. KGVDP has made strong efforts in reating market linkages with different whole sellers from different parts of the country. Open iction system is practiced in setting competitive selling prices of onion products. Hence, tential traders tend to be invited from different parts of the country like from Mekele, AA, hir Dar, Dessie, Gondar and Humera who are said to be the major onion buyers. This rketing system may attract farmers and create more interest to produce onion than any types of egetable.

Ou of the total onion producers, 24(57.14%), 06 (14.28 %), and 12 (28.58 %) producers produced in supplementary, primary and secondary production seasons respectively. Most farmers produce onion largely in supplementary production season periods. The general estimated average lands allocated for onion were, 0.19, 0.29 and 0.18 ha in supplementary, primary and secondary production seasons respectively. The total volumes of production were estimated 355.76, 78.44, and 175 quintals in the order of mentioned seasons.

The importance of onion to small-scale producers is reflected by its area being the largest of all produced vegetables. In supplementary production season, the demand of onion is expected to be very high than the rest of the seasons due to Ethiopian new year ceremony , low supply, high probability. However, most farmers preferred to plant onion in supplementary production season, the average land size allocated for was the least out of all the seasons. This might be due to allocation of more lands for diversified crops like cereals. To the contrary, the number of farmers who produced onion in primary production season was smaller than the supplementary while the land allocated was higher. Relatively, inverse reasons of supplementary production season may work.

Productivity of onion in supplementary, primary and secondary production seasons was estimated 79.94, 37.78, and 136.57 quintals/ha respectively. All productivities were ranged from 2-258.1 qt/ha under the context of supplementary and secondary production seasons respectively. However, the productivity of the crop is very low compared to the potential yield obtained in the research centers and on technology verification studies on farmers' field. The productivity onion, tomatoes compared to the potential yield of 400 q/ha in the research center (EIR, 2008). Generally, there are quite a lot of complex production and technical constraints that limit the expansion of the sector in the country. These includes low genetic potential, lack of high yielding and high quality cultivars for domestic and export markets, appropriate management techniques, appropriate disease and insect pest control measures, quality seed supply, post harvest technology, trained manpower and research facilities(EIR, 2008).

4.2.4. Tomato production

Tomato is produced throughout the year in Golina modern irrigation scheme constituting supplementary, primary and secondary production periods include the time between July to October, October to end of January and February to May respectively. Out of the total tomato producers, 11(36.67%), 06 (20%), and 13 (43.33%), produced in supplementary, primary and secondary production seasons respectively.

According to WoARD of Kobo, the major source of tomato supply both for local and for cross regional demand is Golina modern irrigation scheme. Tomato is the second major vegetable crop produced in Golina modern irrigation scheme three times in a year. The major buyers of the crop are whole sellers of Mekele tomato traders. Hence, Meleka sholla & Marglobe tomato varieties are used; however, Melka sholla is widely adopted in the community. This is because of its long shelf life-(not easily perishable), high productive and less labor for handling.

Productivities of tomato were estimated based on the yield data gathered from producer's information. Moreover, tomato producers estimated pre and post harvest tomato loses. Finally, pre harvest loses were excluded and post harvest loses were included in estimation of productivity of tomatoes. Productivity of tomato in supplementary, primary and secondary production seasons was estimated to be 120, 101.5, and 97.8 quintals/ha respectively (Table 4.2.3). Productivities of tomato lied with a range of 2.5-333.33 qt/ha, the minimum and

maximum productivities were recorded under secondary and supplementary production seasons respectively. As we can see from the previous Table 4.2.1, the estimated average lands allocated for tomato were 0.12, 0.18 and 0.17 ha in supplementary, primary and secondary production seasons respectively. The total volumes of production were estimated 97.5, 80, and 267.5 quintals in the order of the above-mentioned seasons (Table 4.2.3). It implies that higher yield was recorded in supplementary production period followed by primary while the least yield was recorded in secondary production season. The minimum average land allocated was recorded in supplementary production period while the maximum was in dry periods of primary and secondary periods. However, the highest total volume of tomato was obtained in dry period of secondary irrigation.

The above mode of productions have their own implications on moisture availabilities, farmers' decisions and participations, seasonal supply distributions and market conditions. Moisture stress is the major constraints that reduce tomato productivity. In addition, demands of tomato may vary across seasons, hence, producers may use different seasons to make market responses accordingly. On the assumption of good market opportunities, production of cash crops can play vital role in addressing both food security and income level of households but with secured market of produces.

Producing tomato in wet season might be an opportunity for the one who can manage the field drainage and the frequent pest occurrences properly and it can risky for the one who cannot. Tomato can be grown throughout the year provided diseases control measures and irrigation water are available (MoARD, 2009; Lemma Desalegn, 2002). Supplementary production season is characterized by the major water available season and the highest tomato product deficits as well. However, most farmers plant cereals both to minimize input costs of vegetable production and to secure cereals for household consumptions and animal forages for the coming drought seasons. There are heavy diseases infestations, high rate of insect attack and high rate of fruit and flower drops in rainy seasons (Lemma Desalegn, 2002). In the absences of support and chemical inputs, EIRA recommended that tomato production should be limited in dry season.

Currently, farmers who have better land holding sizes or better resource positions cultivate vegetables like tomato and onion in supplementary production periods and fetch better income

level than others fetch. Such farmers use frequent pest control measures and field managements are critically required to produce in this season but not Poor farmers. These problems may prevent many poor farmers not to use moisture and market advantages. Hence, problems of chemical input and technical supports may influence farmers' production decisions.

Dry season is characterized by low yield potential constrained by, moisture stress, insect incidences and sunburn problems. In this period, the amount of chemical required is relatively lower than wet periods of supplementary production season. Farmers who scarified their land to cereal production in rainy season may plant tomato after they harvest cereals. These farmers might be those who have large family sizes but small land sizes, who do not have sufficient resources to cover their food expenses and unable to produce profitable vegetables in supplementary production period as input costs can be high. Such farmers, who usually plant cereals in rainy seasons and plant tomato in dry periods, are large in number.

This condition may reduce the potential benefits of the crop. However, such farmers may face challenges of moisture stress and input scarcity that in turn may reduce the both the amount and quality of yield to be produced. The average productivity of tomato in primary and secondary production periods was smaller than that of the supplementary. On the other hand, the gross amount of supply may rise due to the large aggregate supply by high number of producers; total production in secondary production period was much higher than supplementary and primary production periods. High supply of poor quality tomato product may bear low output prices in local markets, and farmers may face complex challenges too.

Table4.2.2.3: Productivity of onion and tomato by season

Production Season	Crop	N	%	Mini.	Max.	mean	Std. Deviation
Supplementary	Tomato/ha	11	100	40	333.33	119.99	82.13
	Onion	24	100	2	166.67	79.94	33.32
Primary	Tomato	6	100	16.67	246.15	101.52	101.98
	Onion	6	100	2.54	83.33	37.78	31.97
Secondary	Tomato	13	100	2.5	250	136.57	85.57
	Onion	12	100	24	258.06	82.71	61.35
Total	Tomato	30	100	2.5	333.33	123.48	85.62
	Onion	42	1000	2	258.06	74.71	44.63

Source: Own field survey, 2010

4.2.4.1. Tomato Harvesting and Post harvest handling

The high perishable nature of tomato fruits require careful attention in harvesting and post harvesting operations in order to reduces loses, meet home and export standards and to ensure high prices for producers, distributors, processors, and traders(Lemma Desalegn, 2002). Hence, on time harvesting, proper post-harvest treatment of the fruit and timely distribution is very important. If they are not handled carefully they decay easily, which affects their taste, flavor and nutritional value.

According to respondents' responses, tomato was harvested at the stage of start of ripening, red or orange color, and mixed green and red color with 40%, 20%, and 40% of producers respectively (Table 4.2.4.1). Usually thick skinned, vigor, healthy, large and medium sized tomato products have better markets as it can be easily transported to more distances with minimum wastage and damages relatively. To the contrary, immediate users for making sauces and even slices prefer more ripened, thin-skinned types of fruits.

For all these harvesting stage managements to be sounds, the qualities of products need to be maintained to maximize values of tomato sub sector. Hence, organized market is essential to encourage farmers in harvesting tomato timely. If the tomatoes are to be sold as vegetables on the market, they can be harvested while still green. Green tomatoes can be ripened after picking, until they are red. A few red, ripe tomatoes will speed up the ripening process. One disadvantage of early picking is that the nutritional value of the tomatoes is lower.

Table 4.2.4.1: Harvesting stage of tomato

Harvesting stage	Frequency	Percent
start of ripping	10	33.3
Orange color	5	16.7
Mixed of green and red	14	46.7
Total	29	96.7
Missed data	1	3.3
Total	30	100.0

Source: Own field survey, 2010

Tomato collecting materials

Collecting materials like wooden crate, plastic cart, and locally made bamboo basket were used to collect tomato product in the study area. Among which, wooden crate is popularly used. The

average weight of this wooden cart ranges from 5-7 kg and it can hold a volume of 50-60 kg tomato in average. Both locally made bamboo basket (Kirichat) and Cartoon box have various size. Plastic containers are two types, the first is Plastic box with a volume of 25 kg and the other is opened mouth type plastic container (jerica), which was initially made for fetching and storing drinking water in home.

Table 4.2.4.2: Tomato Collecting Materials

Types of collecting materials Collecting materials	Ownership of collecting materials						Materials used to collect in 2009/10			
	Nothing		who has1-2		who has three		Yes		No	
	N	%	N	%	N	%	N	%	N	%
Wooden cart	15	50	13	43.7	2	6.7	26	86.7	4	13.3
Plastic cart	25	83.33	3	10	2	6.67	2	6.7	26	93.3
Basket and cartoon	25	83.33	4	13.3	1	3.33	4	13.3	26	86.7

Source: Own field survey, 2010

86.7% of tomato producers used wooden box to collect and transport produces to markets and the rest of them used plastic carts, cartoon box and locally made baskets; however, only 50% of the total producers had wooden cart collecting materials, out of which, 43.7% producers had from 1-2 amounts of wooden cart while the rest 6.3% had three in average (Table 4.2.4. 2). Producers indicated that Mekele traders supply them wooden crates to harvest and collect their products. However, lack of own collecting materials may cast shadow on searching other potential markets. Producers indicated that they have faced problems of collecting materials.

Farmers usually source re-used wooden crate collecting materials from fruit supermarkets found in Woldia and Dessie. Super markets usually import fruits like banana by wooden crate from Addis Ababa and sell the used containers for farmers through some local traders. Farmers re uses such materials for short period of production, usually for a single or two production seasons. However, such problems looks like minor virtually, it has its own influence in creating dependency of farmers on trader sources apparently. However, the concerned experts of the Woreda admitted that the problem was over looked.

Different standards of containers in terms of size, quality and appropriateness need to be assessed, identified and supplied for producers, like the other input supply arrangements. In good standard quality containers that attract consumers, tomatoes could be packed to a net of 6-10 kg tomatoes for short and distance markets (MoARD, 2009). Except wooden crate and locally made baskets, the rest collecting materials may have a potentials to speed up the physical damage of ripen and soft tomato and create media for pathogenic infections under conditions of poor handling, poor transportation facilities coupled with exposure of tomato to high temperatures in open markets.

Storage

Storing tomato fruits in hot climates like Kobo Woreda can be difficult without cold storage. Tomatoes that are to be sold fresh for table consumption must not be stored for long. It was evidenced that producers did not store tomato for longer days, the duration of storage days range from 1-2 days with a mean of 1.37 days life (Table 4.2.4.3). The average duration of days to store tomatoes in under supplementary, primary and secondary production periods were, 1.64, 1.17, and 1.23 days respectively. This may reduce the profitability of the tomato sub sectors by large. However, fresh market tomatoes harvested at turning stage can be held a week at 10-12 0C long storage for 1-2 weeks.

However, red ripened will not stay more than 7 days (MoARD, 2009). Moreover, fruits could be stored in ventilated ambient conditions or cold storage. Harvesting at breaker stages has the advantage of keeping fruit for longer period. Storage in breaker and turning stages has about five days storability advantages over fully red ripen fruits (MoARD, 2009). This shows that farmers may have rooms to extend storage life of fresh cut tomato and capture better price potentials within days of a week.

Table 4.2.4.3: Storage life of tomato

Tomato production cycles	N	Minimum days	Maximum days	Mean days	Std. Deviation
Supplementary	11	1	2	1.64	0.50
Primary	6	1	2	1.17	0.41
Secondary	13	1	2	1.23	0.44
Total	30	1	2	1.37	0.49

Source: Own field survey, 2010

Transportation

Most of the farmers transport their product from field to street side by using either own cart or rent cart, pack animals and overhead carrying. From the total responses of 133.3% given by producers, 86.7% showed that cart is commonly used to transport produces to Kobo markets while the rest 46.7 % used vehicles(Table 4.2.4.4). Producers indicated that Vehicle transport is not only so expensive but also unavailable when needed than cart. Cart is the popular means of transportation in the study area. According to key informant interview, farmers usually pay 4 birr/wooden cart to transport produces from field to street side in rent cart. The average distances from field to farm gate markets and to Kobo open markets were, 2.78 and 9.78 Km respectively. 63.3% of farmers should travel from 2.01 km -4km from field to farm gate market. According to the study, 70% respondents need to travel 8.01-10 km if they need to sell their products to Kobo markets. Producers pay additional 4-5 birr/ wooden cart. Poor availability of means of transport and high cost of transportation is contributing to low profitability of the farmers.

Table 4.2.4.4: Transportation

Means of major transportation	M. Responses (Yes)			M. Responses (No)		
	N	%	% of cases	N	%	% of cases
Cart	26	65	86.7	4	20	20
Vehicles and others	14	35	46.7	16	80	80
Total	40	100	133.3	20	100	100

Source: Own field survey, 2010

Sorting and grading at farm gate markets

After harvesting and collecting stages, dealers sort fruits by picking up and screening out low quality products from healthy fruits. Farmers usually mix poor qualities with good qualities, matured with immature, thick flesh with thin flesh products when they supply to markets. Grading simply consists of arranging the tomatoes into a number of uniform categories according to the economically important physical and quality characteristics. The process involves identification, classification and separation. Then after, Packaging is convenient for handling, transporting and storing tomatoes. It protects against pathogens, natural predators, loss of moisture, temperatures, crushing, deformation of tomatoes and bruising.

Sorting areas are found on street side of AA-Mekele road, and exposed to direct sun light. Nevertheless, sorting areas need to be out of direct sunlight, preferably cool and clean. In these small-scale handling and sorting operations, dealers act as both as mediators and work forces for, sorting grading, and loading of tomatoes. Care is required in grading and packaging, mature green tomatoes can be stacked on top of one another in a package, since they are firm, but not too many must be packed all at once, or the tomatoes at the bottom of the package will be deformed or bruised due to excessive weight on top of them.

There was no established system for the grading quality of agricultural products of tomato. This has two important implications. First, product prices become non-comparable between areas. Second, lack of grading leads to transactions only between sellers and buyers who know each other, contracting of the size of the market place. These have resulted to low packaging quality, absence of quality standard for packaging of products for the local market.

4.2.4.2 Tomato Product loses

Table 4.2.4.5: Tomato productivity and loss

Tomato production cycles	Loss Qt/ha	N	Minimum	Maximum	Mean	Std. Deviation	% LOST
Supplementary	Pre harvest/ha	11	10	43.33	25.21	12.11	21.02
	Post harvest/ha	11	10	60	26.09	16.83	21.74
	Total waste/ha	11	20	103.33	51.3	22.96	42.76
	Productivity/ha	11	40	333.33	119.99	82.13	
Primary	Pre harvest/ha	6	10	17.14	12.09	3.29	11.91
	Post harvest/ha	6	10	26.67	18.33	8.68	18.06
	Total waste/ha	6	21	36.67	30.43	6.72	29.97
	Productivity/ha	6	16.67	246.15	101.52	101.98	
Secondary	Pre harvest/ha	13	10	43.33	18.01	9.77	13.19
	Post harvest/ha	13	10	43.33	16.72	9.15	12.24
	Total waste/ha	13	20	86.67	34.73	18.11	25.43
	Productivity/ha	13	2.5	250	136.57	85.57	
Annual	Pre harvest/ha	30	10	43.33	19.47	10.8	15.78
	Post harvest/ha	30	10	60	20.48	12.83	16.61
	Total waste/ha	30	20	103.33	39.95	20.13	32.38
	Productivity/ha	30	2.5	333.33	123.48	85.62	

Source: Own field survey, 2010

Table 4.2.4.5 indicated that, the average total pre harvest, post harvest and total amount of tomato loses were estimated to be 19.47 qt/ha, 20.48 qt/ha and 39.95 qt/ha respectively with a percentage of 15.78%, 16.61% and 32.38% of the product in the same order. The total average loses of tomato in supplementary, primary and secondary were 42.76%, 29.97% and 25.43% of the products respectively. Both pre and post harvest loses were higher in supplementary production season which accounts 21.02% of the total product.

According to Girma Abera Jibat, (----), the loss of vegetables between production and consumption is estimated to be 25-35%. He indicated that, the purpose of packing, transport and storage is to mitigate post harvest loss gap between producer and consumer. And or reduce the time interval between harvesting and consumption. The case of Kobo has relatively better infrastructure advantage in both feeder roads and major international roads. According to farmers view, over surplus and market imperfection were deep-rooted challenges that faced them for both pre and post harvest losses.

4.2.4.3. Factors of pre and post harvest losses

Table 4.2.4.6: Factors of pre and post harvest tomato loses

Tomato production cycles	Pre harvest lose factors				Post harvest lose factors			
	Factors	**N**	**% responses**	**% cases**	**Factors**	**N**	**% responses**	**% cases**
Supplementary	Staying tomato on field to wait markets	3	16.70	37.50	Non Marketed	7	50.00	87.50
	Flood	5	27.80	62.50	Diseases	3	21.40	37.50
	Pest	6	33.30	75.00	Handling	2	14.30	25.00
	Drought	4	22.20	50.00	Insect	2	14.30	25.00
	Total	18	100.00	225	Total	14	100.00	175.00
Primary	Over ripened but uncollected	1	33.30	100	Non Marketed	3	50.00	100.00
	Pest	1	33.30	100.	Diseases	3	50.00	100.00
	Flood	1	33.30	100	Total	6	100.00	200.00
	Total	3	100.00	300				
Secondary	Staying tomato on field to wait markets	2	10.50	16.7	Non Marketed	7	36.80	70.00
	Pest	7	36.80	58.3	Diseases	6	31.60	60.00
	Flood	10	52.60	83.3	Handling	5	26.30	50.00
	Total	19	100.00	158.30	Insect	1	5.30	10.00
					Total	19	100.00	190.00

Source: Own field survey, 2010

Table 4.2.4.6 indicates that, tomato producers in Kobo faced various and complex constraints that limit the profitability of the subsector in both pre and post harvest stages. Out of the total 225% of multiple responses, the major causes of pre harvest loses in supplementary irrigation was pest (75%) followed by flood (62.5).Drought and lack of market accounted the rest 50% and 37.5% respectively.

Unlike the rest seasons, market was not the major factor because there might be low supply of tomato in wet season of July to August. In this season, there might be high potential of pest incidence and flooding which may damage tomato fruits on field level. Moreover, from field observation and key informant interviews made with producers and experts, there was no any practice of tomato bed making in the Woreda in general and the scheme in particular. According to the farmers, tomato bed making is not common due to lack of awareness, lack of bed making materials, and labor. However, such practices are recommended in tomato production to keep the fruits from soil contact and flooding (Lemma Desalegn, MoA, 2010).

Out of the total 300% multiple responses, lack of markets, pest, and flood were equally important factors of pre harvest loses which account 100% each. Here, marketing problem was seemed to be critical factors and may trigger the rest two constraints. Farmers usually adjust harvesting days to gain better advantages of higher prices through strategies of spending some marketing days and harvesting on the coming marketing days. This leads mass volume of product loses both in markets and fields that may expose the ripened fruits for pest, drought or flood.

Out of the total 158% multiple responses, 16.7, 58.3, and 83.3%, marketing problem, pest, and flood were factors of pre harvest loses in secondary production season respectively (Table 4.2.4.6). Flooding was the major factor followed by pest. Farmers gave witness that they faced tomato wastages on field level caused by the water they irrigate and natural flood. However, this can be solved through developing tomato bed making culture, proper furrow irrigation management and drainage excess water. Pest and flood were important problems than market problems in supplementary, primary and secondary production seasons.

Post harvest lose is production loses occurred after harvest. Problems of poor handling in transportation, grading, storing, loading, and unloading techniques, leads lack of sufficient

buyers of the product. This loss accounts from harvesting up to marketing stage. Evidently, lack of market was the major factor of post harvest loses over the three production periods, which accounts 50%, 50 %, and 36% of responses in supplementary, primary and secondary production periods out of the total 100 % response for each seasons respectively. This problem was associated with incidences of diseases and insects, and poor techniques of loading and unloading which minimize the desired quality of fruits, which in turn may minimizes the quality of the fruits and its potential market prizes as well.

4.3. Service Provision in Vegetable value chains

There is a wide range of primary and secondary stakeholders in vegetable sector value chains. This includes input suppliers and stockiest, producers, often smallholder farmers, brokers, intermediaries and traders, processors, distributors, retailers including shops and traders on markets. In addition to these primary stakeholders, there are various supporting and service delivery institutions including Government Ministries, Research Institutes, trade and promotion associations and NGOs. Both primary and secondary stakeholders have key roles to play in ensuring the value chain operates effectively. Increasingly representatives of each stakeholder are encouraged to meet to analyze their roles, identify constraints and seek solutions using an innovations systems approach, often described as an Innovation Platform.

4. 3.1 Input sources and system

Generally, there are two major categories of input channels in the study area, namely, informal and formal input sources. Formal input sources include; cooperatives, NGOs, WoARD and formal sources while informal sources include local chemical suppliers, open markets, and major tomato buyers of Mekele whole sellers.

As indicated in Table 4.3.1, the formal input sources for fertilizer, chemical, and improved seed covered 85, 31.9, and 48.9% of the respective users respectively. The rest 15, 68.09, 51.1% sourced these inputs from informal sources in the same input orders. This implies that, improved seed and chemical were majorly pumped by the informal input channel system while the formal system has major role in fertilizer supply.

Table 4.3.1: Major input sources

Inputs	Total		WoA		Coop		MK		Open markets		NGOs		Others		Formal		Informal	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Fertilizer	20	33.33	9	45	8	40	0	0	3	15	0	0	0	0	17	85	3	15
Chemical	47	78.33	8	17.02	7	14.89	17	36.17	12	25.53	0	0	3	6.38	15	31.91	32	68.09
Improved seed	49	81.66	6	12.24	11	22.45	12	24.49	10	20.41	7	14.29	3	6.12	24	48.98	25	51.02

Source: Own field survey, 2010

Cooperatives, WoARD, and NGOs have small share in supplying certified seeds and chemicals to farmers. Out of the total fertilizer users, 45%, 40%, used 15 %, had access chemical through WoARD, Coop and open markets (Table 4.3.1). Likewise, 17.02 %, 14.9%, 36.17%, 25.53%, and 6.38% of chemical users used WoARD, cooperative, Mekele traders, open markets, and other sources. Out of the total improved seed users, 35%, 19.05%, 28.87%, 23.81%, 19.05 %, 4.76%, 4.76% accessed seeds through WoARD, cooperative, Mekele traders, open markets, NGOs and others respectively.

Generally, it shows that it is necessary to be aware that informal and formal seed systems have complementary tasks in supporting agricultural development. Input regulatory frameworks can provide legal boundaries in which both systems operate, even though; this has been designed to regulate the formal system only. Both formal and informal input sources have their own roles in supporting the vegetable input value chain.

The degrees of ; input affordability, timely delivery, technological divisibility and availability, presence of menu of alternatives and quality problems of inputs influences farmers decisions on types of channels to use. Producers revealed that they enjoy informal channels in affordability of inputs like tomato seed, onion seed and chemicals coupled with the possibility of getting inputs easily both in time, space, types, and quantity, as they require. The cooperative rarely supplied tomato seed, onion seed, and chemical with prices of 320 birr/kg, 380birr/kg, and 420birr/liter respectively while informal input suppliers supplied these inputs with 210, 250, and 350 birr respectively (WoARD, 2010).

However, According to case team leader of cooperative development of WoARD and the chair of the cooperative of Golina irrigation scheme, the cooperative runs without having legal entity

and enough capital, hence, unlike the other legalized cooperatives, it does not have any guaranty to buy inputs in credit from other high-level cooperatives. This implies that the cooperative has limited resources like financial, human, and materials, as a result its performance has come so week in supplying required inputs and searching potential markets for their products.

From the total 1375 HH beneficiaries of the scheme only 270 are members, hence majority of the beneficiaries use informal input system from the illegal traders (traders who usually buy them their product)(WoARD, 2010). Among the formal input sources, strategically, cooperative must play major roles in supplying inputs and in marketing outputs. However, the cooperative is not strong enough to provide such services effectively to its members, which lead less involvement of beneficiaries in memberships. Such and other reasons may forces significant numbers of farmers to prefer illegal chemical and seed suppliers' channels.

Likewise, from the group discussions made with case team leaders of WoARD showed that, farmers usually request inputs lately and DAs sometimes estimate demands of inputs randomly. Farmers also claimed that they experiences on onion seed germination problems. Expired seeds were supplied by cooperative in 2001 E.C., and tomato seed too by WoARD in 2000E.C. Leaders of case teams of WoARD indicated that, the management bodies decided to accept 75% germination rate of tomato seed in 200E.C, which is below 85% of minimum standard of germination rate. Woreda experts claimed that Farmers request seed usually after they prepare their land, hence it can be difficult to make germination test, quarantine, and inspection work before distribution. According to farmers' view, quality problem is associated with associated high input cost and scarcity of input supply. These inter related challenges might be due to lack of effective coordination both within and between various stake holders-producers, extension experts, researches, coop, input suppliers and etc. along the three major stages of technology generation, transformation, and utilization.

The Ethiopian Seed Enterprise (ESE) is a sole governmental organization dedicated to contribute for the improvement of agricultural production in the country. The enterprise itself does not directly supply select seeds to farmers but through Union, cooperatives, Associations and agricultural bureaus established at various levels. These bodies usually add their transportation expenses. To satisfy the growing needs of seed demands in Ethiopia, the

government has realized that ESE alone cannot satisfy farmers and investors. Hence, the enterprise has planned to expand its scope and the roles of private investors, research centers, and other organizations efforts in increasing seed production and distribution. This initiative can be good news to encourage the private sector roles.

In the study area, farmers has already built a circular type of relationships with some Mekele traders through inflow of input and output flows of out puts between them. This input and output circulation between farmers and some vegetable traders of Mekele has developed the interest of farmers to maintain their relations with the expectation of mutualism. Hence, Mekele traders play major role in supplying inputs like tomato seed, onion seeds, and chemicals to farmers. Traders usually buy tomato fruits and onion yields from various parts of the country like Meki of Oromia, some of them circulate inputs like tomato and onion seeds, and pesticides from one area to the others as a multipurpose journey.

However, Farmers usually buy seeds of tomato and onion, and chemicals from various sources without any quarantine and quality standards. Unlike onion, there is no organized seed system especially in the tomato sub sector. Open market, shops, tomato whole seller of Mekele, and others are involved in pumping out tomato seeds to producers without any legal entities. These situations may open doors for expansion of the roles of illegal input suppliers' and the chances of introducing expired , inappropriate chemicals and seeds to producers without any control of quality management. However, many farmers prefer informal input channels, farmers has become victims of low quality seed and expiry chemical supply.

4.3.2 Credit access and facilities

In subsistence agrarian society, financial service can play vital roles in encouraging small-scale producers to accelerate the rate of technological adoption. However the producers in the study area showed that only 11.7% were beneficiaries of the service while the rest not. As indicated in Table 4.3.2, out of the total women respondents, 22.2% were credit service beneficiaries and 9.8% for male respondents. This implied that very small numbers of vegetable producers were beneficiaries of credit in 2009/10 production season. However, relatively, women's participation was higher than men were.

Money made from sales of the previous tomato harvest season can be of great help. It is important to save part of the money earned, so it can used to buy the inputs required for the next production cycle. Money can also be borrowed from many sources. Credit sources included ACSI, local lender, cooperative, ARD (others) with shares of 57.1, 14.3, 14.3, 14.3, percentage respectively. Relatively, ACSI provide better coverage of assistance to small farmers on collateral bases. Out of the total seven credit users, 4 borrowed from ACSI, and the rest one each sourced from local lender, cooperative, and Woreda ARD. Amount of credit borrowed were 200-1000, 1001-2000, 2001-3000 categories in which 28.6, 42.9, 28.6% of users used respectively (Table 4.3.2).

None of the respondents used Banks as source of finance, though Banks are also available for loans, but usually banks are not interested in very small loans and demand proof of property as a guarantee. However, it can be easy to get loan and credit services from potential financial sources like Bank if farmers organize themselves into formal cooperative association. Sometimes farmers unite, to form cooperatives or informal associations, for example marketing groups or production groups. Pooling resources together can have big advantages for small farmers.

Out of the total credit users, 14.3, 71.4 and 14.3% used the money for buying farm tools, fattening and other purposes. Therefore, the major money went for animal fattening. Key informants indicated that poultry farming, sheep and goat fattening are the major focus of many farmers usually for marketing purpose. None of the respondents direct the money borrowed directly to the development of the vegetable subsector

4.3.2.1. Awareness on credit

The nature of producers' awareness on credit determines the level of credit participation regardless of the presence of credit services.

Producers were asked to indicate their view on weather credit has value or not. Hence, 50%, 28.3%, and 21.7% indicated that credit has good value, credit has no value, and they do not know respectively. Likewise, only 45.1 % of the total male respondents had good awareness on the advantage of credit while the rest 31.4% did not accept that credit has value and the rest 23.5% did not know the value of credit. By far, women had good awareness on credit, 77.8%

of women respondents realized the importance of credit. This implies that there is a need to work on awareness creation to increase the level of participation.

Table 4.3.2: Credit services

Credit users	Cases	N	%	Awareness on credit	Male		Female		Total	
					N	%	N	%	N	%
Male	Yes	5	9.8	It has good benefit	23	45.1	7	77.8	30	50
	No	46	90.2	It has no value	16	31.4	1	11.1	17	28.3
	Total	51	100	I don't know	12	23.5	1	11.1	13	21.7
Female	Yes	2	22.2	Total	51	100	9	100	60	100
	No	7	77.8	Purpose of credit			Credit source			
	Total	9	100	Purpose	N	%	Sources	N	%	
Total	Yes	7	11.7	Farm tools	1	14.3	ACSI	4	57.1	
	No	53	88.3	Fattening	5	71.4	Friends& relatives	1	14.3	
	Total	60	100	Others	1	14.3	Cooperative	1	14.3	
Repayment	Yes	6	85.7	Amount	N	%	WoA	1	14.3	
	No	1	14.3	200 – 1000	2	28.6	Total	7	100	
	Total	7	100	1001 – 2000	3	42.9				
				2001-3000	2	28.6				

Source: Own field survey, 2010

4.3.3. Agricultural extension service

Knowledge and information about new seed varieties and their cultivation techniques are extremely critical area for increasing farmer's productivity and profitability. Producers' were asked to indicate their awareness and knowledge level on areas of market information , fertilizer application, chemical application, improved seed application, vegetable production, and post harvest handling. Accordingly, 83.3%, 65%, 60%, 51.7%, 38.3% and 75% of respondents respectively indicated that they do not have sufficient awareness and knowledge (Table 4.3.3). Market information was the major problems of farmers followed by post harvest handling and input uses.

Moreover, access to market information is much more difficult for the tomato producer than it is for the trader in the study area. The prices of many vegetable products are constantly moving up and down. It is up to the producer to try to find out the market price at any given time. Unfortunately, very little market information is available on the more obscure vegetable products on which many communities of producers depend. Producers of these products should be aware, however, that most commodity prices rise and fall in concert. Perhaps the most useful way in which producers can inform themselves about the markets for their goods is to link with other producers of the same product. Different producers have different market experiences, different market experiences, different contacts, and sources of information.

The success of agricultural development depends, among other institutions, on the existence of an efficient marketing system. If the marketing system is inefficient, high marketing costs will render products uncompetitive. Standardization of agricultural products, improving the supply of market information system, expanding and strengthening cooperatives, and strengthening private sector participation are key elements for proper functioning of the agriculture marketing system. Because of several reasons, Agricultural marketing in Ethiopia is weak and inefficient. Some of the inherent causes are absence of effective transport network, poor rural urban linkages, lack of market information, presence of too many intermediaries, and absence of standards, storage difficulties and general under development. These limitations made smallholders, economically disempowered and exploited too much not to benefit out of their effort (Lemma Desalegn, 2000).

4.3.3.1. Trainings and Field visit participation

Field visit participation is one of extension approach to create mutual learning opportunities within and between farmers and experts. Effective filed visits will create opportunities to improve farmers' awareness, know ledges, and skills on different areas of farming practices. However, the study showed that 75 % of the respondents did not participate in field days while only 15% rarely participated and 1the rest 10% frequently participated. Three DAs serve farmers in areas of livestock production, crop production and natural resource management. Table 4.3.3 indicates that, only 45% 0f Producers indicated that DAs assisted them on field level visits frequently and 36.5% of the respondents complained that no service was given on field level visits. The rest 16.67 % indicated that, on filed assistance had been given rarely.

Table 4.3.3: Farmers' Knowledge of production & their participation in extension services

Production knowledge	Farmers' knowledge level				Extension service & farmers' participation						
	Yes		No		Participation	Nothing		Rarely		Frequently	
	N	%	N	%		N	%	N	%	N	%
Vegetable production	37	61.7	23	38.3	Field visit participation	45	75	9	15	6	10
Chemical application	18	30	42	60	On filed DAs Visit	22	36.7	10	16.67	27	45
Fertilizer application	21	35	39	65	Training access	47	78.3	8	13.33	5	8.33
Improved seed uses	29	48.3	31	51.7							
Post harvest knowledge	15	25	45	75							
Market information management	10	16.7	50	83.3							

Source: Own field survey, 2010

Training is one of the critical interventions to support producers in pre cultivation, pre harvest, harvest, and post harvest practices. However, 8.33%, 13.335 and 78.3% of total respondents indicated that, training was given frequently, rarely, and nothing, respectively (Table 4.3.3). From key informant interviews made with elders, only producers who are better in powers , who have better relations with DAs, who have better income levels and those who are called model farmers have better training opportunity than the rest of the majority. The agricultural extension department as well as research center is, supposedly, the primary suppliers of this knowledge; however, the dissemination process is inefficient. According to the evaluation made in 2010 to assess woreda agricultural offices performances in implementing packages of irrigation development programs, it was witnessed that Kobo Woreda (town) was the least performer out of the total 12 Weredas of the zone. The Wereda agricultural officer complained that the office do not have sufficient labor, vehicles and office materials.

Problem ranking of onion

According to responses of onion producers, insect, disease, moisture stress, high input price and canal damage were ranked from 1-5 respectively having scores of 78.57%, 76.19%, 59.52 %, 52.38% and 42.86% in the above order of problems(Table 4.3.4). Among which insect, disease and moisture stress were the major top three of constraints of onion production. These

problems might be aggravated due to the high shift from other crops to onion that lead expansion of mono cropping mode of production practices.

According to the reports of WoARD (2009), the newly introduced auction based market linkage system play as a magnetic effect in attracting large number of farmers to onion production. The marketing opportunity forced farmers to produce onion twice in a year with chickpea production in between the two onion production seasons. This phenomenon may trigger input scarcity and increase input costs. Moreover, high rate of moisture stress has been increasingly exhibited after the crop shifts from low water loving cereal crops to high water loving onion crops. This might be associated with poor water management practices in and out of the field. Such interlinked constraints may expose the crop to high rate of incidences of insects and pests.

In such a context, market is not like a freewheeling tool that correct and drive by itself. So far, efforts are seldom made to link production with market. It is a simple unpleasant fact to see tomato products over surplus periodically. To create a synergic functioning vegetable value chain, market and production strings need to be attached together. It is common to see farmers in the same area all planting tomatoes at the same time. Everybody does what the others are doing. Of course, this results in a glut and low prices at harvesting time, it causes for further low prices. With respect to increasing production for the market, irrigation schemes can be judged successful when farmers achieve greater output, higher standard of life and are able to sell more of their output on the market thus stimulating the multiplier effects of agrarian development (Fiona Wilson, 2004). Low quality products will not be easily transported to long distances where there are high demand potentials. Therefore, the demand of the product will be limited only around small radius of production area and it may have low demand with low output prices.

This works as a downward spiral – "to keep the price of tomato competitive, the local producers tend to use: cheaper, lower quality, and inadequate amount of inputs like seed, fertilizer and pesticide, which greatly reduce yield and profitability". This results in significant loss of market share over time.

The local producers have also started experiencing high cost of production due to increased price of inputs, Poor farming practices, high cost of labor, high price of packaging materials

and high transportation cost, etc. All the above factors are prohibiting local producers from attaining desired economy of scale to increase per unit cost of tomato.

Table 4.3.4: Problem ranking of onion and tomato sub sectors

Crops	Problems	Not a problem		Less		Medium		High		Total		
		N	%	N	%	N	%	N	%	N	%	Rank
Onion	Insect	1	2.38	3	7.1	5	11.9	33	78.57	42	100	1
	Diseases	3	7.14	3	7.14	4	9.52	32	76.19	42	100	2
	Low output price	8	19.05	6	14.29	14	33.33	14	33.33	42	100	8
	Market insecurity	4	9.52	8	19.05	14	33.33	16	38.1	42	100	6
	High input price	9	21.43	4	9.52	7	16.67	22	52.38	42	100	4
	Input scarcity	10	23.81	8	19.05	9	21.43	15	35.71	42	100	7
	Canal damage	6	14.29	10	23.81	8	19.05	18	42.86	42	100	5
	Moisture stress	2	4.76	4	9.52	11	26.19	25	59.52	42	100	3
	Labor shortage	15	35.71	11	26.19	9	21.43	7	16.67	42	100	10
	Poor service delivery	22	52.38	7	16.67	8	19.05	5	11.9	42	100	10
	Capital shortage	18	42.86	10	23.81	4	9.52	10	23.81	42	100	9
	Transport shortage	18	42.86	10	23.81	6	14.29	8	19.05	42	100	11
	Storage	15	35.71	6	14.29	4	9.52	17	40.48	42	100	6
Tomato	Insect	2	6.67	7	23.33	9	30	12	40	30	100	5
	Diseases	2	6.67	7	23.33	11	36.67	10	33.33	30	100	8
	Low output price	2	6.67	2	6.67	4	13.33	22	73.33	30	100	2
	Market insecurity	1	3.33	2	6.67	3	10	24	80	30	100	1
	High input price	9	30	5	16.67	6	20	10	33.33	30	100	8
	Input scarcity	4	13.33	1	3.33	9	30	16	53.33	30	100	4
	Canal damage	5	16.67	7	23.33	5	16.67	13	43.33	30	100	7
	Moisture stress	2	6.67	4	13.33	7	23.33	17	56.67	30	100	3
	Labor shortage	10	33.33	6	20	7	23.33	7	23.33	30	100	9
	Poor service delivery	13	43.33	6	20	5	16.67	6	20	30	100	10
	Capital shortage	14	46.67	6	20	5	16.67	5	16.67	30	100	11
	Transport shortage	5	16.67	4	13.33	7	23.33	14	46.67	30	100	6
	Storage	6	20	7	23.33	2	6.67	15	50	30	100	5

Source: Own field survey, 2010

Problem ranking of tomato

Like of onion, similar procedures were engaged on tomato producers to identify problems that reduce profitability of tomato. Accordingly, market insecurity, low output prices, moisture stress, input scarcity and insect problems were ranked from 1-5 respectively by 80%, 73.3%, 56.67%, 53.33%, and 40% respondents respectively (Table 4.3.4). Tomato subsector is constrained by various and complex problems of spider waves. Among the major constraints, marketing problems were the critical factor reducing profitability of the subsector. Each problem has systematic interactions to reduce the crop yield potentials both in quality and quantity terms. Marketing of tomatoes at low price was a simple unpleasant fact for tomato producers.

To effectively reducing rural poverty levels, it requires thinking beyond productivity, and incorporating themes such as profitability and competitiveness. Market is the central element of development drive in the agricultural development tool kits. In the absence of effective market linkages, encouraging farmers to produce perishable vegetables is like discouraging them not to produce.

4.4 Vegetable Market

Productions of perishable crops demand efficient marketing system. The efficiency could be in the speed with which the produce reached the ultimate consumer, the prices, and qualities. Bulkiness and Perish ability of products - Tomatoes have a relatively low value compared to their volume/weight, which influences transportation cost making commodities with higher value but lower volume and/or weight more attractive. Tomatoes are a perishable crop with limited time between harvest and the onset of deterioration. For a critical understanding and identification of the inefficiencies, the following section is spent for some investigation of the prevailing marketing system.

4.4.1 Market structure and roles of participant actors

The major actors involved in the system were producers, rural dealers/assemblers, wholesalers, retailers, transporters and consumers. Tomato products flow towards two major market categories namely out of region market and within region markets. The major out of the region tomato buyers are wholesale traders of Tigray region, who buy the bulk of tomato from farm gate through rural dealers and transport to Mekele. Other wholesale traders are from within

region that buys tomato from Kobo and transport to other towns of the North Wollo, South Wollo, and border towns of southern Tigray (Alemata, Korem, and Maichew). Relatively, the within region wholesale traders buy tomato from open markets of Kobo town. Retailers are also the other participants who buy tomato from open markets of kobo and retail either on the same market or/and other markets of Kobo and its surroundings. The local demands usually buy small quantities of tomato from open markets of Kobo town and its surroundings.

4.4.1.1. Producers

These are those types of the actors who farm and sale onion/tomato. They either would have their own land or rented to produce both or one of the two crops. These farmers produced vegetables and sold commonly at roadside farm gate and rarely at open markets of Kobo and its surroundings.

According to the group discussion made with producers, producers usually harvest from their fields and sell their product on roadside farm gate market to Mekele whole sellers. Buyers may come, check the quality and 'negotiate' the price. Otherwise, farmers inform dealers to search them potential large traders, and dealers informed Mekele traders through mobile phone, passing truck drivers, or other passengers.

As soon as large traders and producers meet at farm gate, dealers negotiate prices between sellers and buyers. After price agreement farmers would do harvesting and collecting to roadside, while local dealers would do sorting, weighing and loading. As the crops are perishable, the sale had to be made as soon as harvested. Farmers used wooden boxes for collection as well as product delivery. Commonly, producers harvest, transport, collect, and sell tomatoes on Sunday or/and Thursday. Sometimes, there might be also a probability of disagreements occur between bulk buyers and sellers after harvesting of tomato. Disagreements may occur on price, quality, quantity, and types of transaction after harvesting. In such conditions, farmers complained that they might be forced them to agree with traders.

If producers may fail to sell bulk volume of harvested tomato products at farm gate market to Mekele traders, they may take it on Monday and Friday Kobo markets a day after harvest. Hence, farmers indicated that to harvest on Thursday and Sunday is, to minimize potential marketing risk partially. Farmers also used different harvesting stages of tomato to minimize

risks of market and to widen their opportunities of market and various demand segments. Farmers may try the second chances in Kobo open markets after a day of harvest, to sell un-marketable, surplus, and low quality graded yield. However, these situations may cost producers with deterioration of quality of products, increased storage costs, transport costs and end with low prizes or even total losses. In kobo open markets, farmers claimed that they have repeated experiences of ; dumping tomatoes in markets, feeding tomatoes for cattle, selling tomatoes in minimums of minimum prices.

Price discovery followed non-scientific measurement the estimated average weight of wooden box was 50 Kg. Farmers viewed that mischief usually appear (cheating in weighing). Farmers explained their grievance of being cheated up their product apart from low price. Farmers have less power as they cannot store tomato or easily take them elsewhere. Expectedly, producers faced bedrock of prices and exposed to the evils of monopolization at farm gate market.

4.4.1.2. Rural dealers

Dealers played vital role in communicating Mekele traders. There are an estimated of 10-15 local dealers, they are all-young and engaged themselves first in dealing then grading, packaging, and loading activities. Local dealers lived with farmers and some of them were engaged in farming, hence, they exchange information with tomato producers before starting to communicate with such traders.

During pick harvesting periods, dealers contact Mekele traders and inform about the production status, its harvesting stage, product types and amounts. Mobile phone is the major information exchanging technology for dealers and remote traders. On the other hand, traders may come by themselves without the knowledge of dealers, and mobilize dealers to announce the coming of traders and selling price proposal to producers. Dealers facilitate selling prices and buying activities timely. Dealers also served in suppressing grievances of selling farmers at the time of weighing, and other mischief. The role of brokers was inclined towards buyers. The small number of such traders and the market information available to them give traders some ability to influence price.

Theoretically, these activities should be encouraged as a way to increasing prices to farmers and reducing final consumer price. However, according to the views of tomato producers, Mekele

whole sellers have strong bond with rural agents and assemblers than producers do. Dealers have important role in communicating the buyers and sellers by implementing traders' interest along the process of price setting and transaction scenarios.

4.4.1.3. Wholesale buyers

Generally, there were two major categories of wholesale buyers; the first type was those participants of the marketing system who used to buy onion and/or tomato on the roadside-based farm gate market with a larger volume than other actors did.

Table 4.4.1: Estimated numbers of whole sellers of tomato and potential volume they trade

Aradom farm gate market	Participant traders by residence	Male		Female		Total		Whole sale Market volume (Qt)
		N	%	N	%	N	%	
Kobo market	Woldia	5	33.33	10	67.67	15	27.27	21.54
	Lalibela	3	100	0	100	3	5.45	11.54
	Sekota	2	100	0	100	2	3.64	19.69
	Maichew	4	100	0	100	4	7.27	12.31
	others	2	28.57	5	71.43	7	12.73	3.85
	Dessie	1	16.67	6	83.33	7	12.73	11.54
	Alemata, Korem	3	17.65	14	82.25	17	30.91	15.31
	Non-Mekele	20	36.36	35	63.64	55	100	95.78
Total	Mekele	9	31.03	0	0	9	14.06	287.54
	Non-Mekele	20	68.97	35	100	55	85.94	125.4
	Total	29	100	35	100	64	100	412.94

Source: Own field survey, 2010

It was difficult to arrive at the exact number of such wholesalers. Nevertheless, through focus group discussion made with eight local dealers, information triangulation made with some wholesale traders and local tax collectors, there were around an estimated number of 20 whole sellers who bought tomato and onion in bulk at farm gate level (Table 4.4.1). Each wholesaler used to load onion and/or tomato with an Isuzu or FSR. Unlike tomato buyers, there were 10-12 onion buyers who buy onion in bulk during leap years, eve of Ethiopian New Year, constituting

; 3 Mekele traders, two major onion buyers from AA, and One trader each from Bahir Dar, Gondar, and Humera. Unlike tomato, onion buyers were from different parts of Ethiopia and the market was relatively competitive between buyers. Out of the total larger vegetable whole sellers, 8-10 were from Mekele who usually visit and buy tomatoes from producers at farm gate level in a monopolized nature of market. These traders were the major buyers of tomatoes almost throughout the production seasons. These traders are traveler traders they usually buy tomato fruits through local dealers and transport the product by rent vehicles. Rarely, some of the traders directly contact producers without the involvement of dealers.

The second type was those participants of the marketing system who used to buy onion and/or tomato in open markets of Kobo and its surroundings' markets. These traders are the second major buyers of tomato next to Mekele tomato whole sellers. Relatively, usually, such traders come to markets of Kobo from remote towns of outside the Woreda. Some of them occasionally buy tomatoes when its price become below cheap while others constantly buy and distribute.

From the information gathered from two key informants of market days based tax collectors, there are around an estimated number of 56 tomato whole sellers who usually buy tomato from Kobo and sometimes from Alemata marketing days. Out of them, 39 whole sellers who have participated in tomato trade at Kobo markets on Friday and Monday market days. Out of them, 15, 3, 2, 4, 7, 7 whole sellers were from Woldia, Lalibela, Sekota, Korem, Waja, and Alemata respectively (Table 4.4.1). Traders of Woldia, Alemata, Korem, Maichew, Lalibela and others buy different volume of tomato usually from Kobo open markets and may use different size of Lorries and tracks to transport to their localities.

Unfortunately, 100% of Woldia whole sellers were female and all were Orthodox religion followers. Two traders were above 39 while the rest 3 and 1 traders were 29-38 and 19-28 age ranges respectively. Out of them, 60% and 40% were literacy grade and grade1-6 completed respectively. All Korem traders were Male and their age range was between 29-38.Out of them, 66.7% were from 1-6 grade completed while the rest was literacy completed.

Mekele traders were all male. The age ranges implied that six traders were between 19- 39 while the remaining two were above 39. Except one trader who was Muslim, all of them (87.5%) were Orthodox religion followers. Out of the total respondents of Mekele Whole sellers, 37.5% were

grade 10 completed while the rest 12.5% each were grade 1-6, grade 7-8 and grade 10completed completed accordingly (Table 4.4.2).

Table4.4.2: Whole sellers' demographic characteristics

Residence	Sex	% from total	Age			Education status		
	N		N	%			N	%
Lalibela	2	11.11	Male	100	19-28	Literacy completed	1	50
						Grade 10	1	50
Woldia	5	27.78	Female	100	19-28	Literacy completed	3	60
			male	o	29-38	1-6 grade	2	40
Korem	3	16.67	Female	100	29-38	Literacy completed	1	33.33
			male	o	>39	1-6 grade	2	66.7
Mekele	8	44.44	Male	100	19-28	Literacy completed	2	25
					29-38	1-6 grade	1	12.5
					>39	junior grade	1	12.5
						Grade 10	3	37.5
						Grade 12	1	12.5

Source: Own field survey, 2010

Retailers' Demographic characteristics and roles in tomato market

Retailers are the final link in the chain that delivered onion and/or tomato to consumers. They are very numerous as compared to wholesalers and their functions were to sell to consumer in pieces after receiving larger volumes from wholesalers or farmers.

Generally, 28 retailers were selected purposively from different localities at Kobo open markets. Accordingly, 10.7, 32.1, 10.7 and 28.56 % were from Alemata, around Kobo, Woldia and Mekele respectively (Table 4.4.3). . Unfortunately, all respondents were female retailers, out of them, 10.7, 57.1, 25 and 7.1% of respondents had age ranges of < 20, 21-35, 36-50 and above 50 years old respectively. Retailers were highly diversified in; places of residences, household types, age categories, education status, degree of participation and numbers of vegetables retailed.

Table4.4.3: Retailers' demographic characteristics

House hold head	Frequency	Percent	Ethnicity	Frequency	Percent
Male	11	39.3	Amhara	18	64.3
Female	17	60.7	Tigray	10	35.7
Total	28	100	Total	28	100
Marital status			**Education status**		
Married	8	28.6	Un able to read & write	9	32.1
Unmarried	12	42.9	Literacy completed	2	7.1
Divorced	4	14.3	1-6 grade	10	35.7
Widowed	4	14.3	junior grade completed	3	10.7
Total	28	100	Grade 10 completed	2	7.1
Religion			Grade 12 completed	2	7.1
Orthodox	25	89.3	Total	28	100
Muslim	3	10.7	**Types of commodity traded**		
Total	28	100	Tomato	15	53.6
Residence			Both	1	3.6
Kobo	5	17.9	More than three	11	39.3
Alemata	3	10.7	Tomato and pepper	1	3.6
Around Kobo	9	32.1	Total	28	100
Woldia	3	10.7			
Mekele	8	28.6			
Total	28	100			

Source: Own field survey, 2010

Generally, out of the total retailers, 60.7 % female-headed household while the remaining was male headed. Marital status of respondents implied that 28.6 & 42.9% of respondents were married and unmarried respectively while divorced and widowed were each 14.3%. Out of the total retailers, 32.1, 35.7, 10.7, 7.1% and were un able to read & write, 1-6 grade completed and junior grade completed respectively, while the rest literacy completed Grade 10 completed and Grade 12 completed constituted each 7.1%. Out of the total respondents, 89.3% and 10.7% were Orthodox and Muslim religion followers. In addition, two major ethnic groups were Amhara & Tigray constituting 64.3 and 35.7% respectively.

Retailers retails one or more types of vegetables, 53.6, 3.6%, 39.3% and 3.6% of retailers indicated that they retail only tomato, both tomato and onion, multiple vegetables and tomato & paper respectively (Table 4.4.3).

Out of the total respondents, 17.9, 35.7 and 46.5 % had no experiences, less than one-year experiences and above two year experiences in tomato retailing business respectively. Respondents were asked to estimate their plan to stay in tomato retailing, accordingly, 64.3, 25, 3.6 and 7.1% indicated that it was unknown, seasonal, half year and greater than one year respectively.

Table 4.4.5 indicated that 17.9%, 25%, 25%, and 32.1% of retailers retailed tomato, as it was means of survival, additional income sources, and better profitability and to support their families respectively. Out of all retailers, 21.4, 60.7, 14.3 and 3.6 retailers learned to retail from their own entrepreneur skills, from friends, from simple observations of markets and for the sake of time spend respectively.

Generally, based on the study, retailers can be divided into two major categories, namely seasonal type and permanent type retailers. These retailers have different types of characteristics in method of retailing, economic scales, and degree of participation, business experiences, and mode of business, legal framework, and related socioeconomic conditions.

Seasonal type of retailers

Retailers of Kobo and its surroundings usually buy from farmers or sometimes from whole sellers in the morning and retail there for limited hours of market. According to market visits, these retailers were by far higher in numbers than the other was. From previous table 4.4.3, we found that young retailers, who were below 20, were higher in both kobo and its surroundings, constituted, 20% and 22.2% respectively out of the total retailers in their residence. Such retailers had limited or no experiences before, out of Kobo town retailers, 40% had no experiences and the rest 60% had below one-year experiences. Likewise, 33.3% and 55.6% of retailers of villages of around Kobo had no and below one year experiences respectively.

Most respondents implied that they do not have fixed plans on how long to stay in business. Retailers indicated that, some rural retailers might be disappeared after one retailing market. These retailers might be disappeared after they retail small volumes of tomato and buy some household expenses by the money they got. Mostly, poorer retailers may stay one production season in maximum and shift soon in minimum to other dominant crop types of the next season.

Out of the total retailers of Kobo and its surroundings, 80% and 88.9% retailed only tomatoes. Degree of participation was so narrow in its scope and temporal or unknown in its life. Commonly, they may participate in nearby markets of their residences and retail only one or two markets/week. Mostly, mode of retailing is limited by retailing where they buy. Rarely, some town retailers may use roadsides to retail the unsold after the market. Unlike town retailers, whatever the result of retailing activities, rural retailers are limited to retail only for a single market day, which may end between 6-7 hours duration. Consumer price may rise through the day if demand is strong or fall if few buyers are present in the market.

Generally, these traders have seasonal characteristics; they frequently shift from one crop to another depending to the type of the seasons. They do not have their own retailing plot lands in any of the markets they participate in, they commonly use traditional measuring units in retailing tomatoes, or they retail through guessing or fruit counting. On marketing days, they usually run when they notice that the local revenue collectors come to them, to tax 5birr/ 50kg tomato retailing business. In doing so, as the revenue collectors indicated that, apart revenue collection tasks, they settle or reduce the rivalry occurrences between such retailers and permanent retailers. Unlike seasonal types, permanent traders pay the revenue, as a result, they constantly complain to take out such non-payer retailers out of the markets. Barriers to entry include a local council letter of approval, market authority registration and space in the market place.

Degree of participation is relatively wide; they retail vegetables by moving from their residences to any potential markets of Kobo, Alemata, and other small rural markets too. They retail more than one vegetable; usually they retail multiple types of vegetables like tomato, onion, cabbage, green pepper, etc. Woldia traders indicated that each 33.3% retailers trade that, <one, 1-3, and above five Kassa (50kg) of tomato/weekly market. Mekele traders retailed all retailed from differently from 1-5 Kassa of tomatoes.

Table 4.4.4: Tomato retailers' age, experiences, plan to stay and volume traded

Residences	Age category	N	%	Experiences	N	%	Plan to stay in	N	%	volume traded in Kassa	N	%
Kobo	< 20	1	20	<= 0.00	2	40	Unknown	3	60	<1.00	4	80
	21- 35	3	60	0.01 - 1.00	3	60	seasonal	1	20	1.01 - 3	1	20
	36 - 50	1	20	Total	5	100	> 1 year	1	20	Total	5	100
	Total	5	100				Total	5	100			
Alemata	21 - 35	1	33.3	0.01 - 1.00	2	66.7	seasonal	2	66.7	<1.00	2	66.7
	36 – 50	1	33.3	2.01+	1	33.3	> 1 year	1	33.3	3-5	1	33.3
	51.00+	1	33.3	Total	3	100	Total	3	100	Total	3	100
	Total	3	100									
Around Kobo	< 20	2	22.2	<= 0.00	3	33.3	Unknown	6	66.7	<1.00	8	88.9
	21- 35	6	66.7	0.01 - 1.00	5	55.6	seasonal	3	33.3	1.01 - 3	1	11.1
	36 - 50	1	11.1	2.01+	1	11.1	Total	9	100	Total	9	100
	Total	9	100	Total	9	100				<1	1	33.3
Woldia	21 - 35	1	33.3	1.01 - 2.00	1	33.3	Unknown	1	33.3	1.01 - 3.00	1	33.3
	36 – 50	2	66.7	2.01+	2	66.7	seasonal	1	33.3	5.01+	1	33.3
	Total	3	100	Total	3	100	1/2 year	1	33.3	Total	3	100
							Total	3	100			
Mekele	21 - 35	5	62.5	2.01+	8	100	Unknown	8	10	<1	2	25
	36 – 50	3	37.5							1.01 -3.00	3	37.5
	Total	8	100							3.01 - 5.00	3	37.5
										Total	8	100
Total	< 20	3	10.7	<= 0.00	5	17.9	Unknown	18	64.3	< 1.00	17	60.7
	21-35	16	57.1	0.01 - 1.00	10	35.7	seasonal	7	25.0	1.01 - 3.00	6	21.4
	36.50	7	25.0	2.01+	13	46.5	1/2 year	1	3.6	3.01 - 5.00	4	14.3
	51+	2	7.1	Total	28	100.	> 1 year	2	7.1	5.01+	1	3.6
	Total	28	100.0				Total	28	100.0	Total	28	100.0

Source: Own field survey, 2010

Experienced type of retailers:

From the market visits, unlike the first type of retailers, they were relatively small in numbers. Most of them support their family and they were relatively organized and settled types of retailers. Unlike the other side of retailers, relatively, they live in bigger towns, like Woldia and Alemata. There was no new retailers in Alemata, however, 66.7 % of retailers had below one-year experiences. While 33.3, 66.7% of Woldia retailers had below one and above two years of experiences. In addition, all Mekele retailers had above two years of experiences. There was no

retailer below 20 in Alemata, Woldia and Mekele. In Mekele 100% of retailers were with age range of 21-35, while in Woldia f 66.7%were in 36-50 age range.

Table4.4.5: Factors influence tomato retailing

Reasons of tomato retailing			How you learned to become a trader		
Means of survival	5	17.9	Entrepreneur skills	6	21.4
Means of additional income	7	25	From friends	17	60.7
Profitability	7	25	From simple observations	4	14.3
To help family	9	32.1	to spend my time	1	3.6
Total	28	100	Total	28	100

Source: Own field survey, 2010

4.4.2 Tomato Product flow

The flow of agricultural commodity from the production centers to the consumer end depends on the distance and market proximity, means of transport, availability and quality of infrastructures, the nature of the product the need and purchasing power of consumers, etc. The supply chain participants such as the farmers, distributors, small and big markets, supermarkets and small shops, etc, determine the marketing and distribution channels.

There are six major tomato market channels identified that farmers use to sell their products (see Figure 4.4.1 below):

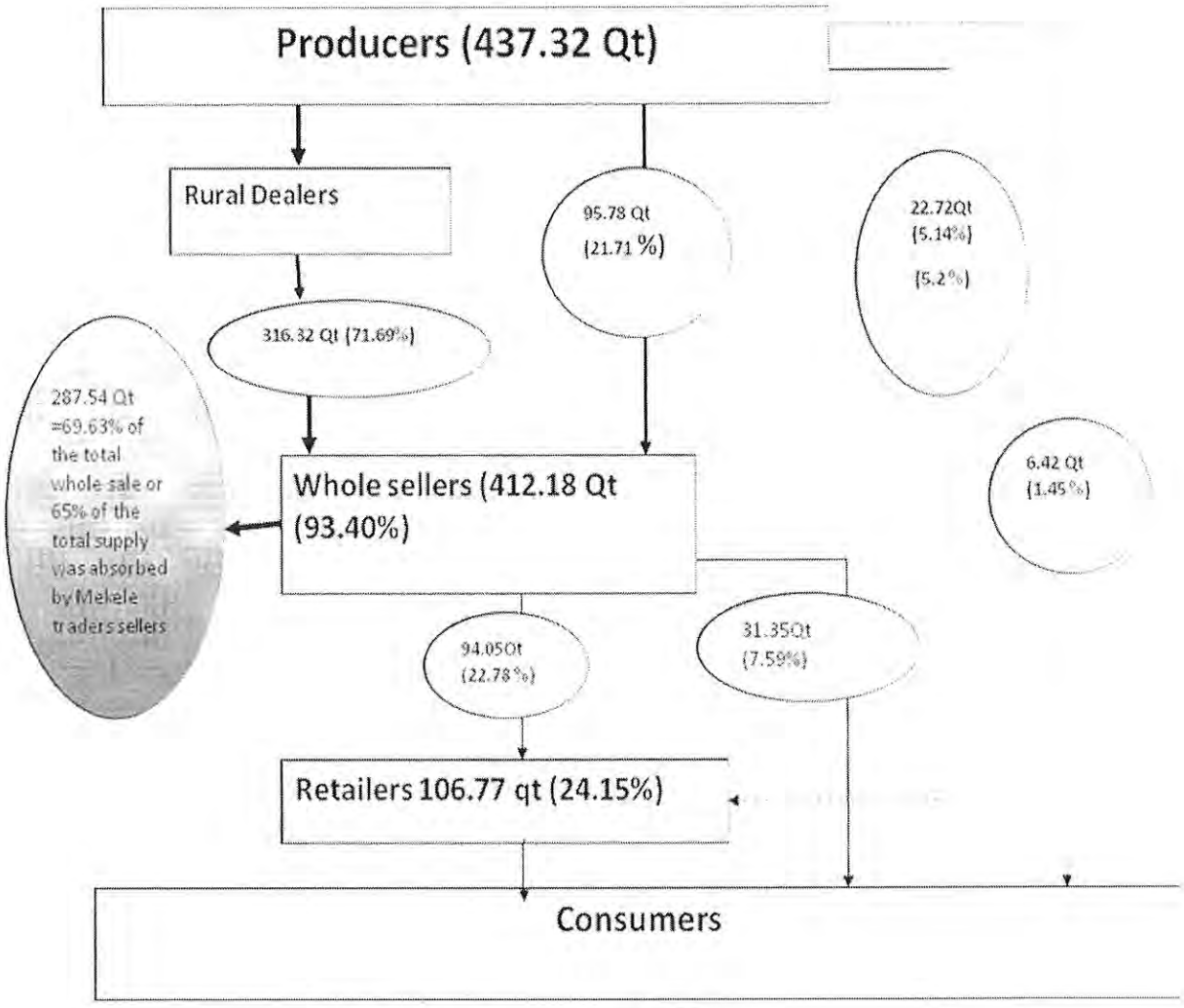
1. Farmer-Rural dealers-Whole sellers of Mekele (65.98%) [farm gate market]
2. Farmer-Whole sellers of local areas and surroundings (21.92%)[open local markets]
3. Farmer-consumers (7.76%) [open local markets]
4. Farmer-Retailer – consumers (5.20%)[open local markets]
5. Farmer- Whole sellers-retailers-consumers (18.5%)[open local markets]
6. Farmer- Whole sellers-consumers (6.5%) [open local markets]

The above Figure 4.4.1 indicates that, the total volume of marketed tomatoes produced by the respondents in Golina modern irrigation scheme was estimated to be 437.32qt. The annual flow of tomato product to Tigray region, excluding Alemata, Korem and Maichew was estimated 288.32 qt (66%) constituting 68.5, 57.9, and 161.84 qt in supplementary, primary, and secondary production seasons respectively. The rest 149 qt (34%) was absorbed in local markets including Alemata, Korem, and Maichew.

The survey showed that large volume of the product flow to the northern part of Ethiopia, Tigray region. Out of the total volumes of tomatoes, 87.89% were sold to whole sellers while the rest 5.2% and 7.76 % were directly sold to retailers and consumers respectively. From the total whole sale, Mekele traders while the rest 25% was to Alemata, Korem and Maichew, Kobo, Kobo Zuria, Woldia, and Lalibela absorbed 75%. Local retailers and consumers shared 18.5% and 6.5% of the total tomato volume respectively.

Tomato product flow

Figure 4.4.1: Tomato product flow



Source: Own construction, 2010

Farm gate market at Aradom was the major tomato market followed by open markets of Kobo, while the rest markets have very small shares. Among all buyers, Mekele Whole sellers are the

major buyers of tomato. According to the group discussion made with dealers, tomato buyers bought 2-3 Lorries of tomato/day in low production periods and 4-7 in good production period. One lorry of tomato is equivalent to 42 quintals.

4.4.3. The roles of Mekele whole sellers in tomato market value chain

According to key informant interviews made with Mekele traders, tomato business has been running by 126 member traders and 15-20 non-member traders. Out of the total traders, their own vehicles imported 30-40% of imported tomato independently while the rest was through rent vehicle. To feed the potential demands, Mekele traders indicated that 5-15 lorries of tomato/day, and 7-20 lorries of onion/day has been imported from various sources producing areas. Mekele traders import both tomato through agents and themselves. According to the group discussion made with five Mekele traders and individual based key informants, traders usually import tomato to Mekele from different parts of the country and distribute to potential demands of different towns and cities of the region. Among major demand potentials of the region, Mekele, Adawa, Axum, shire, and Adigrat are fully deficit areas throughout the whole year. While, Wuikro four months, Senkata for 7 months, shiraro and Humera for 8 months each are partial deficits. Partial deficit areas produce tomato in their non-deficit periods.

Table 4.4.3.1 shows that, Mekele traders import tomato to Mekele from different directions of Ethiopia to satisfy demands across different periods throughout the year. Amhara and Oromya regional states are the major tomato sources, found out of Tigray region, while some parts of Tigray share small parts of the total supply from within region. From Amhara regional state, Kobo, Kombolcha, and Woreta are the major sources located 150, 345, and 580 km away from Mekele respectively while Meki is from oromya regional state located 1035 km from Mekele. Wuikro, Gerbgeb, Sinkata and Mohoni are parts of Tigray that are located, 45, 25, 80 and 120 km away from the regional administrative city respectively and contribute to the gross annual supply of the region. According to Mekele traders, they collect tomato from Wukiro and Kobo throughout the year, from Meki from June-August and in belg season, from Woreta from Feb-April, from Mohoni from Dec-March, from Kombolcha from Sep-Nov.

There were an estimated of around eight Mekele traders who bought tomato from the study area. The total supply of tomatoes in supplementary production season, primary production season and secondary production period were 19.95%, 17.76% and 62.29% of the total supply

of 2009/10 respectively. Mekele whole sellers bought 79.1%, 74.57% and 59.28% of the total production produced in supplementary, primary and secondary production seasons respectively, while the remaining productions were absorbed locally accordingly. Out of the total products exported to Mekele, 56.15% of the product was exported in secondary production seasons and the rest 23.76% and 20.09% in supplementary and primary production seasons respectively. On the other hand, out of the total locally absorbed tomatoes, 74.6%, 13.25% and 12.15% of tomato were absorbed in secondary, primary and supplementary production seasons.

Table 4.4.3.1: Potential Sources of tomato supply and Demand in Tigray

Sources of supply	Region	Distance from Mekele in km	Production type	Collection periods
Wukiro	Tigray	45	Irrigation	All seasons
Gerbgeb	Tigray	25	Rain fed	Jan and Feb.
Sinkata	Tigray	80	Rain fed	June-Aug
Meki	Oromia	1035	Irrigation	June-Aug
Mohoni	Tigray	120	Irrigation	Dec-March
Woreta	Amhara	580	Irrigation	Feb-April
Kobo	Amhara	150	Irrigation	All but high from Nov-March
Kombolcha	Amhara	345	Irrigation	Sep -Nov
Demand areas	Region	Distance from Mekele in km	Production periods	Deficit Periods
Mekele (35-40%)	Tigray	0	None	12
Wukiro	Tigray	45	Sep-Jan And April-Jun	4
Senketa	Tigray	80	June-Aug	7
Adigirat	Tigray	120	None	12
Adawa	Tigray	210	None	12
Axum	Tigray	235	None	12
Shire	Tigray	300	None	12
Shiraro	Tigray	395	Aug-Nov	8
Humera	Tigray	570	Aug-Nov	8

Source: Own field survey, 2010

4.4.4. The nature of inter relationships of tomato value chain actors

4.4.4.1. Price governance

Price negotiation is usually performed at farm gate market before the tomato is harvested, after which cash is paid. Negotiation is based on the quality of tomatoes and volumes. Farmer have limited bargaining power.

According to the data showed blow in Table 4.4.4.1, producers put their views on the price arrangements acts or behaviors of major tomato buyers constituting; Mekele whole sellers, local traders, local dealers, and consumers' price setting scenarios. Out of the total tomato producers, 33.3%, 30% indicated that whole sellers of Mekele are good and bad in fair price arrangements respectively. The rest 36.7% producers indicated that they do not know what the behaviors of traders look like in fair price arrangement processes. It implies that more than one-third of the producers might be behind the iron curtain of the price setting processes, probably, these producers may remained inactive in price negotiation process and simply accept prices what others decide to accept. The rest 30% complained that these traders act badly in setting prices. To the contrast, the rest one-third of tomato producers claimed that Mekele whole sellers have good fair price setting arrangements.

In the price negotiation processes, local dealers run the interests of whole sellers' missions and put product owners outside of the price-setting scenario. In price negotiation processes, dealers usually dance the dances of traders, sing the songs of traders, and enjoy together on the same boat with traders. It was witnessed that the behaviors of local dealers were considered as bad and unknown by 53.33% and 33.33% of the total tomato producer farmers respectively. Dealers usually try to settle disagreements between buyers and sellers in price setting and transaction scenario through continuing convincing mechanisms and simply making producers as price takers.

Moreover, key informants complained that dealers also use their neighbors, families and other friend farmers to achieve the convincing process timely over majority of the producers. This implies that, consciously, local dealers play tricky gambling games over producers. Sadly, producers who might be their families, friends, neighbors, and others will be the victims of such operations. Likewise, there are also some producers having established strong friend ships with buyers, who play artificial simulation effect on others in accepting any fixed prices by traders. Sometimes, despite with all these net worked traps, sellers may tend to resist not selling with low selling prices to these buyers, and then buyers may reconsider the buying prices and reaching price agreement through re negotiation process. Key informants heartily indicated that, if some dealers accomplish their mission over producers successfully, then they would have additional awards given by buyers but secretly without the knowledge of sellers.

Immediately after the negotiation process is successfully accomplished, farmers will harvest, collect tomato products, transport from field to roadside by carts on Sunday and Thursday, and sell them at farm gate.

However, if there might be lack of common agreements in price setting, amount of supplies, qualities of supply, types of transactions, or other conflict sources, producers usually take on the next market days to Kobo markets. In kobo markets, local tomato traders and consumers were assumed the major buyers of tomatoes.

According to 50% and 23.33% of the total tomato producers, local traders have unknown price arrangement behaviors and others assumed them as bad respectively. On the other way, the remaining 26.7% claimed that local traders have fair price arrangement behaviors. Local consumers were assumed good in paying attractive prices to 40% of the producers and bad and unknown for 13.33% and 46.7% respectively. This implies that different producers may experienced different market conditions differently, this might be depends on the nature of supply and demand gaps, the time of harvest, the nature of product qualities and others. Producers usually decide to harvest or not to harvest based on their experiences of previous marketing days. However, the market prices may go in the reverse directions of their assumptions. The price of tomato at Kobo markets may go high when they predict low, and the reverse. Traders may also calculate the reverse assumption of producers'; they may decide to come next week if they heard that tomato was cheap the week before. Such and others market experiences may work negatively to the participations of buyers and sellers.

Moreover, failures of farm gate markets after harvest may aggravate problems on the system of local market operations. From this view, commonly, producers may supply high volume of product at a time to local markets in which there might be small demands that may absorb small part of the total supply. Hence, producers may face bigger challenges than they faced a day before at farm gate level. Comparatively, such contradictory experiences of marketing challenges may lead farmers to regret and look back ward a day before and conclude that farm gate buyers may be as choice-one buyers, though they were also low price setters.

Generally, farmers have experienced 'menu of market challenges' both at farm gate and local markets of kobo town. The sad fact implies that, market challenges work their own vicious circle, then add, and pack huge problems over the shoulder of the poor producers.

4.4.4.2. Reliability

Despite the complex natures of trapping market challenges, 83.3% of tomato producers indicated that Mekele whole sellers were the most reliable actors in tomato value chain. Farmers showed that these traders were the only traders who periodically visit them and absorb the lion's share were of their products. However, 60% and 33.33% of the producers complained that dealers were non-reliable and unknown to predict their roles, respectively. On the other hand, comparatively, the rest of local traders were less reliable and less capable to absorb the bulk products frequently over production periods. Evidently, only 23.3 % of the total respondents indicated that local traders were reliable, while the rest did not. Similarly, 20%, 36.67%, and 43.3% respectively implied that consumers were reliable, non-reliable and unknown. The lack of reliability of local traders may associate with inconsistencies of supply and demand that frequently occurred in local markets of kobo.

Moreover, local markets might usually characterized by excess supply during pick production periods triggered by absences or delay of Mekele traders. Rural urban linkage is so weak in North Wollo that limits the exchange of resources like capital, product, information and labors (Kay Sharp & etal, 2003).

4.4.4.3 Trust

As the degree of social cohesions between dealers and experienced traders increase, dealers usually may work toward the benefit of traders hopping to get additional benefit from such traders trough pre calculated and hidden common agreements. Though 70% of the producers implied that Mekele traders were trustful buyers comparatively, most traders deal through dealers in arrangements of lower prices, arrangements of informal and illegal actions in grading and valuation, delay of transactions and payments, misbalancing of weighing tools and techniques, playing different tricky tricks has been developed between buyers and sellers. Out of the total producers, 53.33% indicated that local dealers were low trusted while 43.33 were unable to know dealers action evidence fully.

If farmers might have permanent relationship with traders, it is based on mutual suspicion rather than trust. According to farmers key respondents, traders cheat producers through inappropriate weighing balances and by down cutting weight reading techniques. Farmers who cannot read and write may be the major victims of such tricks. Moreover, some traders bought tomato by using 50 kg wooden crate box with weight ranges from 6-8Kg; however, traders deduct the maximum weight of the container and deduct 2-3 kg tomatoes. Traders may also reject to buy the already harvested tomato for the reasons of 'low quantity supply of good quality products', without agreed standard quality measurements. Unless and otherwise farmers provide additional supply, traders may decide to buy them with a down scaled lower prices. Alternatively, Traders may resist buying tomato for the reasons 'not to pay high transportation cost to supply of below one lorry product. In fact, sometimes, producers may supply below they promised to supply, but traders may use of it as strategy to get either maximum volume of quality products out of additional bulk supply or to enforce producers to sell the already harvested tomato with a down scaled buying prices. Traders and local dealers have been extracting a living. During long-term relationships between dealers, farmers and traders, traders used dealers or themselves to make non-cash transaction arrangement with producers after they harvest tomato. Farmers may extend credit to larger buyer for a certain periods allowing them time for sale.

From the group discussion made with producers and dealers, it was witnessed that one trader was disappeared without repaid 60, 000 birr to farmers after he bought their product in credit. He paid back after a year of payment delay. Once after they produce it, traders may inform farmers as if they do not have enough money to pay farmers in cash, then traders may enforce farmers to sell it in credit through the arrangements of informal, unauthorized and illegal agreements supported by guarantying farmers with the copy of signatures. To agree might be the only options producers have; otherwise, they should decide on the fate of their bulky and perishable products. Not to lose all what they harvest, Producers sell the harvested product in any of the cases that the buyers wish to buy.

Sadly, farmers also indicated they had bad experiences faced by such traders before a decade back. Producers resisted selling tomatoes at farm gate in a minimum of minimum low prices arranged by Mekele traders. They all decided themselves to take their product together by rent

car to Mekele markets. However, the condition they faced in Mekele was so unexpectedly irritating; Mekele traders, who were at farm gate, communicated the others who were in Mekele and informed them to decide not to buy the farmer agents beyond the prices that farmers resisted to sell at farm gate. The sad fact was that, with additional costs, farmers' agents were systematically forced to sell the products in Mekele with the same price that was fixed at their farm gate.

These actions may develop strong distrust over traders, though traders may assume that farmers may take lessons not to make such attempts again. In one hand, as a short cut, such shocking strategies may 're-create and build strong market attachment' with such large buyers and in the other hand; it may block the entries of other potential buyers and kept producers under a buyer control that build up the evils of market monopolization, which is out of the norm of market. Such huge market holes may develop black dots over the black board of farmers' life; no one can easily observe the nature of scope and level of such an invisible but huge pit falls of practical marketing facts. That must be why local service providers advocate the presence of effective market linkage between such producers and traders of Mekele.

Currently, the Woreda administration office with the collaboration of police officer assigned one police officer in the village to run transactions smoothly and to solve disputes that may arise between sellers and buyers.

Producers were trying to increase their production in the face of reduced inputs and declining prices. This increases the supply of low-quality goods onto the market, which further suppresses prices. More farmers supply more products into a market where prices were steadily falling and fluctuating, natural resources were being degraded and poorly managed farming systems were spreading into increasingly marginal Woreda.

Generally the price and quality regulations were absent in the tomato subsector. Hence, large traders influence the price governance largely through their strong backward and forward network. Producers prefer to sell products at lower price to such traders than the rest; this raises high rivalry between tomato traders of different Woreda and causes the degree of market imperfection between and among traders. This may influence /distort market prices by large and affect producers income and their market opportunities. A need exists for producers to plan

ahead to ensure they supply what the market wants in terms of quality and quantity when it is required.

Table 4.4.4.1 Farmers' perceptions on behaviors of buyers and dealers

Indicators	Major market actors	Responses	Good		Bad		I don't Know		Rank
			N	%	N	%	N	%	
Fair price arrangements & governance	Whole seller of Mekele	30	10	33.3	9	30	11	36.7	2
	Local Retailers	30	8	26.7	7	23.33	15	50	3
	Dealers	30	4	13.3	16	53.33	10	33.3	4
	Consumer	30	12	40	4	13.33	14	46.7	1
Reliability	Whole	30	25	83.3	3	10	2	6.67	1
	Retailer	30	7	23.3	13	43.33	10	33.3	2
	Dealer	30	2	6.67	18	60	10	33.3	4
	Consumer	30	6	20	11	36.67	13	43.3	3
Trust	Whole	30	21	70	6	20	3	10	1
	Retailer	30	8	26.7	11	36.67	11	36.7	3
	Dealer	30	1	3.33	16	53.33	13	43.3	4
	Consumer	30	14	46.7	9	30	7	23.3	2
Summative values (indicator of goodness)	Whole	90	56	62.2	18	20	16	17.8	1
	Retailer	90	23	25.6	31	34.44	36	40	3
	Dealer	90	7	7.78	50	55.56	33	36.7	4
	Consumer	90	32	35.6	24	26.67	34	37.8	2
	Total responses	360	118	32.8	123	34.17	119	33.1	

Source: Own field survey, 2010

4.4.5 Tradeoff between Kobo and Farm gate tomato markets

The following qualitative data were taken from tomato producer farmers found in Kobo open market, who failed to sell their tomatoes even with any lower price arrangements. Five market visits were conducted at Kobo open markets to gather information about marketing conditions from tomato market participants. Two market visits were conducted in Friday market of Kobo, which is the largest market in the Woreda and two other visits were conducted on Monday market day.

According to personal observations made on Friday and Monday market days of Kobo, there was high supply of marketable tomato but not marketed due to low demand capacity (see figure 4.4.2 below). As we can see from the photographs below, it can be difficult to observe a figure

counted numbers of buyers, as if buyers and sellers live in two different separated planets. The left side of the picture indicated that farmers were ready to sell tomato products at any prices for wholesale buyers in Kobo open market. Tomato producer farmers looked depressed thoroughly, bending their neck down and hoping the coming for potential tomato buyers. Similarly, the right side of the picture indicated that retailers faced similar market challenges. Retailers bought a wooden box of tomato (50 kg) in 40 birr in the morning around 1 am and retail up to the end of the marketing hours (up to lunch time). Some farmers sold the same amount of tomato with 8-10 birr at the side of retailers. Other farmers were waiting to sell a 50kg of tomato even with the prices of retailing units that contained around 5 kg.

Figure 4.4.2.: over surplus tomato product in kobo open market

(Source: Own, April, 2010)
Over surplus tomato at Kobo market.
Producers are waiting for tomato buyers in Kobo market

(Source: Own, April, 2010)
Women retailers at Kobo market sitting to retail at the side of tomato producers.

Case 1: He said that; *"Throughout the seasons, tomato price fluctuation in Kobo is seemed to be a usual events, the degree of fluctuations is so tragedy and discouraging. It is totally unmanageable and unpredictable even in hour and minute levels. My friend sold 200 kg at 1 birr/kg price, just 30 minutes ago, but now, I will sell it with any price I get, if not, I will take it back to home and feed my cattle. Tomato market is a matter of fortune, if you were lucky enough, you will get high benefit, otherwise you will return home with your empty pocket. I faced both faces of the coin the year before and so did the others around us."*

Such facts implies that farmers have faced lower prices of tomato trend in open markets and the price level may not even cover cost of transportation. Transportation of bulk material to kobo market is very expensive. Producers cost 6 birr/ 50kg (60 birr/cart).They may sell it with a price below transportation cost, or they may return it back to home for their animals feed with additional transport cost, or even they may dump it in the market not to incur other transport costs. Such and other bad experiences enforce producers to maintain their relationships with traders at farm gate markets irrespective of the evils of monopoly. For such deep-rooted market problem, farmers usually prefer to sell their products in high volume, with any prices at farm gate level than to sell in better price in other markets like Kobo market days.

Ato Abera was one of the farmers who had bulk amount of fully ripened tomatoes and that was why, it was impressive to take his picture and tomatoes in a digital camera. He strongly, emotionally, and aggressively, gave me warning not to take any pictures of him while he noticed me impressed in with a camera in my hand. He explained why he acted like that and he continued.

Case 2:*"Sorry my son, I know it may irritate you when we become out of the game of the market. If you have the patience to wait up to lunch time, we assure you that majority of the product will be returned to home while some fortuned sell with a very low prices, one kassa volume at 4-5 birr price. You will also see that when some of us dump the product and simply return to home having nothing in hand while our family expect us to take them certain urban commodities. This is the reality where we were, but agricultural experts advise us to replace our cereal production by cash crop without any market guaranties. We can store teff and sorghum but tomatoes will die out if it lacks someone to buy us. Tomato fruit is like a dead animal in fasting days, since its meat cannot be eaten. Look this tomato; I spent two market days without harvesting the harvestable. Hence, I lost much tomato in field so do I here due to such poor market characteristics. We were losers, losers, and losers in tomato markets. Sadly, irrespective of the deep rooted market challenge, we continue to produce year after year and season after season."*

On the absence of large buyers, producers may spend one or two or more market days without harvesting ripen fruits with the expectation of getting better prices than previous market days. But such measures aggravate the amount of wastage on farm fields and the price will getting

high in the next marketing day as there will be lower supply and higher demand than the previous marketing day. Price fluctuation may continue and so dose supply and demand. That producer will lose their confidence of getting good price in such markets due to the state of price fluctuation scenario and so does the buyer. Such experiences teach farmers to develop and maintain a single marketing channel with Mekele traders and block the potential market entries.

Figure 4.4.3. Tomato loses in market

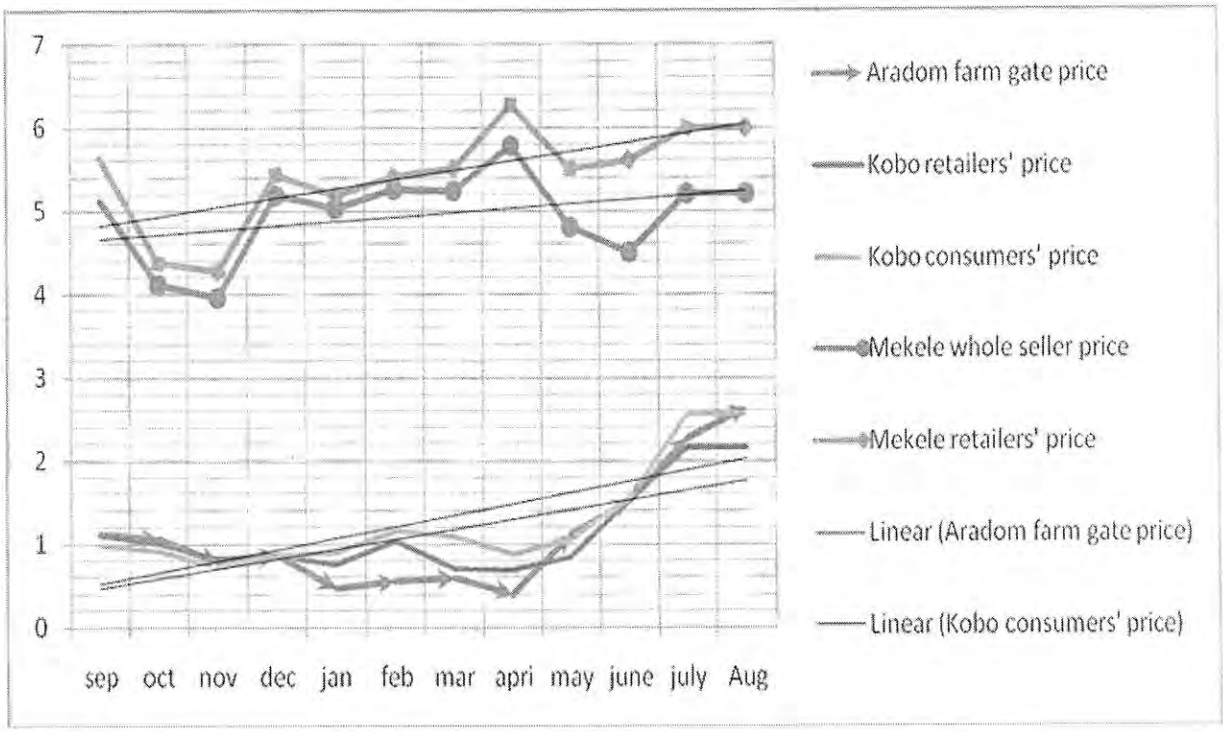
(Source: Own, April, 2010). What is the fate of over surplus tomato at Kobo market? The answer is, either to dump it in the market or to take it back for animal feed. In the absence of effective market, encouraging farmers to produce tomato can be a double lose for farmers, because farmers can't store it like cereals .

As indicated above, Figure 4.4.3 shows that farmers dumped part of their marketable tomato in Kobo market, and takes back the rest of it to feed their cattle. At the left side of the picture, a cow was eating the dumped tomatoes while town women collected part of it with cartoon box. At the right side, the red bull seemed to be quite satisfied with 'tomato forage'. Producers complained that the reason why they dump the product in market was not to incur additional cost of transportation. Therefore, to dump is the only solutions for those farmers who do not have their own donkey cart.

4.6 Tomato price trends in 2009/10

As we can see from Figure 4.4.4 below, seasonal price variations of tomato were marked throughout the whole production seasons.

Figure 4.4.4: Tomato price trend in 2009/10



Source: Own field survey, 2010

Generally, farm gate prices of tomatoes varied between 0.36 and 1.33 birr/kg in April and August of 2009/10 respectively. The lowest price was recorded in April and the highest in August. The price of tomato increased sharply from April to August and slightly declined back from September to mid November then slightly stable from mid November to mid December. The prices highly fluctuate from mid December on wards up to May. In general, prices of tomato were highest at the end of the rainy season and lowest at the end of the dry season, reflecting the facts that fewer farmers cultivated during the less favorable growing conditions of the rains and that more cultivate during the more productive dry season.

Tomato prices in open markets of Kobo is found to be equal to farm gate price, from September to mid December, and increased from mid December to April. Then after both farm gate price and the price at open market highly increased up to August and farm gate prices take over the highest price selling slightly. At farm gate market, traders only paid competitive prices

in the time of supply deficit that usually occurred during May – August. From mid May-August, there were high supply deficits. Deficit periods may force Mekele traders to buy producers with better prices comparatively. Such traders may pay equivalent prices to local markets from September-mid December. From September- mid December, the volume of product will increased slightly than the wet season so the demand and supply gap tends to be narrow accordingly with relative contexts. In such circumstances, large buyers will pay either equivalent price to the local market prices or even slightly below it.

4.4.6.1. Tomato price in primary production season:

The general trend of prices declined slightly from September to mid November and slightly kept constant onwards up to mid December. In this period, the volume of supply was relatively smaller than the rest of the production seasons, therefore traders of other towns outside kobo may not able to compete large buyers of Mekele. Local traders of Kobo and its surroundings might be solely participating with low competition with Mekele traders.

From September to mid October, tomato prices at Mekele showed sharp declination than prices of kobo markets and kept slightly constants up to mid November, then, it sharply increased up to mid December while prices at Kobo kept constant. According to Mekele traders' view, additional supply might be imported from Kombolcha town of South Wollo, from September to November. From mid November to mid December traders mainly bought from Kobo, hence there would be deficits and price rise.

Mid December was a starting point of price variations that continued onwards throughout the year. From mid September to mid December, relatively, Mekele traders paid higher price per a kilogram of tomatoes than the rest of local buyers did, but with smaller price margins. Relatively, local consumers paid smaller price followed by local traders.

4.4.6.2. Tomato price in secondary production season:

Demand and supply tend to be very high caused by the two months of Ethiopian orthodox fasting days. However, secondary production season was known for its higher volume of tomato supply that suppressed the prices to the lowest point to Mekele traders and pushed the prices up to local consumers. The season is characterized by over surplus production season that farmers usually prefer to sell in bulk to large buyers of Mekele traders and others who

come from outside Kobo. In terms of price level relativity, the season is the worst season for farmers and the best season for large buyers. Starting from end of December to mid of May, Mekele whole sellers paid the least prices while local consumers tend to paid highest prices than any of the other buyers did.

The price margins between Mekele traders and local buyers were high enough until April. Likewise, the price margins of local consumers and local traders were high from mid February to end of April. Tomato producers sold mass volume of their product to Mekele traders with the lowest price ranges especially from mid December to mid April, and with competitive prices after mid Aprils. From mid December-mid April there is high volume of supply, hence farmers prefer to sell high volume of their product in mass with minimum prices than selling at better price in open markets with low quantity. This period is known for its small supply and high demand size across different parts of the country in general due to two months of Ethiopian Christians' fasting days. The prices of tomato at Mekele increased from mid January to mid April though prices at farm gate were the least. Therefore, this was the condition when farmers sold large volume of tomato to Mekele retailers at minimum prices and Mekele consumers paid high prices. The fundamental constraint to tomato marketing is that tomato is highly perishable.

4.4.6.3. Tomato price in supplementary production season

From end of April onwards, the general price trends sharply increased than any before. In most parts of the country, the period is known for its deficits. Large numbers of tomato traders might participate than ever before in this period. Mekele traders over took the higher price from local market buyers from mid May to mid June, then after, local consumers took back the ceiling of higher prices up to mid August, while Mekele traders paid equivalent prices to local traders from mid June to mid July and higher prices on ward.

The higher prices of tomato were recorded in July-August, which might be due to low supply and high demand. Farmers may not produce tomato in wet seasons for the reasons; high insect incidences associated with inability to apply frequent insecticides, high flooding problems, priority of cereals for household consumptions, priority of onion for the new year of Ethiopia celebrated on September 1. Tomato had better price in October, December, and April. Price

may be high in April and May, as there may be high demand and low supply caused yield decreases due to high drought and pest incidence.

Theoretically, Price is expected to be increased for the following reasons; a) Increase in population (migration from rural Woreda, birth rate) , b) Increased income due to increased employment opportunities, , c) Increased social and economic activities due to development programs, and , d) Better road communication system both in urban and rural Woreda. Despite the theoretical facts, price fluctuation in tomato sub sector is found to be common not only Season by season, month by month, but also day by day, hour by hour and even second by second.

4.4.7. Marketing and pricing strategies of traders

Tastes, season, location, income, population, age and price influence demand. The authors also indicated that, supply is influenced by price, season, and weather, costs of production, change in production techniques, prices of other products, quantity available and import.

As Table 4.4.7.1 indicated that, out of the total wholesale respondents, 45.5 and 54.5 % indicated that, quality parameters and expected profit margins were the major criteria to buy set tomato prices and buy from producers. Likewise, out of the total retailers, 46.4, 14.3 and 39.3% indicated that quality parameters, market prices and profit margins were the determinant factors to buy tomatoes. These implied that both quality parameters and expectation of profit margins are the major determinant factors for tomato traders to set buying prices. On the other hand, 27.3, 4.5 and 68.2% of the total whole sale traders implied that quality parameters, market prices and profit margin were the major criteria to set selling prices. Unlike the buying price criteria, quality parameters become less considered in setting selling prices. For whole sellers, the major criteria considered to set selling prices was profit margins. To the contrary, quality parameter was considered by 57.1% of the total respondents as the major factor to set selling prices while 35.7 and 7.1 % of retailers considered profit margin and market price.

Table 4.4.7.1: Factors influencing traders in tomato price setting scenarios.

whole sellers			**Retailers**		
Criteria to set buying price	N	%	Criteria to set buying price	Frequency	Percent
Quality parameters of color, size, clean	10	45.5	Quality parameters of color, size, clean	13	46.4
Profit margin	12	54.5	Market price	4	14.3
Total	22	100	Profit margin	11	39.3
Buying price stability			Total	28	100
Moderate	5	22.7	**Buying price stability**		
Very instable	17	77.3	Moderate	4	14.3
Total	22	100	Instable	3	10.7
Criteria to set selling price			Very instable	21	75
Quality parameters	6	27.3	Total	28	100
Market price	1	4.5	**Criteria to set selling price**		
Profit margin	15	68.2	Frequency	Percent	
Total	22	100	Quality parameters	16	57.1
Selling price stability			Market price	2	7.1
Moderate	3	13.6	Profit margin	10	35.7
Instable	8	36.4	Total	28	100
Very instable	11	50	**Selling price stability**		
Total	22	100	Stable	1	3.6
There is imperfect price trend across towns at a time			Moderate	4	14.3
Yes	16	72.7	Instable	15	53.6
No	6	27.3	Very instable	8	28.6
Total	22	100	Total	28	100
Causes of price trends			**There is imperfect price trend across towns at a time**		
Supply and demand levels	18	81.8	Yes	16	57.1
Market imperfections	1	4.5	No	12	42.9
Information collision	2	9.1	Total	28	100
Unknown	1	4.5	**Causes of price trends**		
Total	22	100	Supply and demand levels	20	71.4
			Market imperfections	8	28.6
			Total	28	100

Source: Own field survey, 2010

Out of the total whole seller respondents, 77.3 and 22.7% indicated that fluctuations of tomato buying price were moderate and very instable respectively. While 75, 14.3 and 10.7% of respondent retailers indicated that tomato-buying price was very instable, instable and moderate, orderly. On the other hand, Out of the total whole seller respondents, 50, 36.4 and

13.6 % indicated that fluctuations of tomato selling price was very instable, instable and moderate respectively. While 28.6, 53.6, 14.3 and 3.6 % of respondent retailers indicated that fluctuations of tomato-selling prices were very instable, instable, moderate and stable, orderly.

Out of the total whole seller respondents, 72.7% indicated that there was an imperfect price trend across towns at a particular time. Similarly, 57.2% of retailers claimed that there was an imperfect price trend across towns at a particular time. Out of the total respondents whole sellers, 81.8% indicated that supply and demand variations was causes of price fluctuations while the rest implied that market imperfection, information collision were the factors of price fluctuation. Likewise, 71.4 and 28.6% of respondents showed that supply and demand variations, and market imperfections were key factors of price fluctuations.

4.4.8. Measures taken by farmers to reduce marketing challenges of tomato

As table 4.4.8.1 shows below , Out of 219.2% multiple responses, 67.3%, 63.5%, 42.3%, 28.8%, and 17.3% used strategies of ; continuing producing at least for their animal forages; continuing producing and sell with any lower prices; continuing producing but with changing production periods; and producing but with minimize land allocation respectively.

Table4.4.8.1: Farmers' strategy to market problems

Strategy	N	% responses	% of cases
Farmers who minimize size of future land allocation	7	13.20%	26.90%
Farmers who change production schedule(planting time adjustment)	7	13.20%	26.90%
Farmers who sell tomato in lower prices	17	32.10%	65.40%
Farmers who feed their animals	16	30.20%	61.50%
Farmers who search potential markets	6	11.30%	23.10%
Total	53	100.00%	203.80%

Source: Own field survey, 2010

In our agricultural policy framework, farmers were advised to make a shift from subsistence cereal production to commercialized crops like tomato. Poor farmers, who have large family sizes but small land holdings, may sacrifice their land for vegetables hopping that they may get better and enough income enabling them to both buy food crops and send children to schools. In effective marketing securities, such a shift may feed farmers and bring additional income to

the pockets of farmers. However, in the face of escalating practical market challenges, they have continued to produce tomatoes. This is the strange alchemy of farmers' decisions; perhaps, they might be miss-guided with the optimistic philosophy of 'who knows about tomorrow', without answering market insecurity. However, farmers' themselves indicated that such decisions have added & built up problems over the menu of the state of poverty package they were living in. Farmers continue to produce tomato under the tidal wave of market; hence, their landscape of life may tend to getting worse in the future. Vegetables like tomatoes must be sent to market as quickly as possible, otherwise, it would be spoiled and end up with low benefits or total loses.

Moreover, unlike other types of vegetables, the nature of yield potential and multiple harvesting periods of tomato may have its own role, working as means of risk distribution strategies. If farmers fail to sell a one harvest, product he may try the next harvests and so on until the last harvests of tomato. Hence, if farmers would have found market confidence, the tomato sub sector may contribute a lot in addressing the income level of more farmers. Hence, organized tomato market channels is needed in order to assist and encourage those involved in the development of fresh market tomato industry.

Hence, organization and strengthening of producers cooperative may play vital role in solving such a spider wave natures of marketing problems. Moreover, all the value chain actors should build a sense of collaboration through agreed common interests. The approach should takes a "value chain" perspective that strengthens business linkages between producer groups, service providers and other actors such as processors and importers, rather than focusing only on on-farm interventions. To address this situation, development agencies, donors and NGOs were placing more emphasis on enabling farmers to increase their level of competitiveness, to produce for an identified market, rather than trying to sell what they have already produced and seeking new market opportunities that offer higher levels of income. These goals can be achieved through better economic coordination and institutions. Farmers' organization empowers small-scale farmers within and between chain actors.

4.5. Cost and benefit distributions in major tomato value chain

This section discusses the distributions of costs and benefits among the major value chain actors of tomato producers and traders of Mekele. The two major categories of costs incurred by producers and traders were production cost and distribution cost respectively. Costs and benefits shown below were midpoint values. The subsector study attempted to reveal an accurate cost analysis in each activity related (see below in Table 4.5.1).

4.5.1. Cost of Production

(a) The average cost of production for cultivating 0.16 ha of tomatoes in the wereda in question is determined by respondent Farmers. The production costs were determined based on the responses of in the previous season, and include:

(i) The cost of all materials used for cultivating 0.16 ha of tomatoes (seed, fertilizer, agro-chemicals, depreciation on cultivation equipment, harvesting equipment and materials).

(ii) The total value of the labor required through the season for all operations, charged at the opportunity cost of household labor in the wereda (usually equivalent approximately to the cost of hired labor in the local informal agricultural sector).

(b) The total cost of production was divided by the average yield of fresh Tomatoes from 0.16 achieved by farmers in the previous season. The resulting figure is the absolute minimum price, which the farmer must receive to cover the costs of production, without allowing for any profit margin or return on fixed investments (especially land).

Table4.5.1: Cost benefit distribution

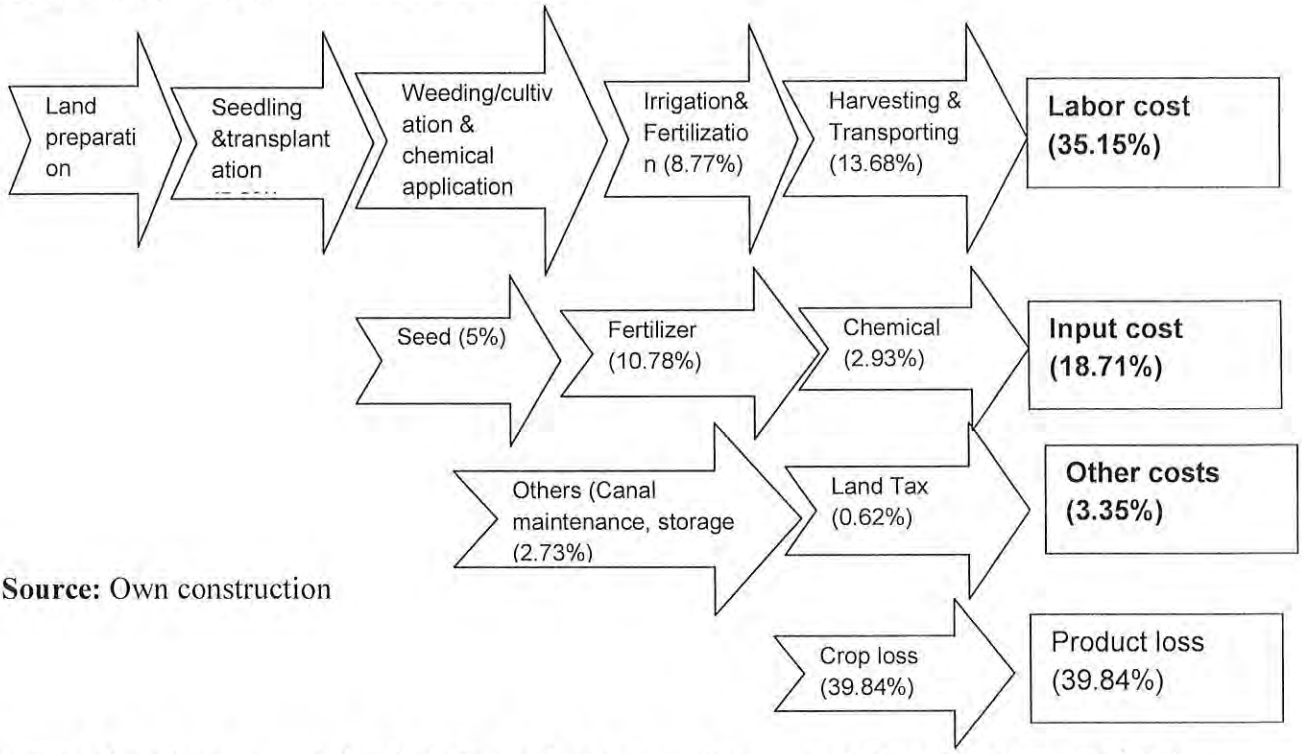
Producers			**Whole sellers**				**Retailers**		
Major Sources of cost	Cost in ETB		Major Sources of cost	Cost in ETB			Major Sources of cost	Cost in ETB	
	Cost/0.16ha	cost /kg		1 Isuzu (42 qt) tomatoes	1Kass(tomatoes)	1kg		Kassa (50kg) tomatoes	1kg tomatoes
Land preparation	(2.54) 33.59	0.02	Buying commissions	420	5	0.1	capital cost	2.6	0.052
Seedling & transplantation	(4.0) 52.5	0.04	Grading &load-unload	798	9.5	0.19	Packaging tools	3.5	0.07
Irrigation application	(6.56) 86.1	0.06	Transportation	2478	29.5	0.59	Labor	20.63	0.41
Weeding and cultivation	(5.12) 67.19	0.05	Storage	252	3	0.06	Transport	5	0.1
Harvesting and transporting	(10.24) 134.39	0.09	Distribution	1050	12.5	0.25	store	10	0.15
Total labor costs	(28.48) 373.77	0.25	Loss	420	5	0.1	Waste	9.75	0.13
Seed	49.37	0.03	Tax &license	1638	19.5	0.39	buying price	213.5	4.27
Fertilizer	105.87	0.07	Capita cost	126	1.5	0.03	Total cost	258.9	5.18
Chemic	28.8	0.02	Buying cost	3696	44	0.88	Selling price	271.5	5.43
Land tax	6.17	0	Packaging materials	1260	15	0.3	Gross benefit	271.5	5.43
Others (capital cost, maintenance ...	26.86	0.02	Administrative cost	1092	13	0.26	Net benefit	12.63	0.25
Total input cost	217.06	0.15	Total cost	13230	157.5	3.15			
Wastage (product loss)	391.27	0.27	Selling price	17934	213.5	4.27			
Total cost	982.11	0.67	Gross benefit	17934	213.5				
Selling price	1287.2	0.88	Net benefit	4687.2	55.8	1.12			
Gross benefit	1287.2	0.88							
Net Benefit	147.32	0.21							

Source: Own field survey, 2010 Key numbers in ( ) are maydays

Cost of production includes; Input costs constituting-seed, fertilizer, and chemical; Capital costs including-land tax, interest cost, Labor costs constituting -land preparation, Seedling & transplantation, Irrigation application, Weeding and cultivation, Harvesting and transporting;

and; others like maintenance cost and product loses. Production costs, costs of transportation and loses after harvest were included. Finally, to determine the costs required to produce one-kilo gram of tomatoes was calculated by dividing each cost components to the average products produced. To produce and market 14.6577 quintals of tomatoes from 0.16 ha land, in average, 982.11 ETB was estimated to be required. This means, 0.67 ETB was required to produce and market one-kilo gram tomato fruits. On average, costs of product loss, labor cost, input cost, and other costs constituted 39.84%, 35.15%, 18.71%, 3.35% of the total cost required respectively. Out of the total costs, product loss was the major cost incurred followed by labor costs (see in Figure 4.5.2 below).

Figure4.5.2: Cost distribution for Farmers



Source: Own construction

Loses of products occurred both in pre and post harvest stages majorly caused by pest, flood, drought for the former stage and lack of market by poor handling for the later stage. Generally, on average, a total labor of 28.48 person-days was required at 15 ETB/man days that is equivalent to 439.73 ETB. Major sources of labor costs constituted; harvesting and transporting, weeding/cultivation and chemical application, irrigation and fertilizer application, land preparation, and seedling and transplantation were 36%, 23%, 18%, 14%, and 9% of the total labor costs respectively. The data indicate that, harvesting and transporting cost was the

major labor costs followed by irrigation and fertilizer application. From the total input costs, cost of fertilizer was the largest followed by seed and chemical costs respectively.

Farmers incurred two types of transportation costs namely, Local transport from the farm to roadside collection centre and transport from village to towns; Donkey cart is the predominant mode of transport in the village, from farm to roadside farm gate market. Farmers may use either their own animal cart or others' through rent. Head loading is almost exclusively done by women and children or by daily labors, usually from farm to village, but it is an inefficient mode of transport. Aside from health implications, it is very expensive due to the opportunity costs of time involved, limited carrying capacity, and limited distance that can be covered. Similarly, farmers may use majorly animal cart, and rarely do they use vehicles like mini-bus and small tracks to transport product from village to open markets of Kobo town. Harvesting and transportation cost might be higher in pick periods, transportation –Producers transport their products by rent cart from farm to main roadside at a cost of 4 birr/1 Kassa (1 Kassa=50 Kg tomato).

4.5.2. Cost of Distribution

(a) The average cost of trading tomatoes from farm gate of the wereda in question is determined by respondent traders and crosschecked with views of local dealers. The trading costs were calculated based on the responses of in the previous season, and include:

(i) The cost of all materials used for trading of 1 of 50 kg of tomatoes (The major costs of whole sellers included; buying cost, transportation cost, and local taxes &working licenses, packaging materials &tools, administrative costs, distribution costs, grading, loading and unloading costs, costs of buying commissions, product loss, storage costs, and capital costs.).

(ii) The total value of the labor required through the season for all operations, charged at the opportunity cost of household labor (usually equivalent approximately to the cost of hired labor in the local wage rate).

(b) The total cost of trading is divided by the average traded fresh tomatoes in the previous season.

As indicated below in Figure 4.5.3, the three major costs of distribution that whole sellers incurred includes, transportation costs, local taxes and license costs, and packaging material

costs, which accounts, 19%, , 12% and 10% of the total costs respectively. Following to these costs, costs of distribution, administrative costs, grading and loading-unloading costs, product loss and cost of commission at farm gate respectively attributed 8%, 8%, 6%, 3% and 3% of the total costs incurred. By far, buying costs was much smaller than distribution cost that was 28% and 72% respectively.

According to local dealers' & traders' information, local dealers link Mekele whole sellers with tomato producers at a commission rate of 0.1birr for each kilogram of tomatoes, and a processing labor costs of 7.50 birr to sort, grade, pack, weigh, and load one wooden crate tomatoes(1 kassa or 50kg). They also paid a local tax at 300 birr/ 42 qt of tomatoes level. Generally, excluding buying costs, traders cost 1350 birr at farm gate level /one Isuzu tomatoes that constituting 1050birr for local dealers and the remaining for local revenue authority.

The average transportation cost incurred to transport a wooden crate of tomatoes from farm gate to Mekele was estimated 29.50 birr or 2478 birr/ Isuzu track , a capacity of 42 qt. Transport costs vary in accordance to the distance and type of vehicle used and averages for each district has been used. Transportation is one of the most significant cost elements in the commodity chain. It varies according to factors such as mode of transport, distance, road conditions, and season.

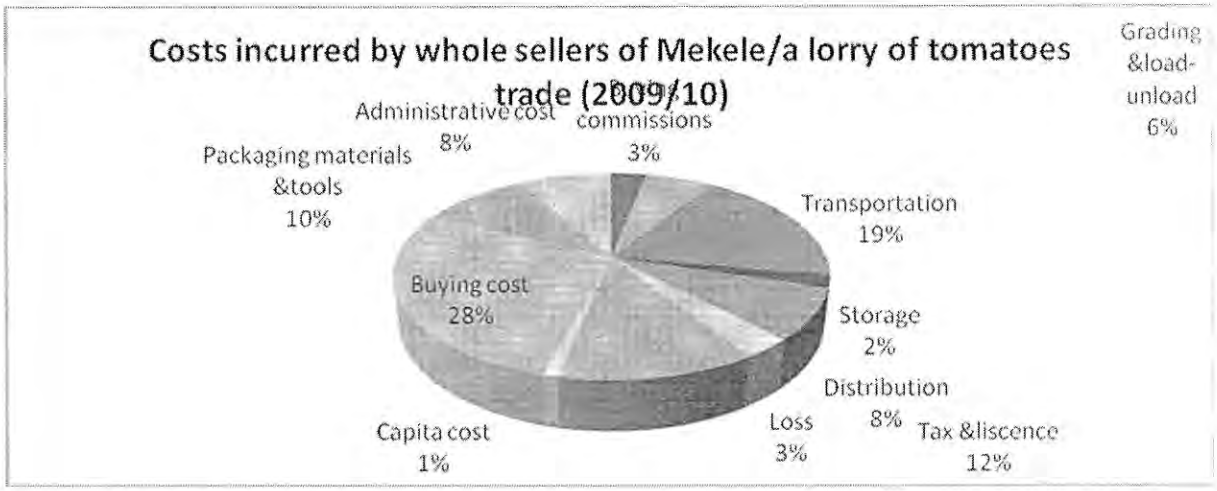
Larger wholesale traders based in urban centers such as Mekele, hire trucks to go directly to rural Woredas where they buy from village dealers who have assembled relatively large quantities of produce. Usually, traders use rent vehicle at individual level but sometimes they use rent vehicle when production supply become low. It was pointed out that the carrying capacity of the vehicle influences the transport cost, i.e. the use of larger Lorries leads to economies of scale resulting in lower per unit transport charges. Other factors highlighted as influencing transport costs were the level of fuel prices, and the fact that vehicles often have to travel empty to the more remote Woreda to collect agricultural produce.

To unload tomatoes at destination point of Atikilt Tera (vegetable market) in Mekele, traders paid 2birr/ wooden crate of tomatoes and an average of 1.64 birr were estimated to store tomatoes in a rent house. A total of 12.5 birr was incurred to distribute a kassa of tomatoes. Distribution cost includes labor costs in weighing and packing, communication costs, and

security. Traders also paid an estimated of 3000 birr/month for working licenses. With the assumption of four-trip tomato trading, one-fourth of the cost of working-license was taken in whole sellers' cost analysis. The average estimated tomato loses was 2.28 birr/ a kg of tomatoes.

Generally, traders incurred 157.7 birr / one wooden crate of tomatoes, which constituting 43.9 birr buying cost and 113.8-birr distribution cost. An average of 13230 birr a total working capital was required to buy and distribute 42 qt tomatoes, from Kobo to Mekele consumers.

Figure 4.5.3: Cost of distribution incurred by Mekele wholesale traders



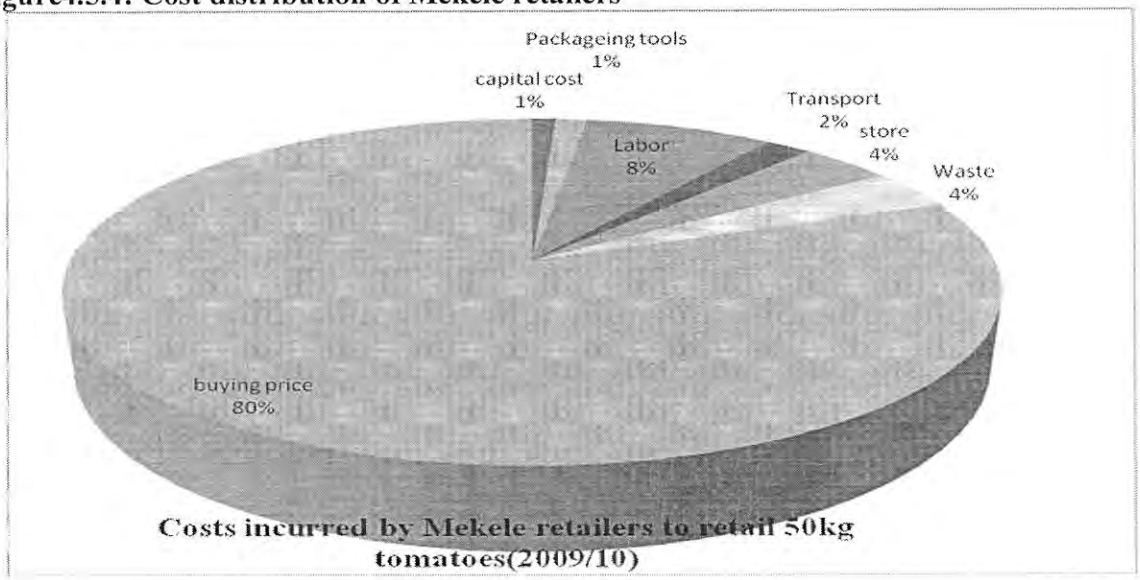
Source: Own field survey, 2010

Costs incurred by Retailers of Mekele

As indicated below in Figure 4.5.4, out of the total average costs incurred by retailers, 20% was costs of distribution while the remaining 80% was buying cost. Labor cost was the major distribution cost followed by product loss and storage costs. Generally, the average costs required to retail 50 kg tomatoes was 258.9 birr. Inner-urban transport is characterized by a multitude of modes of transportation reflecting usually congested market places. They include, often in combinations: Humans carrying goods on their heads or backs; Intermediate means of transportation such as pushcarts, or wheelbarrows, Motorized transport such as mini-buses and taxis. Diversified means of transportations were used in cities like Mekele, among which, taxi and carrying were the major means of transportation of tomatoes. Retailers' retail in different parts of the city, the average cost incurred to transport a kassa (50kg) of tomatoes was 5 birr.

Retailers also paid for working licenses, rent for land plots of markets, on average, 6birr/1 kasa was estimated. Like the other chain actors, they cost 9.75 birr/1 kassa of tomato retailing. Generally, on average, a capital of 258.9 birr was required to buy and sell 50 kg of tomatoes, constituting 271.50 birr buying cost and 45.38 birr as distribution cost.

Figure4.5.4: Cost distribution of Mekele retailers



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Source: Own survey, 2010

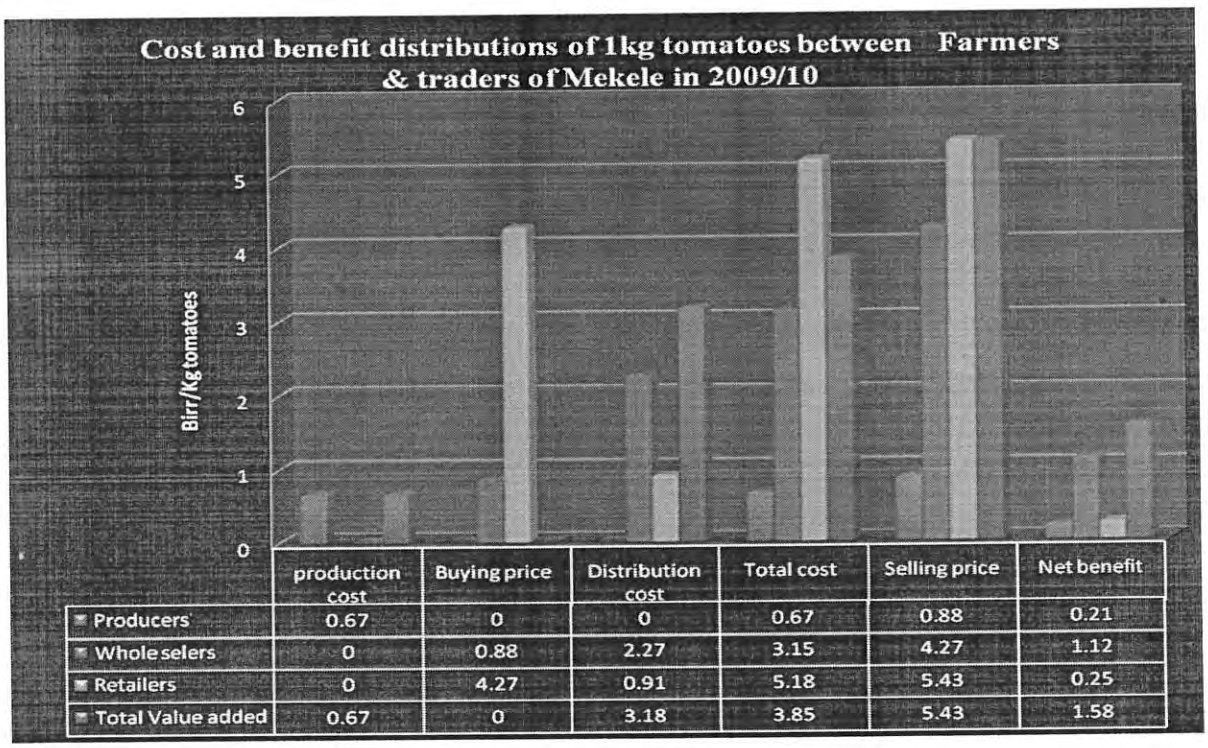
4.5.3. Cost and benefit distributions

Producers incurred 0.67 birr to produce & sell a single kilogram of marketable fresh tomatoes to Mekele whole sellers. This production cost covered 17.40% of the total costs required to produce and distribute one kg of tomatoes to Mekele consumers. As we can see from the Figure 4.5.6 below, the remaining 83.60 %(3.18 birr) of the total cost was costs of distribution, covered by Mekele traders constituting 58.96% (2.27 birr) by whole sellers and retailers covered the remaining 23.64 % (0.91 birr) of the total cost. Finally, a single kilogram of tomatoes took 3.18 birr to produce and distribute to Mekele consumers.

Producers obtained a net of 0.21 birr out of a single kilogram of marketed fresh tomatoes to Mekele whole sellers, this benefit covered 13.29 % of the total net benefits of a kilogram of tomatoes obtained after sold to Mekele consumers. Mekele traders shared the remaining 86.71% (1.37 birr) of the total net benefit constituting 70.87 %(1.12 birr) by whole sellers and

retailers enjoyed the remaining 15.82 %(0.25 birr) of the total net benefits. Finally, a single kilogram of tomatoes gave yields a net benefit of 1.58 birr, in its path from farmers to consumers.

Figure 4.5.6: Cost and benefit distribution



	production cost	Buying price	Distribution cost	Total cost	Selling price	Net benefit
Producers	0.67	0	0	0.67	0.88	0.21
Wholeselers	0	0.88	2.27	3.15	4.27	1.12
Retailers	0	4.27	0.91	5.18	5.43	0.25
Total Value added	0.67	0	3.18	3.85	5.43	1.58

Source: Own field survey, 2010

Conclusion and Recommendation

Conclusion

Farmers of Kobo produced three times in a year in irrigation. In Golina irrigation scheme, cereal production is the leading subsector having the maximum coverage along the three production seasons followed by vegetable. Onion and tomato are the major crops produced in the Wereda in general and in the scheme in particular. Kobo wereda has become the major sources of onion supply to different parts of the country. Unlike onion, tomato has not organized types of markets, hence, farmers are forced to sell their product to limited major buyers of Mekele traders with little share of local buyers of kobo. Mono cropping practices of onion associated with supply of poor quality of seeds has exposed the crop to high rate of insect and diseases incidences. These constraints along chronic moisture stress of the area made the potential productivity of the crop very low.

There was lack of coordinated service delivery system in Golina modern irrigation scheme. Extension and research sectors had poor linkage in developing, demonstrating and transformation of effective technologies to end users. Moreover, there was lack of trainings given for farmers on areas of input applications, credit advantages and allocations, post harvest handlings, market management and information systems. The cooperative is so weak to provide sufficient inputs and market out puts of its members. The cooperative had not any legal entity; hence, it ran with less capita, human, material and physical resources. Unlike other legal cooperatives, it failed to buy inputs in credit arrangements and sell members out put through legal procedures. Most farmers used informal input channels for factors of; ease of affordability, ease of availability, accessibility, input supply divisibility, bad experiences of seed germinations sourced from formal channels, the establishment of forward and back ward linkages with Mekele vegetable traders. On these facts, there was no any system to make quarantines of inputs delivered by informal traders; as a result, informal traders might pump expired chemicals and poor qualities of seed.

High amount of tomato loses was recorded both in field and after harvest. Field loses were caused by drought, flooding, insects and pests. Such problems rose from two major categories; the first factor was due to lack of technical advises and the second was lack of harvesting

harvestable tomatoes due the fear of lack of markets. Similarly post harvest loses were due to deteriorations of product qualities and absence of buyers that caused by over supplies.

Absence of effective markets and information management systems make farmers the victims of mono channel marketing system with low price negotiation powers. Moreover, local dealers work toward the interest of large buyers of tomato and suppress farmers along the process of marketing. Local dealers run the interests of traders in price setting and negotiation processes. Farmers produced tomato on the faces of market insecurity, unmanageable natures of price fluctuations, trends of monopolized natures of markets, experiences of frequent dumping of tomatoes both in field and in Kobo markets.

Tomato marketing seems to be under the control of few buyers but large volume buyers, such traders close the entries of other potential buyers. Farm gate market was the major market at which farmers sold tomatoes to Mekele traders. In the absences of such larger buyers, farmers used Kobo markets to sell their products for different segments of buyers. Kobo markets did not absorb much of the supplies. Therefore farmers had been faced the worst experiences in dumping tomatoes at open markets and feeding cattle with tomatoes. Marketing problems forced them to create strong bond with the only Mekele traders with any lower selling-price arrangements. As a result, farmers are said to be price takers having insignificant price negotiation powers.

Farmers incurred a total cost of 0.67 birr to produce one kilogram of tomatoes and obtained only 0.21 net birr out of the total net benefits of 1.58 birr/kg. The largest cost for farmers was cost of product loses that occurred both in field and in markets. Labor cost was also the largest cost incurred by farmers. The largest cost incurred by Mekele traders was cost of transportation while cost of buying was for retailers. Much of the benefits accrued to Mekele traders, farmers deserved the least benefit out of the total benefits distributed. Whole sellers enjoyed 1.12 birr/kg that was the larger portion of the total benefits.

Recommendation

- Improving cultivation services and post harvest handling techniques; providing pest management services, supply of packaging material services, delivery of information services, functioning financial services, networking transportation services and markets, etc., needs to be focused in developing desirable growth of the subsector. This will reduce much of the costs and increase profitability for all actors.
- Searching potential markets and strengthening market linkages may improve the market performance and its competences. This will avoid monopolies and invite the entry of potential traders. Creating coordination between producers, local dealers and large traders through forums and discussions is essential to develop common understanding between chain actors for fruitful coordination in the value chain system.
- It is also important to develop the farmers' access to backward (seed, fertilizer, pesticide and other inputs) and forward (trading, wholesaling) markets for improving their profitability. Encouraging farmers to integrate vertical and horizontal activities in production and marketing processes.
- Formal input channels majorly focused in supplying fertilizers with little share to seed & chemical. Hence, they should be strengthening by solving problems of delays of delivery, promotion of credit awareness, seed and chemical quality control and guarantying cooperative with legal entity. Strengthening the present association as well as developing new producer and marketing cooperatives will help to develop the entire subsector. The association can play a number of critical activities and can work as the central hub for the improvement of the subsector.
- Moreover, Inputs introduced by illegal traders and informal sources need to be monitored and pass through quarantine systems. Formalization of informal input traders can be one of the means to monitor input quality and to improve the bases of input system.
- Absence of provision of value addition of tomato is also critically affecting the growth and profitability opportunities of a large number of farm households who are engaged in the tomato cultivation and sales process. Efforts should be made to promote small-scale

household level processing technologies like preparation of juice, drying of fruits, etc to support both household consumption and income.

- Private sector investors can be encouraged to invest in input supply and output processing and distributions. Standardization (testing, certification) of agricultural inputs (seed, fertilizer, pesticide) is required.
- Regulating trade of vegetables is critically important to minimize the burdens of imperfect markets from the shoulders of the poor producers. Creating effective coordination between service providers like agricultural research and extension will improve the generation and transformation of technologies.

References

Altenburg, (2007). "Donor approaches to supporting pro-poor value chains". A Report prepared for the donor Committee for Enterprise Development Working Group on Linkages and Value chains, German Development Institute.

Bezabih Emana and Hadera Gebremedhin, (2007). Constraints and Opportunities of Horticulture Production and Marketing in Eastern Ethiopia, DCG Report No. 46, Addis Ababa.

Central Statistical Authority (CSA), (1994). Ethiopia Agricultural Sample Enumeration 2001/02: Result for Amhara region, Statistical Report on Area and Production of Crops, Part IIB, Addis Ababa.

CSA (Central Statistical Agency), (2007). Abstract of population estimation of Ethiopia, Addis Ababa

Christoph Arndt, Kelly Cormier, Eugene Ryzanov, (2005). "Value chain management and poverty Alleviation in rural areas" : Project Experience of Kyrgyzstan, Kyrgyzstan.

Co-SAERAR and CECE P.L.C. (Commission for Sustainable Agriculture and Environmental Rehabilitation in the Amhara Region and Concert Engineering and Consulting Enterprise Private Limited Company), (1999). Development Plan Report for the Kobo- Girana Valley Development Program. Bahirdar, Ethiopia.

Demelash Seifu, (2003). A review on Agricultural marketing problems and possible solutions in Amhara region, Bahir Dar, Ethiopia.

Da silva, C., (2005). The growing role of contract farming in agro-food systems development: drivers, theory and practice. AGSF Working Document 9, Agricultural support systems, Division, FAO.

District Agriculture and Rural Development Office, (2009). Base line data of North Wollo Zone, Amharic version (Unpublished).

District Agricultural and Rural Development Office, (2010). Annual report on the performance of agricultural development, North Wollo zone, Amharic version, (Unpublished).

District Agricultural and Rural Development Office, (2010). Annual report on the performance of agricultural development , Kobo , Amharic version, (Unpublished).

District Agricultural and Rural Development Office, (2010). Annual report on the performance of agricultural development , Kobo wereda , Amharic version, (Unpublished).

Dolan, K, C. and J. Humphrey, (2000). "Value chains and upgrading: The impact of UK retailers on the fresh fruit and vegetables industry in Africa", Journal of Development Studies, Vol. 37, No. 2, pp. 147-176. www.ids.ac.uk/global, accessed on June 22, 2010.

ECA (Ethiopian Customs Authority), (2010). Amount, Price, Destination of Commodities Exported from Ethiopia from the Year September 1997 to September 2009, Addis Ababa.

ECA (Economic Commission for Africa), (2009). A Working Document: Developing African Agriculture through Regional Value Chains.

FAO. (2000). FAO Regional Expert Consultation on Farm-Agribusiness Linkages, Bangkok, Thailand, and 18-21 September 2000 (unpublished).

Fiona Wilson, (2004). The Impact Study; Group of the Joint Ethio-Danish Development Program,

Frank Lusby hennery Panlibuton, (2007). Value chain program approach: Promoting market based solutions for MAME and Industry competitiveness .S.Agency for Institutional Development Office of Microenterprise Development, Washington, DC, WWW.actionforeenterprise.org.

G/ Woldewahid1, Gebremedhin, k. Berhe and d. Hoekstra,(2009). Changes in response to integrated interventions in the value chain of vegetables: The case of Atsbi-womberta district of Tigray Region, northern Ethiopia, IPMS- ILRI, Addis Ababa, Ethiopia.

Girma Abera Jibat, (----). Associate Research Officer/Horticulture Research Division, Oromiya Agricultural Research Institute.

Karl M., Rich Derk Baker, Asfaw Negassa and Brent Ross, (2009). Concepts. Applications and

Extensions of Value chain analysis to livestock system in Developing Countries: Contributed paper prepared for presentation at the International Association of Agricultural Economists Conference, Beijing, China, and August 16-22, 2009.

Joosten. F., (2007). Development strategy for the Export Oriented Horticulture in Ethiopia: Wageningen University, Netherland.

Lemma Desalegn, (2002) . Tomatoes: research experiences and production prospects. Research Report No 5. EIAR, Ethiopia.

MOA (Ministry of Agriculture), (2007). Annual statistic official report on Agricultural Export Commodities, Amharic Version, Addis Ababa.

MOA (Ministry of Agriculture), 2006. Agricultural policies, programs and targets for a plan for accelerated and sustainable development to end poverty (PASDEP) 2005/6-2009/10. Addis Ababa

MOA (Ministry of Agriculture), (2009). A Manual to produce vegetable; RCBP, Addis Ababa, Ethiopia, www.moard.gov.et, accessed on December 18, 2009

MoFED (Ministry of Finance and Economic development), (2010). Draft Report on: Growth and Transformation Plan (GTP) 2010/11-2014/15, September 2010 Addis Ababa.

Raphael Kaplinsky and Mike Morris, (2000). A handbook for value chain Research Prepared for the IDRC by for in the Bellagio Workshop, www.centrim.bus.bton.ac.uk/ and on January, 2010

SWHISA, (2007). PRA diagnostic report: On Assessment of Challenges and Opportunities of modern and traditional irrigation schemes of Amhara Regional State: the case of Golina Kobo Woreda., Bahir Dar Ethiopia.

Syde Tamjid Ur Rahman and Mahmud Hossain Change Maker, (2009). Tomato value chain analysis the case of Afghanistan: Enhancing farmers' profitability through value addition society for Social and Economic Development, USA.

UASID, (2007). "'Ethiopia Four Thousand Tons per Day: A Global Development Alliance with the Heinz Group' represented in Egypt, Workshop on Value Chain Development: December 3-6, 2007, Semiramis Intercontinental Cairo, Egypt.

WB, (2005). Back ground report; Opportunities and challenges for developing high value agricultural report in Ethiopia; A draft document on poverty reduction and economic management, Country department for Ethiopia, African Region.

Wilhelm Elfring, Yohannes Agonafir, (2005). SNV Support to Business organizations and their access to markets (BOAM), Value chain identification for intervention; progress report, Addis Ababa, April 2005. www.snvworld.org/en/countries/ethiopia.accessed on December 19, 2009

World Report Fall, (2006). The value chain approach; Strengthening Value chains to promote Economic Opportunities in Africa WWW.acdivoca.org/852571DC00681414/ID/resource. Accessed on December 19, 2009

-------, (2008). "Regional Competitiveness: creating an east African Economic Strategy." A Presentation at the east African Business Summit, Kampala, Uganda, 18 July 2008.

Appendices

Part One: Questionnaire for vegetable producers

Remark: The following questions have been set to understand vegetable value chain in Kobo Woreda modern irrigation schemes. The answers are confidential and will not have any consequence on you personally in any ways. Please give correct answers to the following questions

Interview Scheduling:

Serial no: _____

Date of interview: _____

Name interviewee (include grandfather): _____

Name of peasant association _____

Name of interviewer: _____ Signature: _____

1.1. Household Characteristics (General information) 1. 2. Household member's information

Age category	Sex		No of family members work on the farm full time		No of family members who work part time work		Education level			
							On education		Non educated	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Children <10										
Children 10-14										
Between 15-64										
Elderly >64										

1.3 Household asset condition

8. What are the major assets, which indicate wealthiest people in your PA?

_____

9. What types of peoples are categorized under rich category of people in your PA?

_____

10. What types of people are categorized under poor category of people in your PA?

_____

11. List wealth indicators in your community._____

12. Can you rank your wealth status in your society? 1. Poor 2 .Medium 3. Rich

1.4 Live stock holding

1.4.1 Indicate the livestock types you own in (2009/10).

Cattle	Number	Shot	Number	Pack animals	Number	Remark
Oxen		Sheep		Donkeys		
Bulls		Goats		Mules		
Cows				Horses		
Calves				Camel		

1.5. Farm implements

1.5.1 What type of farm implements do you use for vegetable production? (Indicate price & year of purchase)

No	Type of farm equipment	Number	Year of purchase	Cost of purchase	Expected life
	Plough/shovels				
	Hoe				
	Rake				
	Harrow				
	Pump				
	Others				

1.6. Landholding and farm characteristics

13. Do you have your own land? 1 = No 2 = Yes

14. If your response for Q.42 is yes, what is the total land holding (in timad)_____

15. If your response for Q.42 is yes, what is the total cultivated land holding (in timad)_____

1.6.1. out of the total land holdings, how many timad were allocated for tomato in 2009/10?

Land type	Land size in Timad	Irrigated		Rain fed only
		Modern irrigation	Traditional irrigation	
Crop land				
Homestead				
Grazing land				
Fruit garden				
Others. specify				

1.6.2. Show the allotment of your modern irrigation land in 2009/10.

Plot number	Land size (Timad)	Distance from home (km)	Crops grown	Ownership	Accessibility of the plot	Soil characteristics		
						Soil type	Slope	Fertility
P1								
P2								
P3								
P4								
P5								
others								

Remark * Crops grown = 1) tomato 2) onion 3) Sorghum 4) Chickpeas

5) 6) maize 7) Garlic 8) Lin seed 9) specify if others_____

* Ownership owned = 1) Rented in 2) Borrowed 3) Inherited 4) Received from PA

* Accessibility of the plot = 1) Has all whether road 2) = Dry season road 3) No road 4. Others_____

* Soil type = 1) Clay soil 2) Loamy soil 3) Sandy soil

* Slope = 1) Plain 2) Moderate 3) Steep

* Fertility = 1) Fertile 2) Moderate 3) Not fertile

* Moisture Stress problem = 1) High 2) Medium 3) Low 4) No

If you received, land from others or give your land for others, answer the questions indicated in the table below accordingly

Land arrangement category	Put 1 if it is Yes otherwise 2	Land type*	Types of agreement**	Gained benefits****
'Land received' in				
1.Leased from others				
2.Sharecropping				
'Land given for others in '				
1.Rent				
2.Share cropping				

Key

Land type * 1. Modern irrigated 2.Traditionally irrigated 3. Rain fed

Types of agreement**, For share cropping, indicate the amount of shared crop to be received based on agreement as 1= 1/3 2 = ½ 3 =1/4 4= 2/3,

For renting, indicate the agreed value of the land in birr/cropping seasons or year

Gain benefits ****, For share cropping, Indicate the actual amount of crop share gained from the total produced crop (indicate the crop type produced and share received), **for renting,** indicate the actual amount of money paid or received for the land

18. Do you have stored grain? 1. Yes_____ 2. No_____

19. Do you have Cash savings? 1. Yes_____ 2. No_____

20. Have you faced food shortages in the past 5 years? __ 1. Yes 2. No

20.1. If yes, how did you overcome?

1. Selling cattle 2. Borrowing from relatives 3. Off farm activities 4.Aids 5. Others

21. Do you cultivate / manage your irrigated land by yourself? 1. Yes 2. No

21.1 If you cultivate your land by yourself what was your source of labor to cultivate your land in 2009/10? (Multiple responses is possible)

1. Son 2. Daughter 3. Relatives 4. Hired labor 5. Myself

6. Labor exchange 7. Combination 2 or more answers

21.2 If you are not cultivating your land by yourself what is the reason? 1. Lack of labor 3.Lack of seed and fertilizer? 2. Lack of oxen 4.Other (specify)

1.7 Off farm income generating activities

22. Did you have other sources of income in 2009/10? 1. No 2. Yes

22.1. If your answer is yes, what were your sources of income? (Multiple responses is possible)

1. Remittance 2. Food aid 3. Off farm income 4. others

22.2. If your answer for Q.22.1 is off farm income-generating activities, what were these activities? (Multiple responses is possible)

1. Food for work 3.Small and medium enterprises_____ 5. combination of 2 or more
2. Daily labor_____ 4. Trading_____

22.3. If your answer for Q.22.1 is off farm income generating activities, who was involved on these activities? (Multiple responses is possible)

1. Yourself 2. Your sons 3. Your daughters 4. Combination of 2 or more

23. What percent of your household expenditure was covered by the following income sources ?

1. Off-farm income generating activities _____ 2. Remittance _____ 3. Food aid_____

2.1 Vegetable production

24. Did you produce vegetable in 2009/10? 1. Yes 2. No

24.1. If your response for Q. is no, what is your reason? _____

1. Lack of interest 2. Lack of labor 3. Inaccessibility of land to irrigation schemes

4. Disease and insect problem 5.Lack of knowledge 6. Lack of inputs and technologies

7. It is not profitable 8. Lack of market 9. If others, (specify) _____

25. When did you start producing vegetables (E.C)? _____Year

Fill the following table based on your under modern irrigation production in the year 2009/10

Production season	Crop type*	Size of land in timad	Yield in quintal	Consumed in Kg	Sold in Kg	Total income
Primary irrigation period						
Secondary irrigation period						
Supplementary irrigation period						

Key: * Type of crop

1=tomato 2=potato 3=onion 4=pepper 5=cabbage 6. Cereals **Indicate whether you use the following improved technologies or not for the listed vegetables.**

Crop	Seed		Chemical		Fertilizer		Indicate Sources of inputs		
							Seed	Chemical	Fertilizer
	Yes	No	Yes	No	Yes	No			
Tomato									
Onion									
Pepper									

Key: 1= Yes 2= No

2.2. Tomato production and technology

26. Did you produce tomato in the year 2009/10? 1. Yes 2. No

If, your response is yes, indicate the answer the following questions accordingly in the table below

Land type	Allocated Land size In timad	Total Production in of tomato in qt	Variety used in Kg or local unit		Fertilizer used in Kg		Manure or compost in kg	Chemical used in Li or Kg
			Improved	Local	Urea	Dap		
Modern irrigation								
Traditional irrigation								
Rain fed								
Homestead								
Others								

26.1. If you did not produce tomato under modern irrigation in the year 2009/10, what was your assumption? (Multiple responses is possible).1. Lack of inputs 2. High price of input 3. Risk of low price

4. High price of other crops 5. Two or more combinations of responses_____

27. What are the types of tomato varieties you use in modern irrigation? _____

28. When did you get these varieties (year/s)? _____

29. Where did you get these varieties? 1. WoARD 2. SARC 3. Open market
4. Neighbors 5. NGOs 6. Unknown source

30. If you use pesticides, where do you get them? _____

1. Agriculture office 2. Legal/Known source in market 3. Illegal/Unknown source in market 4. Cooperatives 5. Fellow traders 7. NGOs 8.Others

33. How many times you plant tomato per year. 1. One 2. Two 3. Three

34. How many times you plough your land for tomato planting.

1. One 2. Two 3. Three 4. Four

35. What is your ploughing technique? _____

36. Do you prepare tomato seed? 1. Yes 2. No

37. How do you plant tomato? 1. Transplanting 2. Broad casting

37.1. If you use broad casting technique, explain your reasons_____

37.2. If you transplant, how do you plant it? 1. Raw planting 2. Non-raw planting

38. Do you raise seedlings? 1. Yes 2. No

39. What did you use to increase land fertilities in 2009/10?

1. Manures 2. Fertilizers 3.Mix of manures and fertilizer 4. Others____

40. If you used fertilizer in 2009/10, did you apply both Urea and Dap to tomato? 1. Yes 2. No

40.1. If you applied only one of the fertilizer types, explain the reasons_____

41. How do you irrigate tomato? 1. Rowing 2.flooding

41.1. If you use flooding type of irrigation, why you prefer it? _____

42. How many times did you irrigate tomato in 2009/10 production season? _____

43. Do you prone tomato plant? 1. Yes 2. No

43.1. If your response is no for Q.43, explain the reason _____

44. Do you make support system to tomato? 1. Yes 2. No

44.1. If your response is no for Q.44, explain the reason _____

45. How do you manage weed in tomato? 1. Chemical 2. Weeding 3. Both methods 4. Others

47.1. If your response is yes for Q.47, what do you use to minimize the problem? _____

48. What materials do you use to collect tomato produces from your farm?

1. Sack 2. Basket 3. Plastic bag 4. Wooden box, 5. Plastic box (Kasa)

6. Combination of 2 or more responses. 7. Others

49. Did you face wastage or damage of tomato before harvesting? 1. Yes 2. No

49.1. If your response is yes for Q., what was the reason? _____

49.2. What was the amount of wasted tomato in kg due collection? _____

50. Did you face wastage of tomato after harvesting? 1. Yes 2. No

50.1. If your response is yes for Q.50, what was the reason? _____

50.2. What was the amount of wasted tomato in kg due collection? _____

Indicate severity of problems in tomato production under modern irrigation Use

Crops	Problems	Not a problem	Little	Medium	High	Put Remarks
Onion	Insect					
	Diseases					
	Low output price					
	Market insecurity					
	High input price					
	Input scarcity					
	Canal damage					
	Moisture stress					
	Labor shortage					
	Poor service delivery					
	Capital shortage					
	Transport shortage					
	Storage					
Tomato	Insect					
	Diseases					
	Low output price					
	Market insecurity					
	High input price					
	Input scarcity					
	Canal damage					
	Moisture stress					
	Labor shortage					
	Poor service delivery					
	Capital shortage					
	Transport shortage					
	Storage					

51. What alternative solutions did you take for the above selected problems identified as very high and high types of problems/ constraints? _____

52. What alternative solutions do you suggest to solve each major constraint you mentioned as high and very high? 1._____

2.3. Cost of production of tomato

2.3.1 Estimate the amount of inputs you used for producing tomato in modern irrigation land to produce tomato in the year 2009/10.

No	Item	Amount used /One timad land	Unit price	Total price	Source of input
	Seed/seedling				
	Fertilizers (Urea & Dap)				
	Chemicals				
	Irrigation maintenance costs				
	Packing materials				
	Transport cost				
	Overheads & m'gemt				
	Storage rent				
	Land rent/tax				
	Total variable cost				

2.3.2 The amount of labor in person-days required producing tomato from one timad of your land.

No	**Labor costs of tomato production and marketing**	**Hired labor(in man days)**	**Family labor(in man days)**	**Total labor(man days)**	**Wage rates/man day**
	Seed bade preparation				
	Seed preparation				
	Seedling growing				
	Land preparation				
	Planting or transplanting				
	Irrigating				
	Fertilizer application				
	Weeding and cultivation				
	Chemical application				
	Harvesting				
	Transporting				
	Selection/processing				
	Storing				
	Loading unloading				
	Promotion				
	Selling				
	Others, specify				

2.3.3 Fixed cost

No	Cost	Unit	Amount	Unit cost	Total cost
	Land rent (value)/timad				
	Machinery rent (if any)				
	Irrigating tools				
	Irrigation fee				
	Farming tools				
	Interest payment				
	Others, specify				

2.4. Role and level of participation in vegetable production

53. Have you ever served as contact farmer in the package program? 1. Yes 2. No

54. Social status of the household head in the PA

1. PA executive member 2. PA cadre 3. Religion leader
4. Edir & other social committee member 5. Other, Specify _____

55. In which of the following informal institutions are you involving?

1. Idir 2. Ekub 3. Jigie

4. Water unit 5. Other, Specify _____

56. Do you think women have active role than men in vegetable value chain? 1. Yes 2. No

2.4.1 Decision making Power

57. Do you think that there is difference in the decision making power of FHHs and women in MHHs on the production process of vegetables? 1 = No 2 =Yes

58. Do you think that there is difference in the decision making power of FHHs and women in MHHs on the income obtained from vegetables and spices? 1= No 2 =Yes

58.1. If your answer for Q.58 is yes, can you elaborate the differences? _____

1. Cultural influence
2. Religious influence
3. Wealth status of the household
4. Presence/absence of male relatives of the women
5. Presence/absence of matured children
6. Health status of women's parents
7. Combination of 2 or more answers

59. What do you suggest as a solution to alleviate these decision-making power differences?

59.1. By women themselves_____

59.2. By men _____

59.3. By government_____

2.5. Information flow and service provision

60. How do you prefer to grow tomatoes? (Multiple responses is possible)

1. through training
2. Information from DAs
3. Information from neighbors and friends
4. By observing its market profitability
5. Combination of 2 or more

61. In which aspect do you have better information? (Multiple responses is possible)

1. Management of vegetables
2. Fertilizer use of vegetables
3. Improved seeds of vegetables
4. Treadle and water pump use
5. Pesticide use of vegetables
6. Market information of vegetables
7. All
8. Combination of 2 or more

62. How did you get this information? (Multiple responses is possible)

1. Extension agent 3. Radio 5. Neighbors and friends 7. Parents
2. Training 4. Field day 6. Posters 8. Combination of 2 or more

62.1. If you get information from extension agents, how many times did you contact with the extension agents in 2009/10? _____

63. Do you think that women need additional extension service that can address their needs and problems other than the common ones? 1. No 2. Yes

64. Which type of vegetables training did you get in 2009/10? (Multiple responses is possible)
1. Management of vegetables 3. Harvesting of vegetables 4. Composition of all
2. Marketing of vegetables 5. Combination of 2 or more answers

65. In which vegetable crops you need to have more training.
1. On tomato 2. On onion 3. On cabbage 4. If others, specify it

66. If someone needs to give training on tomato, which type of training you prefer more?
1. How to produce tomato 2. How to handle tomato after harvesting
3. How to get market information 4. How to preserve tomato for HH consumption

67. What government policies constrain your activities? _____

68. What government policies are good for your business? _____

69. How do you choose the people that you do business with? _____

70. If you get training in 2009/10, how many times did you get? _____

71. If you get training in 2009/10 for how long did you get? _____

72. Was the training you get easily understandable and practicable? 1. No 2. Yes

72.1. If your answer for Q.72 is no, how should be the way of training in order you to understand and practice it easily? _____

73. Did you visit a demonstration site or other farmers' fields of tomato to get experience in 2009/10?
1. No 2. Yes

74. If you get training /visit demonstration site or other farmers' fields of tomato what was its contribution to your production process of tomato. _____

75. If you did not get training/visit demonstration site or other farmers' fields in 2009/10, what is the reason? (Multiple responses is possible)
1. Cultural restriction 2. Undermining women's participation 3. Lack of time
4. To look after my children and my house 5. Since I am poor

76. Can you rank out the extension service provision to women? 1. Low 2. Medium 3. Good

2.6 Access to credit and inputs

77. Do you think that credit will help to improve your tomato productivity? 1. Yes 2. No

77.1. If your response for Q. 77 is yes, can you clarify how credit contributes to your tomato production? _____

77.2. If your response is yes for Q.77, yes, what amount of loan you took last year? _____

77.3. What was the source of credit?
1. Relative 2. ACSI 3. Friend farmer 4. Peasant association
5. Neighbor 6. Office of Agriculture 7. Others,

78. What was the purpose of borrowing?
1. To buy seed 2. To buy fertilizer 3. To buy farm implements
4. To buy food for consumption 5. Others, specify

79. From where did you get these inputs? (Multiple responses is possible)
1. Development agents 4. Private suppliers 6. Combination of 2 or more
2. Woreda of ARD 5. Cooperative 7. Other NGOs (specify)
3. Sirinka Agricultural Research Center

80. Did you face any problem in accessing these inputs? 1. Yes 2. No

80.1. If your answer for Q.80 is yes, what was the problem? (Multiple responses is possible)

1. Inputs are expensive 3. Financial problem 5. Combination of 2 or more
2. Inputs are unavailable 4. Remoteness of input selling site 6. If others, specify

81. How did you solve these problems? _____

82. Have you paid back your loans? 1. Yes 2. No

82.1. If your response for Q. 82 is 'No', why you did not pay fully?

1. Yield reduced due to drought 2. Low market price 3. Other

83. How do you evaluate the opportunity /access to credit vegetable production?

1 = low 2 = medium 3 = high

2.7. Marketing

84. Did you sell tomato produces in 2009/10? 1. Yes 2. No

84.1. If yes, to whom do you usually sell your tomato produces? (Multiple responses is possible)

1. Consumers 2. Intermediaries 3. Whole sellers 4. Retailers
5. Cooperatives 6.Combination of 2 or more answers 7. If others

85. Which one is more profitable for you? (Multiple responses is possible)

1. Selling to consumers 2. Selling to retailers 3. Selling to intermediaries
4. Selling to whole sellers 5. Selling through cooperatives 6. Others

86. What factors do you take into account when you negotiate prices with buyers? _____

How long do price negotiations usually take? _____

86.2 Does the amount of tomato product vary much between the wet and dry seasons? 1. Yes 2. No

86.3. If your response is yes for Q.86.2, what was the reason?

1. Very stable 2. Stable 3. Moderately stable 4. Instable 5. Highly instable

87. How stable are tomato product selling prices?

1. Very stable 2. Stable 3. Moderately stable 4. Instable 5. Highly instable

88. How does the trader assess the quality of tomato before buying the product? _____

89. When selling, do you receive higher prices for tomato products of higher quality?

1. Yes 2. No

90. What quality attributes receive the best prices? _____

91. On average, how long do you store the tomato product before you sell it? _____

91.1. If the store for long periods, why? _____

91.2. If you does not store for long periods, what was your reason? _____

92. How do you transport your farm products to market place?

1. Own donkey pulled cart 2. Rented donkey pulled cart 3. Hired human labor
4. Carrying by family labor 5. Renting vehicles 6. Others, specify

93. If you used (rented) transportation, how much you paid for it? _____ Birr.

94. Did you face wastage of tomato due to transportation problem? 1. Yes 2. No

94.1. If your response is yes for the Q.94, what was the reason _____?

94.2. What was the amount of wasted tomato in Kg _____?

98. Was there any problem you faced in vegetables market in 2009/10? 1. Yes 2. No

98.1. If your response for Q.105 is yes, what was the problem? _____

98.2. How did you solve these problems? _____

99. Did you store tomato? 1. No 2. Yes

99.1. If your response for Q.99 is yes, which types of vegetables did you store? _____

Rank the following buyers vertically* in order of their importance (1 if good, 2 if bad, 3 if I don't know)

Buyers	Price worthiness	Trust	Reliability
Consumers			
Whole sellers			
Retailers			
Cooperatives			
Rural assemblers			
Others			

Indicate the vegetable you produced and the buyers of your vegetable in 2009/10.

Crops	Volume of sold vegetable product (physical flow in qt) by market & residence of buyers in 2009/10									
	1	places	2	Places	3	places	4	places	5	places
Onion										
Tomato										
Pepper										

Key: 1 =consumer, 2= wholesalers, 3. Open market areas 4. Rural dealers, 5. Consumers

Indicate the price trend of tomato in 2009/10.

No	Type of buyers	Prices of tomato over months in 2009/10 per 1 kilogram tomatoes											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Consumers												
2	Whole sellers												
3	Retailers												
4	Cooperatives												
5	Rural assemblers												
8	Others												

Questionnaire for traders

Remark: The following questions have been set to understand vegetable value chain in Kobo Woreda modern irrigation schemes. The answers are confidential and will not have any consequence on you personally in any ways. Please give correct answers to the following questions.

Interview schedule for traders

Date of interview: _____

Name interviewee (include grandfather): _____

Name of Residence _____

Name of interviewer: _____

Signature of interviewer: _____

Section One

1.1 Household Characteristics (General information)

1. Household type_____: 1. Male headed 2. Female headed
2. Age of the household head _____
3. Marital Status of the household head: 1. Married 3. Divorced 5. Others, specify
   2. Unmarried 4. Widowed
4. Religion: 1. Orthodox 2. Muslim 3. Catholic 4. Protestant
5. Ethnic origin of household 1. Amhara 2. Tigray 3.Oromo
7.. Academic Status of the HH 1. Unable to write and read 2. Literacy program completed
   3.Primary education, grade (1-6) 4. Junior, between grade (7-10)
   5. 10th grade complete 6. Vocational

Section 2

2.1 Description of whole/retail selling activities

9. How long have you been in business as wholesaler?_____
10. Is it a family business? 1. Yes 2. No
11. How long do you intend to remain in the wholesaling business?_____
12. How many products do you trade in?_____
13. What are these products? _____
14. Why do you trade in these particular products?_____
15. Describe how the tomato products reach you from the farmers?
16. Describe what happens to the tomato product after you have sold it_____
17. What are the main areas of production of the tomato product?_____
18. What factors do you take into account when you negotiate prices with people who sell tomato product to you?_____
19. What factors do you take into account when you negotiate prices with people who buy tomato product from you?_____
20. How long do price negotiations usually take? _____
21. How stable are tomato product buying prices?
    1. Very stable 2. Stable 3. Moderately stable
    2. Instable 5. Highly instable
22. How stable are tomato product selling prices?
    1.very stable 2. Stable 3. Moderately stable 4. instable 5. Highly instable
23. In a typical week, how much tomato product do you sell? (ask to see records if they exist)_____
24. Does the amount of tomato product that you trade vary much on a weekly basis? 1.Yes 2. No
25. If your response is yes for Q., yes, what is the reason ?
26. Does the amount of tomato product vary much between the wet and dry seasons? 1. Yes 2. No
27. If your response is yes for Q 26., explain the reason ?
28. Are you aware of any wholesalers who export tomato product to neighboring town? 1. Yes 2. No
29. If yes, how important do you think this kind of trade is? 1. Important 2. Not important
30. Would you list down such exporters_____?
31. Do you experience problems in finding people who sell tomato product to you? 1. Yes 2. No
32. If yes, why?_____
33. Do you experience problems in finding people who buy tomato product from you? 1. Yes 2. No
34. If yes, why?_____
35. What are the best methods and conditions for storing tomato product?_____
36. How does the trader assess quality before buying the tomato product?_____

37. When selling, do you receive higher prices for tomato products of higher quality?
1.Yes 2. No
38. When buying, do you offer a higher price for higher quality cassava product? 1. Yes 2. No
39. What quality attributes receive the best prices?_____
40. On average, how long do you store the tomato product before you sell it?
41. If the store for long periods, why?_____
42. If you does not store for long periods, why not?_____
43. Did you experience tomato product losses? 1. Yes 2. No
44. If yes, how much you lose out of 50 kg tomato?_____
45. How profitable is tomato product trading compared with other products._____
46. What is the current difference between your buying and selling price of tomato product?_____
47. What is the usual difference in your buying and selling prices?_____
48. Do you buy the tomato product in different grades? 1. Yes 2. No
49. Do you sort the tomato product into different grades? 1. Yes 2. No
50. What sort of packaging do you use?_____
51. Why do you use that type of packaging?_____
52. Do you operate your own truck or pick-up van? 1. Yes 2. No
53. If yes, do you transport just for yourself or do you transport for other people as well?
1. To myself only 2. Both to myself and others
54. If the wholesaler only transports for yourself, why do you operate your own transport?_____
55. If you feel that it is appropriate, ask questions relating to transporters
56. Do you use credit or borrowed money? 1. Yes 2. No
57. From where do you usually get credit?_____
58. Try to distinguish between money that is being borrowed for fixed capital (storage shed) and for working capital (stocks)
59. If your response for Q., is no, is credit or borrowed money available to you? 1. Yes 2. No
60. If yes, why don't you use credit or borrowed money?_____
61. Do you offer credit to the people who buy tomato product from you?
62. If yes, why do you let them have credit?
63. Do you receive credit from the people who sell tomato product to you?
64. If yes, why do they let you have credit?_____
65. Does the number of and activity among wholesalers give the impression that competition is strong?
66. Are there any conditions that you have to fulfill before you enter wholesaling?
1. Yes 2. No
67. If yes, explain_____
68. How do the actions of the government/local authorities/trade associations affect your business?_____
69. How do you choose the people that you do business with?_____
70. Given a particular period, do prices in different towns usually move in the same direction?
1.Yes 2. No
71. Please describe what influences prices in different towns_____
72. How did you learn to become a wholesaler?_____
73. Have you ever received any business training? 1. Yes 2. No
74. What is the highest level of education that you attained?_____
75. In which of the following you participated?
1. Trader associations (get description of associations)
2. Seeking to supply new markets
3. Responding to changes in market requirements

4. Vertical integration
5. Interlocking markets.

76. How do you obtain information on:

1. Prices in your own market_____
2. Prices, supply and demand in other markets_____

Costs you incurred when you buy tomato from Kobo modern irrigation schemes in 2009/10.

Cost	Where do you buy it?	Amount of Purchased tomato *	Unit cost	Total cost	Remark
Transportation					
Storage					
Packing					
Loading and unloading					
Cost of tomato					
Promotion					
Tax					
VAT					
Other Payments					
Others					

Remark: * put the unit of purchased tomato quantity (example, in Kg, Wooden box, truck (42qt volume), etc.

Answer the following questions after you filled the above table.

77. From whom did you buy?_____
78. When did you buy?_____
79. When did you sell it ?_____
80. What was the selling price of tomato/a unit _____
81. Where did you sell it?_____
82. For whom did you sell it ?_____
83. What was the net benefit in birr_____?
84. Mentioned any other sources of tomato that you buy ? , When you buy? , Why you buy from them?

Key informant interviews, discussions and observation on vegetable value chain

Indicate your feeling in the table below about the trends of irrigation based production for the last five year

Crop	Production coverage	productivity	Product quality	HH Consumption	Market surplus	market opportunity	Price level
Tomato							
Onion							
Pepper							
Cabbage							

Key: 1= increases 2= stagnant 3= decreases

- ✓ Rank five major production constraints of tomato in irrigated modern schemes?
- ➢ _____
- ✓ What solutions have been taken by farmers to solve each constraint?
- ➢ _____
- ✓ What supportive measures have been taken by WoARD?
- ✓ What supportive measures have been taken by NGOs?
- ✓ What supportive measures have been taken by cooperatives?
- ✓ Is there market problem for tomato production? 1. Yes 2. No
- ✓ If there are market problems, could you list the problems in the order of importance?

- ✓ Who are the major victims of these problems?
- ✓ Who are the major beneficiaries in these circumstances?
- ✓ How these issues can be solved?
- ✓ What supportive measures have been taken by private sectors?
- ✓ What measures are required from the producers to improve their productivity?
- ✓ What measures are required from service suppliers to mitigate these challenges?
- ✓ What are the main market trends in terms of demand for tomato product in markets?
- ✓ Is demand rising or falling and how fast?
- ✓ What are the relative strengths and weaknesses of vegetable value chain?
- ✓ What are the key market channels through which product flows?
- ✓ What are the value chain governance systems for the main value chain channels or channel?
- ✓ What are the shares in and distribution of, the final consumer price among the various links of the main sub-sector supply chains?

Part two for traders

- ✓ What vegetable products did you trade?
- ✓ How much tomato can you buy once/week?
- ✓ From where did you buy products usually?
- ✓ Where did you sell products?
- ✓ Do you face marketing problem for your product?
- ✓ How do you see the quality of tomato you buy?
- ✓ What is the nature of supply and demand of tomato?
- ✓ How do you see the nature of inter relationships between traders and producers?
- ✓ What determinants they use in negotiating price while they buy from suppliers/producers?
- ✓ What determinants they use in negotiating price while they sell for their customers?
- ✓ What are the main factors that affect firm-level profitability of different actors involved at different stages of the value chain (production, collection/trade, processing and distribution/retail)?

Part three for Service suppliers

- ✓ How the nature of coordination among stake holders is looks like?
- ✓ What are the gaps of service provision?
- ✓ What are methods of contact to value chain actors of vegetable?
- ✓ What measures have been taken to fill these gaps?
- ✓ What are the major challenges of vegetable production?
- ✓ What are the major challenges of vegetable marketing?

Observation guidelines

- ➢ Land quality: Soil , slope, moisture
- ➢ Irrigation canals; network, diversion
- ➢ Land covers; vegetables-tomato
- ➢ Field management; cultivation, husbandries, weed managements
- ✓ Filed visits were conducted to observe infrastructures;
- ✓ **Visits of Service providers to observe ;**
- ➢ Cooperatives vegetable sale and input distributed volumes
- ➢ Available technologies and visit other stake holders when necessary

Annex

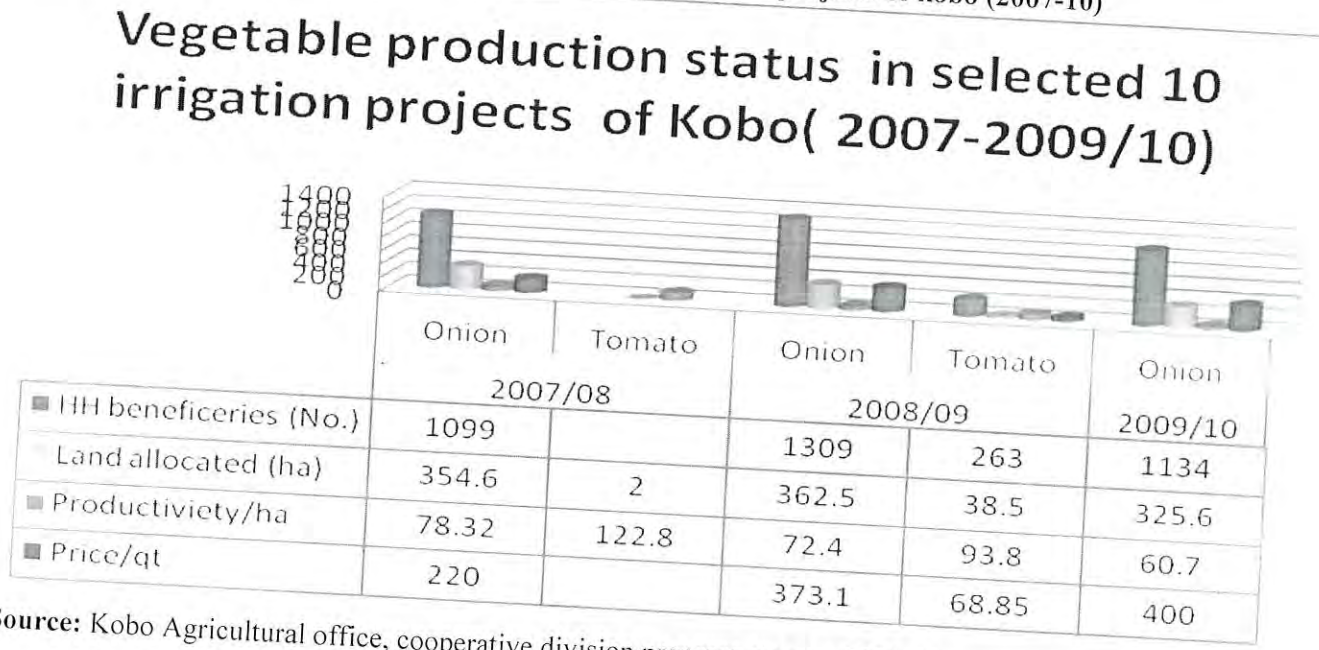
Annex 1: Irrigation potentials of Amhara region, North Well Zone, Kobo Woreda

Irrigation Potentials	Supplementary irrigation	Primary irrigation	Secondary irrigation	Annual irrigation
Total Golina*	10345.6	6724.65	5172.8	22243.05
Total kobo	96207.38	62534.8	48103.69	206845.87
Total zone	219966	142977	109984	472927
Total region	1750433.2	1209544.33	875268.6	3835246.13
Percentage share of irrigation potential				
Golina share in kobo%	10.75	10.75	10.75	
Golina share from zone (%)	4.70	4.70	4.70	
Kobo share from zone (%)	43.74	43.74	43.74	
Zone share from region (%)	12.57	11.82	12.57	
Woreda share from region (%)	5.5	5.17	5.5	

Source: Bureau of Agriculture and rural Development; Annual report of 2010

Key: * Diversion Structure (11 diversions & 2 pumps) and Source of water: 12 rivers & 1 groundwater

Annex 2: vegetable production status in selected 10 irrigation projects of kobo (2007-10)



Source: Kobo Agricultural office, cooperative division progress reports, 2007-10